



An Explorative Study of the Synergy between Social Enterprises
and Local Micro-entrepreneurs in the Provision of Off-grid Clean
Energy Access

Whitney Lisa Pailman
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Supervisor: Dr Bothwell Batidzirai
(Previous Supervisor: Dr Gisela Prasad)

Co-Supervisor: Mr Wikus Kruger

Energy Research Centre (ERC)
University of Cape Town

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Signature: *Whitney Lisa Pailman*

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Abstract

Alleviating energy poverty requires innovative and sustainable business models for delivering energy access. Social enterprises have entered off-grid clean energy access markets, pioneering innovative energy access business models, many of which involve the participation of local micro-entrepreneurs. This research study explores the synergy between social enterprises and local micro-entrepreneurs, specifically in terms of the business models used to incorporate local micro-entrepreneurs into off-grid clean energy value chains and the stages of the value chain in which the local micro-entrepreneurs participate. It furthermore identifies key enabling enterprise ecosystem conditions. A qualitative research methodology and a multiple case study design was used. The sample consisted of 11 respondents, selected through purposive sampling. A semi-structured interview served as the primary data collection instrument and a thematic within-case and cross-case analysis was carried out. This research study represents a pioneering effort, contributing to a growing body of knowledge on innovative participatory business models for energy access.

Key findings:

- Business models used to incorporate local micro-entrepreneurs into clean off-grid energy value chains:
 - i. Micro-franchising emerged as one of the main business models.
 - ii. Local micro-entrepreneurs benefit from the business development support and the income generating opportunities created through the micro-franchising business models.
 - iii. Challenges relate to: pioneering social enterprise business models in nascent markets; constraints in providing financing and training; attrition of local micro-entrepreneurs and sustaining durable solar product sales.
- Value Chain Participation:
 - i. Local micro-entrepreneurs are primarily incorporated in the 'last mile distribution stage' to leverage existing social networks and local insights to sell off-grid clean energy products to customers who may be located in geographically remote areas.
- Key ecosystem conditions include finance, policy and regulatory support, awareness, the ease of doing business and business development support.

Keywords

Business models, enterprise ecosystems, off-grid clean energy, social enterprises, value chain participation.

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Table 1: Glossary of Key Terms (Table Created by Researcher)

Term	Definition
Energy Enterprises	Businesses that provide decentralised off-grid renewable energy products and services to un-electrified and under-electrified households and businesses.
Local Energy Micro-Entrepreneurs/ Village Level Entrepreneurs (VLEs)	Individual local micro-entrepreneurs that participate in the clean energy value chain, e.g. through the sale of off-grid renewable energy products or the provision of an off-grid renewable energy service.
Decentralised Off-grid Renewable Energy Systems	Off-grid stand-alone renewable energy products e.g solar lighting devices or solar home systems.
Inclusive Business	Businesses that provide essential goods and services to and form synergies with people at the economic base of the pyramid (BOP) and incorporate them into value chains.
Social Enterprise	Enterprises that through their core business, wish to create a positive social impact. They can be structured as for-profit and non-profit entities.
Clean Energy Value Chain	The various value adding stages involved in the creation of clean energy products and services, including research and development, manufacturing and supply, sales, distribution and installation, payment and consumer finance, and after sales service and maintenance.
Enterprise Ecosystem	The various enabling conditions created by a variety of stakeholders in order to create a conducive environment for businesses. The ecosystem also includes the interactions and synergies between the various stakeholders including government; development partners; NGOs; private funders and funding institutions; business development institutions and research institutions.
Synergy	Collaboration that draws on the core strengths of individual entities in order to create mutual value or benefits.

Chapter 1 Introduction

1.1. Background and Context

1.1.1. Energy Poverty and Sustainable Energy Access

Energy poverty is defined by the International Energy Agency (IEA) as a lack of access to modern energy services, including electricity and clean cooking facilities (IEA, 2013). The energy poor are reliant on unclean energy sources, including the unsustainable traditional use of biomass. This includes three-stone open fire and inefficient cookstoves (IEA, 2013). Currently an estimated 1.3 billion people globally do not have access to electricity, while 2.7 billion do not have access to clean cooking facilities. Energy poverty is most pronounced in the developing world, specifically within Sub-Saharan Africa and developing Asia. Within Sub-Saharan Africa alone it is estimated that 620 million people (close to two thirds of the population) do not have access to electricity and that almost 730 million are dependent on the traditional use of solid biomass (IEA, 2014). This has serious implications, particularly with regard to health and safety dangers, including respiratory illnesses, burns, smoke inhalation and related deaths (Kaygusuz, 2011; World Health Organisation, 2015). It is therefore necessary to champion innovative and sustainable solutions to energy poverty.

Within the context of un-electrified and under-electrified indigent communities, energy poverty is usually symptomatic of a systemic multi-dimensional poverty challenge, as indigent people without energy access often experience numerous other deprivations, including a lack of income and limited access to income generating opportunities. Extreme poverty cannot be reduced without addressing energy poverty (Iyer, 2007). Providing energy access does not only address energy poverty, but has the potential to lift indigent people out of multi-dimensional poverty. Energy access, however, should not be viewed as a panacea for poverty alleviation, but as necessary catalyst for the emancipation of indigent people from the cycle of poverty (Halff, Sovacool & John, 2014). Tice & Skierka (2014:4) articulate this idea in the following way:

“Electricity doesn’t cause well-being, but it enables people to create opportunity for themselves. Energy empowers people to join in the kind of activities that drive development and create new

freedoms by facilitating the ability to study and work before sunrise or after sunset, use cell phones, and access the Internet”.

There are various global initiatives adding impetus to the development of sustainable energy access solutions. These include the Sustainable Energy for All global call to action, initiated in 2011 and the United Nations General Assembly’s declaration of 2014-2024 as the Decade of Sustainable Energy for All (Sustainable Energy for All, 2013). Universal access to modern energy services is one of the three key objectives of the Sustainable Energy for All global initiative. These global initiatives play a critical role in terms of shaping international dialogue and policy on energy access and the implementation of energy access initiatives, projects and programmes.

1.1.2. Decentralised, Market Based Approaches for Energy Access

Decentralised energy can be defined as, “electricity production at or near the point of use, irrespective of size, technology or fuel used – both off-grid and on-grid” (World Alliance for Decentralized Energy, 2015:1). Off-grid energy can be defined as, “not using or depending on electricity provided through main grids and generated by main power infrastructure” (Kempener et al., 2015: 5). Decentralised off-grid energy can therefore be defined as energy where generation and point of use are in close proximity and where alternatives to centralised power generation through the main grid are used.

Decentralised off-grid energy can make use of both renewable and non-renewable energy sources (e.g. diesel or gasoline powered generators). However, renewable energy sources have been increasingly recognised as cleaner, efficient and cheaper alternatives to non-renewable energy sources. There has been a stable growth in the roll out of renewable off-grid energy systems in both developed and developing countries. The decreasing costs and improved performance of solar photovoltaics (PV), wind turbines and mini hydro installations could contribute to off-grid renewables playing an important part of renewable energy deployment as a whole (Candelise, Winskel & Gross, 2013; Kempener et al., 2015).

There are various reasons why decentralised, renewable, off-grid approaches need to be prioritised. Firstly decentralised approaches could extend energy access to un-electrified and

under-electrified households and businesses in a shorter timeframe than grid-based electrification, reaching people that the grid won't reach in the short to medium term (Tice & Skierka, 2014). Secondly this approach is demand driven, and could be more closely matched to the end-user's energy needs (Lovins, 1976). Thirdly, decentralised off-grid approaches could be coupled with participatory energy access approaches that incorporate local communities in the provision of energy access (Best, 2013; Tice & Skierka, 2014). These participatory approaches are important because they could facilitate the 'last mile' distribution of off-grid clean energy alternatives (through local micro-entrepreneurs, sales agents and solar technicians) and simultaneously create income generating opportunities through micro-energy enterprises.

The energy access discourse has shifted to market-based approaches for decentralised off-grid energy because sustainable energy access cannot be delivered solely through public sector and philanthropic initiatives (World Entrepreneurship Forum, 2010; World Business Council for Sustainable Development, 2012; Miller Centre for Social Entrepreneurship, 2015). Due to public sector financial resource and capacity constraints in developing countries, the private sector will have to fill the gap that governments are unable to fill, and become more prominent players in the provision of decentralised off-grid energy solutions. Furthermore, while philanthropy will continue to play a role in energy access, models that are purely philanthropic present challenges of sustainability in the long term. The Miller Centre for Social Entrepreneurship (2015: 2) states, "despite billions of development and charity dollars spent on energy access by government aid agencies, foundations, and corporations, we still lack a viable scenario for offering everyone the energy they need to survive and thrive."

As illustrated in Figure 1, a multiple stakeholder approach is required, with the private sector being a key stakeholder (World Economic Forum, 2013). The private sector is a critical part of the provision of sustainable energy access (World Entrepreneurship Forum, 2010; World Business Council for Sustainable Development, 2012; Miller Centre for Social Entrepreneurship, 2015). Businesses could expedite the dissemination of off-grid clean energy technologies and the quality of energy services by providing, "innovative products and services, efficient service delivery,

essential technologies, management and technical capabilities, and financial resources” (World Business Council for Sustainable Development, 2012: 6).

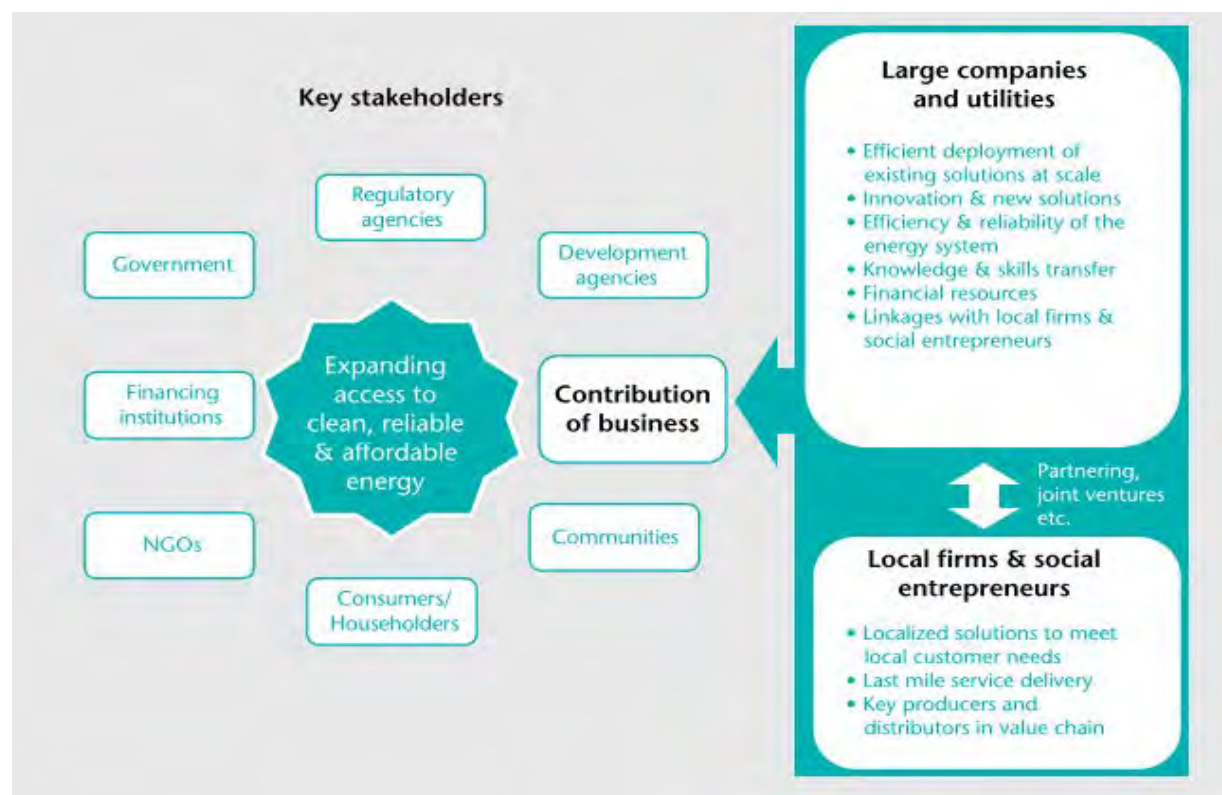


Figure 1: The Contribution of Business in Energy Access (World Business Council for Sustainable Development, 2012)

1.2. Focus and Rationale

In recent years there has been a focus on inclusive, participatory market-based approaches for energy access (World Business Council for Sustainable Development, 2012; Miller Centre for Social Entrepreneurship, 2015). Social enterprises have entered the off-grid energy access market, providing innovative solutions for the provision of sustainable energy access. Social enterprises are able to combine elements of commercial business and philanthropy into their business models, thereby providing an alternative to philanthropy that could be more sustainable (Phan et al., 2014; Miller Centre for Social Entrepreneurship, 2015). It is furthermore recognised that in order to facilitate these inclusive market based approaches, an enabling enterprise is required (Practical Action, 2012; World Business Council for Sustainable Development, 2012).

This research study explores the synergy between social enterprises and local micro-entrepreneurs, specifically in terms of the business models that the social enterprises use to incorporate local micro-entrepreneurs into the clean off-grid energy value chain and the stages of the value chain in which the local micro-entrepreneurs participate. It furthermore identifies key ecosystem conditions required by the social energy enterprises and the local micro-entrepreneurs.

1.3. Scope and Parameters

This research study is a qualitative study that focuses specifically on energy social enterprises that collaborate with local micro-entrepreneurs to provide energy access. It looks at the business models for distributed off-grid stand-alone products (e.g. solar lanterns and solar home systems) and services (e.g. solar powered mobile phone charging). This study does not include mini-grid business models as these models are substantially different to stand-alone product business models. The empirical fieldwork draws energy enterprise case studies from Sub-Saharan Africa; with a focus on East Africa, because many social energy enterprises have established a footprint in East African countries.

1.4. Aims, Objectives and Research Questions

1.4.1. Aims and Objectives

The broad aims of the research study are:

- To explore the synergy between social energy enterprises and local micro-entrepreneurs in the off-grid clean energy value chain.
- To identify key enabling ecosystem conditions that social energy enterprises and local micro-entrepreneurs in Sub-Saharan Africa require.

The above aims are further subdivided into the following objectives:

- To analyse the existing social enterprise business models that use networks of micro-entrepreneurs to provide off-grid clean energy products and services.

- To explore the stages of the off-grid energy value chain in which local micro-entrepreneurs participate and the rationale for their participation.
- To identify key enabling ecosystem conditions that could facilitate the work of the energy enterprises as well as the participation of local micro-entrepreneurs in clean energy value chains.

1.4.2. Research Questions

In order to achieve the aims and objectives, the research study will be guided by the following research questions.

1. Which business models do social energy enterprises use to incorporate local micro-entrepreneurs into the off-grid clean energy value chain, in the provision of energy products or services?
 - How do micro-entrepreneurs benefit from being incorporated into these business models?
 - What are some of the key challenges with these business models?
 - Which factors could contribute to the potential sustainability of these business models?
2. In which stages of the value chain is there synergy between energy enterprises and local micro-entrepreneurs?
 - What is rationale for the participation of local micro-entrepreneurs in these stages?
3. Which enabling ecosystem conditions do social energy enterprises and local micro-entrepreneurs require?

1.5. Research Ethics

Ethics in research protocols were observed by adhering to the guidelines provided by the Ethics in Research handbook. Prior to commencing fieldwork, ethics clearance was obtained by the Faculty of Engineering and the Built Environment's Ethics Committee (see Appendix B: Ethics

Clearance Form). All respondents were requested to give their consent to participate in the research study, and to cite findings with their names and organisation names. Respondents were also requested to grant permission for the interviews to be recorded in order to augment notes taken during the interview. All the respondents consented to participate in the study, the audio recording and to cite their names and organisation names in the findings section of the research study. One respondent granted the interview in a personal capacity (see Appendix C: Request for Permission to Conduct Research and Appendix D: Respondent Consent Forms).

1.6. Dissertation Chapter Outline

Chapter 1: Introduction

Chapter 1 provides a broad overview of the background and context of the study. The focus and rationale of the study is discussed and the aims and objectives are explained.

Chapter 2: Literature Review

Chapter 2 explores an inclusive market based approach to energy access, the value chain for clean off-grid products and services and the energy enterprise ecosystem.

Chapter 3: Methodology

Chapter 3 outlines the empirical component of the research study, including the research strategy, research design, data collection instrument, sampling technique and the data collection framework.

Chapter 4: Findings and Analysis- Within Case Analysis

Chapter 4 presents a within-case analysis of the social energy enterprises interviewed.

Chapter 5: Findings and Analysis- Cross Case Analysis

Chapter 5 presents a cross-case analysis of the 5 social enterprise case studies presented in Chapter 4. It is a synthesis of the empirical data in Chapter 4, the responses from interviews with international development partners and key findings from the literature review.

Chapter 6: Conclusion

Chapter 6 presents a summary of the key findings in response to the research questions and overall objectives of the study. It furthermore provides the proposed inclusive energy ecosystem and recommendations for future research.

1.7. Chapter Summary

Section 1.1 provided the background and context for the study with regard to energy poverty, the sustainable energy access imperative, decentralised off-grid energy access and market based approaches to energy access. Section 1.2 discussed the focus and rationale for the study, with reference to the need for inclusive market based approaches for energy access. Section 1.3 outlined the scope and parameters of the research. Section 1.4 outlined the aims, objectives and research questions. Section 1.5 discussed how ethics protocols in research were observed and section 1.6 provided a chapter outline.

Chapter 2 Literature Review

2.1. Introduction

Alleviating energy poverty requires that significant strides are made in improving energy access. This necessitates the involvement of a variety of stakeholders. The private sector is a key stakeholder in this regard. Within the private sector, social enterprises have been pioneering innovative energy access models. Many of these models involve the participation of local micro-entrepreneurs. The relationship between these social enterprises and local micro entrepreneurs appears to be characterised by synergistic mutual value creation. This group of private sector actors are influenced by the macro and more immediate environments in which they operate – broadly defined as the ecosystem. For these actors to successfully improve energy access, an enabling ecosystem is required.

The exact nature and characteristics of the relationship between social enterprises and local micro entrepreneurs, and the broader ecosystem will be explored in greater detail through the literature review.

2.2. Exploring an Inclusive Market Based Approach to Energy Access

2.2.1. A Market Based Approach to Energy Access

In order to respond to the Sustainable Energy for All global call to action, there is a need for innovative energy access solutions to be implemented at a rapid scale. Increased private sector participation is therefore imperative. As highlighted briefly in Chapter 1, there is a strong case for the involvement of business in energy service provision. Bardouille (2012) however points out that the business case for private sector involvement in energy access was not always clear because energy access has historically been in the domain of the public sector. However, there is a growing recognition that there is indeed a market for the provision of clean energy access alternatives. In the literature on market-based approaches to energy access, there is a paradigm shift from framing energy access as a challenge, to framing it as a market opportunity (Bardouille,

2012; World Business Council for Sustainable Development, 2012; Miller Centre for Social Entrepreneurship, 2015).

The paradigm shift is largely attributed to the realisation that a real market for off-grid clean energy solutions exists. It is estimated that the poor spend \$37 billion per annum on poor quality energy options (Bardouille, 2012). This is indicative of significant cumulative spending power in low income segments of the energy access market and that the money spent on poor quality energy options (such as candles, paraffin and disposable batteries) could rather be spent on a variety of cleaner, safer quality-assured off-grid alternatives (Bardouille, 2012).

Bardouille (2012) furthermore estimates that the market for improved clean lighting solutions consists of 256 million households and that the market for improved cookstoves and fuels consists of 374 million households. This indicates that there is a significant market opportunity for clean cooking and lighting alternatives. While it should be noted that a potential market size does not necessarily translate into market capture, even if a conservative percentage of this market is captured, it would still make for a strong business case.

Recent growth trends in sales of pico-solar lighting technologies are a further indicator of a rapidly growing market for clean off-grid energy alternatives. The African market has seen a substantial growth in the sale of pico-powered lighting systems. In 2009, annual sales figures were approximately 300 000 units and by 2012 the cumulative annual sales reached approximately 4.4 million units (International Finance Corporation, 2013). This is illustrated in Figure 2 below.

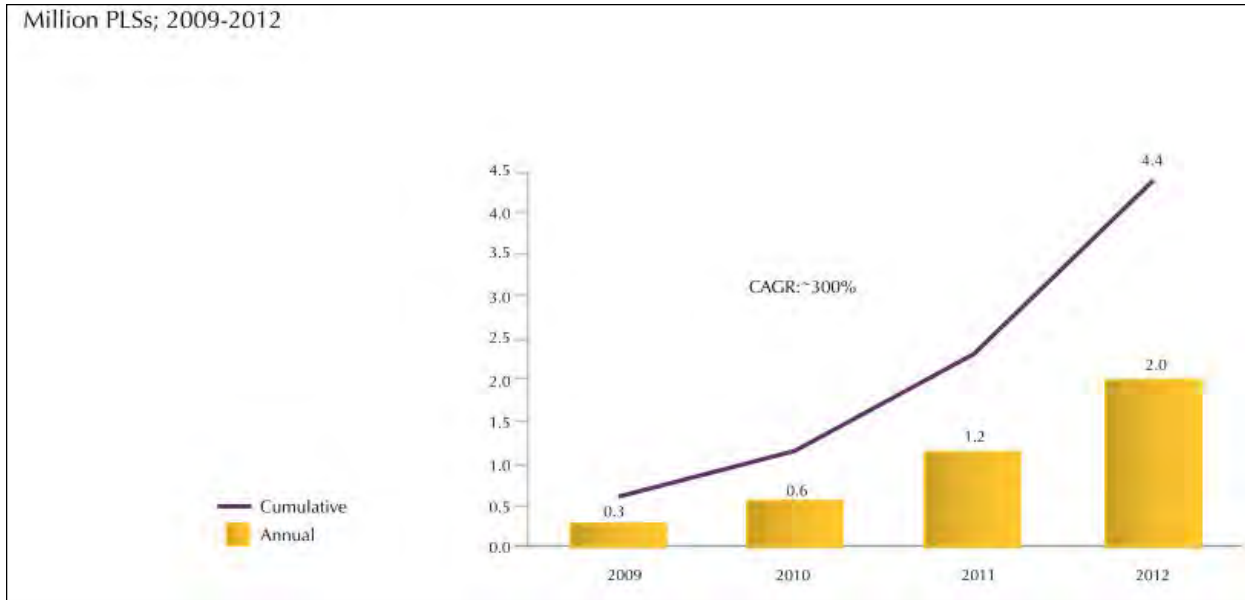


Figure 2: Cumulative Growth in Sales of Pico-Powered Lighting Systems (International Finance Corporation, 2013).

Various private sector actors have entered energy access markets; many who have demonstrated scalable and profitable business models. Bardouille (2012: 12) writes:

“A number of these players — ranging from international social enterprises to local small and medium enterprises (SMEs), domestic conglomerates, and multinational corporations — have already established significant customer bases, or hold promise for scaling up given the right conditions.”

This paradigm shift could furthermore be attributed to a confluence of factors that have placed enterprises in a better position to seize this opportunity. These include, the falling costs of decentralised energy technology components such as PV panels and LED lights (as indicated in Chapter 1); the emergence of new technologies; recognition of the importance of energy access on the global agenda, and innovative social enterprises that have entered the off-grid clean energy access market (Bardouille, 2012).

The rationale for the involvement of business in energy provision pertains to speed, scale, financial resources and technical capacity to improve the quality of energy services (World Business Council for Sustainable Development, 2012). Many energy access businesses are serving , “tens of thousands to hundreds of thousands of customers (Bardouille, 2012: 12)”.

Within the broader literature on market-based approaches to energy access, there has been a focus on *inclusive* market-based approaches. Key concepts and approaches will be discussed in more detail in the sections that follow.

2.2.2. Inclusive Business

As this research study explores the integration of local micro-entrepreneurs in the clean energy value chain, it is important to discuss the concept of inclusive business, because integrating low income communities into value chains forms a critical part of the purpose of inclusive business. Although the concept and practice of inclusive business has been in existence for many years, the general definition adopted by institutions and development agencies was developed by the World Business Council for Sustainable Development (WBCSD). The WBCSD first developed the concept of *sustainable livelihoods business* which later evolved into the concept of inclusive business. They define an inclusive business model as a model that provides affordable essential goods and services required to meet the basic needs of the poor, including, but not limited to, food, water, energy access, sanitation, healthcare and housing. Furthermore the model creates income generating and employment opportunities for low income communities in a direct manner or through value chain integration as retailers, suppliers, distributors and service providers (World Business Council for Sustainable Development, 2012).

Bonnell & Veglio (2011: 2) describe inclusive business as, “sustainable business solutions that go beyond philanthropy and expand access to goods, services, and livelihood opportunities for low-income communities in commercially viable ways.” Similarly Jenkins et al. (2011) notes that an inclusive business model has to be commercially viable and extend the access of goods and services as well as income generating activities to people living at the economic Base of the Pyramid (BOP). The BOP is not a homogenous segment and can be categorised according to various income earning brackets. The definition of the BOP, espoused by Prahalad (2005), refers to people who earn less than \$2 per day. A broader definition of the BOP however, include people who earn less than \$8 per day (George, 2009).

From the inclusive business definitions above, two key aspects of the purpose of inclusive business can be noted: to provide essential goods and services to low income communities; and to provide income generating opportunities to low income communities, through for example, value chain integration. The abovementioned aspects furthermore relate to two main paradigms that have framed the thinking and dialogue around inclusive business. The primary distinction between these two paradigms, commonly referred to as BOP 1.0 and BOP 2.0, is that the former takes a demand side approach and looks at the BOP primarily as customers; while the latter takes a supply side approach and looks at the BOP as producers, suppliers, distributors and business owners. These paradigms are discussed in further detail below.

BOP 1.0

Within a BOP 1.0 paradigm, businesses simply sell essential products and services to consumers at the BOP that may not have had access to these products or services before. The idea of the market opportunity at the BOP espoused by Prahalad (2005) gave rise to people living at the base of the pyramid being viewed as a new captive consumer market that was previously untapped and underserved. The BOP 1.0 paradigm therefore focuses on people at the BOP as consumers or potential consumers of essential products and services including food, water, healthcare and energy access etc. Examples of businesses that could fall into this category include businesses that sell affordable soaps and shampoos; instant foods or nutritional yoghurts.

Hart & Caneque (2015:2) note that BOP 1.0 has been the dominant approach, with a focus on, “adapting models, reducing price points, and extending distribution from previously underserved or unserved customers.” Notwithstanding the importance of extending products and services to the BOP in a more affordable manner, this approach to inclusive business has been critiqued by some and named as the “latest form of corporate imperialism”(Hart & Caneque, 2015: 1). Corporate imperialism refers to large corporates entering emerging markets with fixed business models, mind-sets and perceptions and the view that BOP consumers in emerging markets are hungry for any modern products produced from the outside (Prahalad & Lieberthal, 2003).

Therefore, while it remains imperative for underserved and unserved markets to gain access to affordable, quality products and services, there needs to be a caution that corporate imperialist models are not perpetuated under the guise of “inclusive business”. Furthermore, the concept of the “fortune at the BOP”, through the BOP as consumers, needs to be carefully interrogated and unpacked, as it could be construed as corporates simply finding new markets and profiting off indigent people. It is important that indigent people are not exploited in the process because of the lack of options and choice with regard to essential goods and services.

It also raises the question: can a business be considered “inclusive”, simply by virtue of it selling essential goods and services to an underserved market? The definition and practices of inclusive business need to be interrogated. According to George (2009: 6), one needs to distinguish between businesses that are set up in poor areas or that simply employ low-wage labourers from those areas, and businesses that are “clearly designed to improve the lives of the poor.” In order to maximise economic and social benefits for people at the BOP, there needs to be inclusion at various levels of the value chain. More specifically there needs to be a greater focus on the micro-entrepreneurship opportunities in the value chain as these serve as important income generating opportunities.

BOP 2.0

BOP 2.0 is an approach that focuses on creating value at the base of the pyramid, with people at the base of the pyramid (Hart & Caneque, 2015). This essentially implies incorporating people at the BOP not only as consumers, but into the various parts of the value chain. This involves a process of co-creation and mutual value creation. Co-creation refers to enterprises and the BOP creating technologies, products, services, systems and processes together (Hart & Caneque, 2015). This also relates to the concept of inclusive innovation, which is defined by van der Klein, Chevrollier & Collee (2012: 4) as, “the market-driven development of something new with impact together with low-income groups.” Within such a paradigm, people at the BOP are actively

involved as co-creators of mutual value. Furthermore, mutual value creation implies that all parties involved in creating value should also benefit commensurately.

While the above-mentioned are broad paradigmatic overviews of inclusive business, Ashley (2009:3) pragmatically highlights four types of inclusive business models:

- Commercial businesses that sell essential goods and services (that could have a great developmental impact) to the BOP;
- Large businesses that already have an established footprint in selling various products in BOP markets, but who are deliberately extending and leveraging those distribution lines to create developmental impact;
- Small and medium domestic businesses that are fully commercially driven, but also driven by local developmental objectives;
- Social enterprises whose core value is of a high social impact.

In line with the objectives of the study, the fourth social enterprise model will be discussed in further detail. Other forms of inclusive business (while not specifically highlighted in the inclusive business models listed above) are enterprises that form partnerships with local micro-entrepreneurs at various stages of the clean energy value chain; specifically in the 'last mile' distribution stage. This inclusive business model is in line with the BOP 2.0 paradigm discussed previously. Many social enterprises have incorporated local micro-entrepreneurs into the value chain as distributors of clean energy products and services. The following sections will explore the roles of social enterprises in the provision of off-grid clean energy access and the business models used to incorporate local micro-entrepreneurs into the value chain.

2.2.3. The Role of Social Enterprises in Expanding Energy Access

Within the broader concept of inclusive business, it is important to consider the role of the social enterprise, which as indicated by Ashley (2009) is a form of inclusive business. Some definitions focus on the structure of the enterprise, while other definitions focus on the purpose and mission

of the enterprise. An overarching theme in most definitions is that social enterprises use entrepreneurial principles to address unmet societal needs and that the enterprise is used as a conduit for achieving their social mission (Battilana et al., 2010; Phan et al., 2014). This can be seen in the definition provided by Phan et al. (2014: 78), who describe social enterprises as, “self-sustaining organisations...which are built on entrepreneurial strategy whose main purpose is not the maximisation of profits but the attainment of social goals and the meeting of unmet social needs.”

With regard to business structure, social enterprises can be categorised as either for-profit, non-profit or hybrid social enterprises. Currently in many countries across the world, there is no single entity that is recognised to receive both donated capital and invested capital. As such, this may compel companies to register as either a non-profit organisation or a company, which according to Bromberger (2011: 49) could, “compromise their social vision and restrict their ability to finance and operate their ventures in a way that meets the founders’ own needs as well as those of their investors, customers, employees and stakeholders”. In order to overcome the limitations imposed by both non-profit and fully commercial legal entity structures, some social entrepreneurs have adopted a hybrid business structure (Bromberger, 2011). Contract hybrids refer to the use of contracts to, “intimately tie together the non-profit and for-profit organisations” (Bromberger 2011: 49).

While there are key overarching similarities in definitions of social entrepreneurship in the literature, there are various permutations to the definition. Peredo & McLean (2006) refer to two continua of social entrepreneurship definitions. On the one continuum there is a greater focus on social impact and on the other there is a greater focus on profit and creating commercial value. Similarly, Battilana et al. (2010: 3) argue that regardless of the structure of the enterprise there is a “hierarchical ordering of social and economic value”, where creating social value is prioritised more than economic value.

Social enterprises play a significant role in off-grid energy access and are at the forefront of the development of innovative energy access solutions. Van Leeuwen & Erboy Ruff (2014) indicate

that small and medium enterprises (SMEs) and social entrepreneurs are the group of private sector actors that have mostly responded to the Sustainable Energy for All global call to action. As noted previously, Bardouille (2012) indicates that the emergence of social enterprises and patient capital have contributed to a strengthened case for private sector involvement in energy access. Koch & Hammond (2013) point out that although multi-national corporations also provide off-grid clean energy solutions, this is often done through their corporate social responsibility division. Energy access social enterprises, on the other hand, focus on the provision of clean energy solutions as their core business.

It is important to consider the role of social enterprises in providing energy access and the unique value that they contribute, in terms of being able to merge business and philanthropic goals; innovation and pioneering new business models in nascent markets (Battilana et al., 2010; Bardouille, 2012; Koch & Hammond, 2013; Phan et al., 2014). These characteristics of social enterprises that enable the effective deployment of energy access solutions are discussed in more detail below. As illustrated in the definitions of social entrepreneurship, social entrepreneurs are poised to bridge the gap between philanthropy and purely profit-driven enterprise approaches (Battilana et al., 2010; Phan et al., 2014). The combination of being social impact driven, and operating in accordance with sustainable business principles, is needed in the provision of off-grid energy access. Off-grid clean energy social enterprises that endeavor to create a positive developmental impact through their businesses are particularly suitable conduits for delivering off-grid clean energy access solutions. They are able to enter into a space that was previously occupied primarily by governments and NGOs. Off-grid energy access markets in developing countries are mostly nascent markets, and social energy enterprises serve as pioneers in these markets (Bardouille, 2012). These enterprises are in the process of developing business models as well as developing markets, which involves testing and refining of business models in these markets through continuous business model innovation (Koch & Hammond, 2013). This requires a risk appetite and patience when models are being tested, risk is high and profitability is still to be achieved.

Social innovation is at the heart of social entrepreneurship. Social enterprises that operate in off-grid clean energy markets are characterised by innovation. Koch & Hammond (2013) conducted a study of 60 social enterprises in the off-grid clean energy market and found that innovation was a critical aspect in enabling the social enterprises to achieve their missions. These organisations had to simultaneously innovate in the dimensions of, “technology localization, business model, and the adaptation to ecosystems”(Koch & Hammond, 2013: 123). Furthermore their innovation was characterised by frugality. Frugal innovation is based on the premise of creating more with less and can be defined as, “a business model characterized by the use of limited resources to create low-cost products...that are sustainable for the environment and individual communities”(Banerjee & Leirner, 2013: 2). Frugal innovation is necessary because most energy access social enterprises are promising SMEs that are in the process of raising capital and often have limited working capital at their disposal.

There are various social enterprises that are providing innovative solutions to energy access, some of them at quite a scale. Examples of the scale achieved by energy enterprises can be illustrated by M-KOPA, SunnyMoney and d.light design. M-KOPA, a social enterprise that facilitates access to energy through their mobile payment innovation technology, reached 250 000 customers by September 2015 (Okoth, 2015). They combine the MPESA mobile money payment platform with machine to machine (M2M) technology to offer an incremental mobile payment option for solar home systems and other solar lighting products. The social enterprise SunnyMoney has sold over 1.3 million solar lights (SunnyMoney, 2016). d.light design is another social enterprise demonstrating the ability to scale rapidly: over the 8 year period in which they have been operational, they have sold an unprecedented 10 million solar lanterns by May 2015 (d.light, 2016).

Table 2 below lists various social energy enterprises and a description of their product and service offerings. While this list is certainly not exhaustive, it does provide an indication of how some social enterprises are serving the energy access market.

Table 2: List and Description of Social Energy Enterprises (GSMA, 2013; ARED, 2014a; SunnyMoney, 2016)

Name of Social Enterprise	Products or Services	Geographic Footprint
Angaza Design (For profit social enterprise)	SoLite3, a bright LED solar light and mobile-phone charger, with built in Pay As You Go payment functionality.	East Africa and Zambia
Barefoot Power (For profit social enterprise)	Extensive product range from LED solar lights to solar home systems, including Barefoot Go and Barefoot Connect.	Africa, India, the Americas
d.light Design (For profit social enterprise)	Pico-solar lighting devices and lighting systems and mini-solar home systems, including their d.light S and D range.	40 countries throughout Africa, China, Asia and the United States
M-KOPA Solar (For profit social enterprise)	Combines mobile money payments with M2M technology to provide affordable pay as you go payment options.	Kenya
Nuru Energy (For profit social enterprise)	Modular Nuru LED lights and pedal power POWERCycle light recharging service.	Rwanda, India
Solar Sister (Nonprofit social enterprise)	Distributor of clean lighting alternatives and clean cookstoves.	Uganda, Tanzania, Nigeria
SunnyMoney (Nonprofit social enterprise)	Distributor of a wide variety of solar lights and pico-solar systems.	Kenya, Tanzania, Malawi
African Renewable Energy Distributor (ARED) (For profit social enterprise)	Solar powered mobile phone charging kiosks.	Rwanda
Juabar (For profit social enterprise)	Solar powered mobile phone charging kiosks.	Tanzania

In their research paper, Battilana et al. (2010: 3) focus on social enterprises that operate at a community level and that address specific community level needs through their enterprises. They argue that social enterprises who are embedded in local communities are able to gain insight into: “the local characteristics of poverty and poverty-related needs at the level of communities.” Furthermore they argue that many social enterprises are embedded in local communities and in certain instances the embeddedness could act as a catalyst for the formation of symbiotic relationships between social enterprises and local communities. The next section will discuss some of the business models used by social enterprises to incorporate local micro-entrepreneurs into clean off-grid energy value chains.

2.2.4. Exploring Business Models that use networks of Micro-entrepreneurs to expand energy access

In recent years, various business models have emerged that use networks of local entrepreneurs (village level entrepreneurs) from indigent communities to provide off-grid clean energy products and services in the last mile. The village level entrepreneur network model is widely used in India and has started to gain traction in Africa. A village level entrepreneur can be defined as, “a local village-based individual who acts as the last mile to reach consumers, thus improving access for the low-income population to diverse products by taking on market innovations at the grassroots level” (Bairiganjan & Sanyal 2013: 4).

These models include, but are not limited to, the micro-franchising model, the direct sales model, and the local solar technician model. These models are discussed in further detail below.

2.2.4.1. The Micro-franchise Model

Franchising can be defined as a “contractual relationship between a franchisee (usually a small business) and a franchisor (usually a larger business) in which the franchisee agrees to produce or market a product or service in accordance with an overall blueprint devised by the franchisor” (Stanworth et al. 1995 cited in Sireau, 2011: 3). Franchising models have offered both the employed and unemployed an opportunity to become involved in business (Sireau, 2011). According to McDade et al. (2014: 2): “franchising offers a promising mechanism through which to drive market efficiencies and achieve scale at speed – marrying the deployment of a proven business model and brand with local talent and market insights”.

Micro-franchising business models have emerged as a permutation of the traditional franchising business models. Illetschko (2011: 26) defines micro-franchising as, “a development tool that adapts the proven operational principles of traditional franchising to the needs of very small businesses located in the developing world.” Koch & Burand (2010: 25) define micro-franchising as, “a business model that, although adopting many of the business practices employed in mainstream commercial franchising, involves businesses that are affordable enough to be owned

and operated by people living at the base of the economic pyramid.” However, it should be kept in mind that affordability in terms of the base of the pyramid is a relative term as the base of the pyramid is not homogeneous. From the aforementioned definitions it can be seen that micro-franchising draws on the principles used in larger commercial franchising operations, and can be used as a conduit for development by extending business opportunities to people in indigent communities, who ordinarily would not be able to tap into traditional larger commercial franchising business structures. While the full potential of micro-franchising models for development is yet to be reached, micro-franchising business models have gained traction in developing countries in Africa and developing Asia for the distribution of essential goods and services, including healthcare, food and off-grid energy products (Illetschko, 2011).

Micro-franchising offers business opportunities which are particularly suited for existing micro-entrepreneurs who operate businesses in indigent communities, as well as the development of new entrepreneurs. Sireau (2011) argues that many local micro-entrepreneurs in indigent communities run informal businesses and experience challenges such as a lack of training, access to working capital, back-up and support to expand their businesses. By becoming part of a micro-franchise model, they are able to tap into a much less risky business structure, with a standardised business model that has been tried and tested. They are also able to gain access to a supply chain, receive the necessary back-up and support from the parent company or organisation including marketing, and other business development support (Sireau, 2011).

Micro-franchising models play an important role in expanding energy access to the energy poor in developing countries. The increasingly recognised benefits of franchising have resulted in a growing number of organisations using the franchise approach in the energy access market. SolarAid could be considered as a pioneering organisation that used micro-franchising for the dissemination of off-grid solar products in developing countries (Sireau, 2011).

It is important to note that in practice there are various permutations to micro-franchising business models. For example, an energy enterprise could enter into a micro-franchising agreement with a village level entrepreneur (with a standardised business model, business

training and infrastructure support), but use a direct sales strategy to sell off-grid solar products. Or solar technicians that install and maintain solar home systems could be part of a micro-franchising model. While direct sales models and local solar technician models are not necessarily always coupled with micro-franchise models, they often form part of micro-franchising models for the distribution of clean energy products and services in the last mile. Some of these models are discussed below.

The Direct Sales Model

The direct sales model uses a network of local micro-entrepreneurs (sales agents) that sell off-grid products in the last mile to their immediate and broader communities (within a certain geographic radius). The direct sales model is primarily used because it involves establishing customer confidence by using sales agents from local communities to sell products to members of the local communities. In order to identify potential distribution agents, energy enterprises often make use of the hierarchical structures in communities by approaching community leaders to serve as sales agents themselves or to recommend potential sales agents who are trusted members of the community (Avato & Madeira, 2010). In addition, by using a direct sales model of local agents, costs associated with establishing more intricate distribution channels in remote locations are significantly reduced (Avato & Madeira, 2010).

The direct sales model is most suited to energy enterprises that sell small portable pico-solar lighting products such as solar lamps, lighting systems and clean cookstoves. These products do not require any installation. Greenlight Planet has replicated the direct sales model they have used successfully in India, to sell lamps in Kenya and Uganda. They use 6500 sales agents who sell lamps directly and earn a commission. Greenlight Planet's rationale for using a direct sales model was the establishment of customer confidence and trust as well as overcoming potential challenges of distributing through local shops; customers usually go to small local shops to purchase food and other essential items that they would usually buy, and will not necessarily purchase durable goods such as solar lamps at a local shop (Mulupi, 2015). In Kenya, Solar Aid

uses a similar approach, where they use a roadshow to market their products and get community members to endorse each other to become vendors for their products (Avato & Madeira, 2010).

The Local Solar Technician Model

The local solar technician model refers to a model where local community members are recruited and trained to install and maintain solar home systems. Where the direct sales model, discussed above, was suited to small modular solar lighting products, the local solar technician model is more suited to larger solar home systems where PV panels need to be mounted on roofs and battery systems installed inside houses. Two permutations to this model emerge, namely a micro-entrepreneurial model where solar technicians make a profit or earn a commission from their installation and repairs; and an employment model where solar technicians are paid a fixed wage for installations and repairs. An example of the solar technician model can be illustrated by Off.Grid:Electric, where local youth are trained in their academy as solar technicians to install and maintain their solar home systems (Energy and Environment Partnership, 2015).

2.2.4.2. Critique of Village Level Entrepreneurship Models

Notwithstanding the advantages of village level entrepreneurship models for last mile distribution of clean energy products or services, these models should not be viewed as a panacea for last mile distribution challenges. It is important to examine the conditions in which the village level entrepreneurship models are the most suited. Dutt (2012) points out that village level entrepreneurship models are applied in various ways and have varying degrees of success. She further indicates that energy enterprises that are considering implementing a village level entrepreneurship model to overcome last mile distribution hurdles, should first consider the conditions under which these models are the most likely to succeed (Dutt, 2012).

In this regard, Dutt (2012) has identified three key aspects that are necessary for the village level entrepreneurship model to be successful, namely: a strong customer demand; a relatively low risk to the village level entrepreneur; and a flexible model where the energy enterprise assumes more risk or takes over the initial capital and marketing costs. The demand for a product or

service is a key consideration for any business model and will have an impact on the VLEs that are selling products or services in the last mile. Factors that influence the demand of off-grid clean energy alternatives include whether the prices of the products match customer spending patterns, whether products are made more affordable through innovative financing options and whether enough customer awareness and confidence has been created.

With regard to the second aspect, when an entrepreneur enters into a micro-franchise agreement (or another type of VLE agreement) efforts need to be made to limit the financial risk that the VLE takes on (Dutt, 2012). VLEs in the market for off-grid clean energy products or services are the interface between the customers and the energy enterprises, and often experience challenges of selling products and creating product awareness first hand. Depending on the model used and the type of products or services being sold, risk to the VLE needs to be limited accordingly. For example, a VLE could have a high financial risk exposure if he or she is required to purchase stock of solar products upfront and struggles to off-set the products at a later stage. This relates directly to the third aspect of model-flexibility. Dutt (2012) argues that VLE models need to be completely flexible and adapted to the specific context and product or service. Some enterprises need to adapt their models and take on more risk or responsibility to make the model fairer to the VLE. For example, a VLE could take products on consignment and pay the energy enterprise in a manner consented to, after sales have taken place. Enterprises could also take on the marketing expenses associated with creating product awareness in the market.

2.3. The Value Chain for Clean Off-grid Energy Products and Services

2.3.1. Off-grid Decentralised Clean Energy Products

Decentralised off-grid energy solutions can be categorised as stand-alone devices and systems, and mini-utility decentralised grid based systems (Bardouille, 2012; Kempener et al., 2015). Bhattacharyya (2013) defines these as individual solutions and collective solutions respectively. Stand-alone devices and systems include pico-solar systems, solar home systems and improved cookstoves. Mini-utilities include micro-grids, mini-grids, nano-grids and pico-grids. These are powered by diesel generators, biomass, mini-hydro, wind and solar energy (Bardouille, 2012; Kempener et al., 2015). Figure 3 below illustrates a proposed categorisation for off-grid applications. Stand-alone devices and systems will be discussed in more detail as mini-utilities do not fall within the scope of the study.

Table 1: Proposed categorisation of off-grid applications

	Stand-alone			Grids		
	DC		AC	AC/DC		AC
<i>System</i>	Solar lighting kits	DC Solar home systems	AC Solar home systems; single-facility AC systems	Nano-grid Pico-grid	Micro-grid, Mini-grid	Full-grid
	Off-grid					
<i>Application</i>	Lighting	Lighting and appliances	Lighting and appliances	Lighting, appliances, emergency power	all uses	all uses
<i>User</i>	Residential; Community	Residential; Community	Community; Commercial	Community; Commercial	Community; Commercial; Industry	
<i>Key component</i>	Generation, storage, lighting, cell charger	Generation, storage, DC special appliances	Generation, storage, lighting, regular AC appliances. Building wiring incl. but no distribution system	Generation + single-phase distribution	Generation + three-phase distribution + controller	Generation + three-phase distribution + transmission

Figure 3: Categorisation of Decentralised Off-Grid Applications (Kempener et al., 2015).

Pico- solar systems are, “solar-electric products or systems that are powered up using solar modules with a power output ranging from as little as 0.1 watt peak (Wp) up to 10-15 Wp”

(Keane, 2014:126). The range of pico-solar systems is diverse and includes lanterns and charging systems for powering additional small appliances (Keane, 2014). The pico-solar market serves as an entry level for cleaner and safer energy access for un-electrified and under electrified low income households (Keane 2014; IFC 2010). Pico-solar lighting solutions are poised to become a fast growing lighting alternative for domestic consumers and small businesses at the BOP (Byrnes et al., 2014).

Solar Homes Systems (SHSs) are a step-up from pico-solar systems as they provide an energy service that is more comprehensive, including lighting and powering of a range of larger appliances (see Figure 4). Smaller SHSs typically cost between \$300 and \$500 and come in a range of pre-designed combinations from 20 Wp to 150 Wp (Bardouille, 2012).

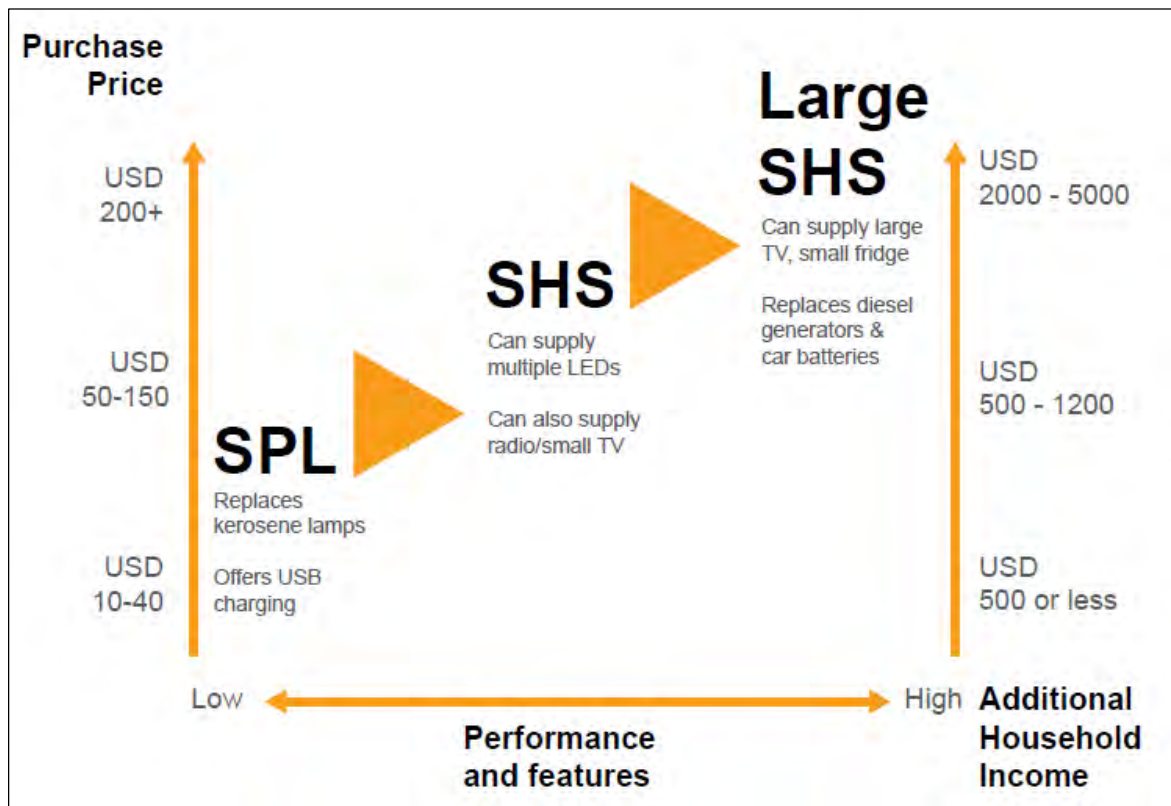


Figure 4: Energy Ladder-Pico-solar to Solar Home Systems (Hagan, Mifsud & Diecker, 2015)

Improved cookstoves are an important cooking alternative for people who have used traditional three stone open fire inefficient cookstoves. Improved cookstoves use biomass or other cleaner

fuels, are more efficient and reduce carbon emissions as well as indoor air pollution. The clean cookstove sector has seen significant growth, with many businesses providing solutions at scale. These cookstoves cost approximately between \$5 and \$25 (Bardouille, 2012).

2.3.2. The Value Chain

A value chain can be defined as,

“a sequence of related value adding business activities for a specific product or service, from primary production through processing, transformation, marketing, and up to the final sale of the particular product to consumers. It also includes the provision of specific inputs needed in the different stages of production”(United Nations Development Programme, 2010: 12).

Figure 5 below illustrates the various stages of a generic value chain for off-grid clean energy products and services. The value chains for specific off-grid applications may vary slightly according to the specific inputs and processes required.

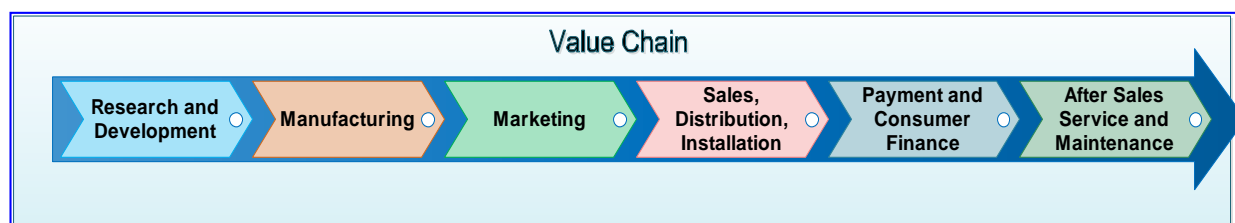


Figure 5: Value Chain: Off-grid Decentralised Energy, adapted from (Bardouille 2012; World Business Council for Sustainable Development 2012)

The various stages of the value chain are discussed in more detail below:

- **Research and Development:** this stage involves designing and developing product and service offerings. It often involves a user-centric design approach from extensive field research to develop products that are tailored to the needs and demands of the target market being served (Bardouille, 2012).
- **Manufacturing:** this stage involves the manufacturing and assembly of components for clean energy products such as solar PV and clean cookstoves (Bardouille, 2012). Bardouille (2012) indicates that the manufacturing methods vary quite widely across the different

technologies. Clean cookstoves, for example, do not require intricate manufacturing techniques and therefore allow for local manufacture by hand-crafting the cookstoves. Pico-solar and solar home systems on the other hand, require highly specialised manufacturing processes and facilities, which make local manufacturing particularly challenging.

- **Marketing:** this stage of the value chain refers to creating awareness and building trust around the product or service being offered (Bardouille, 2012).
- **Sale and Distribution:** this stage involves the establishment of new distribution chains or using existing distribution chains, in order to get the product or service to the end user. Distribution is considered to be a particularly challenging phase of the value chain because the intended target market is often situated in geographically remote regions, with less than optimal local distribution channels (Bardouille, 2012).
- **Consumer Finance:** this stage involves financing products such as pico-solar or solar home systems. Financing is needed to offer an affordable mechanism through which solar home systems can be purchased. As solar home systems typically range between \$300 and \$500 dollars, it is unaffordable to many low income customers. Consumer financing is often provided either through in-house financing or in collaboration with micro-finance institutions (Bardouille, 2012).
- **After Sales Service:** this stage of the value chain involves the interaction with the customer after the sale has taken place to provide on-going product support through additional product information or assistance, product returns or exchanges and maintenance for solar home systems (Bardouille, 2012).

The stages and degree to which energy enterprises participate in the value chain is determined by whether enterprises are strongly vertically integrated or horizontally integrated. Vertically integrated enterprises have the in-house capacity to design, manufacture and distribute, and usually operate along the entire value chain. These companies usually have the required technological expertise and the capacity to combine technical aspects of manufacturing, installation and consumer finance (Bardouille, 2012; Clean Energy Access Network, 2015).

Horizontally integrated enterprises usually focus on a specific stage of the value chain, for example, manufacturing or distribution.

With respect to above, Franz et al. (2015) distinguishes between an integrated supply chain model (high degree of vertical integration) and distribution dealer model (high degree of horizontal integration). Figure 6 below illustrates the value chain for an integrated model for pico-solar lighting devices. Figure 7 below depicts the value chain for a distribution dealer model. It can be seen that pico-solar lighting devices are usually not manufactured locally and are imported from larger international manufacturers. Here distribution companies would import from the manufacturer and distribute through various channels including retailers and local organisations.



Figure 6: Integrated Value Chain for Pico-Solar Lighting Devices (Franz et al., 2015)

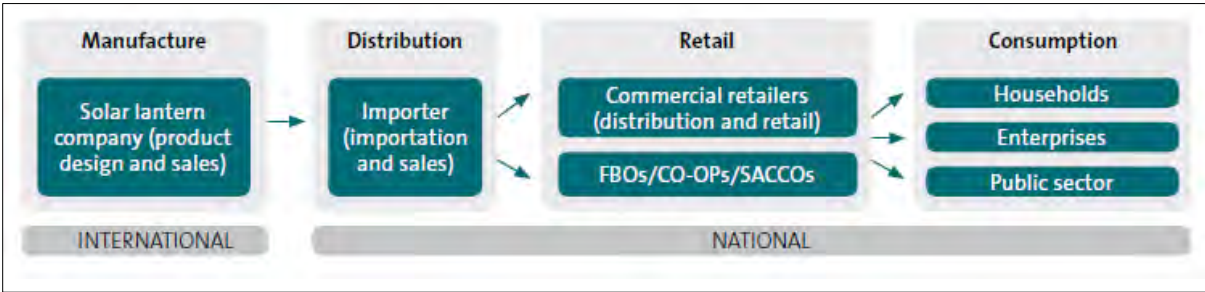


Figure 7: Distribution Dealer Value Chain for Pico-solar Lighting Devices (Franz et al., 2015)

2.3.2.1. Inclusive Value Chains and Value Chain Development

The concepts of inclusive business and inclusive value chain development are strongly interlinked; the overarching purpose being to, “improve the livelihoods of poor and marginalised communities through private-sector initiatives” (Butler et al., 2013:1).

The term *inclusive value chains* is used primarily within the context of agriculture and agro-processing and refers to the integration of local small-holder farmers into agricultural value chains through the creation of market linkages and enabling environment conditions. This concept is however applicable to other sectors and can be extended to the value chain for off-grid clean energy products and services. Value Chain Development is a development approach which aims to achieve inclusive, sustainable economic growth and poverty reduction by integrating small-scale producers, such as farmers or artisans, into growing, stable, or high-value markets (United Nations Development Programme, 2010).

From the perspective of improving energy access delivery mechanisms, the rationale behind developing inclusive value chains for off-grid clean energy products and services, pertains primarily to strengthening distribution networks - particularly within the last mile. Local micro-entrepreneurs could serve as a key link in the last mile distribution stage of the value chain. Incorporating local micro-entrepreneurs in the last mile distribution stage in the value chain could help circumvent some of the key challenges (including costs and infrastructure) associated with establishing distribution networks.

From a local socio-economic perspective, the distributed nature of decentralised off-grid clean energy creates opportunities for local deployment of a significant part of the value chain – which could potentially create new employment and business opportunities (Carley & Lawrence, 2014). In the same line of thought, Ménascé (2014: 1) points out that,

“the implementation of innovative distribution systems relying on micro-entrepreneurs could be an important factor in terms of job creation and income generation; the development of micro-franchise networks also plays a significant part in the development of micro-entrepreneurship.”

2.3.2.2. Inclusive Value Chain Development as an Inclusive Market Development Approach

In line with the concepts of inclusive business, and inclusive value chains, “Inclusive Market Development (IMD) seeks to include the poor more meaningfully and effectively into growing markets both on the demand side as clients and customers, and on the supply side as employees, producers and business owners”(United Nations Development Programme, 2010: 12).

Within many developing nations the necessary institutional support structures needed to support markets are often inadequate. Furthermore the market for off-grid clean energy products and services is still a nascent market, which compounds the existing broader market challenges (Bardouille, 2012). IMD includes various interventions that enable the effective functioning of markets for the BOP. This could include "entrepreneurship promotion; enterprise development and creation of supportive market infrastructure; enhancing market institutions; policies and legal frameworks." The purpose of the IMD approach is to strengthen entire market systems as a whole, with a focus on "enterprises, business relationships, market structures, or the business environment” (United Nations Development Programme, 2010: 11).

Within the IMD approach, the United Nations Development Programme (2010: 12) have identified five priority areas including:

1. Establishing/strengthening the policy and institutional infrastructure.
2. Facilitating pro-poor value chain integration.
3. Brokering investments in pro-poor goods and services.
4. Fostering inclusive entrepreneurship.
5. Encouraging Corporate Social Responsibility in support of inclusive market development.

From the above (and with specific reference to priority area number two) it can be seen that the creation of inclusive value chains is a key component of the IMD process. An inclusive enterprise ecosystem can play an important role in IMD and strengthening value chains. Butler et al. (2013) argue that an enabling ecosystem is necessary to optimally integrate the BOP into value chains. Ecosystems could play an integral role in the strengthening of value chains. The actors in the ecosystem can tackle barriers to inclusive business models and value chain development. The

rationale for an inclusive energy enterprise ecosystem, and specific ecosystem interventions, will be discussed in further detail in the next section.

2.4. An Energy Enterprise Ecosystem

2.4.1. Definition, Origin and Rationale for an Enterprise Ecosystem

In the context of this study, an *enterprise ecosystem* refers to the various enabling conditions created by a variety of stakeholders in order to create a conducive environment for entrepreneurs to develop their business ideas into feasible business models; grow; sustain and scale up their businesses. The ecosystem not only includes the enabling conditions, but also the various interactions and synergies between the various stakeholders (Moore, 2003). These stakeholders include, but are not limited to, government; development partners; NPOs; private funders and funding institutions; business development institutions and research institutions (Practical Action, 2012). The roles of these stakeholders are to provide a conducive policy and regulatory environment; access to funding; business development support and mentoring; inclusive market development and value chain strengthening. These stakeholders serve specific, and at times, overarching functions. The origins of the business ecosystem concept and the rationale for business ecosystems are discussed in further detail below.

The concept of a business ecosystem draws its origin, largely, from the ecosystems found in nature. In ecological terms an ecosystem may be defined as, “the complex of a community of organisms and its environment functioning as an ecological unit” (Mish et al., 2003: 94). It can be seen that the organisms of the ecosystem function as a unit and the entire ecosystem and the well-being of the individual organisms are influenced by interdependencies.

Similarly, businesses cannot operate, evolve and achieve sustainability in a vacuum. Moore (2003) noted that a business is only as good as its ecosystem and that it is the ability of a business to reinvent itself and coevolve with the actors in its ecosystem that ultimately determines its longevity. A business therefore cannot be viewed in isolation from the prevailing conditions surrounding it as its success is dependent on its enabling environment. Gradl & Jenkins (2011)

therefore advocate a holistic approach to inclusive business development that involves a shift from developing inclusive business to developing inclusive business ecosystems.

There are various challenges with building and nurturing ecosystems. The United Nations Development Programme (2013) notes that a key challenge is coordination. There may be various stakeholders that serve different functions, yet the lack of synergy and strategic linkages between these stakeholders poses a problem. Moore (2003) draws observations from biological ecosystems where there is a move from a loose organisation of elements to a more structured one. Similarly within the context of business ecosystems, the roles of the various stakeholders need to be clearly defined and linkages and interactions need to be optimally structured. According to Prahalad (2005: 63), “there have been few attempts to focus on the symbiotic nature of the relationships between various private sector and social institutional players that can lead to a rapid development of markets at the BOP.”

Gradl & Jenkins (2011:6) argue that the creation of ecosystems requires deliberate and concerted efforts: “to tackle the barriers to scale, companies must be equally deliberate, strategic, and creative about cultivating the inclusive business ecosystems on which those models depend.” Nevertheless, the process of creating and strengthening an ecosystem cannot be done by a single player. There exists a need for the brokering and facilitation of partnerships in the ecosystem. Certain organisations can serve as brokers for strategic partnerships between stakeholders. For example development partners could serve as brokers for funding through networks and institutions they have established partnerships with. They can also serve a coordinating role and broker business development support, mentoring and training for entrepreneurs through projects and programmes (United Nations Development Programme, 2013). Governments can also serve as brokers. Governments can broker funding for enterprises with development banks in their country or other financial institutions and underwrite the risk for businesses. There are furthermore examples of companies and NPOs that specifically serve the function of brokering partnerships e.g. the Partnership Brokers Association.

The next section discusses specific ecosystem conditions that have been identified as imperative for stand-alone off-grid energy products.

2.4.2. The Enabling Energy Enterprise Ecosystem

Practical Action (2012:xi) recognises the importance of an ‘ecosystems approach’ to energy access. They refer to an energy access ecosystem as the:

“interconnected network of organizations working on the supply of modern energy services to poor people. From national governments, donors, utilities, and businesses, to NGOs, civil society, community groups, and individual consumers, all of these actors have a crucial role to play in creating universal energy access. No single body can do this alone. Indeed, these organizations are interconnected and their success is linked both to each other and the system as a whole.”

This resonates with the characterisation of ecosystems by Moore (2003) and Mish et al. (2003) discussed previously. Practical Action (2012) has identified key ecosystem conditions which can be broadly be categorised as finance, capacity building and policy. In this regard they recognise, “the importance of the systems of governance on which providers rely, as well as the flows of money supporting creation and regeneration of the system, as well as the skills of those creating and maintaining that system” Practical Action (2012: 74).

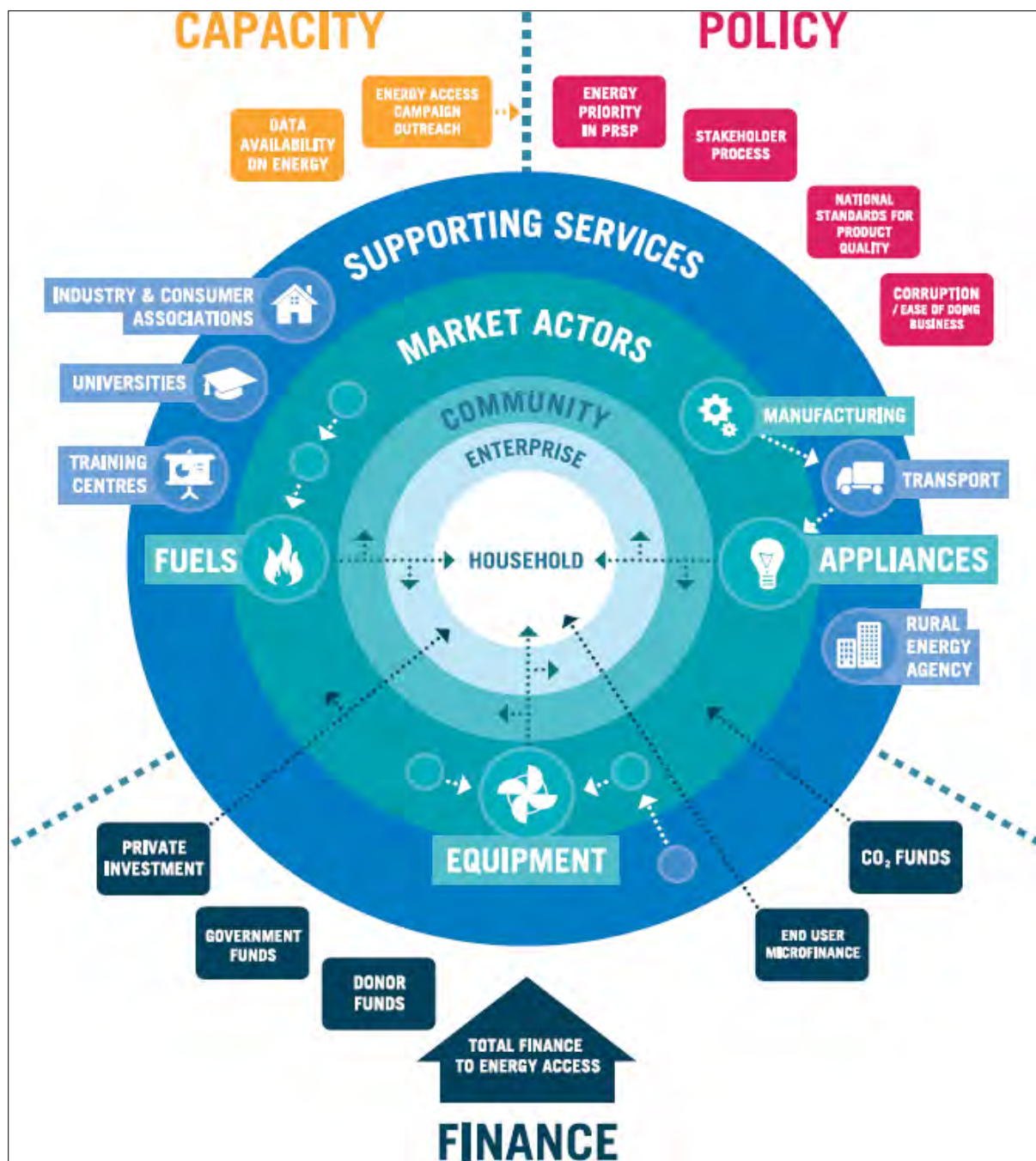


Figure 8: Dimensions of an Energy Access Enterprise Ecosystem (Practical Action , 2012)

Key ecosystem interventions are identified in the literature. These interventions are needed in various parts of the value chain in order to create a conducive environment for off-grid stand-alone products and services. These ecosystem conditions are depicted in the figure above and discussed below.

2.4.2.1. Policy and Regulatory Environment

Fiscal Policy on Solar Off-grid Lighting Products

An appropriate policy and regulatory environment is required to support off-grid energy enterprises. Governments and policy makers should work towards instituting conducive policy and regulatory measures that are aligned to private sector initiatives in order to accelerate off-grid energy access (Diecker, Wheeldon & Scott, 2016). One important fiscal policy measure is the lowering or removal of import duties and Value Added Tax (VAT) on off-grid solar products (Hagan, Mifsud & Diecker, 2015; Diecker, Wheeldon & Scott, 2016). These taxes add to the cost of the product and influence the mark-up energy enterprises can make at various stages of the value chain. It furthermore pushes up the price of the product for the customer (end user). In countries where import duty and VAT exemptions have been applied, energy enterprises are able to sell solar products at a lower cost, making these products more affordable and facilitating the increased uptake of these products (Hagan, Mifsud & Diecker, 2015; Diecker, Wheeldon & Scott, 2016). East African countries - with Kenya and Tanzania leading the way in this regard - have demonstrated market growth and the rapid uptake of clean energy products and services as a result of VAT and import duty exemptions being instituted (Hagan, Mifsud & Diecker, 2015; Diecker, Wheeldon & Scott, 2016). Rwanda for example, has instituted a VAT exemption on quality assured solar products as a mechanism to incentivise the uptake of products that have been quality assured (Diecker, Wheeldon & Scott, 2016).

In order to level the playing field, there is also a need to concurrently remove or reduce existing subsidies on lighting fuels such as kerosene (Hagan, Mifsud & Diecker, 2015; Diecker, Wheeldon & Scott, 2016). Subsidies on kerosene impede the development and transformation of markets for clean off-grid energy alternatives, because clean energy lighting alternatives simply cannot compete with heavily subsidised fuels. It is however noted that subsidy reform needs to be implemented by phasing out kerosene subsidies gradually, as cleaner lighting alternatives become more readily available and affordable (Hagan, Mifsud & Diecker, 2015).

Enhancing Product Quality Assurance and Creating Quality Standards

Quality assurance through standards and certification is important because it helps to establish trust in the off-grid products being sold. Such a process would enable businesses to compete not only based on their prices, but also in terms of the quality of the product provided (Bardouille, 2012). There are various organisations that regulate quality control and standards, e.g. national bureaus of standards. It is important to note that while there may be various standards in place, these standards are not always enforced (Franz et al., 2015). Measures need to be put in place to ensure that regulators are acceptably equipped to be able to test and certify companies and their products on a frequent basis (Franz et al., 2015). Development partners should advocate for global standards and that governments enforce or incentivise the enforcement of standards (GIZ, IFC & US DOE, 2013). Smart subsidies could serve as an incentive for businesses and create competitive advantage to those energy enterprises that sell quality assured products. Here smart subsidies refer to subsidies and incentives exclusively for energy enterprises that source and distribute quality assured products.

Beyond compliance, businesses that are able to provide good quality products could enjoy a competitive advantage because they are able to demonstrate the value and quality of their products (Bardouille, 2012). This could be as a result of building a good rapport with customers that could potentially bring return business (by deciding to purchase larger, more comprehensive systems) or by spreading the word to other potential customers that the energy enterprise is reputable.

The Ease of Doing Business

In addition to enabling fiscal policies on solar products and the enforcement of quality standards for off-grid clean energy products, other enabling environment policies pertain to the ease of conducting business in a country. This relates to, amongst other, the registration of a business and obtaining any relevant licences to operate the business. Minimising bureaucratic bottlenecks - that could cause unnecessary delays - and facilitating efficient administrative processes, forms

an important part of creating an enabling environment for energy enterprises. In this regard, Walters et al. (2015: 13) states:

“By establishing streamlined and flexible processes, energy access SMEs can reduce their time and resources spent navigating various agencies and requirements. Some countries have even adopted “one-stop shop” programs specifically to help energy access SMEs handle business and regulatory issues.”

In Sub Saharan Africa, Rwanda stands out as a country that has made a concerted effort to improve the speed and efficiency of conducting business, including streamlining processes associated with registering a business, registering a property, obtaining credit and conducting cross-border trade. It is ranked no 62 (out of 189 economies) in the 2016 World Bank Ease of Doing Business rank (World Bank, 2016a).

2.4.2.2. Capacity Building and Clean Energy Technology Awareness Raising

Capacity Building

Building capacity at various levels is imperative for improving off-grid energy access. Local capacity building is particularly important. This involves capacity building at an institutional level and at an individual level. Local participants that are being incorporated in the clean energy value chains require capacity building. Local micro-entrepreneurs require both business development support and technology capacity building.

In order for local micro-entrepreneurs to effectively participate in clean energy value chains, a technology transfer needs to take place, as it is imperative for local micro-entrepreneurs to have understanding and take “ownership” of the clean energy technologies used in decentralised off-grid energy distribution business models. Depending on the business model and technology used, the substantive nature of the technology transfer processes may vary. According to Wilkins (2002: 43), “technology transfer can be defined as the diffusion and adoption of new technical equipment, practices and know-how (e.g. private sector, government sector, finance institutions, NGOs, research bodies etc.).” Wilkins (2002: 44) furthermore states that,

“technology should be regarded not only as the equipment, but also the information, skills and know-how which are needed to fund, manufacture, install, operate and maintain the equipment. Transfer should be regarded as putting the technical concepts into practice locally in a sustainable framework so that local people can understand the technology, use it in a sustainable manner and replicate projects to speed up successful implementation.”

Creating Technology Awareness

In nascent markets, product and technology awareness forms part of a market building exercise (Bardouille, 2012). There is a relatively low level of consumer awareness for off-grid clean energy products within the intended target markets, which consequently results in a relatively low demand (GIZ, IFC & US DOE, 2013; Franz et al., 2015). Energy access businesses that serve the market through off-grid products and services could play an important role in developing new markets and establishing trust (Bardouille, 2012).

Vinci et al. (2015: 17) argue that poorly maintained stand-alone solar products that were previously given to local communities have adversely affected customer confidence. This is articulated below:

“In areas where stand-alone solar solutions were deployed previously, many communities had a bad experience with their reliability. A fundamental reason behind this lack of trust is that government programmes and NGOs often installed off-grid lighting systems but failed to maintain them. The broken systems remain dysfunctional, setting a benchmark for how these communities perceive the technology and eventually requiring substantial resources to recover lost trust”.

Furthermore some customers have already purchased personal pico-solar lighting devices or larger solar homes systems that were faulty or simply of poor quality (Lighting Africa, 2010). Previous poor experiences with off-grid clean energy products create a hesitation amongst customers to purchase more products. Regaining that trust may not be an easy task as customers may have lost money on poor quality products.

Therefore, in addition to the normal product branding and marketing there is a need for a concerted effort to create a broader awareness around these technologies and products in order to facilitate increased customer confidence and trust. This is particularly important where poor quality products in the market have adversely affected customer confidence and trust.

Franz et al. (2015) therefore advocate more awareness-raising for stand-alone solar products, including radio advertising drives and product demonstrations, especially within rural areas. In order to effectively serve the market, there needs to be collaboration between business, government and development partners. The task of establishing confidence in a market requires a collaborative concerted effort from a variety of stakeholders. If governments and development partners play a more proactive role in creating product awareness in the market, it would make the environment more conducive for businesses providing off-grid products and services. For example, governments can run public television and radio broadcasting campaigns that educate viewers and listeners about the benefits of off-grid renewable energy options for heating, lighting and other end-uses. Development partners can collaborate with governments and local organisations and sponsor billboard campaigns or campaigns in schools to create awareness surrounding these technologies.

2.4.2.3. Finance for Energy Enterprises

Being able to secure funding to start and grow an enterprise throughout the various stages of the business lifecycle is imperative for enterprises in all sectors. This is especially true for innovative new energy access enterprises (Bardouille, 2012; Van Leeuwen & Erboy Ruff, 2014; SELCO Foundation, 2015). The key funding needs, challenges and options for energy enterprises, identified in the literature, are discussed below.

Start-Up Funding

Accessing start-up funding is both imperative and challenging for new innovative start-up energy enterprises (Bardouille, 2012; Van Leeuwen & Erboy Ruff, 2014). Early stage finance is needed when new innovative enterprises are in the process of testing and refining their business models and building a feasible business case (Bardouille, 2012). This phase involves piloting models and creating consumer awareness in the market (Van Leeuwen & Erboy Ruff, 2014). Securing early stage financing is challenging because investing during this stage (when a business model has not

been proved yet) is risky. Angel investment and grant funding are needed to fill the gap at this stage (Bardouille, 2012).

While most start-up energy enterprises experience challenges with raising start-up funding, these challenges are more pronounced for start-up companies from developing countries. These enterprises are not that visible to international investors and have access to a smaller pool of funding within their immediate geographic location because of a limited number of local venture capitalists or impact investors (Bardouille, 2012).

A survey conducted in 2012, with 582 entrepreneurs in six Sub-Saharan African countries (Ethiopia, Ghana, Kenya, Nigeria, South Africa and Tanzania) illustrated the need for angel investment and venture capital. Figure 9 below illustrates that personal and family funding is the main source of funding and that there is a clear need for venture capital and angel seed funding. Venture capital and angel seed funding comprised only 5% and 4%, respectively of funding sources (Omidyar Network & Monitor Group, 2013).

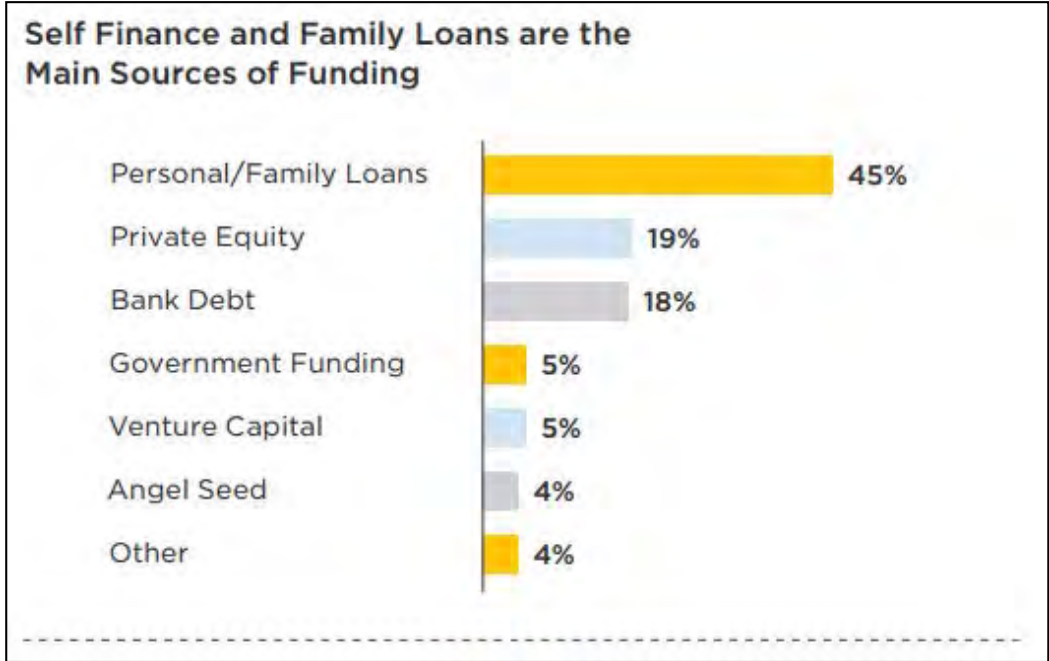


Figure 9: Sources of Funding African Entrepreneurs (Omidyar Network & Monitor Group, 2013)

Proof of Concept Funding - "The Missing Middle"

Bardouille (2012) indicates that investors need to address the “missing middle” between the business development and maturity phases of the business life cycle. Van Leeuwen & Erboy Ruff (2014) advocate the need for working capital for enterprises during the mid-life phase where obtaining finance is particularly challenging because businesses are no longer in the promising start-up phase and are yet to reach the phase of maturity where they have a proven track record. Enterprises in the midlife phase are often not profitable as yet and have only demonstrated a level of success on a small scale. The challenges faced by these enterprises are echoed by Vinci et al. (2015: 18):

“When developing an enterprise, there is a stage prior to scaling-up that occurs before the enterprise receives the necessary limelight to secure financing. The challenge is for a start-up to sustain itself until it is able to showcase itself on appropriate platforms. Because of the lack of a support ecosystem, many promising companies fall through the gaps. Even once enterprises have proven business models and are able to secure funding from mainstream sources, they face the challenge of raising working capital”.

During the proof of concept stage, patient capital and other forms of equity finance is required too as the business model and commercial viability is being tested and proven (Bardouille, 2012).

2.4.2.4. Finance for Local Micro-entrepreneurs

Micro-credit

Local micro-entrepreneurs face various and distinct challenges when trying to access finance. Obtaining credit is challenging (in some cases may not be possible) as banks are hesitant to lend money without security. Micro-credit is a possible avenue for local micro-entrepreneurs. Certain business models have achieved success using conventional microfinance approaches; however replication is not possible within all contexts. Micro-credit is viewed by some as an enabler for micro-entrepreneurship by extending credit (that was previously inaccessible) to start or grow micro-enterprises. Daily- Harris (2002) argues that micro-credit that is invested in a micro-enterprise as working capital could grow the enterprise or result in the creation of new

enterprises. Many micro-entrepreneurs from indigent communities do not meet the requirements set by larger mainstream banks and finance institutions that cater mainly for middle and high income brackets. Although extending micro-credit to entrepreneurs from indigent communities could hold potential benefits, traditional micro-financing mechanisms have come under scrutiny and have aroused debates as to the potential trappings of microfinance for the poor. Bateman (2011) argues that although microfinance has been heralded as a measure to enable the poor to escape poverty, it could effectively serve as a poverty trap in itself by trapping people further and further in debt.

If micro-finance is the chosen avenue, then to reduce the risk of falling into a debt trap, mechanisms need to be put in place. For example, interest free loans in conjunction with reasonable payback periods. The micro-entrepreneurs also need to exercise discipline and proper business management principles and invest the money in the business. In addition, micro-finance could be brokered by governments or development partners and the risk underwritten.

The Global Village Energy Partnership (GVEP) International for example plays an important role in brokering micro-credit and underwriting risk for micro and small enterprises. Through the GVEP Loan Guarantee Fund, GVEP underwrites some of the risk, for businesses they believe have potential. This fund has focussed on very small energy enterprises and has enabled them to purchase inventory and equipment. The fund was set up with funding from USAID, Barclays Bank and other institutions (Global Village Energy Partnership International, 2015).

Micro-consignment

The micro-consignment model is an alternative to micro-credit, where inventory is loaned to local micro-entrepreneurs on consignment. In essence the local-entrepreneur takes receipt of inventory, without having to pay upfront and makes a repayment after the first round of sales, or in a manner consented to. As noted earlier, providing products on consignment is a mechanism of reducing the risk to the local micro-entrepreneurs by allowing them a trial period in which to test product sales without making a capital contribution of their own or having to obtain micro-

finance to purchase products (Dutt, 2012). This reduces the financial risk to the micro-entrepreneur in the event that they are unsuccessful with product sales.

2.5. Summary of Key Findings and the Need for Empirical Survey

In accordance with the overall aims and objectives of the research study, the literature review sought to explore the synergy between social enterprises and local micro-entrepreneurs in the provision of off-grid clean energy products and services, with a specific focus on the business models used to integrate local micro-entrepreneurs into clean energy value chains. It furthermore sought to explore the enabling ecosystem conditions required by these social enterprises and micro-entrepreneurs.

To this end, the literature review explored the concept of inclusive business and the role of social enterprises in the provision of sustainable energy access. With regard to inclusive business, it was noted that there is a need to transition from approaches that simply sell affordable goods and services to the poor (a BOP 1.0 approach), to models that create real opportunities, by creating shared economic and social value with people in indigent communities (a BOP 2.0 approach) (Hart & Caneque, 2015). This could be achieved through the creation of entrepreneurial opportunities throughout the value chain. The literature review also highlighted that energy social enterprises are innovators and pioneers in nascent energy access markets (Koch & Hammond, 2013). Furthermore some social enterprises have demonstrated the ability to rapidly scale innovative clean off-grid energy solutions (Okoth, 2015; d.light, 2016; SunnyMoney, 2016).

Some of the main business models that incorporate local micro-entrepreneurs into clean energy value chains were then discussed, including the micro-franchise model and permutations of this model, namely a direct sales model and a local solar technician model. Micro-franchising was identified as a powerful development tool that extends business opportunities to residents of low income communities. Furthermore it offers the advantage of standardised business model that has been tested as well as business support from the franchisor (Illetschko, 2011; Sireau, 2011). Micro-franchising models have been used to extend a variety of essential goods and

services (including energy access goods and services) to low income markets using networks of micro-entrepreneurs (village level entrepreneurs) (Sireau, 2011).

The literature review also discussed the value chain for clean off-grid products and services and inclusive value chain development. The rationale for developing inclusive value chains for clean off-grid products and services, is primarily to strengthen last mile distribution channels by using networks of local micro-entrepreneurs to sell products and services to customers. In addition, the local micro-entrepreneurs could benefit from job creation and income generation opportunities, by being incorporated into these value chains.

The literature review finally explored the concept of the business ecosystem. Businesses do not operate in a vacuum and are influenced by their macro and more immediate external environments (Moore, 2003). Social enterprises in energy access markets are usually SMEs that operate in nascent markets in developing countries, where there is a need for enabling ecosystem conditions while the market develops, such as appropriate fiscal policies for off-grid solar products (and associated technology components); enhancing product quality assurance; facilitating the ease of doing business; creating technology awareness; and being able to access finance that is appropriate for the various stages of the business lifecycle (Bardouille, 2012; Van Leeuwen & Erboy Ruff, 2014; Hagan, Mifsud & Diecker, 2015; Diecker, Wheeldon & Scott, 2016).

While the above-mentioned ecosystem conditions could potentially be indirectly enabling to the local micro-entrepreneurs that are incorporated into the social enterprises' business models and value chains, there are also specific enabling ecosystem conditions that could benefit local entrepreneurs more directly. These include: business development support and technology transfer, and access to finance (Daily- Harris, 2002; Wilkins, 2002; Global Village Energy Partnership International, 2015).

Due to the exploratory nature of the study, in-depth empirical data is imperative in order to validate the abovementioned key themes and insights emanating from the literature review. Although the literature review also included various current practical examples of how social

energy enterprises are serving the market and the business models used to incorporate local micro-entrepreneurs into clean off-grid energy value chains, in-depth empirical primary data is needed to gain a more holistic understanding of these business models and their nuances - which cannot be fully explored through a desktop study. Furthermore, while some literature sources (including reports, journal articles and studies) explored certain aspects of inclusive business, social enterprises, value chains and enterprise ecosystems separately, this research study looks at the convergence of these concepts with a specific and distinct focus - which warrants a new empirical study.

Chapter 3: Methodology

3.1. Introduction

This chapter outlines the research methodology for the empirical component of the research study. A qualitative research methodology has been selected in line with exploratory nature of the study, guided by the aims of objectives. Figure 10 below highlights the outline for this chapter. Section 3.2 begins with framing the epistemological basis of the study. Section 3.3 describes and justifies the chosen case study research strategy. Section 3.4 describes the purposive sampling approach used and the selection criteria for the respondents. Section 3.5 discusses the semi-structured interview as the primary data collection instrument. Section 3.6 describes the thematic within-case and cross case analysis. Section 3.7 discusses the pilot study. Section 3.8 discusses the validity and reliability of the research study and Section 3.9 outlines the limitations of the study.

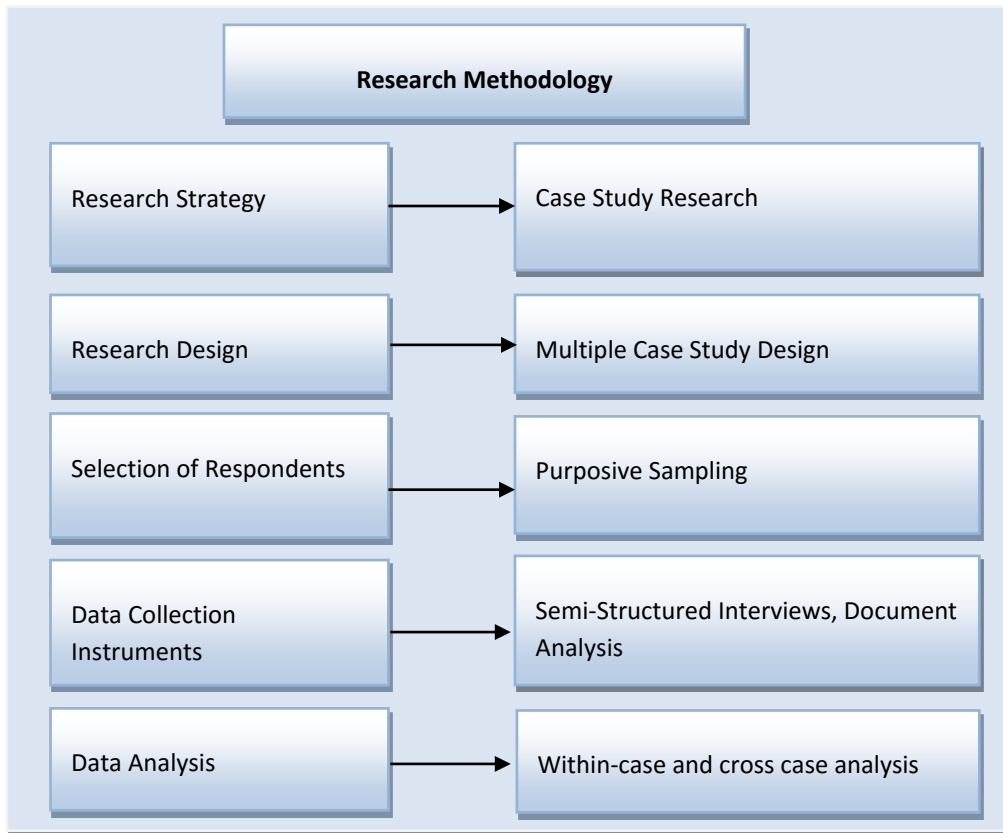


Figure 10: Schematic Overview of Research Methods (Diagramme Created by Researcher)

3.2. The Epistemological Basis of the Research

Ritchie et al. (2003: 2) argues that it is important to understand the “philosophical underpinnings” of qualitative research before delving into the finer methodological details. Epistemology is defined as, “the branch of philosophy that deals with the varieties, grounds and validity of knowledge”(Brown et al., 1993: 851). Ritchie et al. (2003) distinguishes between two main epistemological positions namely *positivism* and *interpretivism*. According to a positivist viewpoint, “the world is independent of and unaffected by the researcher; facts and values are distinct”(Ritchie et al., 2003: 29). Whereas, in an interpretivist viewpoint, “the researcher and the social world impact on each other; facts and values are not distinct and findings are inevitably influenced by the researcher's perspective and values” (Ritchie et al., 2003: 29). In qualitative research an interpretivist viewpoint is usually adopted as, the researcher's interpretations of the social phenomena observed is critical part of generating findings. Interpretation forms part of knowledge building. The researcher in this study adopts an interpretivist viewpoint.

Epistemology therefore has a bearing on the suitability of the research methods, in relation to the nature of the study. Ritchie et al. (2003: 2) states that, “the nature of knowledge and how it is acquired (epistemology)” has an impact on how research will be carried out. Thanh & Thanh (2015: 26) indicate that an interpretivist viewpoint is closely associated with qualitative research methods and that, “researchers who are using interpretivist paradigm and qualitative methods often seek experiences and perceptions of individuals for their data rather than rely on numbers of statistics”. Biggam (2011) states that a qualitative research methodology is suitable when conducting an in-depth exploratory study. Furthermore, it should be noted that the combination of the, “research strategy, research objectives and data collection techniques” determines whether a study is qualitative or quantitative (Biggam, 2011: 131).

3.3. Research Strategy

The empirical component of this research study was conducted using a case study research methodology to present and analyse the findings from the energy social enterprises interviewed and cross-referenced with the interview responses from the other respondent categories. Biggam (2011: 139) indicates that case study is used, “when you seek an in-depth, investigative study.” Yin (2014:16) defines a case study as:

“An empirical inquiry that:

- investigates a contemporary phenomenon (“the case”) in depth and within a real world context, especially when,
- the boundaries between phenomenon and context may not be clearly evident.”

From the above definition it is evident that a case study is appropriate when undertaking an in-depth analysis of a current or recent phenomenon in relation to its contextual setting. Yin (2014) further provides three conditions that can be used to assess the suitability of a case study as a potential research strategy. These conditions are:

- “(a) the type of research question posed;
- (b) the extent of control a researcher has over behavioural events and,
- (c) the degree of focus on contemporary as opposed to entirely historical events” Yin (2014: 9).

With reference to the type of research question, Yin (2014) states that if the research questions focus primarily on “what” questions then there are two possibilities: “what” questions could either be exploratory in nature or could refer to “how many” or “how much”. According to Yin (2014) the former type of “what” question could possibly lend itself to an exploratory case study methodology, whereas the latter would be more suitable for a survey method where quantification is required. “How” and “why” questions are usually suited to case study methodology.

The research questions in this study (indicated in Chapter 1), are exploratory “what” questions that seek to explore the synergy between social energy enterprises and local micro-entrepreneurs in the clean energy value chain, as well as the enabling ecosystem conditions they require. The research questions thus satisfy the first condition. The other two conditions are also

satisfied as the researcher in this study has limited control over the “behavioural events” due to the exploratory nature of the research questions and is exploring a contemporary phenomenon.

The research study furthermore satisfies the second part of the definition as the boundary between the case (the social energy enterprise and its ecosystem) and the context (the immediate and macro environment in which the energy enterprises operate-in essence its ecosystem) is not always clearly defined. The ecosystem thus forms part of the case and the context. Furthermore according to Moore (2003), an enterprise also forms part of its ecosystem and coevolves and interacts with the other actors in the ecosystem. It is therefore evident that a case study research approach is appropriate to meet the overall aims of the study.

3.3.1. Case Study Research Design

After selecting the case study as the broad research strategy, the case study research design needs to be considered. It is important to distinguish between a single case study and multiple case study design methodology. Yin (2014) states that when a single research study contains more than a single case, the study has used a multiple-case study design. In this study, a multiple case study design has been selected. The evidence collected from multiple case studies are often regarded as more compelling and enables a more robust analysis by cross-referencing between the cases and identifying similar or contrasting themes (Yin, 2014). The “case” or “unit of analysis” in this research study is the social energy enterprise and its ecosystem conditions. Figure 11 below illustrates the multiple case study design.

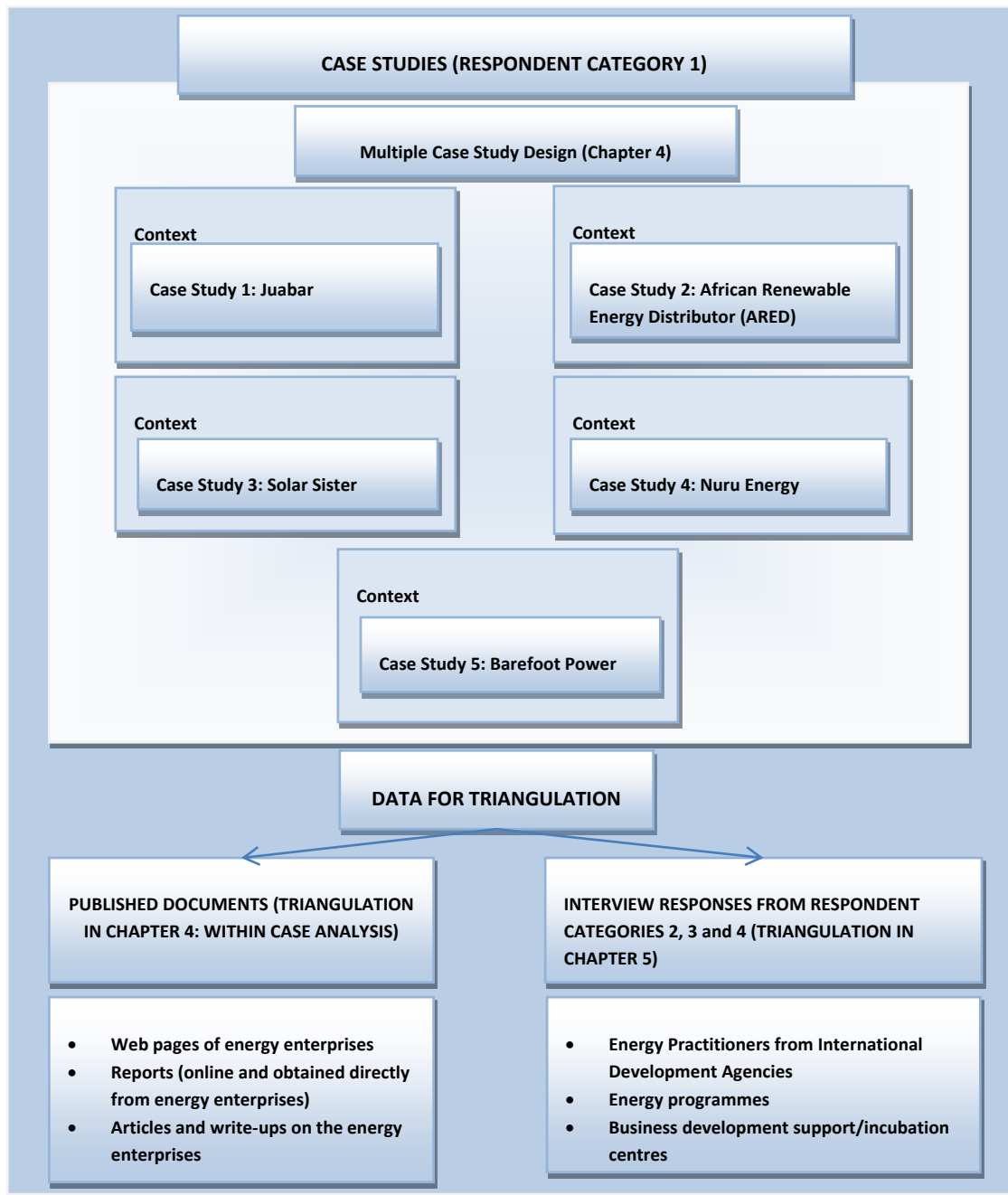


Figure 11: Research Design - Multiple Case Study Design adapted from (Yin, 2014)

3.4. Selection of Interview Respondents

There are 11 respondents in this research study and 4 respondent categories. The breakdown of the respondents per respondent category is indicated in Table 3 below.

Table 3: Number of Respondents in Each Respondent Category (Table Created by Researcher)

Respondent Category	Number of Respondents
Social energy enterprises	6
Energy development practitioners from international development agencies	3
Business development support/ incubation programmes for Energy Enterprises that develop clean technologies	1
Energy programmes that support the development of energy micro-entrepreneurs	1

Table 4 below provides a breakdown of the number of respondents for each social enterprise.

Table 4: Case Studies (Table Created by Researcher)

Respondent Organisation	Number of Respondents From Organisation
Social Enterprise Case Study 1: Juabar	2
Social Enterprise Case Study 2: African Renewable Energy Distributor (ARED)	1
Social Enterprise Case Study 3: Solar Sister	1
Social Enterprise Case Study 4: Nuru Energy	1
Social Enterprise Case Study 5: Barefoot Power	1
Total Number of Social Enterprise Respondents	6

Respondents were selected using a purposive sampling approach. Palys (2008:1) describes purposive sampling as a, “series of strategic choices about with whom, where and how to do your research”. Purposive sampling is a non-probability sampling technique, where participants are selected based on specific criteria. For example: expert knowledge of selected participants; the spectrum of participants required to answer the research questions and the availability and willingness to participate in the study (Oliver, 2006). He notes that in case study research a purposive sampling approach is particularly suitable as decisions need to be made about the participants who could possibly best contribute to the study in both “relevance and depth.” The selection criteria used in this study is indicated in Table 5 below:

Table 5: Selection Criteria for Respondents (Table Created by Researcher)

Respondent Category	Selection Criteria
Social energy enterprises	Social enterprises in Sub-Saharan Africa who incorporate local micro-entrepreneurs/ village level entrepreneurs into their value chain for the provision of off-grid clean energy products or services.
Energy development practitioners from international development agencies	Development practitioners that have gained extensive experience in (knowledge of) market based approaches for off-grid energy access and energy enterprises.
Business development support/ incubation programmes for Energy Enterprises that develop clean technologies	Business Development support/ incubation programmes for SME energy enterprises.
Energy programmes that support the development of energy micro-entrepreneurs	Energy programmes in Sub-Saharan Africa that promote energy entrepreneurship and develop energy enterprises in indigent communities.

Purposive sampling is thus a preferred technique when respondents are selected based of their subject matter expertise and/or relevant practical experience in the area of research. Purposive sampling differs from random sampling, a probability based technique, where samples of the population are selected entirely at random. Random sampling approaches will not be a suitable approach for this study because specific energy enterprises will be specifically selected based on specific predetermined criteria. Purposive sampling offers the advantage that the researcher can decide which respondents to include in the study in order to best provide answers to the research questions (Oliver, 2006).

As indicated in Chapter 1, the broad aims of the research study are to:

- Explore the synergy between social energy enterprises and local micro-entrepreneurs in the off-grid clean energy value chain,
- Explore key enabling ecosystem conditions that social energy enterprises and local micro-entrepreneurs in Sub-Saharan Africa require.

With reference to the above aims, the social energy enterprise respondent category was selected as they often incorporate local micro-entrepreneurs into their value chains. These social energy enterprises are a key data source on their business models and their synergy with local micro-entrepreneurs. In order to effectively participate in clean energy value chains micro-

entrepreneurs require a variety of business development and technology support services. This served as the rationale for the inclusion of the energy programme and business development support institution categories. These support services furthermore form a key part of the enabling ecosystem for the local micro-entrepreneurs. The international development agency category was included because development partners serve as an important part of the enabling ecosystem and have practical hands-on experience in off-grid clean energy markets.

Nevertheless, it is recognised that there are also disadvantages associated with a purposive sampling approach, particularly the element of bias that could result from the subjective nature of the respondent selection. This could affect the validity of the data. In order to overcome this potential challenge, there needs to be, “an internal consistency between the aims and epistemological basis of the research, and the criteria used for selecting the purposive sample” (Oliver, 2006: 4). In this research study, an internal consistency was maintained by ensuring that the selection of respondents (see Table 5 above) was informed by the overall aims and epistemological basis of the research study.

3.4.1. Respondents

Table 6 provides an overview of the social energy enterprise respondents.

Table 6: Respondent Selection-Case Studies (Drawn from Data Available to Researcher)

Respondent Organisation	Respondent Name	Designation	Interview Mode	Reason For Selecting Organisation
Juabar (Case Study 1)	Ms Sachi DeCou	Co-Founder/Director of Connectivity.	Semi-structured Interview via Skype	Juabar is a for profit social enterprise in Tanzania that incorporates local micro-entrepreneurs through a solar powered mobile phone charging service business.
	Mr Geoffrey Shayo	Administrator-Juabar	Semi-structured Interview via Skype	
African Renewable Energy Distributor (ARED) (Case Study 2)	Mr Henri Nyakarundi	CEO and Founder	Semi-structured Interview via Skype	ARED is a for profit social enterprise based in Rwanda that incorporates local micro-entrepreneurs into the value chain through a solar powered mobile phone charging service business.
Solar Sister (Case Study 3)	Ms Caroline Mailloux	Director of Engagement	Semi-structured Interview via Skype	Solar Sister is a non-profit social enterprise situated in Tanzania, Uganda, Nigeria with headquarters in the United States. They incorporate local micro-entrepreneurs in the value chain as sales agents for pico-solar products and clean cookstoves.
Nuru Energy (Case Study 4)	Mr Sameer Hajee	CEO and Co-Founder	Semi-structured Interview via Skype	Nuru Energy is a for profit social enterprise with a footprint in Rwanda and India, that incorporates local micro-entrepreneurs in the value chain through selling Nuru LED lights and providing and light and mobile phone recharging service.

Barefoot Power (Case Study 5)	Mr Jackson Machuhi	Managing Director, Barefoot Power Africa	Semi-structured Interview via Skype	Barefoot Power is a for profit social enterprise with a footprint in East Africa, West Africa, Southern Africa, Asia, and the Americas. They design, manufacture and distribute clean energy off-grid energy products. They have previously incorporated local micro-entrepreneurs in the clean energy value chain through the sale of their pico-solar lanterns. They currently use trained local village technicians to install solar home systems.
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3.4.1.1. Triangulation

Briggs, Coleman & Morrison (2012: 84) define triangulation as a, “means comparing many sources of evidence in order to determine the accuracy of information or phenomena. It is an essential means of cross-checking its validity.” There are different types of triangulation including data source triangulation, methodological triangulation, theoretical triangulation and investigator triangulation (Briggs, Coleman & Morrison, 2012). Data triangulation is a method used to validate the data by cross-referencing one data source with others. This technique strengthens the credibility and validity of the data and corroborates the findings (Biggam, 2011).

This study used published documents including: webpages, articles and reports about the energy enterprises interviewed, to corroborate the findings from the interviews in the within-case analysis in Chapter 4. It also used *respondent triangulation* which is a sub-type of data triangulation (Briggs, Coleman & Morrison, 2012). Respondent triangulation was used in Chapter 5 in the cross case analysis to compare the findings from the social energy enterprises to the findings from the other 3 respondent categories. Table 7 below indicates the respondent categories used for triangulation.

Table 7: Participant Selection- Data for Triangulation (Table Created by Researcher)

Respondent Category	Name Of Respondent	Designation	Geographic Location	Interview Mode
Development Practitioners from International Development Agencies	Ms Yasmin Erboy Ruff	Senior Associate, Energy and Climate, United Nations Foundation	New York	Semi-Structured Interview via Skype
	Mr Yann Tanvez (Interview given in personal capacity)	Analyst Energy and Climate Change, World Bank	Washington, DC	Semi-Structured Interview via Skype
	Dr Pepukaye Bardouille	Senior Operations Officer-Clean Energy Sustainable Business Advisory International Finance Corporation (IFC), World Bank	Washington, DC	Semi-Structured Interview via Skype
Business Support/ Incubation	Ms Janet Yiamoi	Business Analyst, Kenya Climate Innovation Centre	Kenya	Semi-Structured Interview via Skype
Developing Energy Enterprises Programme East Africa (DEEP-EA)	Mr Daniel Macharia	Previously the programme Manager at GVEP International for the DEEP-EA Programme. Current with the Global Alliance for Clean Cookstoves.	Kenya, Tanzania, Uganda	Semi-structured Interview via Skype

3.5. Data Collection Instruments

A semi-structured interview was used as the primary data collection instrument (see semi-structured interview schedule in Appendix A). Yin (2014) states that the interview is one of the most important sources of evidence for case study research. Diccico-Bloom and Crabtree (2006) state that semi-structured interviews are one of the most widely used qualitative data collection instruments and can be conducted with individuals or in groups. Galletta (2013) offers insight into why the semi-structured interview is such a powerful tool: it provides sufficient structure for the dimensions of the research study to be adequately addressed and also gives participants an opportunity to add additional meaningful insights.

The semi-structured interview schedule contained a separate set of questions for each of the four respondent categories. The questions covered most of the same broad categories, but were phrased slightly differently, to accommodate the different stakeholders. The interview questions were informed by the aims and objectives of the research study, key insights emanating from the literature review and the pilot study (see section 3.5 below). Table 8 below highlights the key themes that were covered in the semi-structured interview.

Table 8: Themes in Semi-Structured Interview Schedule -Design of Semi-Structured Interview Schedule (Drawn by Researcher)

Respondent Category	Section of Interview	Categories/ Themes
Social Enterprises	Section A	Information about Social Enterprises (e.g. geographic footprint, number of years in operation, staff complement etc.)
	Section B	Questions Related to Social Enterprise Ecosystem
		Policy and Regulatory Environment
		Product Awareness and Customer Confidence
		Business Development Support/ Ease of Doing Business
		Access to Finance
	Section C	Questions Related to the Synergy with Local Micro-entrepreneurs
		Value Chain Participation
		Business model used to incorporate local micro-entrepreneurs into clean energy value chains <ul style="list-style-type: none"> • Screening and selection criteria • Type of agreement (E.g. micro-franchising agreement) • Setting up, infrastructure, location, support • Fee structure • Revenue generated
		Sustainability of micro-enterprises
	Business Development, Skills Development and Capacity Building	
	Funding/ Access to Finance	
International Development Agency	Section A	Overview of International Development Agency
	Section B	Questions Related to Energy Enterprises (Social Enterprises)
		Policy and Regulatory Environment
		Product Awareness and Customer Confidence
		Business Development Support
		Finance
	Section C	Questions Related to Micro-franchising models (micro-entrepreneurs)
	Business Development Support	
	Technical Training	

		Finance
Business Development Support Organisations	Section A	Overview of Business Development Support Organisation
	Section B	Business Development Support
		Funding
		Policy and Regulatory Environment
Energy Programme	Section A	Overview
	Section B	Identification, Screening and Selection
		Business Development and Skills Development Support
		Financing
		Policy and Regulatory Environment

Semi-structured interviews were conducted via Skype. The geographic location of the interview respondents informed the choice of Skype as an interview medium as the majority of the respondents are based in East Africa and some in the United States. Skype enables the researcher to overcome geographic boundaries. Skype interviews were conducted from the seminar room in the Research Commons (a dedicated research area within the UCT library for postgraduate students and staff).

All interviews were recorded and notes of key points were taken during the interviews. The interviews were on average 50 minutes. After conducting the interviews, the recordings were played back and transcribed personally; a 50 minute interview took approximately 5 hours to transcribe. Although personal transcription is time consuming, it offers the advantage of being able to familiarise yourself with the data and to reflect on key aspects that may have stood out during the interview as the recordings are played back. It also helps ensure the security of the data.

3.6. Data Analysis

3.6.1. Thematic Analysis

Thematic analysis involves breaking down the data according to key themes and then comparing and contrasting the various responses across the respondent categories (Biggam, 2011). Braun &

Clarke (2006: 10) state that, “a theme captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set”.

Similarly, Boyatzis (1998) defines thematic analysis as a method in which patterns in the data are identified and analysed. In the process of thematic analysis, codes are assigned to sections of the raw data collected from the fieldwork (e.g. an interview transcript, field notes etc.) in relation to how they appear to relate to the overall research aim and the themes that emerge from the data (Schwandt, 2014).

The findings from the empirical data were primarily categorised according *a priori* themes informed by key themes in the literature review and the pilot study (see section 3.5). It also however made allowance for emergent themes. A priori themes are identified prior to the data collection process. Emergent themes are the themes that emerged from the empirical data. To this end, structural codes were applied to organise the data according to the themes set out in the semi-structured interview schedule (using a deductive coding approach). After becoming familiar with the data, emerging themes were also identified (an inductive coding approach).

3.6.1.1. Coding

Assigning codes to the data is a key part of the thematic analysis process. A code is defined as:

“A word or short phrase that symbolically assigns a summative, salient, essence capturing and/or evocative attribute for a portion of language-based or visual data. The data can consist of interview transcripts, participant observation field notes, journals, documents, literature, artefacts, photographs, video, websites, and email correspondence and so on”(Saldaña, 2009: 3).

From the above data it can be seen that a code is a succinct label or description assigned to a portion of the data. The process of coding is described further below by Schwandt (2014: 39):

“Coding is a procedure that disaggregates the data, breaks them down into manageable segments, and identifies or names those segments. Although it is impossible to identify and name without at least an implicit conceptual structure, coding is often classified as relatively descriptive or analytical/explanatory depending on the degree of interpretation involved.”

It is recognised that manual coding and coding with the aid of software programmes offer their own set of advantages and disadvantages. One advantage of manual coding using a word processor is that many researchers are already fully conversant with the basic functionality that would be needed for coding in programmes such as MS Word. Furthermore the codes and the sources can be easily traced. Disadvantages include needing to use multiple word documents to visualise the data. Programmes such as NVivo 10, offer the advantage of organising the transcribed data under various nodes, allowing for visualisation of the coded data in one programme and reducing the time taken to code. However researchers often require time to become conversant with the software programme and need to obtain a licence for the software. It is important to note that software programmes such as NVivo 10, are not 'data analysis' programmes as such, but 'data organisation' programmes. In qualitative research studies (irrespective of whether coding is done manually or through a software programme) researchers are still required to 'manually' engage with and analyse the data.

In research study, coding was done manually. Initially, the use of software programmes that facilitate coding, such as NVivo 10, was considered. However manual coding was opted for in light of some technical challenges encountered when installing and running the NVivo 10 software programme (and the SQL server) and software licencing considerations within the UCT library.

3.6.2. Within-Case and Cross Case Analysis

A thematic within-case and cross case analysis was carried out. The 5 social enterprise case studies were first analysed using a within-case analysis approach. This refers to the description and analysis of the individual case studies (presented in Chapter 4).

Thereafter a cross case analysis approach was used. Yin (2014: 238) defines cross-case analysis as, "compiling of data for a multiple-case study, by examining the results for each individual case and then observing the pattern of results across the cases." Yin (2014) furthermore states that cross-case analysis is a particularly relevant technique when analysing multiple cases. A cross-

case analysis of the data from the individual cases in Chapter 4 is presented in Chapter 5. The data from the energy enterprise case studies was also compared with the interview responses from the other respondent categories (as previously indicated) and with the findings from the literature review (see Figure 12 below).

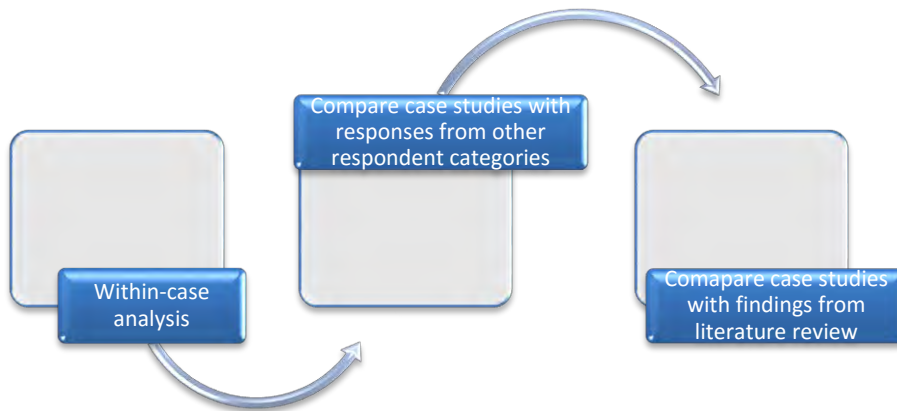


Figure 12: Schematic of Data Analysis Process (Diagramme Created by Researcher)

3.7. The Pilot Study

A pilot study is a critical component of conducting qualitative research. A pilot study refers to a small-scale pre-test of the whole survey or a particular research instrument. The pilot study thus enables the researcher to test the data collection instruments in the field. The pilot study plays an important part with regard to validity. The pilot study procedures help to ensure the internal validity of the survey instrument (van Teijlingen & Hundley, 2001). According to van Teijlingen & Hundley (2001:2), the pilot could serve the following purposes:

- Developing and testing adequacy of research instruments;
- Assessing the feasibility of a (full-scale) study/survey;
- Designing a research protocol;
- Assessing whether the research protocol is realistic and workable;
- Establishing whether the sampling frame and technique are effective;
- Assessing the likely success of proposed recruitment approaches;
- Identifying logistical problems which might occur using proposed methods;
- Estimating variability in outcomes to help determine the sample size;
- Collecting preliminary data;
- Assessing the proposed data analysis techniques to uncover potential problems

In this research study data from the pilot study was not included in the findings and analysis chapters, but rather served the following functions:

- It tested the research instrument with a respondent sample;
- It helped to crystallise the research focus;
- It helped to crystallise the research questions;
- It provided key practical insights from the field.

The pilot study included 7 respondents and involved a multiple stakeholder approach. Table 9 below lists the respondents for the pilot study.

Table 9: Pilot Study Respondents (Table Created by Researcher)

Respondent Category	Organisation Name	Respondent Name	Designation	Geographic Location	Interview Mode
Energy Company	Specialized Solar Systems	Mr Jonathan Hodgson	General Manager	South Africa, George	Semi-Structured Interview via Skype
Energy Company	Restio Energy	Mr Robert Aitken Mr Wikus Kruger	Managing Director Senior Consultant	South Africa, Somerset West	In Person Semi-Structured Interview
Sector Development Agency	GreenCape	Mr Mike Mulcahy	Operations Manager	South Africa, Cape Town	In Person Semi-Structured Interview
Financial Consultancy	PlaNet Finance	Ms Frances Fraser	Regional Director	South Africa, Cape Town	Semi-Structured Interview via Skype
Research Institution	CSIR	Mr Maxwell Mapako	Senior Specialist Enterprise Creation for Development	South Africa, Pretoria	Semi-Structured Interview via Skype
Research Institution	University of Delaware, Centre for Energy and Environmental Policy	Professor Lawrence Agbemabiese	Associate Professor (Previously headed up UN Africa Renewable Energy	United States	Semi-Structured Interview via Skype

			Enterprise Development (AREED) Programme)		
Government Department	City of Cape Town	Gerschwin Williams	Business Support & Skills Development: Economic, Environmental & Spatial planning Directorate	Cape Town, South Africa	In Person Semi-Structured Interview

3.8. Validity and Reliability

The validity of research pertains to the manner in which empirical data is gathered and analysed with specific reference to, “the appropriateness of your research strategy, the relevance of your data collection techniques and the way you analysed your data” (Biggam, 2011: 175). The use of a multiple case study design on energy social enterprises; semi-structured interviews; a purposive sampling approach and a thematic analysis of the data is consistent with the aims and objectives of the research study, and with a qualitative research methodology. As noted in section 3.4, the validity of research could be affected by the subjective nature of respondent selection when a purposive sampling approach is used. This was circumvented by ensuring an internal consistency between the respondent selection criteria, the aims and objectives of the study and the epistemological basis of the research.

The reliability of the research pertains to the record of evidence on how the research was conducted (Biggam, 2011). In this research study, a record of evidence was provided through, amongst other, the description of the sample respondents and the geographic location of case study organisations in section 3.4. A record of evidence was also provided through the description of the interview mode, duration and transcription process in section 3.5 and the semi-structured interview schedule in Appendix A. The reliability of the research was furthermore strengthened through the practical experience and industry insights of the respondents from the social enterprises and other respondent categories, including energy access development practitioners from organisations including the World Bank and United Nations Foundation. In

addition, the validity and reliability was strengthened through the triangulation of data sources, as discussed in section 3.4.1.

3.9. Limitations

It is generally accepted that case study research presents inherent challenges with regard to generalisability because of the use non-probabilistic sampling techniques in case study research (Falk & Guenther, 2006; Biggam, 2011; Yin, 2014). The generalisability of the findings of a research study refer to, “whether a study’s findings are generalizable beyond the immediate study...”(Yin, 2014: 48). However, it is important to bear in mind that the primary purpose of case study research is not generalisability (Falk & Guenther, 2006). Rather, case study research enables rich detail and an in-depth understanding of the phenomena being researched (Biggam, 2011).

Survey methods that use random sampling techniques could generate findings that are more representative of the population. Falk & Guenther (2006: 192), state that, “a carefully selected probability sample allows for generalization of sample statistics to population parameters using probability theory.” Case-studies however, are seldom chosen using probabilistic sampling techniques (Falk & Guenther, 2006).

Falk & Guenther (2006) and Blaikie (2010) also point out that generalisability in the context of qualitative research should not be viewed in same way was generalisability in quantitative studies. Biggam (2011) asserts that in case study research the ‘reliability’ of study is of more relevance than the generalisability. Similarly Blaikie (2010) indicates that the ‘reliability’ or ‘transferability’ need to be looked at for qualitative research studies. Therefore the interpretations of the energy enterprise case study findings in this empirical study should not be seen as representative sample of all social energy enterprises (and local micro-entrepreneurs) in East Africa but does provide in-depth insights into some of these models and pertinent practical lessons and experiences from the field.

Another limitation pertains to not being able to conduct interviews directly with the local micro-entrepreneurs. All data on the micro-entrepreneurs was obtained through interviews with the social enterprises and corroborated through information on their websites and other published documents. Initially, local micro-entrepreneurs were also included as a respondent category. It was however realised (after consulting with some of the energy enterprises) that there would be too many geographic logistical challenges. As the majority of the local micro-entrepreneurs run their businesses within their villages and regions (some within very remote rural settings) and only interact with the social enterprises when they need to and are not always within the immediate vicinity of the local regional offices. Therefore arranging Skype calls with the local micro-entrepreneurs or administering questionnaires was not practical.

Where possible interviews were conducted with people in the respondent organisation that had very close interaction with the micro-entrepreneurs (e.g. Mr Geoffrey Shayo from Juabar, who interacts directly with the Juabar local micro-entrepreneurs on a frequent basis). Notwithstanding, the in-depth semi-structured interviews with the social enterprises provided sufficient breadth and depth to be able to answer the research questions in this study.

3.10. Chapter Summary

This chapter outlined the qualitative research methodology for the collection of empirical data. Section 3.2 framed the epistemological basis of the study and the interpretivist position of the researcher. Section 3.3 described the multiple case study design. Section 3.4 discussed the suitability of a purposive sampling approach and the selection criteria for each of the respondent categories. It furthermore discussed the triangulation of different data sources. Section 3.5 discussed the semi-structured interview as the primary data collection instrument, provided an overview of key themes in the semi-structured interview schedule and detailed the mode and duration of the interviews. Section 3.6 described the thematic within-case and cross case analysis. It also discussed the process of coding that formed part of the thematic analysis. Section 3.7 discussed the pilot study undertaken to test the data collection instrument. Section 3.8

discussed the validity and reliability of the research study, with respect to the process of data collection and analysis. Section 3.9 outlined some of the key the limitations of the study.

Chapter 4 Findings, Analysis and Discussion: Within Case Analysis

4.1. Introduction

This chapter provides a within-case analysis of the empirical findings from the 5 social enterprises interviewed. The case studies in this chapter are compiled primarily from the interview responses. Secondary data from reports, web pages and other published documents were used to support the findings from the respondents and to provide additional insights. The first section of each case study provides an overview of the social enterprises. In line with the aims and objectives of the study, the second section explores the synergy between the social enterprises and local micro-entrepreneurs by looking at the business model used to incorporate local micro-entrepreneurs into clean energy value chains and the stages of the value chain where the social enterprises and local micro-entrepreneurs participate. The final section provides an enterprise ecosystem analysis. Figure 13 below presents an outline of the structure of the case studies in Chapter 4.

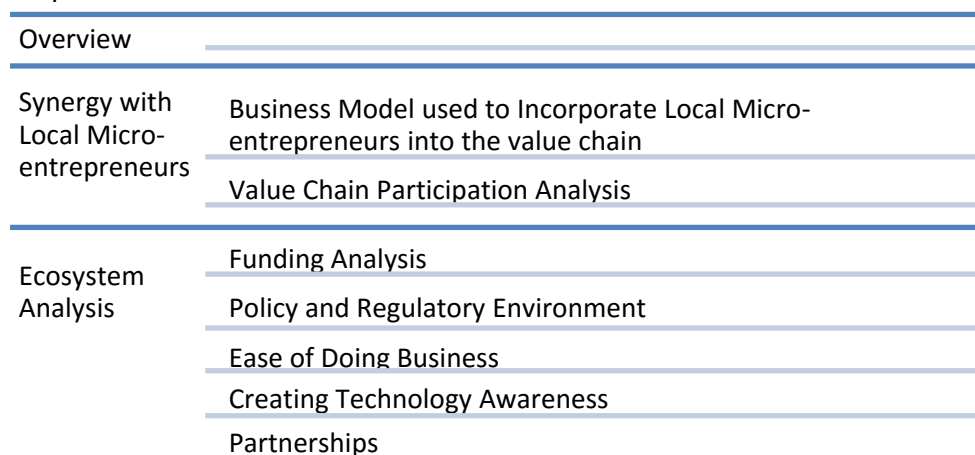


Figure 13: Outline and Structure of Case Studies (Diagramme Created by Researcher)

Table 10: Energy Enterprise Case Studies (Table Created by Researcher)

Name of Energy Social Enterprise	Country
Juabar	Tanzania
ARED	Rwanda
Solar Sister	Uganda, Tanzania, Nigeria
Nuru Energy	Rwanda, India
Barefoot Power	East Africa, West Africa, Asia, the Americas

4.2. Juabar

4.2.1. Overview

Table 11: Overview of Juabar- Energy Social Enterprise in Tanzania (Drawn from Data Available to Researcher)

	Overview	Motivation for Starting Business
Juabar	<ul style="list-style-type: none"> For-profit social enterprise in Tanzania, providing a solar powered mobile phone charging business opportunity to local village residents. Mobile solar powered kiosks primarily operated in region of Morogoro, Tanzania. Currently 30 Juabar micro-entrepreneurs. 	<ul style="list-style-type: none"> Insight into the energy access experience in a rural Tanzanian village and an understanding of the energy needs of the village residents; The disjuncture between the growth in mobile phone access and access to electricity to charge mobile phones; Recognising the opportunity to create an economic opportunity for local Tanzanian village residents through the Juabar mobile phone charging kiosk.

Juabar is a for-profit Social Enterprise in Tanzania. They provide a business opportunity for local village residents to become Juabar entrepreneurs and run their own solar powered mobile phone charging kiosk. The mobile kiosks are currently operational in the region of Morogoro, 184km West of Dar es Salaam. Currently, 30 local Juabar micro-entrepreneurs have been set up with the mobile kiosk (DeCou, personal interview, 21 April 2015).

The design of the solar powered mobile kiosk was part of the design project of Olivia Nava, Anna Acquistapace and Eric Persha, who were MBA students at the California College of the Arts in the United States (US). The design project formed part of the 2011 MBA programme. Juabar, as a business entity, was founded in 2012 by Olivia Nava and Sachi DeCou (also an MBA student at the California College of the Arts). The prototype testing of the mobile kiosks and business model took place in 2012, with two Juabar local micro-entrepreneurs. Juabar has actively been operating as a business since 2013.

The Juabar concept culminated from the insights of a research study undertaken to gain an understanding of the energy experience in Tanzania as well as the solar product market in Tanzania. The research study revealed that there was a sense of hesitation amongst potential customers that previously had poor experiences with solar products. Furthermore there was not enough exposure to solar technologies. The rationale behind the Juabar mobile kiosk was to

introduce a solar powered service to the community that could meet an immediate energy end use need (for which there was an existing demand) and offer a positive experience with solar energy (DeCou, personal interview, 21 April 2015).



Figure 14: Juabar Solar Powered Mobile Kiosk (Juabar, 2015a)

Juabar believed that if local Tanzanian village residents were offered a positive experience with solar energy, confidence in off-grid solar technology and products could increase. Through mobile phone charging at the kiosk, customers could get first hand exposure to the functionality and benefits of solar power, which could then potentially serve as a catalyst for making more substantial investment in personal solar powered devices and systems (e.g. pico solar lighting systems and solar home systems). One of the local Juabar micro-entrepreneurs used some of the profits generated from his mobile kiosk charging business to invest in a personal solar home system for his family (Shayo, personal interview, 20 May 2015).

Juabar recognised the disjuncture between access to mobile phones and access to electricity and took into account Tanzanian regional contexts, in order to develop an innovative solution that could meet energy access needs, facilitate connectivity and create an income generating

opportunity for local Tanzanian village residents. The Juabar design and innovation process involved collaborative efforts with local Tanzanians. This included input from the local Juabar micro-entrepreneurs themselves and their partner organisation, ARTI Energy.

With regard to technology innovation, the design of the mobile kiosks went through various stages. Juabar has applied theoretical social innovation and design principles in a practical real life context in order to create social impact. The initial design process culminated from the MBA project and went through subsequent modifications with input from ARTI Energy and the Juabar micro-entrepreneurs who were running the kiosk (Juabar, 2015b). This process of co-creation with local stakeholders is imperative to the impact of Juabar.

4.2.2. Synergy with Local Micro-entrepreneurs

4.2.2.1. Business Model Used to Incorporate Local Micro-entrepreneurs in the Value Chain

Franchise Model Description

Their business model is a form of a micro-franchise model, where residents from Morogoro can express interest to become part of the franchise and is described by DeCou (personal interview, 21 April 2015) as follows:

“We use a form of a franchise model, it is not a tightly controlled franchise. There is a rather standard market price for the service (cell phone charging) so we do not dictate to the entrepreneurs in our franchise how much to charge, so it varies, but essentially it is a micro-franchise model. The idea is that they can ultimately own their own businesses and interact with us if they want to do product sales and additional sales in the future.”

Initially Juabar used a long term lease model, where the local Juabar micro-entrepreneurs were required to pay a monthly rental on the kiosk. Thereafter they introduced a lease-to-own option, where the local micro-entrepreneurs could ultimately own their own kiosk, once the fee for the kiosk had been paid off.

Franchise Fee Structure

The cost of the kiosk is \$600. The monthly fee is \$37 (80 000 Tanzanian Shillings) and the full kiosk fee can be paid up within a period of about 12 months to 18 months. Initially the first payment was required up-front, however some entrepreneurs were not able to afford the upfront fee. There was also an element of hesitation about whether they would be able to recover their costs in sales (Shayo, personal interview, 20 May 2015). Currently the model works on the basis that the first payment is due after the first month of sales.

Shayo (personal interview, 20 May 2015) offered insight into their experience with the lease and lease-to-own models. In the plain lease model, some entrepreneurs did not necessarily view it as a potentially long term venture and would bring the kiosk back stating, for example, that their business was not doing so well. However with the lease-to-own model, they noticed that there is an extra motivation for the local Juabar micro-entrepreneurs. Some of the entrepreneurs work concerted to pay off the kiosk, because the kiosks become theirs once all the monthly instalments are paid. There have been examples of entrepreneurs who pay 120 000 or 200 000 Tanzanian Shillings per month instead of the required 80 000 Tanzanian Shillings.

Identification and Selection

Many of the entrepreneurs heard about Juabar and expressed an interest in the mobile kiosk business. Shayo (personal interview, 20 May 2015) indicated that after potential sites for the kiosks were selected (based on an assessment of the demand for their mobile phone charging service), they visited these areas and presented the Juabar mobile kiosk business to interested village residents who attended their introductory information sessions. One of criteria that Juabar looks at is entrepreneurial skills or exposure. Those who express an interest are required to fill out a questionnaire that is designed to establish if they are entrepreneurially inclined. Shayo (personal interview, 20 May 2015) indicated that someone who has previously run a shop in the village is more of an entrepreneur than someone who has previously worked as a farmer. They are furthermore invited for an interview. Shayo (personal interview, 20 May 2015) stated that they also get recommendations from village leaders or people in the village that know them and

can attest to their character. Finally, potential Juabar entrepreneurs need to be willing to work with Juabar according to the micro-franchise terms and conditions.

Business Development Support and Technology Transfer to Micro-entrepreneurs

The initial training provided is relatively straightforward and includes technical training (going over how the technology works) and business training (including customer service training). Thereafter entrepreneurs are invited back for additional training that goes into bookkeeping and teaching local micro-entrepreneurs business principles (e.g. the difference between revenue and profit).

The training furthermore allows for skills sharing among the entrepreneurs. DeCou (personal interview, 21 April 2015) commented:

“I think the services we provide are relatively instrumental in terms of business development within a community and beyond that- the goal being that they are gaining skills that they can then grow and share with other entrepreneurs in the area.”

The skills-sharing referred to above can be illustrated by the example of Mr Martin Soka, who has been a Juabar entrepreneur since January 2013. Mr Soka has been recognised as a leader within the Juabar entrepreneur network and plays an important role during the training sessions where he shares his experiences and lessons learnt with the new Juabar entrepreneurs who come to the training sessions. He also assists with some hands-on technical demonstrations on how the kiosks operate (Juabar, 2015b). This is an example of how a local entrepreneur that was provided with business support and training, uses the knowledge to plough back into his own community, thereby improving local business skills transfer and technology transfer.

When analysing the training methodology that Juabar uses, important key aspects are noted. Firstly they provide a combination of technical training and business training. The technical training forms part of the technology transfer process. This technology transfer includes familiarising the Juabar local micro-entrepreneurs with solar power. The entrepreneurs who run the mobile kiosks do not require in-depth, highly technical training on renewable energy per se, but do need to have a good general understanding of how solar energy powers the kiosk and the

benefits of using solar energy to power a business. The business training component is essential, particularly for entrepreneurs who do not have prior experience in running a business. Knowledge on how to manage the finances of the business and how to interact with customers is essential for any business to succeed.

Secondly, Juabar provides training in incremental stages, initially covering the basics (e.g. basic bookkeeping) and thereafter going into a bit more detail on business management. Juabar also provides a type of on-going mentoring support by interacting with the Juabar local micro-entrepreneurs on an ongoing basis, for as long as they wish to continue interacting with Juabar. Another positive value add is the skills sharing that takes place among the Juabar local micro-entrepreneurs, which is facilitated by Juabar. In these skills sharing sessions Juabar invites micro-entrepreneurs that are successfully running their kiosk businesses to share their skills and experiences with new the new micro-entrepreneurs. An ongoing approach to mentoring and training is important, particularly within the early growth stages of their micro-enterprises. As the local micro-entrepreneurs grow their micro-enterprises, interactive mentoring could help to identify current challenges and potential pitfalls and put mitigating measures in place timeously.

Income Generating Potential for Local Micro-entrepreneurs

The Juabar mobile kiosks are an instant business opportunity for local Tanzanian village residents. The Juabar micro-entrepreneurs charge between 300 and 700 Tanzanian Shillings (depending on the device being charged-mobile phones or tablets) and are advised to charge at least 20 phones a day (some charge on average 30 phones a day). The local Juabar entrepreneurs make profits ranging from \$75 to \$150 per month after paying the lease fee for the kiosk. The first calculation in row 1 of Table 12 below, shows that by charging 30 mobile phones per day (for 7 days a week) Juabar micro-entrepreneurs could make a profit of \$169 per month, which is slightly more than the \$150 upper range indicated by Juabar. The second calculation in row 2 is slightly more conservative and is based on the assumptions of 25 phones being charged per day and a 5 day week. In this scenario micro-entrepreneurs could make a monthly profit of \$78 which is very close to the lower bound of the range indicated by Juabar. Shayo (personal interview, 20 May 2015)

indicated that in the case of some of the Juabar micro-entrepreneurs who previously had no form of income, the money from the Juabar kiosk is their sole income stream. For other micro-entrepreneurs, it augments existing income streams including income derived from agricultural activities.

Table 12: Income Earning Potential- Juabar Mobile Kiosks (Calculated from Data Available to Researcher)

Average Number of Phones Per Day	Average Charging Cost per Mobile Phone (Tanzanian Shillings)	Average Revenue Per Day (Tanzanian Shillings)	Number of Days per Month	Monthly Mobile Phone Charging Revenue (Tanzanian Shillings)	Lease Fee (Tanzanian Shillings)	Monthly Profit/ Loss (Tanzanian Shillings)	Monthly Profit/ Loss (US Dollars)
30	500	15 000	30	450 000	80 000	370 000	\$169*
25	500	12 500	20	200 000	80 000	170 000	\$78*

*based on the US dollar/Tanzanian Shilling exchange rate on 31/03/2016.

The mobile kiosk business is however affected by seasonal fluctuations in the income of the local village customers and the number of customers that frequent the mobile kiosks at different times in the year. Periods where the flow of customers to the kiosk is low, presents a challenge and a potential threat to the mobile kiosk micro-enterprises. As noted earlier, Shayo (personal interview, 20 May 2015) indicated that there were instances where entrepreneurs would bring the mobile kiosk back to Juabar stating that business was slow. Although there is a demand for the charging service, there are seasonal factors that could influence the demand for the service. Most of Juabar’s customers are involved with agricultural activities - certain periods of time they are out in the field and other times they are out in the marketplace selling their produce. These factors all contribute to the flow of customers to the mobile kiosks. The sustainability of the mobile kiosk business is therefore dependent on how the Juabar local micro-entrepreneurs are able to navigate through the slow periods of the business.

Micro-entrepreneurs who previously derived income from agricultural activities are now able to supplement their income through their mobile kiosk business. For example, Mama Salama has worked with Juabar for more than 2 years and was the first Juabar micro-entrepreneur. Her

daughter and other family members operate her kiosk the majority of the time. Through the income derived from the kiosk, Mama Salama was able to pay for her children's education and purchase food during periods of low crop yields (Juabar, 2015b).

One of the longest running kiosks has been operating for over two years, which indicates that kiosk business does have the potential to become a sustainable income generating platform.

There are various factors that contribute to the sustainability of the Juabar mobile kiosk business. As Juabar uses a form of a franchise model, the sustainability of Juabar as the franchise and the sustainability of the local Juabar micro-enterprises (franchisees) are interlinked. Juabar derives income from the monthly kiosk rental paid by the micro-entrepreneurs and the Juabar micro-entrepreneurs are dependent on the physical infrastructure and business development support provided by Juabar. The business development support and mentoring is an important part of improving the sustainability of the business. DeCou (personal interview, 21 April 2015) indicated that Juabar would continue to provide support to the local Juabar micro-entrepreneurs for as long as they wished to continue working with Juabar, but that the ultimate goal is for the local micro-entrepreneurs to have a business that they can take ownership of and run as independently as possible.

4.2.2.2. Value Chain Participation Analysis

Figure 15 below illustrates (per red tick) the key areas where Juabar participates in the clean energy value chain. Synergy with local micro-entrepreneurs is indicated with a blue interlocking gear symbol. Juabar participates in the research and development stage in the value chain and in the marketing, sales and distribution stages (through the mobile kiosk phone charging service in the village). The research and development stage includes the design and development of the mobile kiosk prototype. Their local partner organisation, ARTI Energy, was involved with research and development stage of the mobile kiosks. Juabar is also involved in the manufacturing stage of the value chain. The frame (body) of mobile kiosks are manufactured locally in Tanzania by fabricators from a local vocational college and assembled by a team of local technicians who fit

the kiosks with the solar panels and necessary wiring. Juabar is furthermore involved with marketing and awareness raising about their solar kiosks in the local villages. They are also involved with the actual mobile phone charging services through the kiosks and provide a maintenance service for the kiosks.

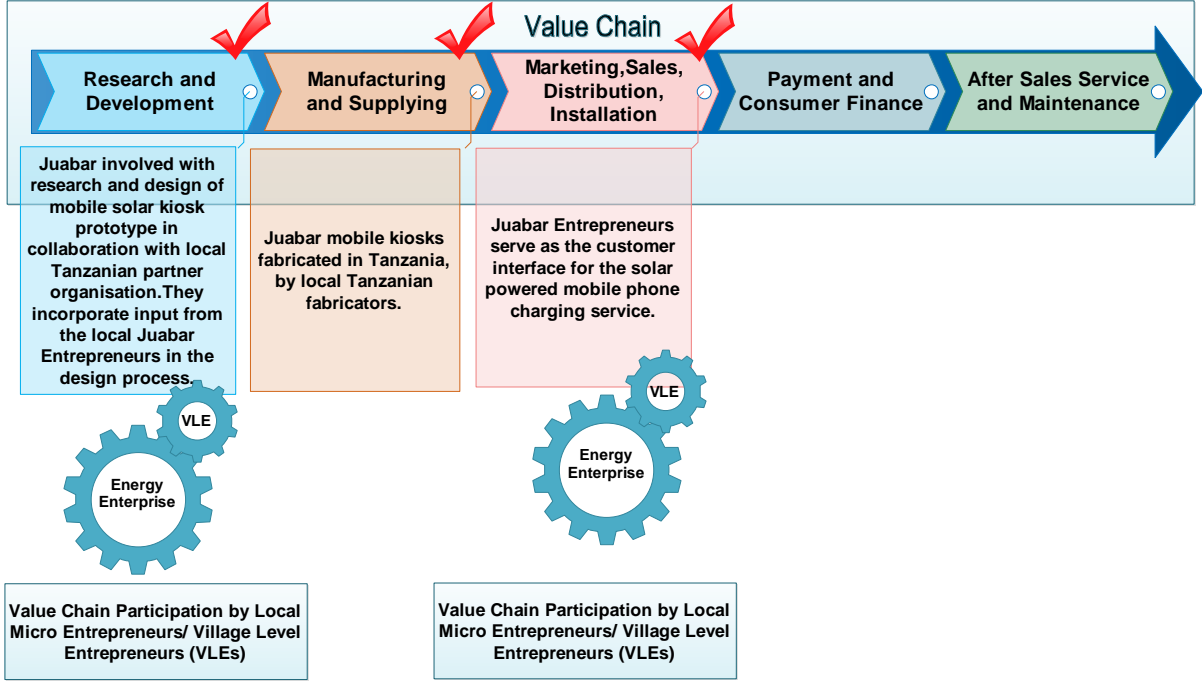


Figure 15: Value Chain Participation Juabar (Diagramme Created from Data Available to Researcher)

There is synergy between Juabar and the Juabar local micro-entrepreneurs during the research and development, marketing and energy service stages of the value chain. In the research and development phase, an iterative design process is used. The local Juabar micro-entrepreneurs give input into the design of the improved versions of the solar kiosk (Juabar, 2015c). These inputs are invaluable; the local Juabar micro-entrepreneurs have hands-on experience as they serve as the interface between Juabar and the local village residents. The local micro-entrepreneurs play a key role in marketing the services offered though the mobile kiosks to the local residents.

Juabar indicated that they have women entrepreneurs in their solar kiosk franchise, although at present, it is mostly men that enquire about becoming part of the franchise. This could be attributed to the prevailing social dynamics prevalent in the local community. They believe that

facilitating women's entrepreneurship is important and something which they encourage by inviting women to come to the capacity building and training sessions (DeCou, personal interview, 21 April 2015).

Shayo (personal interview, 20 May 2015) indicated that there are still cultural rules and norms that are entrenched in the community, which hinder the optimal participation of women in business activities. He stated that women who are invited to attend the training sessions, initially say that they are very interested to attend, but the actual turnout of women at the training sessions is not that high. He provided an example that if 10 women expressed interest to come to the next training session, the actual turnout would be about 6 and the husbands of the remaining 4 women would come in their place.

Futuristically they would like to facilitate more women's entrepreneurship. DeCou (personal interview, 21 April 2015) commented, "the women that we happen to work with happen to be some of our better entrepreneurs."

4.2.3. Ecosystem Analysis

4.2.3.1. Funding Analysis Juabar

Juabar initially obtained grant funding from an entrepreneurship competition they had won for the Juabar mobile kiosk prototype. Other initial sources of funding include, but are not limited to, funding from friends, family and angel investors. She also indicated that they are also financed through debt financing. She commented that being able to access debt finance is a bit easier than accessing grant funding, however they have to ensure that the lease payments of the micro-entrepreneurs are synchronised with their loan payment cycles.

DeCou (personal interview, 21 April 2015) expressed that accessing funding does present challenges and can be a time consuming process:

"I think funding is definitely everyone's biggest challenge - it's time consuming. It's frustrating in the sense that it takes time and is not really your core business. It can be frustrating because you

are spending a lot of time doing things that are not really fundamental to what you are trying to create.”

She further indicated that the social enterprise business structure presents inherent challenges when trying to raise funding. Some potential funders commented that their business model leans too heavily on the social side, and not enough on the commercial business side, while in contrast others indicated that the business leans too much towards a commercial venture and does not have enough of the social impact dimension. She commented, "so that's been an interesting one for us to kind of understand: the communication behind how you talk to different people (potential funders) about what we are doing (DeCou, personal interview, 21 April 2015)".

She furthermore commented that it is important to align yourself with funders who are able to identify with the mission and core values of your business and who are willing to invest in your sector and geographic region (DeCou, personal interview, 21 April 2015).

Another funding challenge relates to raising capital to in order scale the business. DeCou (personal interview, 21 April 2015), commented that businesses are often required to reach a certain size or stage where they are able to demonstrate enough potential to scale, in order to be eligible for funding to scale the businesses. This in itself is a challenge because entrepreneurs require additional rounds of funding (after early stage funding) to be able to grow their businesses to the level where it shows promise of being a scalable business venture. This indicates the need for funding that can bridge the gap between start-up and scale.

4.2.3.2. Policy and Regulatory Environment Analysis Juabar

With regard to government policies that have had a positive impact on the business, DeCou (personal interview, 21 April 2015) indicated that Juabar primarily benefited from the VAT exemptions on solar products in Tanzania, instituted by the Tanzanian government. In 2005 VAT and import duties on PV products were removed including, “solar modules, charge controllers, solar-specific batteries, lights, and associated products”(International Finance Corporation, 2012: 6).

Juabar benefits from the VAT exemption as it has an impact on the cost of the components of the mobile kiosk, for example the PV panels, as these parts are imported and not manufactured locally. DeCou (personal interview, 21 April 2015) commented, “the VAT exemption on solar products is helpful to the whole industry and is something that we benefit from. It is designed to encourage the proliferation of solar in the country and has been very helpful to us.”

DeCou (personal interview, 21 April 2015) however also commented on the possible implications of recent discussions on potentially introducing VAT on solar batteries.

“There was discussion recently on starting to charge VAT on solar batteries, and I believe that there has been enough lobbying against it from the solar industry, that they have decided not to do that, but that type of thing would be difficult for the whole industry so certainly that would not be helpful for us, so I understand where they are coming from, because they have complications in understanding if their batteries are being used for solar or if it’s being used for vehicles and other devices.”

4.2.3.3. Ease of Doing Business

With regard to regulation, DeCou (personal interview, 21 April 2015), commented that the main regulatory challenge pertained to understanding the legal frameworks and procedures for registering and setting up a business in a new country (i.e. coming from the US and setting up a business in Tanzania). She indicated that the requirements for setting up a business in a new country need to be clearly understood in order to avoid unnecessary delays. She further commented that because the process can be very time consuming, it would be useful if the rollout of all the necessary procedures were stipulated with the timeframes associated with the various processes. Tanzania is ranked 139 (out of 189 economies) on the ease of doing business World Bank rank (World Bank, 2016b). In terms of starting a business, it is ranked 129 and has moved down from its previous ranking of 122. Starting a business alone entails 9 procedures that cumulatively take 26 days to complete (World Bank, 2016b), which is cumbersome and time consuming. The World Bank data serves to confirm Ms. DeCou’s assertion that the regulatory environment is not conducive to setting up a business in Tanzania.

4.2.3.4. Awareness Raising

As noted previously, DeCou (personal interview, 21 April 2015) indicated that when they first came to Tanzania, they found that there was generally not enough awareness about solar technologies, and that they hoped to create a positive experience and raise greater awareness about the benefits of using solar, through their mobile Juabar kiosks. Their introductory sessions in the various regions in Morogoro (where they presented the Juabar concept to potential micro-entrepreneurs) and the Juabar kiosks serve as marketing for Juabar and awareness raising for solar technologies. The Tanzania Renewable Energy Association (TREA) in conjunction with the Tanzania Bureau of Standards, has played an important role in awareness raising through radio marketing campaigns and roadshows in the regions of Morogoro, Dar es Salaam, Mwanza and Pwani. It is found that in some regions in Tanzania there is a very high level awareness about solar, but in other regions the levels of awareness are still very low (Overseas Development Institute et al., 2016a).

4.2.3.5. Partnerships

While governments, development partners and funders, all have an important role to play in the creation of an enabling ecosystem, the business themselves also play a part. The establishment of partnerships with a wide variety of stakeholders is imperative in this regard. Juabar established a partnership with ARTI Energy (Potnis, 2012). ARTI Energy is a merger between the Appropriate Rural Technology Institute Tanzania (ARTI-TZ), a non-profit organisation that was founded in 2007, and ARTI Energy Limited. The mission of ARTI-TZ was to, “promote sustainable technologies for energy production, environmental protection, employment and income generating opportunities in Tanzania”(Potnis, 2012: 2). ARTI Energy Limited is a commercial business venture established in 2011 with the mission of identifying and marketing clean energy products to Tanzanians. Juabar and ARTI Energy have a shared mission and this partnership was mutually beneficial as it served as a conduit for advancing their shared mission. ARTI Energy could identify with the need for a new innovative mobile kiosk platform that could provide an energy

access service and create an economic opportunity for residents in local rural Tanzania. Juabar benefited from having a local Tanzanian partner that understood the local regional context and could provide invaluable insights into the design process.

Juabar recently started partnering with economic development organisations in Tanzania, to provide additional training and business support to the local Juabar entrepreneurs. The economic development organisations recognise the value add that Juabar brings in terms of stimulating local entrepreneurship, and the partnership makes sense in that it is part of the mandate of the local economic development institutions to promote local economic development.

4.3. African Renewable Energy Distributor (ARED)

4.3.1. Overview

Table 13: Overview of ARED- Energy Social Enterprise in Rwanda (Drawn from Data Available to Researcher)

	Overview	Motivation for Starting Business
ARED	<ul style="list-style-type: none"> For-profit social enterprise in Kigali, Rwanda. Mobile solar powered kiosks that provide mobile phone charging services, mobile money transactions, airtime purchases and prepaid electricity purchases. Currently 25 ARED franchisees. 	<ul style="list-style-type: none"> The intention to create a positive socio-economic impact through a low cost, clean-energy powered mobile business for local Rwandans that fall within the economic Base of the Pyramid (BOP). Inspiration from mobile phone charging kiosks at airports in the US. The disjuncture between the growth in mobile phone access and access to electricity to charge mobile phones; Recognising the opportunity to create an income generating platform for local Rwandans through the ARED mobile phone charging kiosk.

African Renewable Energy Distributor (ARED) is a for-profit social enterprise in Kigali, Rwanda. ARED was founded in 2013 by Mr Henri Nyakarundi, an entrepreneur from Rwanda, who studied and lived in the United States (US) for a few years. ARED offers a solar powered mobile kiosk that provides a mobile phone charging service, mobile money transactions, airtime purchases and prepaid electricity purchases (Nyakarundi, personal interview, 20 May 2015).

The solar powered mobile kiosk idea was inspired by the growth in mobile phones in Rwanda and by mobile phone charging stands that Mr Nyakarundi observed at an airport in the US. Although mobile phones have shown significant growth in Rwanda, he noted that people were unable to charge their mobile phones as a result of energy access challenges. He thought of taking the mobile phone charging stand concept, and modifying it for an outdoor context within the business city centre of Kigali. He decided to employ the use of solar PV to power the mobile kiosks, as it would be a practical and sustainable solution. There are currently 25 ARED local franchisees (Nyakarundi, personal interview, 20 May 2015).

ARED illustrates the importance of continuous innovation. The initial innovation process involved both technology innovation and business model innovation. Technological innovation included the development of the ARED mobile solar kiosk, which encompassed the concept behind the kiosk and the technical design of the kiosk. Testing the mobile solar kiosk prototype in the market and refining the business model was a critical component in the process of business model innovation. During the pilot testing phase Mr Nyakarundi realised that additional revenue streams would be necessary in order to make the revenue structure work for both ARED as the franchisor and the micro-entrepreneurs as the franchisees (Nyakarundi, personal interview, 20 May 2015). This period also served as an impetus for establishing an advertising partnership with Airtel, which serves as an important recurring passive income revenue stream for the business. Through the process of business model innovation, the ARED business concept evolved from a single mobile phone charging platform to a multiple service platform.



Figure 16: ARED Mobile Phone Charging Kiosk (ARED, 2014b)

4.3.2. Synergy with Local Micro-entrepreneurs

4.3.2.1. Business Model Used to Incorporate Local Micro-entrepreneurs in the Value Chain

Franchise Model Description and Fee Structure

ARED offers a micro-franchise opportunity that supports the creation and development of aspirant local micro-entrepreneurs. The total franchise fee is \$800 for men and \$700 for women. A 20% upfront deposit is required, with the balance payable over a 12 and 18 month period for men and women, respectively. Nyakarundi (personal interview, 25 April 2015) motivated why the franchising model was selected:

“I love franchising because instead of an entrepreneur having to start a business completely from scratch and having to do something on their own, they can buy into a business that has all the structure already laid down. All you have to do is plug into the training and learning and then you can start your business, instead of having to learn everything on your own.”

Identification and Selection

Entrepreneurs are mostly selected through word of mouth marketing and referrals from existing micro-entrepreneurs in the franchise. Nyakarundi (personal interview, 25 April 2015) commented:

“The marketing is a lot of word of mouth. We do a lot of radio campaigns, but mostly word of mouth, because it is an outdoor product. So a lot of people that see the kiosk (that are interested to know more information) ask the agent that is working at the kiosk. Then the agent gives them our number and then they call us. And referrals, we have a referral fee structure, so if an agent refers us to a franchisee that qualifies, it’s roughly \$15 per referral.”

In order to become part of the ARED franchise, potential micro-entrepreneurs need to:

- Pay the 20% upfront deposit;
- Be at least 18 years old;
- Be able to read and write;
- Have completed 4 years of high school and
- Be willing to undergo the ARED standard training.

Business Development Support and Technology Transfer to ARED Micro-entrepreneurs

The training runs over a three-day period and includes customer service, how to market yourself, how to sell the different services, how to use the kiosks and how to re-use the capital etc. In the future they would like to do more video training, to accommodate different learning styles. In addition, video training would enable entrepreneurs coming into the franchise brand to see an example of other entrepreneurs operating the mobile kiosks on the ground (Nyakarundi, personal interview, 25 April 2015).

Income Generating Potential

ARED micro-franchisees keep all the revenue generated from the mobile phone charging service at the mobile kiosk. In addition ARED has a profit sharing structure where they share 5% of the profit made on the other services, with the micro-franchisees. They could also earn a \$15 referral fee (per referral) if they refer other potential micro-entrepreneurs that meet the minimum criteria set by the ARED franchise. Future potential additional revenue streams include revenue from a Wi-Fi service at the kiosks (Nyakarundi, personal interview 25 April 2015).

Jeanne Marie Uhiriwe is an ARED franchisee. She operates her mobile solar powered kiosk in Kigali's business centre. Jeanne was able to obtain funding from her village's Family Association. For Jeanne, the franchise opportunity opened up a whole new avenue through which income can be derived. She runs the mobile kiosk daily from Monday to Saturday for 12 hours a day. Prior to this opportunity, she had considered dairy farming to be the most likely option for making a living. This opportunity has empowered Jeanne to work for herself. She furthermore viewed this opportunity as a conduit for other opportunities. Through her business, she is able to provide financial support to her immediate family, and assist her siblings with their education costs (Gilks, 2015).

The ARED micro-franchise offers a potentially sustainable income generating opportunity. However, because more detailed information on the income generated by the micro-franchisees could not be accessed, the findings that can be drawn on the income earning potential of the

micro-franchisees are limited to the information at hand. Notwithstanding, the multiple service offerings and revenue streams from the mobile kiosk are positive indicators of the sustainability of the ARED franchise, because the business is not dependent on one revenue stream only. This is a form of product and service diversification. The sustainability of the ARED franchise and the enterprises of the local micro-entrepreneurs are interdependent. The franchisor ARED, derives part of its revenue from the electronic services sold at the mobile kiosks and from the monthly franchise fee paid by the ARED franchisees (local micro-entrepreneurs). The ARED franchisees benefit from the business infrastructure and business training that comes with being part of the franchise. The performance of the micro-entrepreneurs on the ground and the strategic vision and decision making on the part of the franchisor will influence the sustainability of the mobile kiosk business.

4.3.2.2. Value Chain Participation Analysis

Figure 17 below illustrates (per red tick) the key areas where ARED participates in the clean energy value chain. Synergy with local micro-entrepreneurs is indicated with a blue interlocking gear symbol.

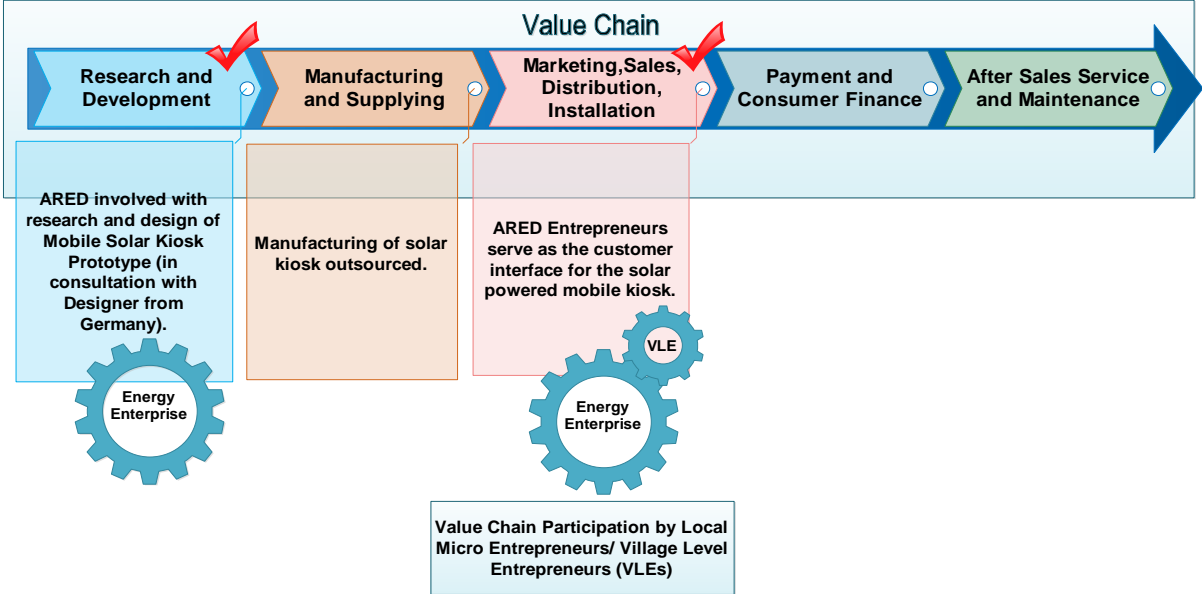


Figure 17: Value Chain- ARED (Diagramme Created from Data Available to Researcher)

ARED participates in the research and development stage in the value chain (through the design and development of the mobile kiosk prototype) and in the marketing, sales and distribution stage (through the mobile kiosk phone charging service in the village). Mr Nyakarundi was actively involved in the research and development phase in the value chain. This involved the design and testing of the prototype of the mobile kiosk. He employed the services of a designer in California and an engineer in Poland for the first design of the kiosk. It took 4 years to develop the first prototype. The prototype was brought to Rwanda in December 2012 and tested in the market for a year (Nyakarundi, personal interview 25 April 2015). The ARED mobile kiosks were initially manufactured in Poland, but are currently being manufactured in China. Futuristically, they endeavour to be able to manufacture their own kiosks by acquiring a 3D printer.

There is synergy between ARED and the ARED local micro-entrepreneurs during the marketing and sales and distribution stages of the value chain, where the local micro-entrepreneurs serve as the interface between ARED and the local customers in Kigali.

ARED makes their business model more women inclusive by offering a slightly lower franchise fee (\$700 instead of \$800) for their solar kiosk and a longer payback period to pay off the franchise fee (up to 18 months instead of 12 months). Currently 30% of their kiosks are operated by female micro-entrepreneurs. Nyakarundi (personal interview, 25 April 2015) indicated that the female ARED micro-entrepreneurs perform really well in running their mobile kiosk businesses. With regard to the franchise payment structure and the performance of female micro-entrepreneurs within the ARED franchise, Mr Nyakarundi commented:

“I really want to have a gender equity type of structure. Unfortunately women don’t have the same access to funds as men do. So we had to structure it a little bit differently and on top of that, women perform really well in our solar kiosk business. To be honest with you, they actually perform much better than the men, because they are more responsible. Especially the women that have a family; that have children. They really take this business seriously.”

4.3.3. Ecosystem Analysis

4.3.3.1. Funding Analysis ARED

Nyakarundi (personal interview, 25 April 2015) indicated that ARED was self-funded from the proceeds of a successful business he ran previously for 7 years in the US. ARED also obtained funding from international entrepreneurship competitions, where they won \$15 000. While he indicated that they were lucky and fortunate in this regard, and the money was channelled into the manufacturing of more kiosks, he also noted that it is “a drop in the ocean” in terms of the type of investment that they require in order to scale the ARED micro-franchise. Nyakarundi (personal interview, 25 April 2015) further commented:

“The biggest issue is access to funding. That is not just in Rwanda, it’s all over in Africa. Access to funding is a big challenge. We need more smart funding, we need more investors that understand business, we need more venture capital, we need more angel investors. Those are the solutions, and we need more to fill up the gap.”

He further indicated that the government should play a greater role in providing grant funding for research and development. In this regard he commented:

“That’s what the government needs to play a role in and that’s what is lacking dramatically: each department and each sector should have grant fund-whether it is agriculture or renewable energy.”

He stated that at present this type of funding is primarily made available to large established companies, particularly foreign companies that establish themselves in the country. He commented that this is in part due to the lack of a dedicated pool of funding for local SMEs. Government grants are often funded by foreign donor organisations that stipulate the eligibility criteria for funding, and very often the criteria is written in favour of established multi-nationals and not emerging local SMEs.

4.3.3.2. Policy and Regulatory Environment Analysis ARED

Nyakarundi (personal interview, 25 April 2015) commented, “the government has got a lot of policy on renewable energy, for example, we don’t pay customs taxes on solar products, we’ve had a lot of exemptions.”

The Government of Rwanda has shown their support for the off-grid clean energy sector, and mentioned the important role of off-grid solar in their Economic Development and Poverty Reduction Strategy II. However there appears to be a disjuncture between policy and the implementation thereof (Overseas Development Institute et al., 2016b). There is a lack of clarity on duty exemptions, with respect to the types of solar products that are exempt. For example, one regulation has been amended to exempt only panels greater than 25W. However under another regulation, smaller solar home systems and pico-solar systems qualify for exemptions (Overseas Development Institute et al., 2016b).

4.3.3.3. The Ease of Doing Business

Nyakarundi (personal interview, 25 April 2015) commented on another enabling factor that the government had put in place, in terms of SME business development support. The government had established a “one stop shop” for SMEs to find out sector specific business related information. Entrepreneurs can enquire about sector specific business opportunities at a central information centre. The government has made the process of registering a new business a little bit easier, especially for SMEs (Nyakarundi personal interview, 25 April 2015). As noted in the literature review, Rwanda is ranked 62 on the World Bank ease of doing business rank (World Bank, 2016a). It takes 5.5 days to register a business. Rwanda is currently ranked the second highest in Sub-Saharan Africa, after Mauritius (ranked at 32) and is followed by Botswana and South Africa (ranked at 72 and 73 respectively). The World Bank data supports the comments of Mr Nyakarundi.

4.3.3.4. Partnerships

The advertising partnership with Airtel is a critical part of the success of the ARED business model, as it serves as an important additional income stream. Airtel gets advertising exposure on the sides of the ARED's mobile kiosks, and ARED benefits from the additional advertising revenue stream. This strategic partnership is a key component of the sustainability of their business model as it enables the business to use multiple-streams of income, thereby making the business feasible for both the franchisor and franchisees. However Nyakarundi (personal interview, 25 April 2015) indicated that the process of establishing partnerships are not easy and presents challenges, particularly for a small business trying to partner with a big company and selling an idea to them.

He also indicated that there is a need for collaborative research partnerships between start-up enterprises and universities, and that these kinds of partnerships could have been beneficial to ARED especially when they were in the process of the prototype development. He found the process of trying to establish research partnerships to be particularly challenging, as the research institutions he approached in Rwanda were not necessarily open to partnering with a start-up small business in the process of product development.

4.4. Solar Sister

4.4.1. Overview

Table 14: Solar Sister- Energy Social Enterprise in Uganda, Tanzania and Nigeria (Drawn from Data Available to Researcher)

	Overview	Motivation for Starting Business
Solar Sister	<ul style="list-style-type: none">• Non-profit Social Enterprise in Uganda, Tanzania and Nigeria.• Focus on empowering women entrepreneurs through sale of off-grid energy products in the last mile.• Currently over 1250 Solar Sister entrepreneurs.	<ul style="list-style-type: none">• Co-founder and CEO inspired by the impact a solar light (used for small scale agricultural purposes) had on the livelihood of a local Ugandan women and her family, during a visit to Uganda.• Recognising the opportunity to empower women through a clean energy business opportunity that has positive impacts on education, health and livelihoods.

Solar Sister is a non-profit social enterprise that empowers women entrepreneurs through the sale of off-grid renewable energy products like pico solar lighting devices and clean cookstoves. Solar Sister was co-founded in 2010, by Katherine Lucey, who is also the CEO of Solar Sister and Neha Misra (Mailloux, personal interview, Monday 27th April 2015). Solar sister is currently operational in three African countries, namely Uganda, Tanzania and Nigeria, with their headquarters in Providence Rhode Island in the US. Solar Sister initially established a footprint in Uganda in 2009, then expanded into Nigeria in 2012 and Tanzania in 2013. Solar Sister currently has over 1250 entrepreneurs in their network (Solar Sister, 2015a; Mailloux, personal interview, Monday 27th April 2015).

The Solar Sister concept originated when Katherine Lucey visited Uganda, with Solar Light for Africa. She saw, first hand, the impact a solar light had on a local Ugandan woman, and how she used the light in order to increase the productivity of the chickens she kept, and ultimately built a farm and a school (Solar Sister, 2015b). This demonstrated the catalytic impact a small light could have, and inspired the Solar Sister concept.

4.4.2. Synergy with Local Micro-entrepreneurs

4.4.2.1. Business Model Used to Incorporate Local Micro-entrepreneurs in the Value Chain

Description of Business Model

Their business model is a form of a hybrid business model, as they are a nonprofit social enterprise, but incorporate certain commercial business principles in order to create a business model that would ultimately be sustainable. The thinking behind the business model was not to be completely dependent on donor funding.

The business uses a direct sales model, similar to the model used by Avon (a US cosmetics company that is known for using the direct sales approach). Solar Sister purchases clean energy products in bulk from a network of manufacturing partners with whom relationships have been established, including d.light Design and Bboxx, which they sell to the Solar Sister entrepreneurs. The model is flexible in that they can sell the products at kiosks or shops they already have, or use a door to door sales strategy where they can sell to their friends, neighbours and community members (Mailloux, personal interview, Monday 27th April 2015).

Interview respondent Mailloux (personal interview, Monday 27th April 2015) commented on the initial thinking behind their model: “it was a combination of what is a market based solution, what is a women inclusive solution, and how do we design this business in a way that is not only woman inclusive but is not giveaways.”

Fee Structure

Solar Sister provides a startup kit to local micro-entrepreneurs, which includes business and technical training, a branded t-shirt, a product catalogue, and a receipt book. In addition, Solar Sister entrepreneurs also receive ongoing training and mentoring, with constant access to the Solar Sister mentors within their specific regions (Solar Sister, 2015b).

The Solar Sister local micro-entrepreneurs purchase their inventory from Solar Sister (e.g. solar lamps or clean cookstoves) depending on how much they can afford at a given period in time and then sell their products at a mark-up to the end consumers in the villages and regions where they are from. Mailloux (personal interview, Monday 27th April 2015) commented, “we do not do any micro-credit and we do not do any microloans: and that is something that has evolved over time. So we used to do micro-consignment and we experimented with micro-credit and we found that it was just not a good idea for us.” She indicated that a further challenge in this regard is that some of the micro-entrepreneurs that have purchased inventory from Solar Sister, sell their inventory on credit to their customers. Solar Sister however discourages this as they found that some customers did not honour the sale and the micro-entrepreneurs lost money in the process.

Identification and Selection

Solar Sister has worked through local community organisations to identify potential micro-entrepreneurs. When Solar Sister initially came to Uganda, they worked through a local organisation Mother’s Union to identify their first three Solar Sister entrepreneurs. Mother’s Union helped with the identification, selection and monitoring of the Solar Sister entrepreneurs.

Retention and Attrition

Solar Sister initially started training 10 entrepreneurs in 2010 and their network of entrepreneurs has grown to over 1250 entrepreneurs by March 2015, as indicated in Figure 18 below.

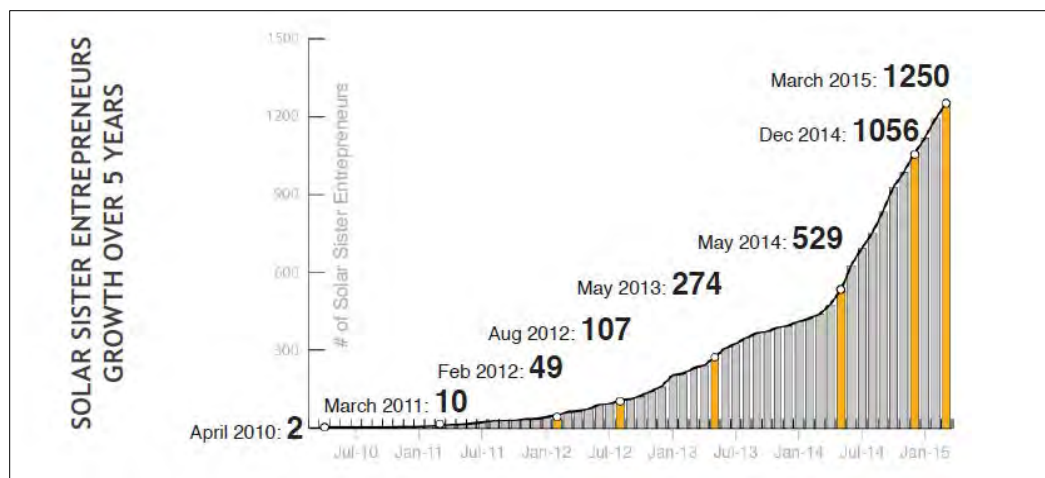


Figure 18: Number of Solar Sister Entrepreneurs from 2010 to 2015 (Solar Sister, 2015a)

With regard to the retention of the Solar Sister micro-entrepreneurs, the following key experiences were noted by the founder and CEO Katherine Lucey:

“There is definitely an attrition rate. There's also a seasonal activity and there's also a big discrepancy in the level of activity. You're going to have just a few entrepreneurs. You know, there's always the traditional 80/20 rule right? 20% generates 80% of your income. We definitely see that. It might even be more extreme where you have a smaller number of entrepreneurs who really take off and are the superstar entrepreneurs who generate a big bulk of our sales. The next tier of entrepreneurs are entrepreneurs who come on board. They're active for maybe 3 months, 6 months, a year. They do run through their sort of easy market, which is their families, their friends, their neighbours, maybe their church group and then they hit a wall because now it's selling as a profession, which is a little bit different than selling as a hobby, you know, selling to your cousin or your sister. All of those sales are valuable sales. Those sales are reaching people who would otherwise not be reached by current distribution and so we look at all of those kinds of sales as an incredibly valuable way of getting into the market. What it means is two things. One is we provide support to those entrepreneurs when they hit that wall and if they are interested, if it's something that they really want to do, we try to support them to step up to the next level of entrepreneurship, which is where they're selling to people that they don't know. They're selling to people that they don't know and they're in the next town. You know, they're really trying to come up with creative marketing ways to expand their market”(Lucey, 2015).

Mailloux (personal interview, Monday 27th April 2015) also commented that approximately 10% to 20% of the local micro-entrepreneurs generate 80% to 90% of their sales revenue in line with the observation made by Katherine Lucey. Mailloux (personal interview, Monday 27th April 2015) indicated that they provide additional training and mentoring to those entrepreneurs who excel in sales, show promise and express an interest to grow their business further. For example they

are given an opportunity to participate in regional exchanges where advanced training opportunities are offered. Part of the training offered is made possible through their global partnership networks.

Business Development Support Solar Sister Micro-entrepreneurs

Solar Sister has Regional Managers that are responsible for recruiting, training and supporting the Solar Sister local micro-entrepreneurs. They have a Director of Talent and Training, who is responsible for curriculum design and working with country managers and sales associates. Training involves everything from teaching entrepreneurs how to leverage existing community networks to understanding and managing finances. Training is on-going and done through a series of training modules. The sales associates work very closely with the entrepreneurs and provide them with one-on-one training or cluster training sessions (Mailloux, personal interview, Monday 27th April 2015). According to Solar Sister (2015b: 8), “it costs US \$500 to recruit, train, and support every new entrepreneur, including business and technical training, a “business in a bag” including a t-shirt, receipt book, and product catalogue, and an ongoing mentor relationship.”

Solar Sister entrepreneurs use their skills and knowledge to effectively market and sell their clean energy products as well as manage their micro-enterprises. This includes prior learning, indigenous knowledge and the additional skills and knowledge acquired through the training and mentoring provided by Solar Sister. With regard to social capital, Solar Sister entrepreneurs are taught how to leverage important social assets (specifically their existing community networks) which may have previously been overlooked, or not necessarily perceived as an asset. Within the context of the Solar Sister business model, this is particularly important as it is a sales driven business strategy within a local community context.

With regard to re-investing back into the business, Solar Sister entrepreneurs are taught during the training sessions to re-invest their profits into the business in order to grow the business. Some of the Solar Sister entrepreneurs use the initial business opportunity provided by Solar Sister to invest in another business, e.g. open up a shop or to expand their existing agricultural

concerns. Some Solar Sister entrepreneurs run their clean energy product sales businesses on a part time basis to supplement existing income from agricultural activities, teaching or nursing (Mailloux, personal interview, Monday 27th April 2015).

Income Generating Potential of Local Solar Sister Micro-entrepreneurs

The income generating potential varies from one entrepreneur to another. Entrepreneurs typically earn between \$10 and \$250 per month. For entrepreneurs that earn in the lower part of the \$10 to \$250 earning range, the income derived from the sales of the clean energy products is not sufficient to make a living. However it should be kept in mind that some of the Solar Sister entrepreneurs also earn income from the sale of their agricultural produce and that seasonality impacts greatly on agricultural livelihoods. There are periods where Solar Sister entrepreneurs derive no income at all from agriculture for long periods within a year, and in this regard any additional income will be welcomed to carry them through these periods. For entrepreneurs who wish to create a full time business from the sales of solar products and services, their monthly revenues would need to increase and show growth. This is dependent on how many sales they are able to do per month, their ability to sell beyond their immediate networks and engage new markets with their products.

Through the sale of the clean energy products, Solar Sister entrepreneurs are able to derive a primary or supplementary source of income. Solar Sister Entrepreneurs invest in education for their families, better health and back into their businesses. These include business opportunities that are related to clean energy e.g. cell-phone charging or businesses that are not necessarily related e.g. a small shop.

The Solar Sister business model encourages organic growth where Solar Sister entrepreneurs increase their inventory through their savings and proceeds from their clean energy sales business. Although organic growth can take time, it could lead to slow, but steady growth of the business. However, it was noted that there is a high attrition rate, and that there are periods where many of the Solar Sister entrepreneurs are not actively selling products. As the business is sales driven, and the income of the solar sister entrepreneurs is dependent on their sales and the

mark-up for their products, the business could potentially have slow periods if they struggle to offset their inventory. As indicated, many entrepreneurs exhaust their immediate market within a few months to a year. This hinders the potential long-term sustainability of a product sales driven business in durable solar products.

4.4.2.2. Value Chain Participation Analysis

Figure 19 below illustrates (per red tick) the key areas where Solar Sister participates in the clean energy value chain. Synergy with local micro-entrepreneurs is indicated with a blue interlocking gear symbol. Solar Sister primarily gets involved as a distributor of clean energy products. As indicated in the diagramme below, Solar Sister gets involved in the marketing, sales and distribution stage and in the after sales service stage. There is synergy with the local Solar Sister entrepreneurs in these stages of the value chain.

Solar Sister sells the clean energy products and services to the Solar Sister entrepreneurs who in turn sell the clean energy products to the end customers.

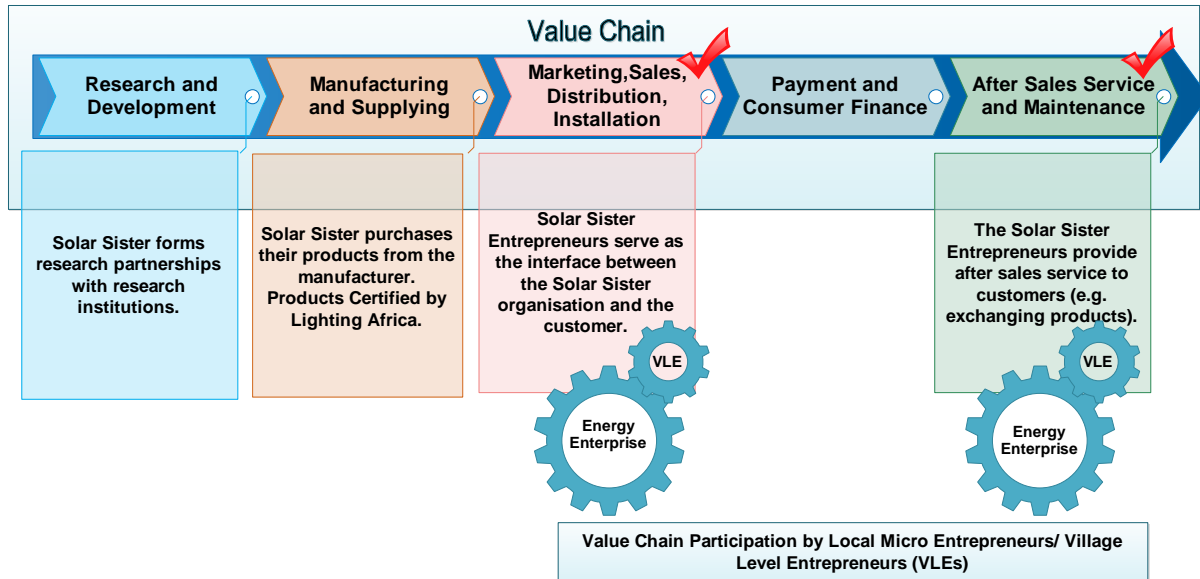


Figure 19: Value Chain Integration: Solar Sister (Own Diagramme Drawn from Data Available to Researcher)

The local Solar Sister entrepreneurs also serve as the interface between Solar Sister and the end customers for after sales service, should customers wish to return or replace a product. All products come with a full 2-year warranty.

What makes Solar Sister unique is its exclusive focus on empowering women entrepreneurs in the last mile distribution part of the value chain. The rationale behind the concerted effort to empower women is expressed as follows:

“As the primary consumers of household energy, women are critical to the successful adaptation of clean energy technology solutions. We believe that investing in women is thus a prerequisite for large-scale adoption of clean energy technologies at a grassroots level. It is this gender inclusive systems approach combined with an enterprise-based model to bring a sustainable livelihood opportunity to address energy poverty that makes us unique”(Solar Sister, 2015a:8).

4.4.3. Ecosystem Analysis

4.4.3.1. Funding Analysis Solar Sister

Solar Sister is funded through a combination of product sales and donor funding: approximately a third of their funding is derived through their product sales and the balance through donor funding (Solar Sister, 2015b). Mailloux (personal interview, Monday 27th April 2015) indicated that with regard to start-up funding, their business was characterised by a ‘lean start-up’ as they had not really been able to tap into start-up funding and had experienced organic growth. As Solar Sister grew and was able to demonstrate their impact to potential donors, they were able to secure donor funding from various organisations. She commented:

“We have definitely gotten a lot of funding from ExxonMobil, Shell, USAID, from corporations from foundations, from aid agencies. So while we definitely receive a lot of outside funding this idea of start-up funding was not really something we benefitted from. It was really after all the ground work was laid, we had proven ourselves, had demonstrated impact, that we earned funding from aid organisations.”

She also indicated that for-profit enterprises would typically be more eligible to receive start-up funding but that start-up funding for non-profit organisations were less likely, because you would need to demonstrate that the business is a potentially profitable venture.

With regard to funding for growth and scaling, she indicated that some funders, who funded them previously when they were smaller, do not necessarily wish to continue funding them because they have grown and expanded and do not necessarily meet the funding criteria anymore. In essence they have outgrown certain funding avenues because their budget is bigger, and are no longer eligible for some of the funding they received as a smaller organisation (Mailloux, personal interview, Monday 27th April 2015). This is indicative of the dynamic nature of the fund raising process and that enterprises require appropriate funding for the various stages of their growth.

4.4.3.2. Policy and Regulatory Environment Analysis Solar Sister

Interview respondent Ms Mailloux did not comment specifically on any policy or regulatory challenges or enabling factors. However, it could be inferred that since they are primarily a distributor of clean solar lighting devices and clean cookstoves (which they import from a variety of manufacturers) favourable duty policies on solar products would create an enabling environment for them by reducing import duty and VAT expenses. As they have a country presence in Uganda, Tanzania and Nigeria, the fiscal policies on solar products in these countries and components are important to consider. Uganda and Tanzania both are exempt from VAT and import duties on solar components.

4.4.3.3. Ease of Doing Business

As with the policy and regulatory environment, interview respondent Ms Mailloux did not comment specifically on the ease of doing business; however the World Bank Ease of Doing business indicators could give an indication of the relative ease within their various countries of operation. Uganda is ranked 122 (out of 189 economies) on the 2016 Ease of Doing Business rank of the World Bank. It takes a lengthy 27 days and 15 procedures are required to be able to start a business (for which they are ranked 168). The 2009 rank for starting a business would be a more accurate benchmark as they started Solar Sister Uganda in 2009, and the ease of starting a business has subsequently evolved. Furthermore they are ranked 128 for cross border trading, which is important to consider as Solar Sister imports their inventory from various product

manufacturers (World Bank, 2016c). Nigeria is ranked 169 on the 2016 Ease of Doing Business rank. It takes 28 days to register a business, for which they are ranked 139. In terms of cross border trade they are ranked 182. Tanzania, as mentioned in the Juabar case study, is ranked 139 and it takes 26 days to register a business (World Bank, 2016b). It is thus evident that conducting business in these countries is quite difficult.

4.4.3.4. Partnerships

With regard to partnerships, Mailloux (personal interview, Monday 27th April 2015) commented, “partnerships are everything: we have technology partners, we have implementation partners, and we have advocacy partners.” She further indicated that the Global Alliance for Clean Cookstoves is an important partnership. Solar Sister sells clean cookstoves as part of their product line, and through their work promotes the message of the Global Alliance for Clean Cookstoves. From an advocacy and communications standpoint, they work very well together. An example of an atypical partnership was with their implementation partner in Tanzania, the World Wildlife Federation (WWF). She explained that at first glance, the link between wildlife and clean energy may not be that explicit. However when looked at carefully there is a very strong link, because when women need to chop down trees for wood in order to cook, it also results in the destruction of habitats in the process. Therefore the promotion of clean cookstoves also aids the mission of the WWF.

Solar Sister has also established research partnerships with academic institutions. This includes a current partnership with North Eastern University and a longstanding partnership with Santa Clara University in California. They furthermore have a strong partnership with the International Centre of Women in Research (ICWR).

4.5. Nuru Energy

4.5.1. Overview

Table 15: Nuru Energy- Social Enterprise in Rwanda (Drawn from Data Available to Researcher)

	Overview	Motivation for Starting Business
Nuru Energy	<ul style="list-style-type: none"> For profit social enterprise operating within Africa and India. Headquartered in Kigali, Rwanda. Serves the village residents at the subsistence level of the economic Base of the Pyramid (BOP). Uses a network of Nuru micro-entrepreneurs (village level entrepreneurs) to sell Nurulight LED lights and offers a recharging service for the lights through their Octopus Charger powered through pedalling and solar PV Also offers a mobile phone charging service. 	<ul style="list-style-type: none"> Insight into the energy experience in a rural village in Rwanda. Recognising that kerosene was a primary energy source for various heating and lighting applications. People earning less than \$1.50 a day, were spending in excess of \$4 a month on kerosene. The wide use of kerosene could to a large extent be attributed to the fact that the quantities bought can easily be matched to the income/spending patterns of the local village residents- residents buy how much they can afford. Recognising that the Octopus charger/POWERCycle generator could be used to create a business opportunity for local village residents, through which they can derive a recurring stream of income.

Nuru Energy is a for-profit social enterprise, headquartered in Kigali, Rwanda, with a geographic footprint in Africa and India. Nuru Energy was co-founded by Mr Sameer Hajee in 2009, who is also the CEO. Through a network of local micro-entrepreneurs in the villages, Nuru sells rechargeable lights and offers a recharging service for the Nuru lights and mobile phones through their Octopus Charger, which can be powered by pedalling (through their POWERCycle pedal generator) or solar PV. A set of 5 portable lights can be recharged simultaneously within 20 minutes of pedalling; each charged light providing a week of light to a rural household. Their business model draws on the principles of a “collaborative consumption” model where a resource is centrally located and can be accessed when needed by a group of people or community. When deciding which energy source to use when the business started in 2009, solar PV was still too expensive at the time (about \$4 /watt). The idea was to harness human energy and convert it to electricity, with a focus on lighting. This served as the impetus for the development of their POWERCycle pedal generator. Furthermore, as LED lights do not require that much power, a pedal cycle designed in a way that it could recharge a set of 5 lights within

20 minutes was seen as a suitable and appropriate option. Solar PV has subsequently been introduced to provide an alternative means of recharging the Nuru lights (Hajee, personal interview, 02 October 2015).



Figure 19: Nuru Energy Octopus Charger (Design to Improve Life, 2016)

Nuru Energy illustrates continuous technology innovation and business model innovation. Their pedal powered POWERCycle is an example of technology innovation that harnesses human energy to generate power. They recently redesigned their recharging stations to include a solar PV recharging option and a USB charging port that can charge up to five small devices (including mobile phones) simultaneously (Hajee, personal interview, 02 October 2015). The Nuru micro-entrepreneurs can purchase credits that unlock the Octopus Charger, using mobile money and the built in functionality of the technology. Their innovative technology creates a business opportunity for local micro-entrepreneurs, through a recurring recharging income stream. A key advantage of this innovative system is that it offers an opportunity for local micro-entrepreneurs to earn the equivalent of a usual day's earnings within 20 min of recharging through solar power or pedalling. It also offers a quick recharge turn-around time for the customer.

The incorporation of a USB port has opened up another potential revenue stream through charging mobile phones. This is an important additional service as Nuru found that 60% of rural Rwandans have mobile phones and need a convenient place to charge their phones. Hajee,

personal interview (02 October, 2015) indicated that mobile phone charging currently plays an important role in the recharging businesses of their micro-franchisees.

The decision to design their recharging stations to incorporate solar PV and mobile phones also forms part of continuous business model innovation.

There are currently 1200 Nuru micro-entrepreneurs in their network and are setting up another 480 within the next 6 months.

4.5.2. Synergy with Local Micro-entrepreneurs

4.5.2.1. Business Model Used to Incorporate Local Micro-entrepreneurs in the Value Chain

Franchise Model Description and Fee Structure

Nuru Energy uses a micro-franchise model to distribute and recharge their LED lights. Each cooperative is provided with a set of 120 Nuru LED lights and set up with the Octopus Charger, POWERCycle pedal generator and solar panel (which Nuru Energy retains ownership of). The cooperative is required to pay an upfront commitment fee (franchise fee) of \$60 (\$12 each) in order to become part of the Nuru Energy micro-franchise.

The entrepreneurs are required to get upfront orders for their start-up set of LED lights from interested customers. This could give rise to the question of whether customers would be willing to place advance orders and pay upfront. Hajee (personal interview, 02 October 2015) commented that through Nuru's presence in the various villages, the extensive marketing campaigns they have embarked on and the customer confidence they have gained, this approach actually works well and interested customers are willing to place advance orders.

Nuru Energy initially priced the Nuru LED lights at \$6. They found however that at this price the Nuru micro-entrepreneurs struggled to sell the lights as the potential customers from the rural villages in Rwanda (most of whom earn less than \$1.50 a day) could not afford it (Hajee, personal interview, 02 October 2015). During the pilot testing phase they found the \$6 price point worked

well. However, the pilot was run in villages that were more affluent. They have subsequently experimented with other price points and have reduced the price point to \$1 (under the cost to produce). They are researching the best price point for their lights and focus on increasing the income generated through the recharging service. They have also experimented with the \$0 price point. In donor funded projects they provide the lights for free. The primary revenue stream is thus from the recurring recharge revenue and not from the sale of LED lights.

Identification and Selection

Initially Nuru approached individual micro-entrepreneurs. Hajee (personal interview, 02 October 2015) indicated that the individual micro-entrepreneur approach would either be a “hit or miss” depending on the drive and motivation of the entrepreneur. Hajee (personal interview, 02 October 2015) commented: “we found that we would get 30% that were superstars, 30% that were doing okay and 30% that were not so good.” They have subsequently altered their model and introduced a group cooperative model where individual entrepreneurs form a cooperative business entity with a minimum of five members. They have drawn lessons from micro-financing, where group lending to self-help groups and other group structures worked better than individual lending.

With regard to previous business experience or exposure Hajee (personal interview, 02 October 2015) indicated that the entrepreneurs becoming part of their micro-franchise do not necessarily require any prior entrepreneurship exposure, as they were looking to create a simplistic micro-business opportunity that would be straight forward and easy to run. However he also indicated that one of their micro-entrepreneurs who owned an existing, has incorporated the recharging business into his existing business and offers the recharging service in this shop. He has the advantage of drawing existing customers and new customers to this Nuru recharging business. Hajee (personal interview, 02 October 2015) indicated that the other members of the cooperative really benefit from having him in their cooperative, as their income is bolstered.

Hajee (personal interview, 02 October 2015) also indicated that there is a negative cost associated with the money lost in setting up the recharging business for someone who is really

not doing well or has opted out the micro-franchise business. There is furthermore an opportunity cost in terms of the recharging revenue that could have been generated through entrepreneurs that optimally utilise the recharging stations.

Business Development Support and Technology Transfer to NURU Micro-entrepreneurs

The training methodology used by Nuru has evolved as the business model evolved. Initially the business model focused both on the sale of the Nuru lights (at the \$6 price point) as well as the recharging business. However at the \$1 price point, the demand for the Nuru lights has increased substantially and there is no longer a need to market the Nuru lights in a concerted manner. The training provided by Nuru was initially more intricate and included training and sales modules and as well as how the technology works. The training has subsequently become simpler and primarily focuses on the technical aspects of how the technology works (Hajee, personal interview, 02 October 2015). The recharging business is relatively straightforward and simplistic to run and the training became more simplistic in line with the nature of the business.

Retention and Attrition

Hajee (personal interview, 02 October 2015) indicated that attrition has been low and that the longest standing entrepreneurs have been with them since they started in 2009. The lights in their market are at the end of life, but the entrepreneurs expressed that they wished to buy new sets of lights.

Income Generating Potential of Nuru Local Micro-entrepreneurs

Nuru micro-entrepreneurs generate revenue through the recharging of the Nuru lights. The cost of a recharge is \$0.2 and Nuru micro-entrepreneurs could generate up to \$1 in revenue per 20 minute recharge. Nuru earns 50% of the recharge revenue and the Nuru micro-entrepreneurs earn 50% (\$0.1 per recharge). As indicated previously, each Nuru light provides light for approximately a week. This implies that customers should come to recharge every week. However Hajee (personal interview, 02 October 2015) indicated that the frequency of recharging is often less; some customers only recharge twice a month. So in essence the income earning

potential of the Nuru micro-entrepreneurs is influenced by the number of customers the entrepreneurs have and how frequently they come to recharge.

Hajee (personal interview, 02 October 2015) provided another example of one of the local micro-entrepreneurs he visited, during a recent visit to Rwanda. The local micro-entrepreneur housed the Nuru recharging business within the existing shop he had been running in the village. Hajee (personal interview, 02 October 2015) commented:

“I specifically asked. How much of your revenue comes from your Nuru Energy business, versus all the other stuff that you are selling. And when he calculated it out, about 80% of his business comes from his recharge revenue. So it’s a substantial income generating opportunity for him that changes his life trajectory, but also changes the trajectory of the customers who now have access to recharging just within their own village. They don’t have to travel to a nearby village, or to the grid or wherever they used to get their stuff charged from.”

With regard to the sustainability of the Nuru micro-entrepreneurship model, Hajee (personal interview, 02 October) commented:

“The good thing about our model is that every single actor in the chain has a vested interest, so we as a company, have a vested interest in making sure that the VLEs deliver as long lasting as possible because they come back for charging and we make money. In a similar way we have to ensure that the recharge stations are operating for as long as possible. So as far as we are concerned we have an incentive to deliver long lasting sustainable products. Entrepreneurs are earning recurring revenue from the same equipment, so as far as they are concerned this is something that lasts way into the future.”

4.5.2.2. Value Chain Participation Analysis

Figure 20 below illustrates (per red tick) the key areas where Nuru participates in the clean energy value chain. Synergy with local micro-entrepreneurs is indicated with a blue interlocking gear symbol.

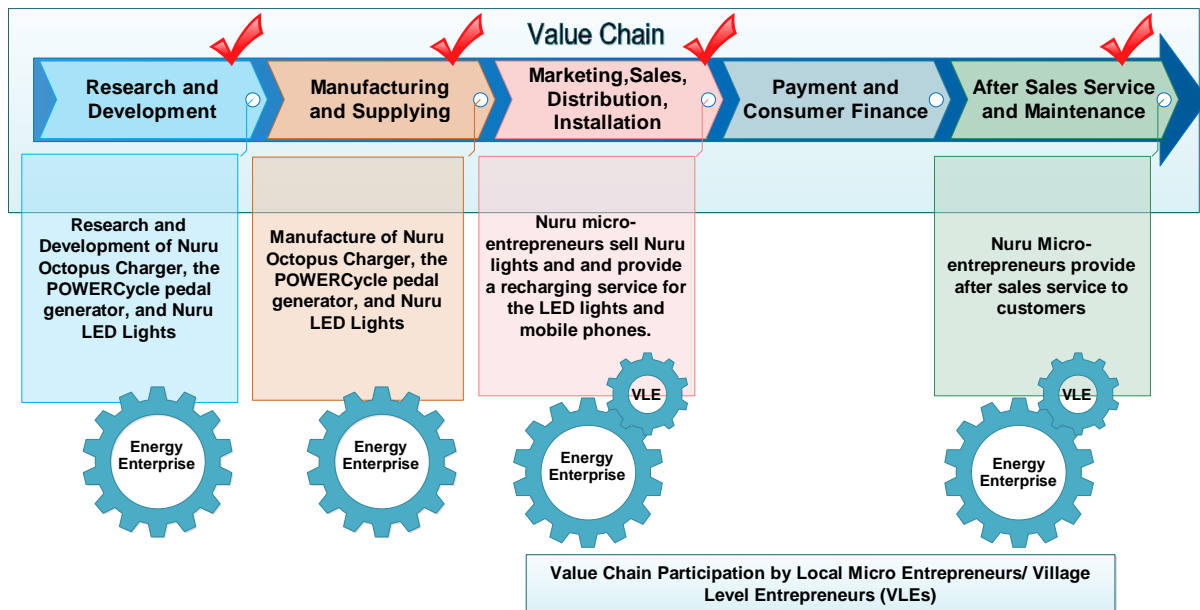


Figure 20: Value Chain Nuru (Diagramme Created from Data Available to Researcher)

Nuru participates very widely in the various different stages of the value chain. This includes the research and development, manufacturing, marketing, sales/service and after sales service stages. The concept and design of the modular Nuru LED lights, the Octopus Charger and the POWERCycle pedal generator is part of the research and development stage of the value chain. With regard to marketing, Nuru initially embarked on an intensive marketing campaign when coming to Rwanda to raise awareness about their innovative clean lighting alternative. Hajee (personal interview, 02 October 2015) indicated that they spent approximately \$10 000 per month at the time on marketing. Nuru offers both a product and a service through the sale of the Nuru LED lights, and the recharging service.

The Nuru micro-entrepreneurs participate in the last mile distribution stage in the value chain through marketing and sales of the Nuru LED lights and the recharging service. They serve as the

interface between Nuru Energy and their customers and provide a critical link in the value chain; they are tasked with the dissemination of the LED lights and provide an ongoing light recharging service to Nuru's customers. The use of a VLE micro-franchise model is a key component of it being a scalable solution with a greater reach. By setting up local village level entrepreneurs with the lights and pedal generator they are able to reach more customers with a clean, portable and affordable lighting alternative to kerosene lamps.

Nuru also encourages the participation of female entrepreneurs in their VLE network with a target of a minimum of 30% female entrepreneurs. Over 50% of the entrepreneurs in their network are women (Ashoka Changemakers, 2015). Part of the rationale for targeting female entrepreneurs was the view that women were more likely to use the money generated from their businesses, to invest in the education healthcare and nourishment of their children and families, thereby culminating in broader social impacts (INSEAD, 2013). A further benefit is that women entrepreneurs can run their Nuru light recharging business from home if they choose to. This enables them to generate an income within 20 minutes of cycling and still take care of their children and other household responsibilities (Energy Access Practitioner Network, 2015). This is possible through the flexibility built into Nuru's micro-franchise business model with regard to the geographic location of the recharging stations and the portability of the pedal generator.

4.5.3. Ecosystem Analysis

4.5.3.1. Funding Analysis NURU

Nuru energy was primarily funded through several rounds of grant funding. Their start-up capital came from a grant from the World Bank in 2008, by winning the Lighting Africa Development Marketplace competition. They had also received funding from the UNEP, by winning the UNEP Sasakawa Prize in 2010 (Hajee, personal interview, 02 October 2015; Nuru Energy, 2016). Hajee (personal interview, 02 October 2015) commented:

“Our initial capital came from the World Bank, through the Development Marketplace grants, where they were shifting to funding organisations that were innovative and potentially high risk. We won a competition for lighting in Africa- we were one of the 16 grant winners- the only one

that is still operating by the way [we received \$200 000]. So that we parlayed into a \$100 000 grant from UNEP. Once you start to get the World Bank on board as funders, it's like a snowball - it just starts to collect momentum. They [other potential investors] are like oh the World Bank and UNEP invested and gave you money, we should take you seriously."

Other funding sources included commercial funding from the Bank of America, Merrill Lynch and the Africa Enterprise Challenge Fund in 2011 (Nuru Energy, 2016a). It is evident that the initial grant funding from the World Bank and the UNEP was critical to being able to secure additional rounds of funding.

Going forward, Nuru energy wishes to secure other forms of non-grant funding including equity investments. Hajee (personal interview, 02 October 2015) also commented on some of the challenges with impact investing and patient capital; some potential impact investors wish to see a certain levels of profitability and appear to be more risk averse than expected.

4.5.3.2. Policy and Regulatory Environment Analysis NURU

Exemptions on customs duties and VAT creates an enabling environment for Nuru. (Hajee, personal interview, 02 October 2015) commented:

"In Rwanda, in particular, our products come in duty free, and VAT exempt. So those two in terms of import duties and taxes have made all the difference in the world. We are working with someone in Cameroon that has been replicating what we have been doing in Rwanda, and they are subject to a 30% import duty. By itself the business becomes not too viable at that point adding 30% to the expense of the business, so in Rwanda, we are able to operate quite effectively because of those import duties and taxes being eliminated."

He furthermore commented on the hierarchical governance structure of Rwanda as another enabling factor:

"I would say the other thing that is really supportive in terms of governance structure, is that the government structure in Rwanda is quite hierarchical and that's served us really well. In that they have got 31 districts and within the districts they have got sectors and within those sectors and you typically have five cells. Within the cells you have five villages in each cell. At each level of government there are leaders and those leaders, meet at the hierarchical level above them on a frequent basis. If not every month then at least every second month, so when you talk about information dissemination you can start at a very high level and, at a sector level. Our first introduction is at a sector level. One of our staff goes and presents to all of the cell level leaders at the sector and basically from there you can decide very quickly where to go."

4.5.3.3. Ease of Doing Business

With regard to the ease of doing business, Hajee (personal interview, 02 October 2015) commented:

“Yes [it is] definitely easier to do business in many ways than when we started. Online banking and online tax filing. Refunds from Rwanda revenue authority still take long and importing products still take a long time sometimes. Often it's not because of the system which on paper has improved but because the people working there are not fully trained or even empowered to make decisions quickly.”

As noted in the literature review and the ARED case study, Rwanda is ranked 62 in the World Bank ease of doing business ranking and is conducive for running a business. It is rated 48 for paying taxes, which supports Mr Hajee’s comment on the ease of online tax filing. It should however be noted that while Rwanda is more conducive for business than the majority of Sub-Saharan African countries with regard to most ease of doing business indicators, it is ranked 156 for cross border trade which marks a significant drop from its 2015 ranking for cross border trade of 77. In this regard, the World Bank data also supports Mr Hajee’s comment that importing products still takes a long time.

4.5.3.4. Awareness

According to the Overseas Development Institute et al. (2016c) the level of awareness about clean solar lighting alternatives is still relatively low in Rwanda, and many people do not know where to purchase clean lighting alternatives. As noted earlier, when setting up in Rwanda, Nuru created a lot of awareness about their clean energy products and service offerings, through radio marketing campaigns and roadshows (Hajee, personal interview, 02 October 2015). As a result of the low awareness levels, Nuru Energy had to invest quite a lot in awareness raising activities in their operating areas. This has gone a long way in creating awareness around their products and services and establishing trust in their brand. Notwithstanding, more needs to be done in terms of awareness raising at a country level.

4.5.3.5. Partnerships

Nuru has established a number of partnerships in the areas of implementation, research and funding. Strong partnerships expedite the time taken to have an impact (Nuru Energy, 2016b). A research partnership with INSEAD Business School and Innovations for Poverty Action (IPA) was established to create a think tank on how to improve the recharge revenue from the recharging stations; for example, the interventions needed to encourage customers to bring back their lights for recharging more often (Hajee, personal interview, 02 October 2015).

With regard to implementation partnerships, Nuru has established partnerships with the governments in their countries of implementation. These partnerships assist with the practical implementation aspects of rolling out and testing their business model. Nuru found the hierarchical structure of the government in Rwanda to be useful in that they are able to establish key information: for example, which villages are earmarked for electrification within the short term and which villages will not be likely to be electrified within the medium to long term (Hajee, personal interview, 02 October 2015). This directly impacts on the potential demand for their products as the demand will be significantly lower when residents receive word that their village will be electrified next.

Nuru also has a partnership with the Environment and Energy Partnership (EEP). The EEP was established by the government of Finland and other donors. They provide seed funding to innovative energy access businesses which could enable them to develop sustainable, commercially viable business models (Ministry of Foreign Affairs of Finland, 2016).

4.6. Barefoot Power

4.6.1. Overview

Table 16: Overview Barefoot Power (Drawn from Data Available to Researcher)

Barefoot Power	<ul style="list-style-type: none">• For profit social enterprise headquartered in Australia, with subsidiaries in Africa and India.• They design, manufacture, distribute pico-solar lighting products and solar home systems.• Make use of several distribution channels including local micro-entrepreneurs and local solar technicians.• They have one of the most extensive product ranges.	<ul style="list-style-type: none">• Insight into the adverse impacts of kerosene lighting in Nepal and Papua New Guinea.• Realised that many villages in the abovementioned areas remained un-electrified, even though transmission cables extended above the villages.• Identified niche for safe, affordable and quality lighting alternatives.
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Barefoot power is a for-profit social enterprise with headquarters in Australia and subsidiaries in Africa, Asia and the Americas. They established a country presence in Uganda in 2008, in Kenya in 2009 and expanded to India and Central America in 2013 and currently have subsidiaries in Uganda, Kenya, Rwanda, Ghana, India, China and the Americas (Machuhi, personal interview, 15 October 2015). They manufacture, design and distribute clean energy products like pico-solar lighting products and solar home systems. Barefoot Power was founded in 2005 by Stewart Craine and Harry Andrews. Through their consulting experience in the field of renewable energy, they bore witness to the adverse impacts of kerosene lighting in areas such as Nepal and Papua New Guinea. They noted that although power transmission cables transporting power to the cities, extended above villages in these areas, these villages remained without light.

They recognised the need to bring renewable energy solutions to areas like these that were not serviced by the grid and identified a niche to develop affordable, safe renewable energy lighting solutions for low income un-electrified regions, as renewable energy products were not affordable at the time (Oiko Credit, 2014).

They have their roots as a socially driven for-profit enterprise, but are currently focusing more on commercial opportunities. According to Machuhi (personal interview, 15 October 2015) they

still however adopt a “people, planet, profit” approach. They have a wide range of products including their Barefoot Power Firefly study lamp, their Barefoot Power Go lamps and their Barefoot Power Connect solar home systems that are powered by solar panels, ranging from 1.5W to 60W (Rivera, 2015).

Technological innovation involves the research and development process that culminates in their innovative product offerings. They seek ways to improve their product and service offerings, through a process of continuous innovation. For example, their Barefoot Firefly solar lamp and charger was technically modified to improve its durability and longevity and comes with a 24 month warranty (Barefoot Power, 2015). They have also introduced a mobile phone charger into their Firefly solar lamp (dob equity, 2016). The Firefly is 8 times brighter than a kerosene lamp and has won the outstanding product of the year award from Lighting Africa in 2012 (Barefoot Power, 2016a).

Barefoot Power distributes their products through various channels; to other distributors and directly to the end user. Table 17 below describes these channels.

Table 17: Barefoot Power Distribution Channels (Drawn from Data Available to Researcher)

Distribution Channel	Description
Large Enterprise Customers	Large enterprise customers are usually large enterprises that wish to have a social impact on their employees. One example is a partnership entered into with the Kenyan Tea Development Authority where Barefoot Power endeavours to provide more than 500 000 tea farmers with interest free loans to be able to purchase their solar powered lamps (Barefoot Power, 2016b; Machuhi, personal interview, 15 October 2015). Other large enterprise customers include mining companies and light manufacturing companies (Machuhi, personal interview, 15 October 2015).
Medium Enterprise Customers	Medium enterprise customers are primarily distributors, who usually purchase in bulk and distribute through their own distribution channels (Machuhi, personal interview, 15 October 2015).
Micro-finance Institutions	Their microfinance institution customers include banks and other micro-lending institutions that have a portfolio of in-house products that they finance for their customers (Machuhi, personal interview, 15 October 2015).
Philanthropic Organisations	Their NGO channel is a purely philanthropic channel where they distribute clean energy lighting products for free or at a subsidised price to NGOs and other organisations who have a developmental impact or provide relief and aid (Machuhi, personal interview, 15 October 2015).

Un-electrified and Under-electrified customers in the last mile	The direct channel is a model where un-electrified and under electrified households are served through local retailers and distribution agents/installation technicians (Machuhi, personal interview, 15 October 2015).
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4.6.2. Synergy with Local Micro-entrepreneurs

4.6.2.1. *Business Model Used to Incorporate Local Micro-entrepreneurs in the Value Chain*

Description of Business Model (the Initial Micro-Franchise Model Pilot)

Barefoot Power initially used a micro-franchise model to sell their Firefly lamp and other pico-solar products. In 2008, Barefoot Power piloted their micro-franchise model in Uganda referred to as the 'Firefly Micro-franchises' (named after their Firefly lamp). The pilot ran for a 6 month period. A total of 16 people underwent training and 11 subsequently graduated from the programme and signed the franchising agreement (Andrews, 2011).

Franchise Fee Structure

In an introductory training session prospective Barefoot Power micro-entrepreneurs were given the task of raising capital to contribute to the inventory costs of the Firefly sales businesses as well as soliciting advance orders from customers, before the next training session in two weeks. The stock of the Barefoot Power micro-entrepreneurs was financed through a combination of their own capital contributions and inventory provided on consignment by Barefoot Power. The entrepreneurs were given product value equivalent to double the capital they raised (Andrews, 2011). Andrews (2011: 56) indicated that they were also provided with a start-up kit which included:

- Cash receipt books;
- Operations manual;
- Daily, weekly and monthly checklists;
- A daily date book/diary;
- Basic bookkeeping aids;
- Marketing and customer service guides;
- Promotional material;

- Marketing flip booklets;
- Incentive scheme;
- Franchise application form;
- Franchise identification tags;
- Branded uniforms;
- A branded carry bag.

Identification and Selection

The candidates were identified through local NGOs, including BRAC Uganda and Uganda micro-finance Ltd. The first phase of the screening took place during the introduction phase of the entrepreneurship training (one day training introduction). According to Andrews (2011: 61), “the aim of this introductory session was to introduce the candidates to the business vision and the products, to present the business proposition and to challenge them to use funds to start a micro-franchise.” During the introductory training session the 11 candidates in essence went through a process of developing a simplistic, yet practical business plan. In order to begin marketing the products, they were provided with a Firefly solar system for demonstration, their business plan, a laminated trainee card and an application form to become a Firefly franchisee.

Business Development Training and Technology Transfer

Training consisted of an initial introductory training session, followed by a subsequent more in-depth training session over a period of four days. Figure 21 indicates the training modules that were used during the programme. It included a combination of technical training, branding, marketing, entrepreneurship and finances (Andrews, 2011).

Day 1	Day 2	Day 3	Day 4
Module 1: Introduction	Module 5: Detailed fundraising and entrepreneurship	Module 8: Incentive scheme	Module 12: Branding
Module 2: Introduction to technical skills and marketing	Module 6: Detailed technical training	Module 9: Cost, revenue and profit calculations	Module 13: Verbal examination
Module 3: Business proposition	Module 7: Marketing	Module 10: Financial management	
Module 4: Introduction to fundraising and entrepreneurship		Module 11: Communications	

Figure 21: Examples of Barefoot Power Training Modules (Andrews, 2011)

Retention and Attrition

The pilot was characterised by initial high sales followed by a decline in sales. Furthermore some entrepreneurs stood out and excelled in sales. Joseph Kato, for example, was the best performing micro-entrepreneur and was responsible for approximately half of the total sales revenue generated in the pilot. However, even though his sales were initially very high, his sales also subsequently plateaued (Andrews, 2011).

The challenge of retaining micro-entrepreneurs experienced in the pilot was also found as the model was rolled out in the field subsequent to the pilot. They experienced several challenges with the direct sales model of the Firefly lamp, and as a result discontinued using this model. Firstly they noted that solar durable consumer products have a slow turn-around time (Machuhi, personal interview, 15 October 2015). Once a customer has purchased specific solar lighting products, they may only need to replace these products within a few years and this decreases the potential of selling products to customers who already made a purchase (i.e. there is no constant, or recurring stream of revenue for the micro-entrepreneurs).

Secondly, Barefoot Power (in their experience), found that their particular target market wanted solar products with greater functionality (i.e. that could power a greater number of larger appliances including appliances like a TV) and that were made more affordable through micro-financing mechanisms. They found that in certain instances, potential customers who were not

prepared to purchase solar lanterns were prepared to pay for solar home systems through micro-financing options, even though the prices of the solar lanterns were substantially lower than the prices of the solar home systems. Micro-finance is an integral part of financing their solar home systems (Machuhi, personal interview, 15 October 2015).

Thirdly they found that the micro-entrepreneurs struggled to find and engage captive markets for their solar lanterns and smaller lighting devices. In Uganda they had a cohort of entrepreneurs that would firstly go out and sell to their immediate families, and then to their extended family and neighbours. For approximately two months, they would build the business on this basis. However, they started experiencing problems the further away they moved from their network of family and acquaintances. Their immediate network was exhausted after a short time and then they struggled to effectively market and sell their products to customers who were unknown (Machuhi, personal interview, 15 October 2015). With regard to the above he commented:

“They started with 350 micro-entrepreneurs and now if they have more than 20 that are active, I would doubt that. The reason why 300 [or so] are not active is because they have exhausted their immediate market, and when [they] came to larger markets, providing a more experiential proposition became difficult. The whole model was built on lanterns. Lanterns are small, portable and affordable, but then the market has shifted towards solar home systems, and the solar home systems distribution model is different.”

Revised Business Model for Local Participation

Barefoot Power has discontinued the model of using local micro-franchisees as local sales agents. They have expanded their service offerings to include installation of their Barefoot Connect solar home systems. In 2012 they piloted this model in Uganda as part of the Light up a Village programme. Members of the local community were selected and trained in installation and after sales service. In Kenya, in 2014, they had various installation projects with 50 trained installers, installing approximately 3000 houses per month (Barefoot Power, 2016c). This includes surface wiring, securing the solar PV panels on the roof, installing the battery pack inside the house and a basic training to the customer on charging and safety (Machuhi, personal interview, 15 October 2015).

On a solar home system that costs \$100, Barefoot Power installers would get paid \$10 (Machuhi, personal interview, 15 October 2015). If the abovementioned example of the 50 trained installers that install 3000 houses per month is looked at, it can be seen that each installer is roughly responsible for about 60 houses per month. At a \$10 for the installation and after sales service, installers could earn up to \$600 per month. This however may vary according to the number of houses that need to be installed in a given month, as there may be periods where the demand is lower.

It is however also important to note that there is a shift towards plug and play solar home systems that do not necessarily require technical expertise for installation. Most of Barefoot Power's products are plug and play systems. While local technicians may not always be needed for installation, there is still a need for after sales service and maintenance.

4.6.2.2. Value Chain Participation Analysis

Figure 22 below illustrates (per red tick) the key areas where Barefoot Power participates in the clean energy value chain. Synergy with local micro-entrepreneurs is indicated with a blue interlocking gear symbol. This value chain diagramme depicts their distribution channels that have local participation through trained technicians. As mentioned, they have other distribution channels, where local technicians or micro-entrepreneurs are not included in the value chain.

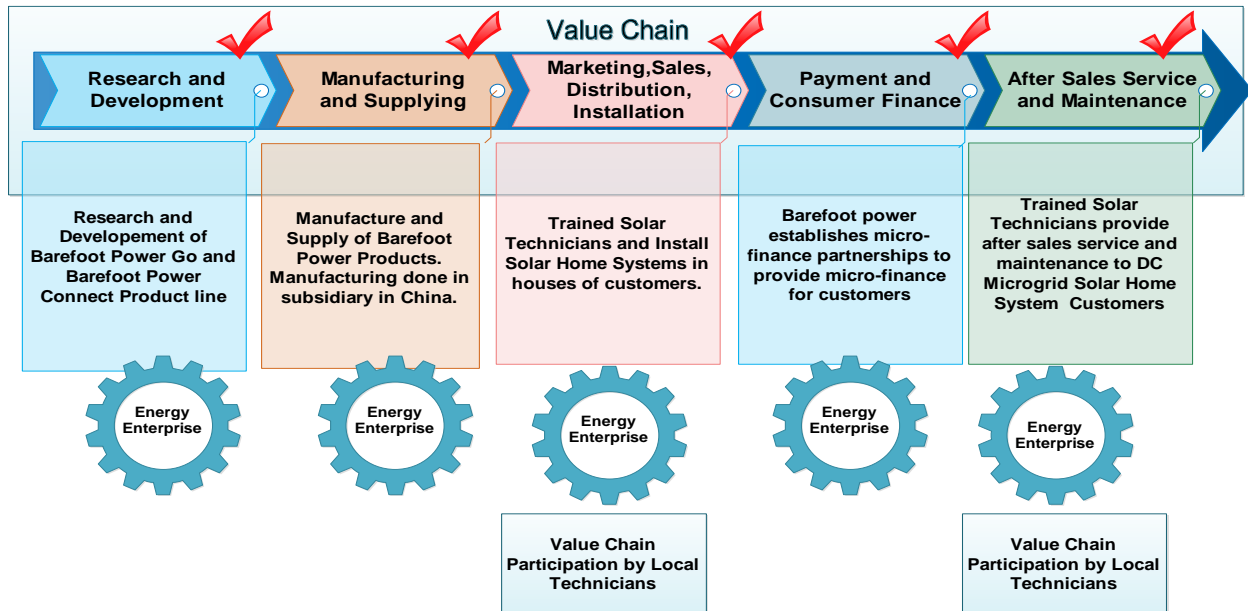


Figure 22: Value Chain Barefoot Power (Diagramme Created from Data Available to Researcher)

Barefoot Power participates widely throughout all the stages of the clean energy value chain. They are an example of a business with a high degree of vertical integration. In essence, they have taken “ownership” of their value chain as they participate in research and development; manufacturing; marketing, sales, distribution and installation; payment and consumer finance; after sales service and maintenance. For larger solar home systems they provide an installation service and facilitate micro-financing to make it more affordable for the end user, as well as after sales service (Machuhi, personal interview, 15 October 2015). The products are designed at the head office in Australia, and manufactured by their subsidiary in China. They have a strict quality control process, and work closely with their factories to ensure the quality of their products (Nagasaki, 2016). It can be seen that by being directly involved throughout the various stages of the value chain, they are able to provide an affordable solution by having greater control over certain costs, including the transaction costs associated with buying products from other manufacturers.

They furthermore draw feedback and input from their local distribution agents with regard to the needs of their target market, how their products are serving the market and how their products could be improved. This key market information is then incorporated into their product

development process. Barefoot Power currently uses local technicians to install their larger solar home systems. These technicians also provide after sales service, including maintenance for the solar home systems.

4.6.3. Ecosystem Analysis

4.6.3.1. Funding Analysis Barefoot Power

The co-founders contributed the initial start-up capital for Barefoot Power, from their savings, consulting revenue and investments from family and friends. Barefoot Power experienced challenges obtaining the funding for product development during the initial start-up phase (Oiko Credit, 2014). Andrews (2011: 52) commented, “in setting up Barefoot Power we quickly exhausted financing opportunities from so-called ‘family, friends and fools’. Making the transition from individual investors to institutional investors was a difficult task”. Oikocredit came on board as an important institutional investor, and played an important role during the transition period. Barefoot Power drew the attention of Oikocredit after they won a business development competition run by the Dutch government in 2006. Oikocredit made an equity investment and provided a board member who served in a strategic advisory capacity.

They have subsequently been funded through private angel investments and social impact investments and have raised \$5.8 million from social impact investment funds. These include Ennovent, d.o.b Foundation, Insitor Fund, Oikocredit, Ecumenical and Development Cooperative (Ennovent, 2016). In addition, they have won three product prizes from the World Bank in 2010 and have received €1 million in grant funding from the European Union in 2011 (Wilson, 2011). They have also registered for carbon finance, where “kerosene savings” through the use of their solar lanterns could be converted into carbon credits (Lighting Africa, 2012).

4.6.3.2. Policy and Regulatory Environment Analysis Barefoot Power

Fiscal Policy

As noted previously, Barefoot Power imports their products from Barefoot Power China, their manufacturing subsidiary. They also work with and support importers of the Barefoot Power product line. Customs duties could therefore add considerably to their expenses. Favourable customs duties are imperative in this regard. Machuhi (personal interview, 15 October 2015) indicated that the VAT and import duty exemptions in Kenya and other East African countries, creates an enabling environment. He furthermore indicated that he was also part of the advocacy and lobbying for these exemptions in Kenya. Kenya, for example has recently introduced VAT and import duty exemptions on solar products. This includes:

“photosensitive semi conductor devices, including photovoltaic cells, whether or not assembled in modules or made up into panels; light emitting diodes” and “specialised solar products and accessories, including solar heaters and deep cycle sealed batteries which exclusively use or store solar power”(Kenya Climate Innovation Centre, 2014).

Quality Standards

The adoption and enforcement of quality standards varies across the various countries in which Barefoot Power has subsidiaries. In Uganda, the Ugandan National Bureau of Standards (UNBS) is the authority responsible for quality assurance, testing and certification of solar products. There are currently still considerable challenges in this regard as Uganda has not adopted the International Electrotechnical Commission (IEC) Standards developed by Lighting Global. They thus primarily use labels and samples to certify products which is problematic in that poor quality or sub-standard products can slip through the cracks and be certified. More rigorous quality control procedures are required to protect the customers and create a fair playing field for businesses that offer quality products. Poor quality products could spoil the market and make it challenging for Barefoot Power to effectively market and sell their products where people have been exposed to poor quality products (Overseas Development Institute et al., 2016c).

In Kenya there are various bodies that are responsible for the quality assurance, testing and certification, including the Kenya Bureau of Standards (KEBS) and the Energy Regulatory Commission (ERC). While Kenya has recently adopted the IEC standards, they have not fully enforced these standards, and are only starting to implement enforcement more concertedly. Notwithstanding the increased presence of good quality products, there is still a presence of poor quality products in the market, and shops in rural and semi-rural areas, are likely to stock poor quality products (Overseas Development Institute et al., 2016d).

In Rwanda, the Rwanda Standards Board is the authority that is responsible for the quality assurance, testing and certification. However, there are capacity constraints to effectively implement the necessary quality control procedures coupled with a lack of clarity surrounding the quality control of imported products (Overseas Development Institute et al., 2016b).

4.6.3.3. The Ease of Doing Business

As Barefoot Power has African subsidiaries in Kenya, Uganda, Rwanda and Ghana, the ease of doing business in the various countries where they have operations could vary considerably from country to country. As noted previously, they set up their first African subsidiary in Uganda in 2008. Uganda is currently ranked 122 (out of 189 economies) on the 2016 Ease of Doing Business rank of the World Bank. They are ranked 168 for starting a business with a lengthy 27 days and 15 procedures required to be able to start a business. Furthermore they are ranked 128 for cross border trading, which is important to consider as their African subsidiaries import from their subsidiary in China (World Bank, 2016c).

Kenya is ranked 108 on the 2016 Ease of Doing Business rank. They are ranked 151 for starting a business and 131 for cross border trade (World Bank, 2016d). Ghana is ranked 114 on the 2016 Ease of Doing Business Rank. They are ranked 102 for starting a business and 171 for cross border trade (World Bank, 2016e). The 2016 ease of starting a business indicator may not be that relevant, because they established operations in 2008, and the business landscape Uganda in 2008 (and Kenya in 2009) was considerably different to what it is today. This indicator would be more relevant to consider for businesses that have recently started up, including Juabar and

ARED. However the overall ease of doing business and other determinants such as the ease of cross border trading are particularly relevant.

4.6.3.4. Awareness Raising

Through their marketing campaigns, Barefoot Power has played a role in raising awareness about solar power in the countries where they have operations. According to the Overseas Development Institute et al. (2016), in Uganda there is a relatively high level of awareness surrounding solar technologies (85% of the population know what solar energy is); however it is estimated that more than 50% of rural dwellers do not know where to purchase solar products. There is furthermore even less knowledge on where to purchase quality assured solar products. In Kenya, Lighting Africa has done considerable work in terms raising awareness around clean lighting technologies through public broadcasting and roadshows. This has resulted in a high awareness levels about solar products. However, there is still a need for increased awareness about where quality solar products can be purchased (Overseas Development Institute et al., 2016d). As noted previously in the ARED and Nuru Energy case studies, awareness about solar alternatives in Rwanda is still relatively low. Similarly it is found that there is a general lack of awareness about where quality alternatives can be bought (Overseas Development Institute et al., 2016b).

4.6.3.5. Partnerships

Forming partnerships is an extremely important part of Barefoot Power's strategy in order to achieve their social impact objectives and reach geographically remote customers in the last mile. Micro-finance institutions and partnerships with local community-based organisations are two key types of partnerships that Barefoot Power enters into (Rivera, 2015). For example in 2015, they have entered into a partnership with the Kenya Women Micro-Finance Bank to provide Barefoot Solar TV and solar home systems to members of the micro-finance bank. They have also entered into a partnership with the Kenyan Tea Development Agency (KTDA) to provide 500 000 solar home systems with a micro-financing option to rural tea farmers.

Chapter 5 Findings, Analysis and Discussion: Cross-Case Analysis

5.1. Introduction

This chapter presents a cross-case analysis of the 5 case studies presented in Chapter 4. It is a synthesis of the empirical data in Chapter 4, the responses from interviews with international development partners and key findings from the literature review (Chapter 2). Key themes across the case studies in Chapter 4 are highlighted and compared with the interview responses from international development partners, a respondent from the Developing Energy Enterprises Project East Africa (DEEP-EA) and the Kenya Climate Innovation Centre (KCIC) (see Table 12). These findings are furthermore compared with key insights emanating from the literature review.

Table 12: Interview Responses for Triangulation (Created by Researcher)

Interview Respondent	Designation
Dr Pepukaye Bardouille	Senior Operations Officer- Clean Energy Sustainable Business Advisory International Finance Corporation (IFC), World Bank
Mr Yann Tanvez (interview granted in personal capacity)	Analyst, Energy and Climate Change, World Bank
Ms Yasemin Erboy Ruff	Senior Associate, Energy and Climate, United Nations Foundation
Mr Daniel Macharia	Previously the Programme Manager for the DEEP-EA programme. Currently with the Global Alliance for Clean Cookstoves
Ms Janet Yiamoi	Business Analyst, Kenya Climate Innovation Centre (KCIC)

In response to the research objectives, Chapter 5 first explores key findings with regard to the synergy between social enterprises and local micro-entrepreneurs and then identifies the ecosystem conditions required to create an enabling environment. Chapter 5 is divided into two main sections. Section 5.2 highlights key findings with regard to the business models that are used to incorporate local micro-entrepreneurs in the clean energy value chain and the stages in the value chain where there is synergy between social enterprises and local micro-entrepreneurs. Section 5.3 identifies the enabling ecosystem conditions.

5.2. Synergy with Local Micro-entrepreneurs

5.2.1. Business Models Used to Incorporate Local Micro-entrepreneurs into the Value Chain

Table 13: Comparative Overview of Business Models Used (Drawn from Data Available to Researcher)

Name of Social Enterprise	Micro-entrepreneurship Model	Products or Services	Franchise Fee	Business Development Training
Juabar	Micro-franchise	Service: Solar powered mobile phone charging kiosks	<ul style="list-style-type: none"> Total fee: \$600 Monthly fee: \$37 per month (80 000 Tanzanian Shillings) First payment: equivalent to monthly fee, payable after first month of sales 	<ul style="list-style-type: none"> Initial upfront training: business development training and technology transfer. On-going mentoring and support.
ARED	Micro-franchise	Service: Solar powered mobile phone charging kiosks (mobile phone charging, airtime purchases, electricity purchases)	<ul style="list-style-type: none"> Total fee: \$800 for men and \$700 for women First payment: 20% required upfront. 	<ul style="list-style-type: none"> Initial up-front training: finances, business management, customer service
Solar Sister	Micro-franchise (direct sales model)	Products: pico-solar lighting devices and clean cookstoves	<ul style="list-style-type: none"> Required to purchase inventory up-front (previously used a micro-consignment model). 	<ul style="list-style-type: none"> Initial upfront training, On-going mentoring and support
Nuru Energy	Micro-franchise	Product: Nuru LED Lights Service: Light recharging service, mobile phone charging service	<ul style="list-style-type: none"> \$60 upfront commitment fee per cooperative \$120 for set of Nuru Lights (financed though up-front orders from customers) \$.01 for every recharge cycle of five lights (or five devices) 	<ul style="list-style-type: none"> Initial upfront training
Barefoot Power	Micro-franchise (currently: local technician model)	Products: extensive range of pico-solar systems and solar home systems	<ul style="list-style-type: none"> Commission per installation for current local installation model 	<ul style="list-style-type: none"> Initial upfront training

The first objective of this research study was to explore the business models that social energy enterprises use to incorporate local micro-entrepreneurs into clean off-grid energy value chains.

There are key insights that emanate from the literature review and the empirical study. In the literature review Sireau (2011) described micro-franchising as a conduit through which social enterprises could achieve social impact. The social enterprises interviewed in this study used micro-franchising business models to incorporate local micro-entrepreneurs into clean energy value chains in order to provide energy access, while simultaneously creating an income generating opportunity for the micro-entrepreneurs (see Table 13 above).

From the case studies presented in Chapter 4, it can be seen that these business models are characterised by combinations of business model and technology innovation. Continuous business model and technology innovation is imperative, particularly for social enterprises that focus on creating energy based entrepreneurial income generating opportunities for local micro-entrepreneurs in indigent communities. The findings with regard to innovation concur with the findings of the study that Koch & Hammond (2013) conducted on social enterprises. Koch & Hammond (2013) pointed out that social enterprises need to innovate simultaneously along multiple dimensions. The social enterprises interviewed in this study also provide examples of simultaneous innovation across multiple dimensions.

Their business models are furthermore characterised by a steep learning curve, as they were pioneering these new innovative business models in nascent markets. Through innovation they were able to refine their business models and distribution networks, improve the functionality and quality of their product and service offerings and create additional revenue streams for the local micro-entrepreneurs that are part of the micro-franchising models.

5.2.1.1. Advantages of Micro-franchising Models for Local Micro-entrepreneurs

Business Development Training and Support

Micro-franchising models offer various advantages. One advantage is the business development training and support offered to the local micro-entrepreneurs. In the literature review Sireau (2011) highlighted that micro-franchising offers the advantage of being able to tap into a standardised business structure and receive business development training. As noted in Chapter

4, Nyakarundi (personal interview, 20 May 2015) commented that he chose the micro-franchising model because local micro-entrepreneurs could become part of a business model where the ground work had already been laid and benefit from the training and business support that is built into the ARED micro-franchising model. All of the social energy enterprises interviewed provided business development support to the micro-entrepreneurs in their micro-franchise models. In addition to upfront training, Juabar and Solar Sister placed an emphasis on ongoing mentoring support. On-going mentoring is an important value add because it enables micro-entrepreneurs to address challenges in the business as they arise and to put mitigating measures into place. In this regard lessons can be drawn from the Developing Energy Enterprises Project East Africa (DEEP-EA) led by GVEP International. This was a five year programme that focused on the development of micro and small energy enterprises. Macharia (personal interview, 15 October 2015) commented that potential candidates were taken through a process of basic entrepreneurship training for approximately four days, which served as a type of entrepreneurship boot camp. Thereafter a “needs analysis” was done to ascertain the particular business support needs of the entrepreneurs. This was done through field mentors who were assigned to a group of entrepreneurs. Macharia (personal interview, 15 October 2015) commented:

“We believe that you cannot build a good entrepreneur given five days or four days, so mentorship was an essential component within the programme. We had the field mentors who were actually interacting with entrepreneurs on a daily basis; looking first of all at what their needs were, how they were trained, if they can translate what they were trained in practice, as well as actually helping them technologically to up their game.”

Notwithstanding the importance of investing in training and development of local micro-entrepreneurs, particularly ongoing training, it is important to note that there is a difference between the level of on-going training and mentoring that can be provided through a programme such as the DEEP EA programme, and the type of training that can be provided by a social enterprise due to financial and capacity constraints.

Income Generating Potential

Another advantage is the income generating potential. From the case studies in Chapter 4 it can be seen that there are tangible income generating opportunities for local micro-entrepreneurs in the micro-franchising models. The potential income and profits that can be generated through the micro-franchising business models vary within and across the case studies. From the case studies of Juabar and ARED, who both offer a mobile phone charging kiosk micro-franchising opportunity, the income generating potential of the micro-entrepreneurs is dependent on the average number of phones charged per day and the flow of customers to the mobile kiosks. As Shayo (personal interview, 20 May 2015) indicated, it is a seasonal business and that there are periods where the flow of customers is low.

ARED and Juabar offer a similar mobile phone charging micro-franchising opportunity. There are however differences as Juabar primarily offers mobile phone charging, whereas ARED offers multiple services that generate multiple streams of revenue. Another difference is that Juabar serves rural customers in Morogoro, whereas ARED serves urban customers in the city centre in Kigali. As noted in the ARED case study, Mr Nyakarundi refined his business model after the pilot as he assessed that that revenue generated through mobile phone charging alone would not generate sufficient revenue. The Juabar mobile kiosks may serve as a primary income stream to some entrepreneurs, but is primarily a supplementary stream to augment agricultural activities as indicated in Chapter 4 by the comments of Mr Shayo, and the example of Mama Salama, one of their longest standing Juabar micro-entrepreneurs. While more detailed information about the income generating potential of the ARED micro-franchisees could not be accessed, multiple streams of income does auger well for potential sustainability. The ARED mobile kiosks, could potentially serve as a primary source of income. ARED micro-franchisee Jeanne, who runs her kiosk for 12 hours a day (6 days a week) illustrates this.

Similar to Juabar and ARED, the income generating potential of the Nuru Energy micro-entrepreneurs is dependent on how frequently customers return to recharge their Nuru lights and other devices such as mobile phones. Similar to ARED, Nuru Energy also identified a mobile

phone charging niche in Rwanda. ARED and Nuru Energy both recognised the importance of additional services. For most of the Nuru Energy micro-entrepreneurs, it supplements income from subsistence farming activities and existing small businesses.

For the Solar Sister micro-entrepreneurs, the income generating potential is dependent on the number of sales, the frequency of sales and their mark-up. The Solar Sister micro-entrepreneurs are not actively selling all the time, and for most of the Solar Sister entrepreneurs it is a supplemental income stream to augment subsistence farming activities, teaching, health care work and pre-existing businesses. A few entrepreneurs however see it as a potential full time business opportunity.

Juabar, ARED and Nuru Energy are businesses that focus on the provision of energy services. These businesses are all impacted by the number of daily customers and the frequency of customers. Solar Sister on the other hand is a product sales driven business, influenced by the turn-around time of durable clean energy products and the number of sales they are able to do. For most of the entrepreneurs the income stream is supplemental; providing an important source of income to tie them through the periods where there is little income from agricultural activities, or to augment the income from other businesses they are running. However there are entrepreneurs who see the energy business ventures as full time ventures (e.g. Jeanne from ARED and the Solar Sister entrepreneurs who excel in sales). This is therefore indicative that the income generated from these energy enterprises could serve as a primary income stream, but this is dependent on the drive and motivation of the individual entrepreneur and how much time and energy they are willing to invest in their business.

5.2.1.2. Emerging Key Challenges and Considerations for Micro-franchising in Off-grid Energy

Providing Finance for the Micro-franchisees

There are various challenges with regard to micro-franchising business models for off-grid clean energy access. Koch & Burand (2010) pointed out that micro-franchising combines many aspects of traditional larger commercial franchising models, but offers a more affordable franchising opportunity that can be tapped into by the BOP. While this is true in that the micro-franchising fees are significantly lower than larger commercial franchises (as illustrated in the summary of the fee breakdown in Table 13 above) affordability is still something which needs to be addressed as it is a relative concept. Although the micro-franchising fees are reasonably and relatively low, it does not imply that micro-entrepreneurs who potentially qualify as suitable candidates, are necessarily able to come up with the finance to pay the initial fee. Tanvez (personal interview, 29 May 2015) indicated that providing finance for the micro-franchisees is one of the main challenges he has seen with respect to micro-franchising business models. He indicated that there are two avenues that are commonly used. In-house financing where the franchisor finances the stock of the inventory of the entrepreneurs (usually through a micro-consignment model). This model presents its own set of challenges. The other avenue is where energy enterprises link up with micro-finance institutions to provide micro-finance to the micro-entrepreneurs in their networks. He indicated that this works in some cases, but in other cases it presents the challenge of high interest rates.

The social energy enterprises in this study, approached the financing of the franchise fees in various ways. With Juabar, for example, the first payment is equivalent to the first month's rental and is payable after the first month of sales. As Shayo (personal interview, 20 May 2015) indicated, a deferred upfront initial payment was introduced because some entrepreneurs had expressed concerns about not being able to recover their upfront payment through the mobile phone recharging. For the ARED mobile kiosk business on the other hand, the 20% upfront deposit is a prerequisite. ARED micro-franchisee Jeanne, for example was not able to afford the

20% upfront deposit and was financed through her local village family association. In the case of Nuru Energy, the upfront fee of \$60 dollars is a prerequisite and is split between the five members of the cooperative. Although Solar Sister used to work on a micro-consignment principle, they found that this approach did not work and subsequently stopped providing products on credit. They advise potential micro-entrepreneurs to purchase their stock incrementally from the proceeds of their agricultural sales or their savings.

As Dutt (2012) noted, micro-franchising models need to be flexible and the micro-franchisor needs to put measures in place to reduce the financial risk of the micro-entrepreneurs and in some cases take on more risk if necessary. This can be seen in the case of Juabar for example, who altered the initial thinking behind an initial upfront payment to a deferred payment, in order to reduce the risk to the micro-entrepreneurs and allow them to gain confidence that they would be able to generate sufficient revenue to pay back the lease fee and make a profit. As seen in the calculation of potential income generated in the Juabar case study in Chapter 4, using a conservative calculation, Juabar micro-entrepreneurs could generate 200 000 Tanzanian Shillings per month in revenue, which is 2.5 times the 80 000 Tanzanian Shilling monthly lease fee. Another example of adjusting the amount of risk an entrepreneur takes on can be seen in the DEEP-EA programme. Macharia (personal interview, 02 October 2015) indicated that while they initially underwrote 100% of the risk for the entrepreneurs in the programme, they subsequently altered the model to underwrite only 50% of the risk, in order for micro-entrepreneurs to make a financial commitment to their businesses.

From the above, it can be seen that the energy enterprises used various approaches with regard to financing the micro-entrepreneurs in their micro-franchise models, according to what worked best in their individual contexts.

Identifying and Selecting the Right Micro-entrepreneurs

The identification and selection of micro-entrepreneurs forms a critical part of the micro-franchise models. In the literature review Avato & Madeira (2010) indicated that energy enterprises usually make use hierarchical structures in villages and approach the community leadership as part of their strategy to identify potential local micro-entrepreneurs. This was also found in the case studies in Chapter 4. In the case of Juabar, Shayo (personal interview, 20 May 2015) indicated that as part of their selection strategy, they get recommendations from village leaders and other members of the community, to assist them in the selection process. Solar Sister used a similar approach through the local community based organisation Mother's Union. Barefoot Power, in their initial micro-franchise model also approached local community organisations such as BRAC Uganda and Uganda Micro-finance Ltd, to in order assist them with the identification and selection of local micro-entrepreneurs.

Nuru Energy provides a good illustration of the causal link between the selection strategy of micro-entrepreneurs and the performance of their micro-enterprises. Hajee (personal interview, 02 October 2015) indicated that selecting co-operatives of entrepreneurs instead of individual entrepreneurs has significantly improved the success of their micro-franchisees (Hajee, personal interview, 02 October 2015). He furthermore provided insight into the negative cost associated with selecting the wrong entrepreneur. This cost relates to the loss of the initially amount spent on setting up the entrepreneur as well as an opportunity cost associated with a recharging station that could have been optimally used by another entrepreneur. Tanvez (personal interview, 29 May 2015) indicated that most energy companies that wish to distribute through local micro-entrepreneurs have indicated that identifying the right micro-entrepreneur is particularly challenging.

Another aspect of the selection criteria that should be considered is the background of the entrepreneur and their prior exposure to entrepreneurship. Local micro-entrepreneurs that have previously run a shop in the village; generated money from the of sale of agricultural produce or that have had some type of prior entrepreneurship exposure, could potentially be better

candidates to run micro-energy enterprises. Shayo (personal interview, 20 May 2015) indicated that when selecting potential candidates they consider entrepreneurship skills and inclination, although this does not necessarily preclude candidates with no previous entrepreneurial background.

Nuru Energy indicates that an entrepreneurial background is not a prerequisite in their selection criteria as their recharging business model is very straight forward, and they wanted to expose people who had no previous exposure to entrepreneurship, to a simple, easy to run business. Notwithstanding, Hajee (personal interview, 2 October 2015) did however indicate that a cooperative member who runs an existing business in the village, is a real asset to the cooperative.

Macharia (personal interview, 02 October 2015) indicated that in the DEEP-EA programme, while they initially also selected people with no previous entrepreneurial background, towards the latter part of the programme, they shifted their attention to working with entrepreneurs who were already running an energy enterprise. This was a very important lesson in the programme, as there was a better success rate from existing entrepreneurs. While there is not sufficient data from the social enterprises interviewed in this study, to draw a causal link between the background of the entrepreneurs and their performance, the comments and experiences of some of the interview respondents does indicate the potential of a strong causal link. However, the individual business models also dictate the extent to which previous entrepreneurial exposure could affect the success of the business.

Providing Training and On-going Mentoring Support to the Micro-entrepreneurs

While business development training and mentoring is imperative for micro-franchise models, and is an important value add for the local micro-entrepreneurs, it should be noted that it is an expense item to the business, which requires a capital investment and the necessary expertise to be able to deliver. Bardouille (personal interview, 05 June 2015) commented that thorough skills development and training requires a high capital investment and offers a low return. Solar Sister's mission is to provide clean energy access and simultaneously empower women through

clean energy entrepreneurship. As a non-profit enterprise that derives two thirds of their funding from donor funding, they are able to invest more in the socio-economic developmental aspects of the business, and are not completely reliant on the income derived from product sales. Solar Sister spends \$500 per micro-entrepreneur for training and mentoring. To train their current network of 1250 local micro-entrepreneurs, they would have spent at least \$625 000 on training (or significantly more if the attrition rate is taken into account). This is a substantial investment in training, in line with their core mission. Some of the for-profit enterprise examples, such as Nuru Energy and ARED, offer a more streamlined approach to training (which is shorter in duration) and covers the necessary basic skills that the entrepreneurs require to effectively operate within their particular business models.

Bardouille (personal interview, 05 June 2015) indicates that when considering local community based micro-entrepreneurship models, it is important to consider who does the training. She indicated that you need to be very mindful of the institution or conduit used to set up and provide the training. She proposes a model where the cost of training is funded through a public goods component similar to what is done through Lighting Africa with their public awareness raising campaigns for off-grid clean lighting alternatives.

“A better model (and that is something which I generally advocate for) is to help fund that additional cost through a public goods component. Where donors can play a role, is not in doing the training but in funding the training, and developing a platform that the private sector can use to secure trained people.”

This is important because it could enable to businesses to focus on core aspects of their business model and outsource the training component to organisations that have the capacity and technical expertise to deliver ongoing training and support to the entrepreneurs. It also removes a significant cost item from the businesses. Some of the social enterprises have recognised the value of partnerships for training. For example, Juabar, started partnering with local economic development organisations to assist with the training. Part of the training provided by Solar Sister is made possible through their global partnership networks.

Challenges with Direct Sales Strategies: Exhausting Immediate Networks

Avato & Madeira (2010) argued that the direct sales model has the advantage of gaining consumer confidence and trust, because the sales agents are from the local community. Solar Sister and Barefoot Power experienced similar challenges with the direct sales approach for their pico-solar lighting products. While their direct sales models may have worked well initially, local entrepreneurs often found that their customer base was exhausted quickly after selling to relatives, extended family, friends and other acquaintances. Furthermore it was also found that a small percentage of the micro-entrepreneurs performed really well and generated most of the sales.

These findings also concur with one of the lessons learnt in the DEEP-EA programme. Macharia (personal interview, 15 October 2015), noted that many of the entrepreneurs found that they did not have a large enough market within their immediate geographic vicinity and would struggle to sell their products. They however learnt the value of going outside of their immediate physical location, to sell their products at the local markets.

From the empirical data it is evident that while it could be useful to leverage these existing networks, micro-entrepreneurs cannot rely solely on networks of acquaintances to build a sustainable business. Barefoot Power discontinued the direct sales VLE model and transitioned to a model that provides an installation and maintenance service through village level technicians. Solar Sister however continues to use the direct sales model and train a new cohort of micro-entrepreneurs as well as provide ongoing mentoring support to the existing micro-entrepreneurs that perform well. It should also be kept in mind that Solar Sister is a non-profit social enterprise, whereas Barefoot Power is a for profit social enterprise, that could currently be more accurately described as a socially minded enterprise based on commercial business principles and distributes to a wide variety of customers (not only to the BOP). Barefoot Power would need to consider the distribution models that make the most sense financially and for effectively distributing their products. In the literature review Dutt (2012) emphasised that the contexts in which village level entrepreneurship models for last mile distribution, are likely to be

successful need to be interrogated as these models have varying degrees of success. Barefoot Power's move away from their initial product sales micro-franchise model, is indicative of a strategic decision to discontinue a village level entrepreneurship model that was not working. It is also indicative of a technology and market shift.

Bardouille (personal interview, 05 June 2015) commented that in some instances it may make sense to incorporate local micro-entrepreneurs into energy access business models, but in other instances it may not. She indicated that it is important not to force a business model to be inclusive, as it may not always be the best approach from an energy service delivery perspective or in terms of commercial viability. She commented that while she has seen one or two really exciting commercially viable and scalable business models that incorporate local micro-entrepreneurs, many inclusive business models are challenged with regard to scaling at the required rate. Caution needs to be exercised when trying to combine too much of the social side with the commercial side, because building a commercially viable, scalable off-grid energy access business is very challenging on its own, and trying to combine too many additional elements could compound these challenges (Bardouille, personal interview, 05 June 2015).

From the above it can furthermore be noted that social enterprises are not a homogenous clustering of enterprises. Their mission, business models and financial structures may differ significantly. As Peredo & McLean (2006) noted in the literature review, social enterprises could be placed on a continuum where some focus more on the social aspects, while others focus more on the pure commercial business aspects. In the examples of the social enterprises interviewed, Solar Sister and Barefoot Power would be on two opposite ends of such a continuum.

Product Centric Models versus Service Centric Models

Some of the social enterprises interviewed used micro-franchising for the distribution of energy products (e.g. Solar Sister, Nuru, Barefoot Power) while others used it for the provision of energy services (e.g. Juabar, Nuru, and ARED). In order for the micro-entrepreneurs to create sustainable businesses, there needs to be recurring revenue streams. From the case studies it can be seen that offering an energy service, such as the recharging of mobile phones or lighting devices offers greater potential for recurring income than the sale of solar durable goods. The services offered by the Juabar, ARED, and Nuru Energy micro-entrepreneurs could potentially generate recurring revenue.

The business models that relied solely on product sales seem less likely to be sustainable than models that were built on energy services, because the micro-entrepreneurs experienced challenges building sustainable micro-businesses based on the sales of durable pico-solar lighting products.

Pricing, Affordability and Aspirational Energy Needs (Wants)

The initial challenges that the Nuru Energy micro-entrepreneurs encountered with sales after the pilot were primarily attributed to the price point and affordability to the end user. After their pilot, Nuru Energy initially priced their lights at a very low price (cost of production). However it was still too expensive for the segment of the BOP they were targeting (i.e. people earning less than \$1.50 per day). The inability to sell the initial set of lights adversely impacted the take-off of the micro-businesses, because they were unable to build a customer base of entrepreneurs that would need to come to recharge their Nuru lights. Although Nuru Energy has shifted to focusing on the revenue generated from their recharging stations (and not the sales of lights), this does illustrate the sensitivity to pricing and affordability.

In addition to the price point, it is important to consider the nature of the product being sold (i.e. durable solar products) and the demand for the product. As noted previously durable solar

products have a slow turn-around time because many customers consider it a long term purchase and are unlikely to come back within a week or month on a consistent basis. Furthermore, while an immediate energy need may be basic entry level lighting, customers may aspire to purchase larger more comprehensive systems. Barefoot Power found that the customers they were serving wanted a more holistic energy experience that could enable them to switch on the TV or light up a room with the flick of a switch. In this case the demand was influenced by aspirational energy needs (or wants) of the customers.

5.2.2. Value Chain Participation Analysis

The second objective of this research study was to explore the stages of the clean energy value chain where there is synergy between social enterprises and local micro-entrepreneurs as well as the rationale for the participation of local micro-entrepreneurs in these stages. Table 18 provides a summary of the areas in the value chain where the energy enterprises participate. Most of the energy enterprises interviewed participate quite widely throughout the various stages of the value chain. The literature review distinguished between enterprises that have a strong degree of vertical integration (that have the in-house capacity to design, manufacture and distribute) and enterprises that have a strong degree of horizontal integration (participating in one or a few stages of the value chain) (Bardouille, 2012; Clean Energy Access Network, 2015; Franz et al., 2015).

Barefoot Power shows a high degree of vertical integration because they participate directly in all the stages of the value chain. Solar Sister on the other hand serves primarily as a distributor of clean energy products and partners with a range of manufacturers and suppliers. There are advantages and disadvantages of being either strongly vertically integrated or horizontally integrated. This is linked to the vision and purpose of the energy enterprise, the level of capital that can be raised for intensive manufacturing operations and the skills and expertise within their team.

Table 18: Value Chain Participation: Energy Enterprises (Drawn from Data Available to Researcher)

Value Chain						
	Research and Development	Manufacturing	Marketing	Sales, Distribution, Installation	Payment and Consumer Finance	After Sales Service and Maintenance
Juabar	X	X	X	X		
ARED	X	X	X	X		
Solar Sister			X	X		X
Nuru Energy	X	X	X	X		X
Barefoot Power	X	X	X	X	X	X

Table 19 provides a summary of the areas where local micro-entrepreneurs participate in the value chain. They are primarily involved with last mile distribution which involves marketing and selling clean energy products and services. They serve as the interface between the energy enterprises and the customers. In certain instances they also provide after sales service to the customers and maintenance where solar home systems have been installed.

Table 19: Value Chain Participation Local Micro-entrepreneurs and Technicians (Drawn from Data Available to Researcher)

Value Chain						
	Research and Development	Manufacturing	Marketing	Sales, Distribution, Installation	Payment and Consumer Finance	After Sales Service and Maintenance
Juabar Micro-Entrepreneurs	x		X	X		
ARED Micro-Entrepreneurs			X	X		
Solar Sister Micro-Entrepreneurs			X	X		x
Nuru Energy Micro-Entrepreneurs			X	X		
Barefoot Power Installers				X		x

Last mile distribution is considered to be one of the most challenging aspects of distribution. As noted in the literature review, many energy enterprises have opted for micro-franchise business models that incorporate local micro-entrepreneurs, to sell their clean energy products or energy services in the last mile to overcome geographic and distribution network challenges. From a distribution network perspective, the rationale is to tap into existing community networks. Tanvez (personal interview, 29 May 2015) noted that local micro-entrepreneurs play a very important role as distributors for product manufacturers of lanterns and solar home systems and energy enterprises that wish to reach more customers. When entering a country, these product manufacturers require distribution partners, and local micro-entrepreneurs play an important role in reaching customers in the last mile and reaching economies of scale. From a geographic perspective local micro-entrepreneurs are poised to be the interface between the energy enterprises and customers as they are able to market and sell products in areas that may be remote and difficult to reach through more conventional retail distribution methods. In all the energy enterprises interviewed the micro-entrepreneurs served as the interface between the energy enterprises and the customers with Juabar, Solar Sister, Nuru Energy and Barefoot Power serving rural areas.

Overall, there is very little local participation in the research and development phases. The case of Juabar is an exception in this regard. Juabar demonstrates the greatest degree of local community participation throughout the various stages of the value chain. This includes the participation of local designers (from ARTI Energy), local fabricators and assemblers (from local vocational colleges) and the Juabar micro-entrepreneurs. Barefoot Power, also uses product feedback from customers to input into their design process, however this is not done as concerted as Juabar.

In the literature review, Battilana et al. (2010) argued that by being embedded in the local community, social enterprises would gain greater insight into the problems they are trying to address and form symbiotic relationships with members of the local community. This has been particularly true with Juabar. Juabar is an example of a social enterprise that is greatly embedded

in the local community. As noted previously in Chapter 4, the Juabar concept culminated from the insights into the energy experience in Morogoro and by being physically geographically located in the region which they serve, Juabar was able to get to know the people of Morogoro more intimately, understand their energy access needs first hand and identify a niche opportunity.

Notwithstanding the potential value of local participation in the research and development stage of the value chain, it is not always practically possible, nor necessarily a prerequisite for successful off-grid clean energy access delivery models. For example, Barefoot Power’s research and development is done at their headquarters in Australia and ARED’s mobile kiosks (which are technologically advanced) was conceptually designed by the founder Mr Nyakarundi and also required the expertise of a designer and an engineer.

5.3. Ecosystem Analysis

The third objective of this study was to identify the enabling ecosystem conditions required to support these inclusive micro-entrepreneurial business models. These ecosystem conditions, as identified in the literature review and the empirical study, are described in more detail in the sections that follow.

5.3.1. Funding

Table 20 provides a summary of the funding sources and challenges of the social enterprises interviewed.

Table 20: Summary of Funding Sources and Challenges (Drawn from Data Available to Researcher)

Enterprise	Funding Sources	Funding Challenges
Juabar	<ul style="list-style-type: none"> • Entrepreneurship competition; • Funding from family and friends; • Debt Funding. 	<ul style="list-style-type: none"> • Obtaining funding to scale the business (having to prove scalability in order to be eligible for funding to scale); • Perceived by some potential funders as either too philanthropic or too commercial.
ARED	<ul style="list-style-type: none"> • Self-funded at start-up (from proceeds from previous business venture; • Entrepreneurship competition. 	<ul style="list-style-type: none"> • Insufficient local venture capital, patient capital and impact investments; • Insufficient local grant funding.

Solar Sister	<ul style="list-style-type: none"> • Self-funded at start-up; • Donor funding 	<ul style="list-style-type: none"> • Not being able to tap into commercial funding and equity investments as a non-profit. • Becoming too big to be funded by certain funding sources certain funding streams”.
Nuru Energy	<ul style="list-style-type: none"> • Grant Funding (World Bank; UNEP); • Commercial Funding (Bank of America, Merrill Lynch) 	<ul style="list-style-type: none"> • Obtaining patient capital equity investments from social impact investors; • Having to demonstrate a certain level of profitability in order to be eligible for patient capital.
Barefoot Power	<ul style="list-style-type: none"> • Self-funded (consulting revenue, savings); • Funding from family and friends) • Private equity investments; • Social impact investments; • Grant funding (European Union) 	<ul style="list-style-type: none"> • Challenges obtaining early stage financing for product development.

The energy enterprises received funding from a wide variety of funding avenues, including their own capital contributions, contributions from friends and family, entrepreneurship and innovation competitions, grant funding, commercial funding and private equity.

During the start-up and early growth stages of the business, three common sources of funding are noted across the social enterprises interviewed, namely: the founders’ own capital contribution, angel investments and entrepreneurship competitions. Juabar was funded through combinations of funding from an entrepreneurship competition they had won and angel investments. ARED was funded through the founder’s own capital contribution and an entrepreneurship competition they had won. Solar Sister was founded through the founders’ own capital contribution. Nuru Energy was funded through grant funding from an entrepreneurship competition (the World Bank Development Marketplace competition) and Barefoot Power was funded through the founders’ own capital contribution and angel investments.

Most of the energy enterprises were able to tap into sources of grant funding (e.g. Juabar, Solar Sister, Nuru Energy and Barefoot Power). Grant funding is an important source of funding that social enterprises can tap into, because most institutions that provide grant funding wish to see certain socio-economic development outcomes from the businesses that they fund. Therefore

social enterprises that provide off-grid clean energy alternatives and incorporate local micro-entrepreneurs into their value chains, could potentially be eligible for certain types of grant funding. Yiamoi (personal interview, 02 June 2015) indicated that grant funding is an important funding option, particularly during the early stages of the business lifecycle when businesses are not yet eligible for commercial funding. However, social energy enterprises cannot depend solely on grant funding to build sustainable, scalable business ventures. In the case of Nuru Energy, Hajee (personal interview, 02 October 2015) indicated the need to pursue other funding avenues including patient capital. Although Solar Sister is a non-profit social enterprise, they also endeavour to build a sustainable business model that is not entirely dependent on donor funding.

Juabar and Barefoot Power both benefitted from angel investments at start-up from family, friends and people who identified with their businesses. As Bardouille (2012) highlighted in the literature review, angel investments are imperative during the early stages of the business lifecycle, when businesses have just started up and require time to develop their business model. At this early stage when institutional investments are unlikely, angel investments are needed to fill the gap. ARED however, was unable to obtain an angel investment during the early start-up phase. Nyakrundi (personal interview, 20 May 2015) commented on the need for local angel investors and innovative financing mechanisms for local African SMEs.

One observation is the marked difference in the scale of investments the social enterprises were able to raise. If we consider the for-profit social enterprises (Juabar, ARED, Nuru Energy and Barefoot Power), Juabar and ARED had obtained relatively smaller capital investments, primarily through entrepreneurship competitions. ARED for example won \$15 000 through entrepreneurship competitions. Nuru Energy and Barefoot Power were able to raise much more substantial capital investments. Nuru Energy initially received \$200 000, in grant funding through the Development Marketplace competition, and were able to raise approximately \$5 million in grant funding to date. Similarly, Barefoot Power was able to raise \$5.8 million through grant funding, equity investments and commercial funding. There are numerous factors, to which the difference in the scale of investment raised, potentially could be attributed. This includes the size

of the enterprises, the number of years in operation, their business model, their service offerings, their exposure to various sources of funding and their geographic location. For example Juabar and ARED, are smaller enterprises that were founded in 2012 and 2013 respectively and could still be considered start-up social enterprises. Nuru Energy founded in 2009 and Barefoot Power founded in 2005 are larger and more established enterprises. Furthermore, Barefoot Power does not only target the BOP market and serve large and medium enterprise customers as well.

From the ARED case study it can be seen that that local African entrepreneurs face distinct challenges when accessing funding. Entrepreneurs from developed economies that set up a business in Africa could potentially have access to more diverse avenues of funding. ARED indicated a need for local angel investment and venture capital. This concurs with the findings from a survey conducted in the literature review that showed angel investment and venture capital comprised of only 4% and 5% respectively of funding sources of the African enterprises in the survey (Omidyar Network & Monitor Group, 2013). It also concurs with the findings of Bardouille (2012), who indicated that entrepreneurs from developing countries often have access to a limited pool of local venture capitalists or impact investors, within their immediate geographic location.

Another funding challenge noted is access to capital for growth and expansion, beyond early-stage capital. Nuru experienced challenges with raising patient capital from impact investors; they found that some impact investors wanted to reduce their risk exposure by funding only highly profitable business ventures. Juabar indicated that with regard to obtaining funding to expand their business, investors wished to see a certain level of scalability before investing.

Findings from the interviewed energy enterprises concur with the findings from the United Nations Foundation's Energy Access Practitioner Network (a membership network established by the UN Foundation). A survey was conducted among members of the Practitioner Network to establish what their greatest business needs were. Erboy Ruff (personal interview, 30 April 2015) commented:

“One of the things that we hear from our membership is that they need additional funding, basically funding is the biggest bottleneck in the sector. For example from our survey, 75% of the respondents reported that funding was the biggest bottleneck they had, to improve delivery, installation and on-going maintenance which are obviously all key to scaling off-grid electrification, so that’s something to keep in mind.”

She furthermore commented on the disjuncture between businesses seeking funding and potential investors. Investors state that there is funding, but that there are not enough good business proposals or projects. Businesses however indicate that they cannot find investors who are prepared to invest in their business ventures (Erboy Ruff, personal interview, 30 April 2015).

The disjuncture could be attributed to a mismatch between businesses and potential investors. Different investors have different sets of criteria with respect to the types of businesses that they would be interested in funding. Businesses could be approaching funders, whose criteria they are not able to meet. Criteria could pertain to the size of the business entity, its potential for scalability, and its vision and purpose. For example Yiamoi (personal interview, 02 June 2015) commented that many energy enterprises are seeking early stage financing under \$100 000, whereas many equity investors are looking to make investments greater than \$500 000. Sometimes this mismatch could be as a result of more subtle criteria that is not necessarily explicitly stated.

As noted in the Solar Sister case study, Mailloux (personal interview, 27 April 2015) indicated that as Solar Sister grew, they were no longer eligible to continue receiving funding from certain funders, as those funders were seeking to fund smaller businesses who were in the early stages of their business lifecycle. This also ties in with the comments of DeCou (personal interview, 21 April 2015) who commented that it is important to align yourself with funders that can identify with your vision, mission and values and who wish to invest in your specific sector and region.

Another possible reason for the disjuncture could be that investors may not be aware of innovative new business ventures seeking funding. A Funding Directory created by the Energy Access Practitioner Network, could serve an important function in matching businesses with potential funders, because it provides a profile of the various energy access businesses with their size and the type of investment they are seeking (Erboy Ruff, personal interview, 30 April 2015).

It can be seen that social enterprise business structures present inherent challenges when raising capital because the social vision of the business needs to be served, but the enterprises also need to make a strong business case and be sustainable. Juabar indicated that some potential investors wished to see more social impact, while others wished to see more commercial viability. Nuru pointed out that even though patient capital is theoretically supposed to be a funding mechanism suited to social enterprises, in practice they found that certain impact investors wished to fund businesses that could demonstrate a social impact, but be highly profitable as well.

The type of funding sources and scale of investment is important as it has an impact on the daily operations of the business and their product and service offerings. It furthermore impacts the rate at which they are able to scale their businesses. The type of funding sources also affect the extent to which social enterprises will include local micro-entrepreneurs into the value chain and the type of investment they are able to make in terms of the business development training and support of local micro-entrepreneurs.

5.3.2. Policy and Regulatory Environment

Enabling Fiscal Policies

As highlighted in the literature review, an appropriate regulatory environment is required to support off-grid energy enterprises. It is necessary for governments and policy makers to institute enabling fiscal policy measures for solar products and components through VAT and import duty exemptions (Hagan, Mifsud & Diecker, 2015; Diecker, Wheeldon & Scott, 2016). This is important as these taxes significantly add to the cost of durable solar products which affects energy enterprises and customers. It was furthermore noted that many East African countries have made significant strides in creating such an environment for energy enterprises. All of the energy enterprises interviewed in this study have a footprint in East African countries including Tanzania,

Rwanda and Kenya and Uganda. Juabar, Nuru, ARED and Barefoot Power all commented that the VAT and duty exemptions for solar PV products were enabling for their businesses.

Quality Standards

The importance of quality standards and certification, and the enforcement of these standards was highlighted in the literature review (Bardouille, 2012; Franz et al., 2015). This is imperative for quality assurance and plays an important role in establishing trust and customer confidence. Procedures for quality testing and certification are regulated by National Bureaus of Standards or relevant bodies within a country. While quality standards for clean lighting products may be adopted, these standards are not always enforced. For example, although Kenya and Uganda have adopted the IEC standards of Lighting Global, they still face challenges with regard to the consistency of the enforcement of these standards and the procedures used for certification. In Rwanda capacity challenges hinder the effective implementation of quality control verification processes. There is therefore a need for development partners to work concertedly with governments in order to improve their internal procedures and strengthen capacity to effectively facilitate product quality assurance. In this regard Tanvez (personal interview, 29 May 2015) commented:

“There is a strong role for development partners to work hand in hand with government to better understand their issues and provide information and knowledge on the different aspects - on quality, on subsidy mechanisms, on enabling policies and regulations, and so on.”

5.3.3. The Ease of Doing Business

The ease of doing business in a country is important to consider as it is interlinked with key operational aspects of a business. This varies across the case studies and within the case studies (where the social enterprises have established themselves in more than one country). Table 20 below, summarises the relative ease of conducting business within the countries where the social enterprises interviewed have established their businesses. It should be noted that while a country may be ranked higher than another in absolute terms, it may be more conducive in terms of individual indicators. For example a lower ranking country may be more conducive for cross

border trade than the country above it. This is a result of the weighting the World Bank gives to individual indicators (which ultimately affects the absolute ranking in their distance to frontier ranking methodology).

Rwanda stands out in terms of making strides in improving the ease of doing business, particularly with regard to registering a new business. Mr Nyakarundi from ARED and Mr Hajee from Nuru Energy both commented positively on the strides the Rwandan government has made to improve the ease of doing business. Ms DeCou from Juabar however indicated that setting up their business in Tanzania proved to be a bit challenging in that they did not always have clarity on the various procedures required and associated time frames. Data from the World Bank supports these findings.

Table 21: 2016 World Bank Ease of Doing Business Country Rankings (Drawn from Data Available to Researcher)

Country	World Bank Ease of Doing Business Rank 2016	World Bank Rank for Starting a Business 2016/ Number of Days taken to register a Business	World Bank Rank for Cross Border Trade 2016	Social Enterprise Established in Country
Rwanda	62	111 (5.5 days)	156	ARED, Nuru Energy
Kenya	108	151 (26 days)	131	Barefoot Power
Ghana	114	102 (14 days)	171	Barefoot Power
Uganda	122	168 (29 days)	128	Barefoot Power, Solar Sister
Tanzania	129	122 (26 days)	181	Juabar, Solar Sister
Nigeria	169	139 (28 days)	182	Solar Sister

5.3.4. Awareness Raising

The literature review highlighted, that due to the nature of nature of off-grid clean energy markets in developing countries (where there is generally not enough awareness about off-grid clean energy technologies and products) creating product and technology awareness forms part of strengthening market structures and is imperative for inclusive market development (United Nations Development Programme, 2010; Bardouille, 2012). The levels of awareness vary across the countries in which the social enterprises established themselves. A key challenge is that there is a very low level of awareness about where quality off-grid clean lighting alternatives can be purchased. DeCou (personal interview, 21st April 2015) indicated that when coming to Tanzania there was generally not enough awareness around solar technologies. Hajee (personal interview, 02 October 2015) indicated that when initially coming to Rwanda they embarked on an intensive marketing campaign to raise awareness about their product offerings and spent approximately \$10 000 per month on marketing. While he also indicated that this has gone a long way in terms of the level of awareness and customer confidence with respect to their products and services, it is still indicative of the capital intensiveness of awareness raising efforts. There is therefore a need for greater participation from governments and development partners to create awareness at a mass scale and through specific regional initiatives. With reference to this Tanvez (personal interview, 29 May 2015) commented:

“So governments and development partners have a strong role to play, by running national consumer awareness campaigns, which are not promoting any kind of product or any kind of company in particular, but putting a focus on the quality. Why... because, it happens (and it’s now happening more and more) where you have lanterns and small solar products that have very poor quality and standards, increasingly available in developing country markets and even in rural areas, especially in West and East Africa. These products can be the first renewable energy products reaching those villages. And because they have high fault rates, they spoil the market. Therefore customers need to be informed that some standards exist-and not only customers but also village level entrepreneurs because they are the first touched by selling the wrong products [low quality] products that they bought stock of. As soon as the first customer realises that the product is not working, word of mouth spreads, and the micro-entrepreneurs are left with stock of poor quality products that they have invested in but can’t sell. That has the ability to destroy or impede the development of markets, and therefore there is a strong role for governments and development partners to play a role in building awareness, not only on the benefits of products but also on quality standards. And that’s something that Lighting Africa has been doing. They have been working on developing standards, in the product space and increasingly in the solar home space.”

5.3.5. Partnerships

Table 22: Partnerships (Created by Researcher)

	Technology	Implementation	Research	Finance	Advocacy	Business Development and Training	Private Sector Partnerships
Juabar	x	X				x	
ARED	x						x
Solar Sister	x	X	x		x	x	x
Nuru Energy		X	x	x			
Barefoot Power			x	x			x

Partnerships play an important role in the micro-franchising business models. Technology partnerships, research partnerships, advocacy partnerships, implementation partnerships, advertising partnerships, finance partnerships and enterprise development partnerships, all played a key role in the development of local micro-entrepreneurs and the creation of energy-based entrepreneurial income generating platforms for the local micro-entrepreneurs. Through partnerships the social enterprises were able to achieve what they would not be able to achieve alone. Partnerships enable scale and speed. One key observation is that the partner organisations have shared objectives or complementary objectives that are advanced through collaboration. Forming partnerships is an important part of ecosystem building and strengthening. In this way social enterprises are playing an active role in strengthening their enabling environment.

Chapter 6: Conclusion

6.1. Introduction

This chapter presents a succinct summary of the key findings in response to the research questions and overall objectives of the study. It furthermore provides recommendations for further research.

6.2. Key Findings in Response to Research Question 1

Which business models do social energy enterprises use to incorporate local micro-entrepreneurs into the off-grid clean energy value chain, in the provision of energy products or services?

- *How do micro-entrepreneurs benefit from being incorporated into these business models?*
- *What are some of the key challenges with these business models?*
- *Which factors could contribute to the potential sustainability of these business models?*

In the literature review, micro-franchising emerged as an important development tool and one of the key business models commonly used by social enterprises to incorporate local micro-entrepreneurs into off-grid clean energy value chains. The social enterprises interviewed for the empirical component of this research study used innovative micro-franchise models (or permutations thereof) to sell off-grid energy clean energy products and services to un-electrified or under electrified communities. While these micro-franchising models have similarities, the social enterprises and their micro-franchising models are heterogeneous, with unique value propositions; innovative business structures and models. The social enterprises have identified specific niches and have incorporated principles from micro-franchising into their tailored business models to best serve their specific target markets.

By being incorporated into a micro-franchise, local micro-entrepreneurs benefit from a structured business model and access to business development support and from income generating opportunities. For some micro-entrepreneurs, these income generating opportunities are the only source of income, while for others it serves as an important supplementary source of income, to augment income derived from other sources (e.g. agricultural concerns). The

income generating potential for the micro-entrepreneurs varies based on numerous factors, including: the number of customers and the frequency of customers; whether a product or service is being offered; the average income of the customers in the target market; the drive and determination of the entrepreneurs themselves and the business development support provided.

It should be kept in mind that micro-franchise models should not be viewed as a panacea for off-grid energy access, as these models also present various challenges. One challenge pertains to a relatively high attrition rate in the micro-franchise business that focus primarily on the sales of pico-solar lighting devices. This is influenced by challenges in selling beyond immediate networks of acquaintances and the slow turn-around time for durable solar products.

Another challenge pertains to being able to provide the necessary support structures to the local micro-entrepreneurs who form part of the social enterprise business models. On-going business development training, support and mentoring is imperative, but requires a capital investment and the necessary expertise. In addition to business development training and support, a further challenge relates to providing or brokering finance for the micro-entrepreneurs, as they often are not able to fully fund the franchise fee or purchase inventory themselves. The core mission of the social enterprises; their funding sources and the in-house capacity to train and mentor micro-entrepreneurs influences the extent to which such support can be delivered.

Furthermore pioneering innovative business models in nascent off-grid energy access markets, is a challenge in itself. There is a steep learning curve as these social entrepreneurs refine their business models, build technology awareness in the market and capacity into local micro-entrepreneurs amidst financing constraints and regulatory environment challenges.

The sustainability of the local micro-franchisees are interlinked with the sustainability of social enterprises. The social entrepreneurs need to create long term value for their social enterprises and the local micro-entrepreneurs (micro-franchisees). For the social entrepreneurs, their businesses need to be financially viable in terms of profitability (particularly for the for-profit

social enterprises); demonstrate growth and serve their mission and purpose. The micro-entrepreneurs also need to be able to operate profitably, with the incomes and profits sufficient to satisfy their needs; which could serve as an incentive for them to continue being part of the micro-franchise business models. In some of the social enterprise case studies, there are examples of micro-entrepreneurs who have been part of the micro-franchise models since their inception; which indicates that the potential does exist for micro-franchise models to be sustainable business models.

The sustainability of the micro-franchises is also dependent on the ability of the social entrepreneurs to overcome challenges such as the attrition of local micro-entrepreneurs (in business models where it is a challenge); the ability to generate new streams of revenue; the ability to gain access to funding sources to finance the business throughout the business lifecycle; and the ability to adapt the business models quickly if aspects of the business model are not working.

The local micro-entrepreneurs are dependent on the support structures offered by the social enterprises and the social enterprise are in turn also (to varying extents) dependent on the performance of the micro-franchisees. Social enterprises need to continuously refine their business models and identify mechanisms to improve their product and service offerings, and the revenue streams for their micro-franchisees. The sustainability of these models is dependent on continuous synergy. However there should also be measures in place to reduce the risk to both the social enterprises and micro-franchisees in the event that these models are discontinued by the social enterprise (due to financial and strategic reasons or a change of company vision) or a high attrition of micro-entrepreneurs.

6.3. Key Findings in Response to Research Question 2

In which stages of the value chain is there synergy between energy enterprises and local micro-entrepreneurs? What is rationale for the participation of local micro-entrepreneurs in these changes?

The local micro-entrepreneurs who formed part of the models reviewed in this study participated primarily in the ‘last mile distribution’ stages of the value chain. From the literature review and the empirical study, the rationale for their participation in this stage pertains to overcoming last mile distribution challenges, by leveraging existing social networks within communities (to increase awareness and facilitate customer confidence), and being able to market and sell off-grid clean energy products to customers who may be located in geographically remote areas. Local micro-entrepreneurs use indigenous knowledge, local insights and social capital to effectively reach customers in their immediate and surrounding communities, which benefits their micro-businesses and the micro-franchise as a whole. There is therefore a benefit to working synergistically; through this synergy social enterprises are able to better navigate through the last mile distribution stage.

6.4. Key Findings (and Recommendations) in Response to Research Question 3

Which enabling ecosystem conditions do social energy enterprises and local micro-entrepreneurs require?

- i. Finance: The energy enterprises reviewed in this study, were funded through various sources including their own capital contributions, grant funding, commercial funding, entrepreneurship competitions and angel investments. There are various funding challenges noted in the literature review and empirical data. There exists a need for innovative financing mechanisms for social enterprises with regard to: start-up capital and early stage financing; funding to address the gap between start-up and scale; funding to expand and scale the

business. More specifically, there is also a need for more local angel investment, patient capital and venture capital for African entrepreneurs.

- ii. Policy and Regulation: East African fiscal policies with regard to import duty and VAT exemptions have generally been enabling for the social enterprises interviewed. More needs to be done from a regulatory point of view in terms of enforcing quality standards for off-grid solar lighting products.
- iii. Awareness: The general level of awareness about clean off-grid energy alternatives varied across the countries in which the social enterprises have established themselves. While there is a generally high level of awareness about clean energy alternatives, many potential customers do not know where quality assured products can be purchased. The energy enterprises interviewed all played a role in increasing the level of awareness about these alternatives through their individual marketing campaigns. Although the extensive efforts of the energy enterprises have played an important part in creating technology awareness for off-grid clean energy alternatives (and will continue to do so), this requires a significant capital investment in marketing, on the part of the social enterprise. There is a need for a concerted effort from governments and development partners to facilitate awareness and increased penetration of readily available quality assured products, which could facilitate the work of the social enterprise and enable them to focus on the core aspects of the businesses.
- iv. Ease of doing business: The ease of doing business varied across the countries in which the social enterprises have established themselves. Rwanda stood out as a conducive environment for conducting business. Governments need to work concertedly to improve the ease of doing business. While there is not sufficient data to draw a causal link between the relative ease of doing business and the performance of the micro-enterprises, the energy enterprises based in Rwanda are growing and performing well.
- v. While the above-mentioned ecosystem conditions could indirectly be enabling for the micro-entrepreneurs who form part of the micro-franchise models, the micro-entrepreneurs are more directly influenced by the enabling environment created by the social enterprises, through business development support, technology transfer and in some instances in-house

or brokered financing. As noted earlier, it is important to recognise that social enterprises are constrained with regard to financial and technical expertise required to provide on-going training and support for the local micro-entrepreneurs in their networks. There is a need for development partners and business development institutions to finance the development of training content and draw of the necessary expertise to facilitate the training of the local micro-entrepreneurs. Furthermore technical vocational colleges could assist social enterprises with technical training, where business models require more advanced technical training (e.g. local village solar technician models).

In light of the findings from the literature review and the empirical study, Figure 23 below is a graphical representation of the key ecosystem conditions required by social energy enterprises and local micro-entrepreneurs. The ecosystem conditions are indicated by the circular figures on the top (in blue, brown, pink and green) and the relevant ecosystem actors are indicated in the legend on the right. The combinations of the ecosystem conditions and relevant actors (in relation to the social enterprises and local micro-entrepreneurs) are indicated in the middle. The first row of four blocks (enclosed in the first blue sphere) in the middle, indicate the specific ecosystem conditions required by energy enterprises with the relevant stakeholders required to create these conditions. The second row of blocks (enclosed in the second blue sphere) indicate the specific ecosystem conditions that the local micro-entrepreneurs require with the relevant stakeholders required to create these conditions. Figure 23 should be read in conjunction with the Table 23 below.

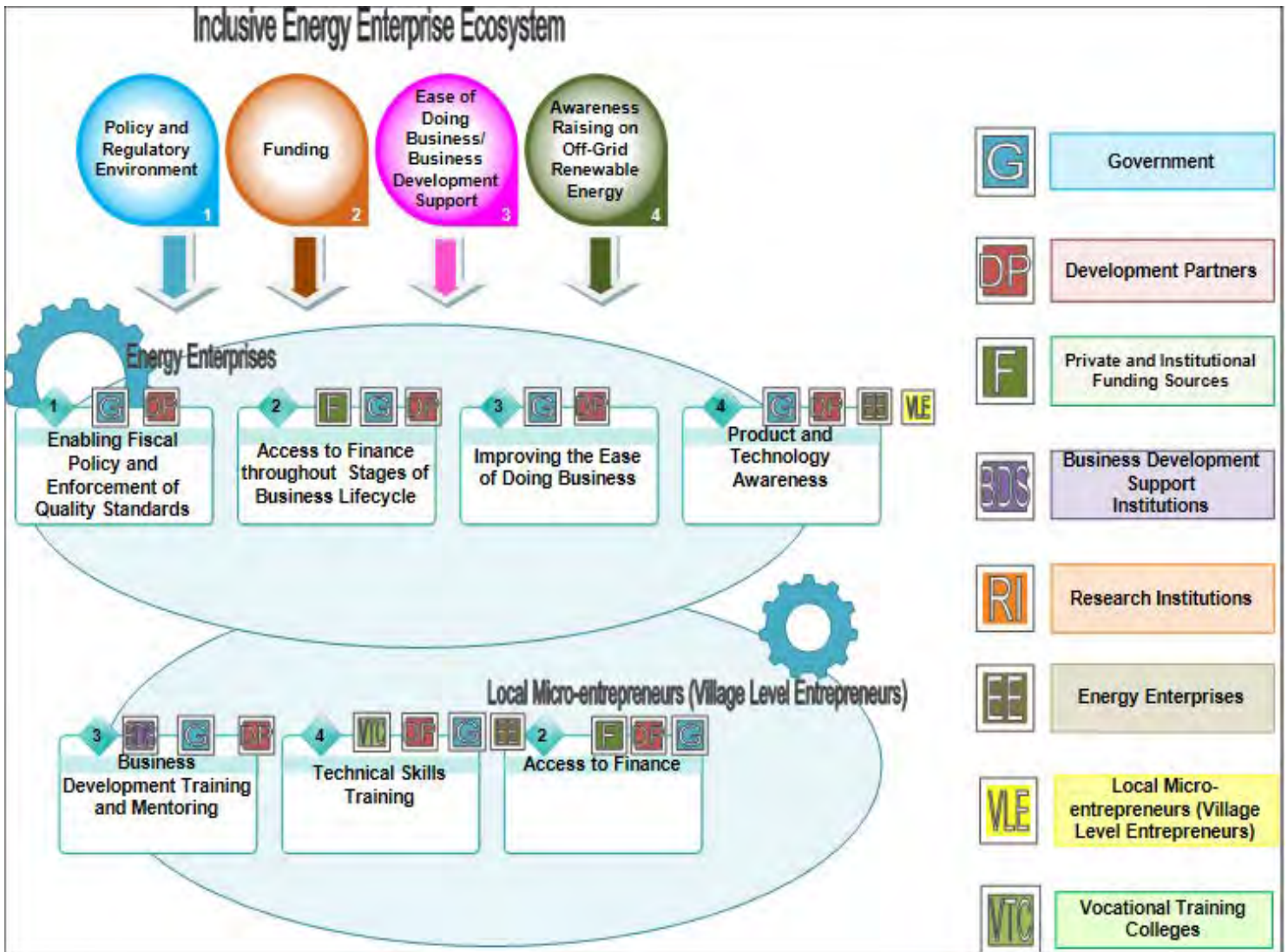

















Figure 23: Proposed Inclusive Energy Ecosystem (Diagramme Created by Researcher)

Table 23: Description of Ecosystem Interventions (Created by Researcher)

Ecosystem Intervention	Description of Intervention	Relevant Stakeholders
Policy and Regulatory Environment	<p>A conducive policy and regulatory environment for decentralised off-grid renewable energy technologies and products through:</p> <ul style="list-style-type: none"> • Enabling fiscal policies for off-grid clean energy products. • Greater regulation of quality assured products in the market. • Smart subsidies and incentives to enterprises that manufacture or distribute quality assured products. 	<p>Key Stakeholder:  Government</p> <p>Partnering Stakeholder:  Development partners</p>
Funding	<p>Energy Enterprises:</p> <ul style="list-style-type: none"> • Seed and start-up funding • Grant funding • Funding for prototype and business model development • Access to venture capital for for-profit enterprises and innovative alternatives such as patient capital for social enterprises. • Dedicated sources of funding for local African social entrepreneurs. 	<p>Key Stakeholder:  Private and institutional investors</p> <p>Partnering Stakeholders:   Government; Development partners</p>
	<p>Local Micro-entrepreneurs:</p> <ul style="list-style-type: none"> • Facilitated access to micro-finance (brokered micro-finance with risk underwritten; zero interest rates and reasonable payback periods) • Access to in-house micro-finance permutations through energy enterprises (e.g. micro-consignment) • Dedicated pool funding for clean energy micro-entrepreneurs. 	<p>Key Stakeholders:  Development partners</p> <p>Partnering Stakeholder:  Government</p>
Business Support (Ease of Doing Business) and Business Development Support	<p>Energy Enterprises:</p> <ul style="list-style-type: none"> • Facilitating the ease of doing business (business registration, paying tax, and ease of cross border trade). 	<p>Key Stakeholders:   Government, development partners.</p>
	<p>Local Micro-entrepreneurs:</p> <ul style="list-style-type: none"> • Business management training and support • On-going business mentoring and support • Business sustainability support • Technical skills training • Business plan support • Market linkages 	<p>Key Stakeholders:  Business development support institutions.</p> <p>Partnering Stakeholders:  Energy Enterprises (social enterprises)</p>
Awareness Raising	<ul style="list-style-type: none"> • Public broadcasting awareness raising campaigns (e.g. television and radio advertising; billboards etc.) • Concerted in-person community level engagement and awareness raising in schools and community halls • Other avenues of media advertising (e.g. through mobile phones) 	<p>Key Stakeholders:   Government, Development partners</p>

	<ul style="list-style-type: none">• Awareness raising through individual marketing campaigns by energy enterprises• Awareness raising by local micro-entrepreneurs through direct engagement with customers and potential customers in the last mile.	<p>Partnering Stakeholder:</p>   <p>Energy enterprises (social enterprises), local micro-entrepreneurs.</p>
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6.5. Limitations

One limitation of the study, as highlighted in Section 3.9 in the Research Methodology pertains to the generalisability of case studies. It is recognised that case study research presents inherent challenges with regard to the generalisation of findings. While certain overarching similarities were found across the case studies with respect to certain aspects of micro-franchise business models, value chain participation and ecosystem conditions, it is important to note that there are nuances with respect to the socio-economic cultural settings within each community, which require energy access business models that are tailored for specific contextual settings. This makes generalisation to the broader population difficult. However it was also noted that the primary purpose of case study research is to provide a rich in-depth understanding of the phenomena being studied and not to generalise to the broader population. Therefore the interpretations of the energy enterprise case study findings in this empirical study should not be seen as representative sample of all social energy enterprises (and local micro-entrepreneurs) in East Africa, although the study does provide in-depth insights into some of these models and pertinent practical lessons and experiences from the field.

Another limitation, as discussed in Section 3.9 pertains to not being able to conduct interviews directly with the local micro-entrepreneurs due to logistical geographic challenges. Data on the micro-entrepreneurs was obtained through interviews with the social enterprises and triangulated through information on their websites and other published documents. As the majority of the local micro-entrepreneurs run their businesses in villages (some in remote rural settings) and only interact with the social enterprises when they need to, arranging Skype calls or administering questionnaires was not practical. While additional insights could have been drawn by engaging directly with some of the micro-entrepreneurs, the data obtained from the social enterprises provided sufficient insights and depth for the purpose of this research study.

6.6. Recommendations for Future Research

- i. Additional insights could be drawn by conducting surveys and in-depth interviews with the local micro-entrepreneurs who are part of these micro-franchise models. This could provide first-hand information on their experiences and the challenges they may encounter while running their businesses. It could also provide an indication of the daily, weekly or monthly incomes (and profits) they generate through their micro-energy businesses. This could furthermore provide first-hand information on the socio-economic impact these models have had in their lives and the lives of their immediate or extended families.
- ii. A more in-depth analysis on the sustainability of energy access micro-franchise business models could be undertaken to identify key indicators of and measurements of sustainability.
- iii. Further lessons could be drawn by looking at enterprises business models from outside Sub-Saharan Africa, particularly India where VLE models are used quite widely.
- iv. More research could be done on each of the specific ecosystem indicators to identify exact impacts on business success and sustainability.

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APPENDIX A: Semi-Structured Interview Schedule

Table 24: Semi-structured Interview Schedule: Social Energy Enterprises

Respondent Category	Section of Interview	Categories/ Themes
Social Enterprises	Section A	Information about Social Enterprises
		<p>Could you please provide a brief narrative description of your business in terms of your product/ service offerings?</p> <ol style="list-style-type: none"> a. For how many years has the business been in operation? b. What was your motivation for starting the business? c. What is your geographic footprint? d. What is your staff complement?
	Section B	<p>Questions Related to Social Enterprise Ecosystem <i>The following set of questions relates to potential challenges and enabling interventions in the areas of funding, policy and regulatory support, product awareness & customer confidence and business development.</i></p>
		<p>Policy and Regulatory Environment</p> <p>Could you provide a brief description of the policy and regulatory environment of clean off-grid energy products and services in (replace with country/ countries of operation).</p> <ol style="list-style-type: none"> a. Are there any policies and regulations that are enabling for your business? Please elaborate. b. Are there any policy and regulatory challenges? Please elaborate. c. What, in your view, are some of the policy and regulatory interventions required?
		<p>Product Awareness and Customer Confidence</p> <ol style="list-style-type: none"> a. How do you go about marketing and creating awareness for your products and/or services? a. Have you identified any challenges with regard to product awareness and gaining customer confidence?
		<p>Business Development Support/ Ease of Doing Business</p> <p>What are your key business support needs?</p>
		<p>Access to Finance</p> <ol style="list-style-type: none"> 1. How was your business funded at start-up? <ol style="list-style-type: none"> a. Were you able to obtain start-up/ seed funding or institutional or individual investors? b. Have you experienced any challenges in accessing start-up funding? c. Were you able to access grant funding? 2. What sources of funding are available to grow, expand and scale the business? <ol style="list-style-type: none"> a. Were you able to obtain funding to grow and scale your business? b. Have you experienced any challenges in accessing funding for growth and expansion?

	Section C	Questions Related to the Synergy with Local Micro-entrepreneurs
		<p>Value Chain Participation <i>The value chain for off-grid clean energy products and services comprises various stages including, but not limited to, R&D/Product design, manufacturing, marketing, distribution, consumer finance, maintenance and after sales service.</i></p> <ol style="list-style-type: none"> 1. Could you kindly explain/ elaborate on the ways in which you collaborate with/ incorporate local micro-entrepreneurs in the value chain? (Can you elaborate on the synergy/ collaboration with local micro-entrepreneurs?) 2. In which stages of the value chain do the local micro-entrepreneurs mainly participate? 3. How many entrepreneurs do you currently collaborate/ work with? 4. Do you collaborate/ work with women entrepreneurs in your value chain? How can the participation of women entrepreneurs in the off-grid clean energy value chain be facilitated and strengthened?
		<p>Business model used to incorporate local micro-entrepreneurs into clean energy value chains</p> <p>Screening and selection criteria</p> <ol style="list-style-type: none"> 1. What does the process of screening and selecting local micro-entrepreneurs involve? 2. Are there any minimum criteria that the local micro-entrepreneurs have to meet? <p>Type of agreement (E.g. micro-franchising agreement)</p> <ol style="list-style-type: none"> 3. Please can you explain which type of business model do you use? e.g. [micro-franchise]? 4. What is the nature of the franchise relation between the two parties? <ol style="list-style-type: none"> a. Do you resort to the standard terminology that is applicable to traditional franchises? b. Could you please explain the nature of the agreement in terms of legality and time frames? <p>Setting up, infrastructure, location, support</p> <ol style="list-style-type: none"> 5. Could describe the type of business set-up you provide to the local micro-entrepreneurs? [What type of equipment/ infrastructure/ products are they set up with?] 6. Who is responsible for the maintenance of the equipment of infrastructure (for example kiosk?) <p>Fee structure</p> <ol style="list-style-type: none"> 7. Do you require an initial fee/ upfront fee from those interested in the franchise (other business model form)? <ol style="list-style-type: none"> a. How much is the initial upfront cost? b. How much is the total cost? c. Do you apply a royalty system where the local micro-entrepreneurs pay a pro-rate royalty on sales? d. What is the payback period? e. How often are the local micro-entrepreneurs required to pack back? 8. How do local micro-entrepreneurs obtain the funding to pay the initial deposit/ upfront fee? (What are the funding sources?)

		<ul style="list-style-type: none"> a. Can you please provide an example of how some of the micro-entrepreneurs you work have obtained finance? b. What are some of the challenges local micro-entrepreneurs face with regard to obtaining finance? c. Do you provide any assistance to local micro-entrepreneurs to obtain funding from third part institutions? <ul style="list-style-type: none"> i. What type of assistance do you provide? ii. Who are those organisations? <p>9. What do entrepreneurs earn on average per day (per week/ per month)? (How much do they make in sales?)</p> <ul style="list-style-type: none"> a. Could you please provide an example of one or two of your micro-entrepreneurs? <p>10. What is the type of profit mark-up the micro-entrepreneurs make?</p> <p>Sustainability of micro-enterprises</p> <p>11. How many local micro-entrepreneurs have you worked with/ supported since the inception of your business?</p> <p>12. How many of those micro-enterprises are currently still running/ operating?</p> <ul style="list-style-type: none"> a. What in your view are the main reasons why some of the businesses have not succeeded?/ (Why some micro-entrepreneurs have decided not to be part of the micro-franchise business model?) b. What are some of the key success factors that have contributed to the success of some of the businesses? <p>13. Have you noted any growth in the businesses from the time they have started the business? (increased sales, increased profits etc.)</p> <p>14. Have any of the businesses used the initial business opportunity to start new businesses?</p> <p>15. Can individual local energy micro-entrepreneurs move beyond being survivalist entrepreneurs and grow their businesses into viable and sustainable enterprises? How could this be facilitated?</p>
		<p>Business Development, Skills Development and Capacity Building</p> <ul style="list-style-type: none"> 1. What are the business support, skills training and capacity building needs of the local micro-entrepreneurs you collaborate with? 2. What type of support does your business provide to local micro-entrepreneurs in your value chain? 3. Do you partner with any organisations to provide capacity building and business support to local micro-entrepreneurs? What type of support do they provide?
		<p>Funding/ Access to Finance</p> <ul style="list-style-type: none"> 1. Which funding/ finance options are available for individual local micro-entrepreneurs who wish to start and grow their energy businesses? <ul style="list-style-type: none"> a. How did the entrepreneurs that you work with finance the cost of the franchise fee/ inventory? b. Are there any challenges that local micro-entrepreneurs face when trying to access funding? c. In your view, how can funding for local micro-entrepreneurs be brokered/ structured/facilitated?

Table 25: Semi-structured Interview Schedule: International Development Agencies

International Development Agency	Section A	Overview of International Development Agency
	Section B	Questions Related to Energy Enterprises (Social Enterprises)
		<p>Policy and Regulatory Environment</p> <ol style="list-style-type: none"> 1. In your view, what types of policy and regulatory interventions are required to create an enabling environment for energy enterprises (social enterprises)? 2. How could development agencies, like yourselves, partner with governments and facilitate the development of a conducive policy and regulatory environment?
		<p>Finance</p> <ol style="list-style-type: none"> 1. What types of start-up/ seed funding are available to energy businesses selling off-grid clean energy products and services? <ol style="list-style-type: none"> a. Are there any challenges in accessing start-up funding? Please explain. 2. What sources of funding are available to grow, expand and scale the business? <ol style="list-style-type: none"> a. Are there any challenges in accessing funding for growth and expansion? Please explain. 3. How could development agencies like yourselves facilitate, structure and broker finance for local micro-entrepreneurs?
		<p>Product Awareness and Customer Confidence</p> <ol style="list-style-type: none"> 1. How could development agencies, like yourselves, partner with governments and facilitate awareness raising on off-grid clean energy alternatives?
		<p>Business Development Support</p> <ol style="list-style-type: none"> 4. What are the key business development needs, in the start-up and early growth phases of the business? 5. What the ongoing business development needs as energy businesses grow and expand? 6. Does your organization facilitate any type of business development support?
	Section C	Questions Related to Micro-entrepreneurs
		<p>Value Chain Participation/Inclusive Value Chain Development <i>The value chain for off-grid clean energy products and services comprises various stages including, but not limited to, R&D/Product design, manufacturing, marketing, distribution, consumer finance, maintenance and after sales service.</i></p> <ol style="list-style-type: none"> 1. How do you see the role of local micro-entrepreneurs providing inputs into the above categories of the value chain? <ol style="list-style-type: none"> a. Do you see an interactive, mutually beneficial collaboration unfolding? 2. How can the participation of women entrepreneurs in the off-grid clean energy value chain be facilitated and strengthened? 3. How can synergies between energy service businesses and individual local micro-entrepreneurs be strengthened? <ol style="list-style-type: none"> a. What role could (does) your organization play in this regard.
		<p>Business Development Support</p> <ol style="list-style-type: none"> 1. What in your view are the key skills development and capacity building needs of local micro-entrepreneurs?

		<ol style="list-style-type: none"> 2. Are there specific business support needs of individual local micro-entrepreneurs that you have identified? 3. How can individual local energy micro-entrepreneurs move beyond being survivalist entrepreneurs and grow their businesses into viable and sustainable enterprises? 4. In which ways could development agencies like yourselves assist energy enterprises to provide business development support and skills training to micro-entrepreneurs?
		<p>Finance</p> <ol style="list-style-type: none"> 1. Please explain funding/ finance options available for individual local micro-entrepreneurs who wish to start and grow their business? <ol style="list-style-type: none"> a. Are there any challenges that local micro-entrepreneurs face when trying to access funding? b. How could development agencies like yourselves facilitate structure and broker finance for local micro-entrepreneurs?

Table 26: Semi-structured Interview Schedule: International Development Agencies: Energy Programme and Business Development Support Organisation

Energy Programme (DEEP –EA programme)	Section A	Overview
	Section B	<p>Screening and selection criteria</p> <ol style="list-style-type: none"> 1. What did the process of identifying, screening and selecting entrepreneurs involve? 2. Were there any minimum criteria that the entrepreneurs had to meet? <p>Business Development and Skills Support</p> <ol style="list-style-type: none"> 1. What were the main skills development needs of the local entrepreneurs in the DEEP-EA programme, which you have identified? 2. What type of business development support/ technical training was provided to local energy micro-enterprises in the DEEP Programme? <ol style="list-style-type: none"> a. Did you partner with other organisations, to augment the support you provided? Please elaborate. <p>Financing</p> <ol style="list-style-type: none"> 1. Which funding options were available to the micro-entrepreneurs in the DEEP-EA programme? <ol style="list-style-type: none"> a. How did the programme broker/ facilitate access to finance for the entrepreneurs in the programme? <p>Policy and Regulatory Environment</p> <ol style="list-style-type: none"> 1. Could you please comment on the policy and regulatory environment in (replace with country/ countries of operation)? <ol style="list-style-type: none"> a. Were these policies enabling to the entrepreneurs in the programme? b. Were there any policy and regulatory challenges that affected the entrepreneurs in the programme?

Business Development Support Organisations	Section A	Overview of Business Development Support Organisation Could you please provide a brief overview of your organisation and the business support services you offer?
	Section B	Business Development Support <ol style="list-style-type: none"> 1. What in your view are the key business development support needs of SME energy enterprises? 2. What business development support offerings does your organisation provide? Funding <ol style="list-style-type: none"> 1. What types of start-up/ seed funding are available to energy businesses selling off-grid clean energy products and services? <ol style="list-style-type: none"> a. What are the main challenges with regard to obtaining start-up funding? b. How does your organization assist with/ broker funding start-up SME energy enterprises? 2. What sources of funding are available to grow, expand off-grid clean energy businesses? <ol style="list-style-type: none"> a. What are the main challenges with regard to expansion funding? b. What service offering does your organization play in this regard? Policy and Regulatory Environment <ol style="list-style-type: none"> 1. In your view, what types of policy and regulatory interventions are required to create an enabling environment for energy enterprises (social enterprises)? 2. What role could/ does your organization play a role in facilitating a conducive policy and regulatory environment?

APPENDIX B: Ethics Clearance Form

EBE Faculty: Assessment of Ethics in Research Projects (Rev2)

Any person planning to undertake research in the Faculty of Engineering and the Built Environment at the University of Cape Town is required to complete this form before collecting or analysing data. When completed it should be submitted to the supervisor (where applicable) and from there to the Head of Department. If any of the questions below have been answered YES, and the applicant is NOT a fourth year student, the Head should forward this form for approval by the Faculty EIR committee; submit to Ms Zulpha Geyer (Zulpha.Geyer@uct.ac.za; ChemEngBuilding, Ph021 650 4791).
NB: A copy of this signed form must be included with the thesis/dissertation/report when it is submitted for examination

This form must only be completed once the most recent revision EBE EIR Handbook has been read.

Name of Principal Researcher/Student: **Whitney Pailman** Department: **Mechanical Engineering**

Preferred email address of the applicant: wpailman@gmail.com

If a Student: Degree: **MPhil Energy and Development Studies** Supervisor: **Dr Gisela Prasad**

If a Research Contract indicate source of funding/sponsorship:

Research Project Title: **Inclusive Business Ecosystem Development and Innovation for Off-Grid Solar Product Dissemination: A Catalyst for Sustainable Energy Access and Value Chain Integration in Indigent Communities**

Overview of ethics issues in your research project:

Question 1: Is there a possibility that your research could cause harm to a third party (i.e. a person not involved in your project)?	YES	<input checked="" type="checkbox"/> NO
Question 2: Is your research making use of human subjects as sources of data? If your answer is YES, please complete Addendum 2.	<input checked="" type="checkbox"/> YES	NO
Question 3: Does your research involve the participation of or provision of services to communities? If your answer is YES, please complete Addendum 3.	YES	<input checked="" type="checkbox"/> NO
Question 4: If your research is sponsored, is there any potential for conflicts of interest? If your answer is YES, please complete Addendum 4.	YES	<input checked="" type="checkbox"/> NO

If you have answered YES to any of the above questions, please append a copy of your research proposal, as well as any interview schedules or questionnaires (Addendum 1) and please complete further addenda as appropriate. Ensure that you refer to the EIR Handbook to assist you in completing the documentation requirements for this form.

~~I hereby undertake to carry out my research in such a way that~~

- ~~• there is no apparent legal objection to the nature or the method of research; and~~
- ~~• the research will not compromise staff or students or the other responsibilities of the University;~~
- ~~• the stated objective will be achieved, and the findings will have a high degree of validity;~~
- ~~• limitations and alternative interpretations will be considered;~~
- ~~• the findings could be subject to peer review and publicly available; and~~
- ~~• I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.~~

Signed by:

	Full name and signature	Date
Principal Researcher/Student:		27/10/2014
This application is approved by:		
Supervisor (if applicable):		27.10.2014
HOD (or delegated nominee): <i>Final authority for all assessments with NO to all questions and for all undergraduate research.</i>		27.10.2014
Chair: Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the above questions.		

2015

ADDENDUM 1:

Please append a copy of the research proposal here, as well as any interview schedules or questionnaires:

ADDENDUM 2: To be completed if you answered YES to Question 2:

It is assumed that you have read the UCT Code for Research involving Human Subjects (available at <http://web.uct.ac.za/depts/educate/download/uctcodeforresearchinvolvinghumansubjects.pdf>) in order to be able to answer the questions in this addendum.

2.1 Does the research discriminate against participation by individuals, or differentiate between participants, on the grounds of gender, race or ethnic group, age range, religion, income, handicap, illness or any similar classification?	YES	NO X
2.2 Does the research require the participation of socially or physically vulnerable people (children, aged, disabled, etc) or legally restricted groups?	YES	NO X
2.3 Will you not be able to secure the informed consent of all participants in the research? (In the case of children, will you not be able to obtain the consent of their guardians or parents?)	YES	NO X
2.4 Will any confidential data be collected or will identifiable records of individuals be kept?	YES X	NO
2.5 In reporting on this research is there any possibility that you will not be able to keep the identities of the individuals involved anonymous?	YES X	NO
2.6 Are there any foreseeable risks of physical, psychological or social harm to participants that might occur in the course of the research?	YES	NO X
2.7 Does the research include making payments or giving gifts to any participants?	YES	NO X

If you have answered YES to any of these questions, please describe below how you plan to address these issues:

2.4 All interview notes, audio recordings and transcriptions will be stored securely and only be used exclusively to draw research findings in the manner consented to by the participant in the Consent Form. All interviews will be personally transcribed by the Researcher (Whitney Palman). Audio recordings and transcriptions will be discarded within a standard acceptable timeframe after the research study is complete (guided by ethics in research best practice).

2.5 In the appended Consent Form, there is a request for consent to include the name of the stakeholder organisation and/or the name of the participant in the list of consulted stakeholders and publications arising from the research study. The participant can also indicate if their responses should be kept anonymous (See consent form).

ADDENDUM 3: To be completed if you answered YES to Question 3: *N/A*

3.1 Is the community expected to make decisions for, during or based on the research?	YES	NO
3.2 At the end of the research will any economic or social process be terminated or left unsupported, or equipment or facilities used in the research be recovered from the participants or community?	YES	NO
3.3 Will any service be provided at a level below the generally accepted standards?	YES	NO

If you have answered YES to any of these questions, please describe below how you plan to address these issues:

ADDENDUM 4: To be completed if you answered YES to Question 4 *N/A*

4.1 Is there any existing or potential conflict of interest between a research sponsor, academic supervisor, other researchers or participants?	YES	NO
4.2 Will information that reveals the identity of participants be supplied to a research sponsor, other than with the permission of the individuals?	YES	NO
4.3 Does the proposed research potentially conflict with the research of any other individual or group within the University?	YES	NO

If you have answered YES to any of these questions, please describe below how you plan to address these issues:

APPENDIX C: Request for Permission to Conduct Research



Energy Research Centre

University of Cape Town • Private Bag • Rondebosch 7701 • South Africa
Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Dear Sir/Madam

Re: Request to Conduct Research for Masters Dissertation 2015

Title of Research Study: Exploring the Synergy between Social Enterprises and Local Micro-entrepreneurs in the Provision of Off-grid Clean Energy Access

I am conducting research towards a Masters in Energy and Development. The aim of the research study is to explore the synergy between social energy enterprises and local micro-entrepreneurs in the off-grid clean energy value chain, and to identify key enabling ecosystem conditions that social energy enterprises and local micro-entrepreneurs in Sub-Saharan Africa require.

A Semi-Structured Interview with open ended questions will be used as the data collection instrument. The purpose of the interview is to obtain a multi-stakeholder perspective through consultations with inclusive businesses (social enterprises), policy makers and development agencies. I envisage that the approximate interview duration will be 60 min.

I hereby kindly request your participation in this study.

Thanking you

Sincerely yours,

Whitney Pailman



Energy Research Centre

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Website: www.erc.uct.ac.za

Consent to Participate in Research Study

- Your participation is voluntary.
- You can choose not to respond to any of the questions or to withdraw at any time from the interview.
- If necessary please feel free to seek clarity on a question or to request that a question be rephrased.
- Questions pertaining to the research study are welcome.

Consent to an Audio Recording

I kindly request your consent to do an audio recording of this interview. The recordings will be used solely for reference purposes to augment the notes taken during the interview. Interviews will be personally transcribed and the data will be coded in order to identify emerging themes in the field.

Security of Data

All interview notes, audio recordings and transcriptions will be stored securely and only be used exclusively to draw research findings in the manner consented to.

Consent to Use Organisation Name/ Name of Participant in Research Study

I kindly request your consent to include the name of your organisation and/or your name in the list of participants and consulted stakeholders. I furthermore request your consent to cite findings from the interview responses in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study. Kindly note that your responses can also be kept anonymous, if you prefer.



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Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Consent Form

Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.
 - Name of Organisation
 - My Name and Designation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:
 - Name of Organisation
 - My Name and Designation
- I prefer that the responses remain anonymous.

Name of Participant: _____

Designation: _____

Name of Organisation/ Institution/ Business: _____

Signature of Participant _____ Date of Interview _____

Your participation in this study is highly appreciated.

APPENDIX D: Respondent Consent Forms



Energy Research Centre

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Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Please tick the appropriate boxes to indicate your consent.

I give consent to an audio recording.

I give consent to include the following information in list of participants and consulted stakeholders.

Name of Organisation

My Name and Designation

I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:

Name of Organisation

My Name and Designation

I prefer that the responses remain anonymous.

Name of Participant: _____ Sachi DeCou _____

Designation: _____ Director of Connectivity _____

Name of Organisation/ Institution/ Business: _____ Juabar Design _____ Signature of

Participant _____ Date of Interview _May 2015_

Your participation in this study is highly appreciated.



Energy Research Centre

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Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.
 - Name of Organisation
 - My Name and Designation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:
 - Name of Organisation
 - My Name and Designation

I prefer that the responses remain anonymous.

Name of Participant: Geofrey Thobias Shayo

Designation: Geofrey

Name of Organisation/ Institution/ Business: Juabar limited Company

Signature of Participant G.T.Shayo

Date of Interview 20th May 2015

Your participation in this study is highly appreciated.



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Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.
- Name of Organisation
 - My Name and Designation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:
- Name of Organisation
 - My Name and Designation
- I prefer that the responses remain anonymous.

Name of Participant: Aemri Nyakawandi

Designation: _____

Name of Organisation/ Institution/ Business: African Renewable energy Distribution

Signature of Participant _____ Date of Interview _____

Your participation in this study is highly appreciated.



Energy Research Centre

University of Cape Town • Private Bag • Rondebosch 7701 • South Africa
Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.arc.uct.ac.za

Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.
 - Name of Organisation
 - My Name and Designation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:
 - Name of Organisation
 - My Name and Designation
- I prefer that the responses remain anonymous.

Name of Participant: CAROLINE MAILLOUX
Designation: Director of Engagement
Name of Organisation/ Institution/ Business: Solar Sister
Signature of Participant _____ Date of Interview 4/27/2015

Your participation in this study is highly appreciated.



Energy Research Centre

University of Cape Town • Private Bag • Rondebosch 7701 • South Africa
Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Title of Research Study:

Exploring the Synergy between Social Enterprises and Local Micro-entrepreneurs in the Provision of Off-grid Clean Energy Access: A Business Model, Value Chain Participation and Enterprise Ecosystem Analysis

Consent to Participate in Masters Research Study

Please tick the boxes to indicate your consent.

- I give consent to be interviewed for this research study.
- I give consent to an audio recording.
- I give consent for the master's student to cite findings from the interview (sent through for prior perusal and approval) in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with my name and the name of the organisation I represent.

Name of Participant: SAMUEL HASSON

Designation: CEO

Name of Organisation/ Institution/ Business: NURU ENERGY

Signature of Participant _____ Date of Interview 02 October 2015

Your participation in this study is highly appreciated.



Energy Research Centre

University of Cape Town • Private Bag • Rondebosch 7701 • South Africa
Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Title of Research Study: *Towards an Inclusive Energy Enterprise Ecosystem for Sustainable Energy Access and Livelihoods*

Consent Form

Please tick the appropriate boxes to indicate your consent.

I give consent to an audio recording.

I give consent to include the following information in list of participants and consulted stakeholders.

Name of Organisation

My Name and Designation

I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:

Name of Organisation

My Name and Designation

I prefer that the responses remain anonymous.

Name of Participant: [Jackson Machuhi](#)

Designation: [Managing Director](#)

Name of Organisation/ Institution/ Business: [Barefoot Power \(Africa\) Ltd](#)

Signature of Participant

Date of Interview Thur: 15 Oct: 4pm- 5pm (GMT+3)



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Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of respondents and consulted stakeholders.
 - My Name
 - My Designation
 - Name of Organisation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters

Dissertation with the following information:

- My Name
- My Designation
- Name of Organisation
- I prefer that the responses remain anonymous

Please share any quotes that you wish to attribute to me for prior clearance. Thank you!

Name of Participant: Pepukaye Bardouille
 Designation: Senior Energy Specialist
 Name of Organisation/ Institution/ Business: IFC/World Bank Group
 Signature of Participant _____ Date of Interview _____

Your participation in this study is highly appreciated.



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Please tick the appropriate boxes to indicate your consent.

I give consent to an audio recording.

I give consent to include the following information in list of participants and consulted stakeholders. NO

Name of Organisation

My Name and Designation

I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:

Name of Organisation

My Name and Designation

I prefer that the responses remain anonymous.

Please note my participation on a personal basis. The opinions and views shared during this interview will NOT represent the World Bank Group or its Board of Directors. Thanks!

Name of Participant: YANN TANVEZ

Designation: Energy and Climate Analyst

Name of Organisation/ Institution/ Business: World Bank Group

Signature of Participant _____

Date of Interview TBD

Your participation in this study is highly appreciated.



Energy Research Centre

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Website: www.erc.uct.ac.za

Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.
 - Name of Organisation
 - My Name and Designation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:
 - Name of Organisation
 - My Name and Designation
- I prefer that the responses remain anonymous.

Name of Participant: Yasemin Erbay Ruff

Designation: Officer, Energy and Climate

Name of Organisation/ Institution/ Business: United Nations Foundation

Signature of Participant _____ Date of Interview 04/30/2015

Your participation in this study is highly appreciated.



Energy Research Centre

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Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.
 - My Name and Designation
- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:
 - Name of Organisation
 - My Name and Designation

Name of Participant: _____ Janet Yiamoi _____

Designation: _____ Business Analyst _____

Name of Organisation/ Institution/ Business: Kenya Climate Innovation Centre
(KCIC) _____

Signature of Participant _____

Date of Interview _____

Your participation in this study is highly appreciated.



Energy Research Centre

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Tel: +27 (0)21 650 3230 • Fax: +27 (0)21 650 2830
Website: www.erc.uct.ac.za

Title of Research Study: *Towards an Inclusive Energy Enterprise Ecosystem for Sustainable Energy Access and Livelihoods*

Consent Form

Please tick the appropriate boxes to indicate your consent.

- I give consent to an audio recording.
- I give consent to include the following information in list of participants and consulted stakeholders.

- Name of Organisation – UNF -Global Alliance for Clean Cookstoves
- My Name and Designation Daniel Wanjohi – Regional Representative – East Africa

- I give consent to cite findings from the interviews in the Results and Findings of the Masters Dissertation and other potential publications that may emanate from this research study, with the following information:

- Name of Organisation – UNF – Global Alliance for Clean Cookstoves
- My Name and Designation – Daniel Wanjohi – Regional Representative – East Africa

- I prefer that the responses remain anonymous.

Name of Participant: Daniel Wanjohi

Designation: Regional Representative – East Africa

Name of Organisation/ Institution/ Business: United Nation Foundation – Global Alliance for Clean Cookstoves

Signature of Participant _____ Date of Interview _____