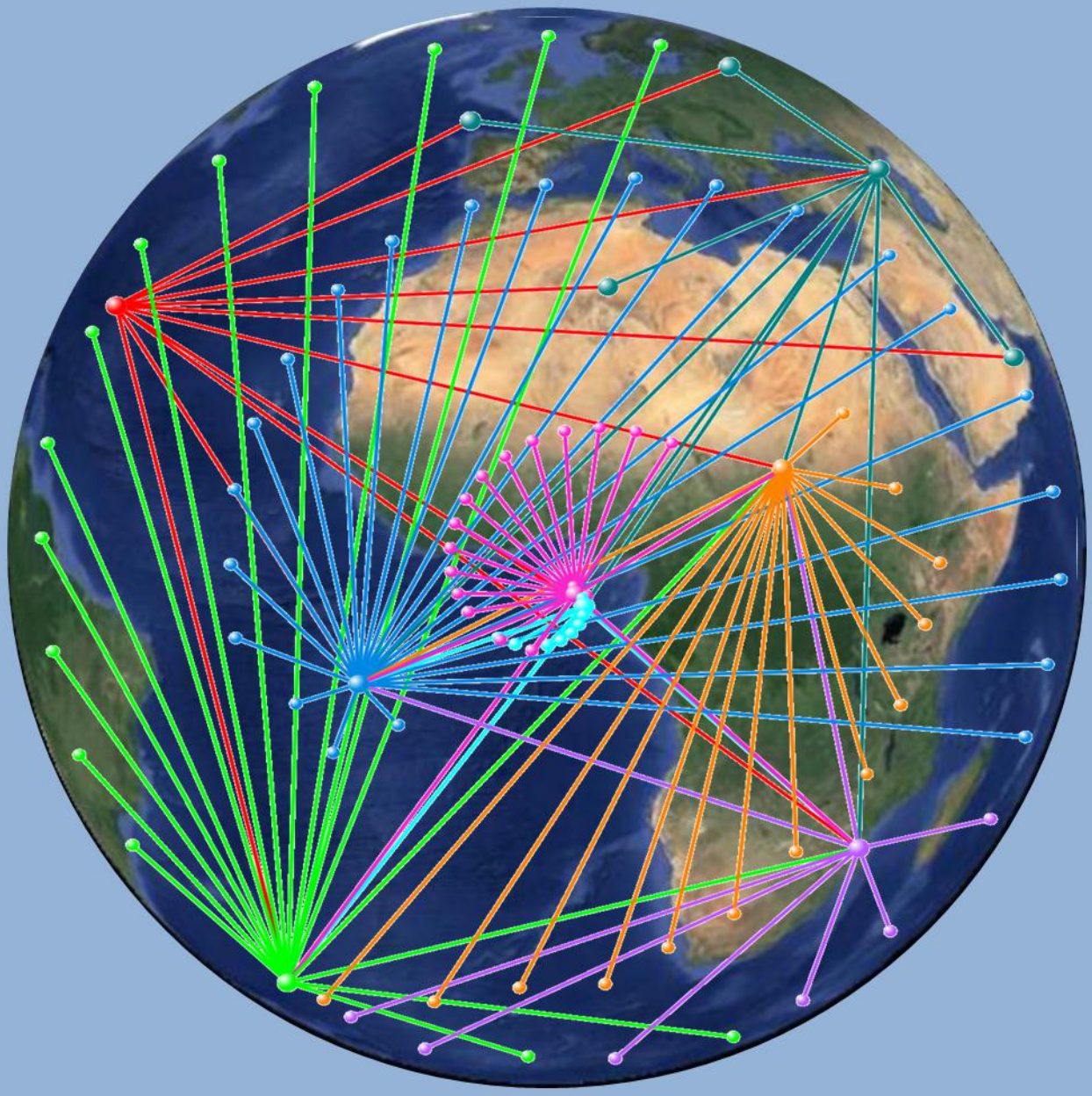

A Sustainability Assessment of Solar Sister in Uganda

January 2014

MIT CITE MIT SSRC USAID FROM THE AMERICAN PEOPLE

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ACKNOWLEDGEMENTS

The authors would also like to thank several people who were instrumental in supporting the fieldwork in Uganda and the publication of this report:

Solar Sister

- Katherine Lucey, for her time and hospitality, but especially for her willingness to be accessible, open and candid with us about her organization.
- Neha Misra, for her keen insights and for making us feel at home in a faraway place.
- David O'Connor, for the time he took to help us get settled in and provide us thoughtful answers to our questions and explanations of the extensive Salesforce data set.
- All RCs and SSEs we interviewed, for their time spent talking to us. Without them, this report would have been impossible.

MIT

- Prof. Olivier de Weck, for his leadership and thought-provoking comments.
- Dr. Rick Schuhmann, for his help thinking through some hard and practical questions, both big and small.

Other

- USAID, and in particular DIV, for supporting our work and for providing us with the opportunity to carry out this research.
- Charles Katerega, for always getting us everywhere we needed to be without fail, and for being a great source of company along the way.

"One learns by doing a thing; for though you think you know it,
you have no certainty until you try." *– Sophocles*

This report was made possible by the generous support of the American people through the United States Agency for International Development (USAID). The contents are the responsibility of MIT and do not necessarily reflect the views of USAID or the United States Government.

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LIST OF ACRONYMS

BoP	Bottom of the Pyramid
CITE	Comprehensive Initiative for Technology Evaluation
DIV	Development Innovations Venture
DoI	Diffusion of Innovations
ESD	Engineering Systems Division
MFI	Micro-Finance Institution
MIT	Massachusetts Institute of Technology
RC	Regional Coordinator
SACCO	Savings and Credit Cooperative Organization
SSE	Solar Sister Entrepreneur
SSRC	Sociotechnical Systems Research Center
UBOS	Uganda Bureau of Statistics
USAID	United States Agency for International Development
VSLA	Village Savings and Loan Association
CBO	Community-Based Organizations
CCES	Center for Complex Engineering Systems
CEO	Chief Executive Officer
CRM	Customer Relationship Management
EPA	Environmental Protection Agency
GDP	Gross Domestic Product
ICT	Information and Communications Technology
IEA	International Energy Agency
IFC	International Finance Corporation
KACST	King Abdulaziz City for Science and Technology
MEMD	Ministry of Energy and Mineral Development
MPH	Masters in Public Health
NBER	National Bureau of Economic Research
NYU	New York University
SAT	Sustainability Assessment Tool
SNA	Social Network Analysis
UGX	Ugandan Shillings
UNDP	United Nations Development Program
USD	United States Dollars

1. INTRODUCTION

Which technology works best where? This is a deceivingly simple question. Surprisingly, despite the thousands of products designed specifically to alleviate key development challenges, no standardized, scientifically-based evaluation exists to allow for cross-comparison among differing products within a given product family.

The Comprehensive Initiative for Technology Evaluation (CITE) seeks to address this gap through the development of a rigorous methodology that will assess products from the three attributes of Suitability, which includes lab and field-testing of the technical performance of lanterns, Scalability, which evaluates the end-to-end product supply chains and their ability to support growth, as well as supply chain maturity and robustness, and Sustainability, which looks at the social, economic, environmental and other contextual factors that drive technology diffusion and adoption over time. Each year the CITE team will evaluate at least two products that are being used in developing countries and will publish the results in a series of Technical Evaluation Reports (TERs), research briefs, and journal articles. CITE's goal is to provide policy makers, procurement officers, and technology users with the knowledge to make informed decisions when choosing among the vast array of products available in the market.

The question of the sustainability of a particular product is not easily answered, since the product itself is part of a much larger innovation ecosystem that influences how it is used and how widely it spreads, as shown in Figure 1. The stakeholders and processes working in close proximity to the product at the "micro-level" have the most interaction with the product, but they are influenced by the stakeholders and processes working at the higher "meso-"and "macro-levels" which themselves are driven by the exogenous "mega-level" factors that, though transparent to the micro-level actors, can have a large influence on the long term sustainability of the product.

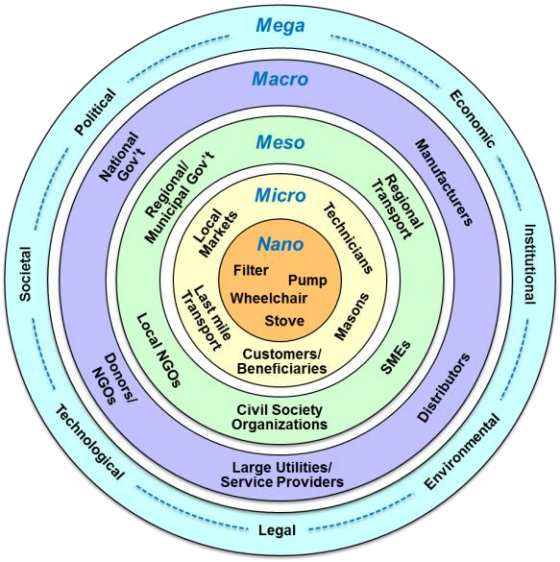

FIGURE 1: SUSTAINABLE INNOVATION ECOSYSTEM

In order to provide USAID and other development practitioners with actionable recommendations of which products to distribute, we are proposing three separate but synergistic activities under the CITE Sustainability group: first, a product assessment activity which will use a simplified weighted criteria matrix tool to calculate a Sustainability score for the products being tested by the CITE Suitability team in D-Lab using a "Consumer Reports" style approach; second, a series of associated "deep dive" studies on specific elements of the Sustainability assessment that need further refinement; and third, the development of simulation models and decision support tools that will attempt to capture the complexities of the ecosystem shown in Figure 1, with a focus on how different technical, economic, social and environmental factors affect the diffusion of the products over time. This three-prong approach is illustrated in Figure 2.

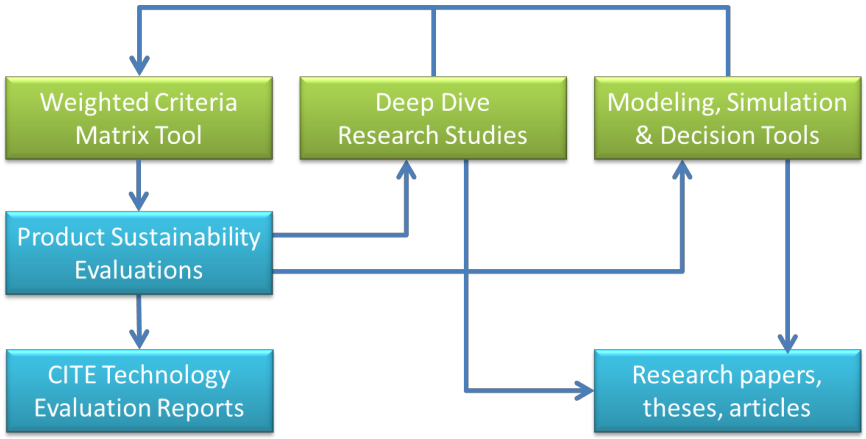

FIGURE 2: THREE PRONG APPROACH TO SUSTAINABILITY EVALUATIONS

In the summer of 2013, the CITE Sustainability team was asked to evaluate the solar lanterns distributed by of one of USAID's Development Innovations Ventures (DIV) partners, Solar Sister, in their program in Uganda. Solar Sister distributes the lanterns through a network of women entrepreneurs who obtain the products from Solar Sister for a discounted price (and mostly on credit) and then sell them within their local communities and retain a 10% commission to help with household expenses and school fees.

While reviewing the Solar Sister financial records and meeting with the organization's founder, Katherine Lucey, the CITE Sustainability team began to realize that the most important factors for the long-term sustainability of the endeavor was not the difference in technical performance between the solar lantern models, but rather the capacity of the Solar Sister Entrepreneurs (SSEs), the strength of the *product diffusion strategy*[1] that they had chosen, and the ability of the social business model to continue to function at scale.

For CITE, we have identified four types of diffusion strategies employed by the private sector and our partners:

- Commercial Product Diffusion Strategies: For-profit businesses procure or manufacture products and sell them to individual or institutional consumers either directly or through a series of intermediaries (e.g., retailers, wholesalers, etc.).
- International/Domestic Humanitarian Aid Product Diffusion Strategies: During a time of crisis, national governments and international donors purchase and donate products to affected beneficiaries via direct, bilateral or multilateral means or through international and/or national NGOs and other community service organizations.
- International/Domestic Development Program Product Diffusion Strategies: Products are distributed for free or at a highly subsidized price to target beneficiaries, as part of near- and long-term development interventions that aim to increase diffusion (or uptake) through social marketing programs, support service capacity building and post-distribution follow-up (in some cases).
- Hybrid Diffusion Strategies: Combines elements of Commercial and Development Program Product Diffusion Strategies. This can include social entrepreneurship models; social business models; funding small scale businesses; incubators; etc.

[1] A Product Diffusion Strategy (PDS) is defined as the end-to-end approach used by the Change Agent to encourage the user to adopt the technology. This can include the business model, awareness and promotion programs, distribution logistics, capacity building of change agents and community workers/volunteers, etc.

For the solar lantern evaluation, the CITE Sustainability team decided to perform a "deep dive" research study into the social and economic aspects of the Solar Sister organization and then identify whether each solar lantern model had any variance in their contribution to the long term sustainability of the social business and their hybrid product diffusion strategy. We found that the primary differentiators between models were the cost and the ability to charge cell phones, although the perceived quality of the light and discharge time also played a role. To account for these factors in the product evaluation score, we suggest a series of "k-factors" to apply to the base scores determined in the Suitability team product comparison scores to capture the sustainability aspects.

2. SOLAR SISTER: A HYBRID DIFFUSION STRATEGY FOR HOUSEHOLD-LEVEL SOLAR PRODUCTS

2.1. ORGANIZATIONAL OVERVIEW

Solar Sister was founded in 2010 by Katherine Lucey, an American businesswoman with more than two decades of experience working as an investment banker in the energy sector. Through Katherine's participation with a philanthropic organization working in rural Uganda to provide access to solar renewable energy, she saw first-hand the lack of access to affordable, reliable, clean energy. While she appreciated such charitable efforts, Katherine realized that the need for cheap, reliable energy services far outweighed the resources available through philanthropy alone; market forces need to be tapped and harnessed if an impact on a large scale is to be realized. From a socio-economic point of view, energy poverty was a significant impediment to self-empowerment and development. From a business point of view, energy poverty was an opportunity.

Katherine was able to use the contacts she had nurtured in-country to her advantage when building Solar Sister from the ground up. In particular, her established relationship with the Mother's Union (MU) - a widespread, formalized faith-based system of women's bible study and prayer groups—served as the basis for Solar Sister's entry into several communities.[2] By working through existing, credible networks, Solar Sister's did not have to recreate networks, but rather was able to find established women's networks that could be leveraged for the diffusion of solar lanterns. Partnering with existing organizations on the ground, and continually working to build more partnerships, allows Solar Sister to actively and consciously build a grassroots, women-driven network in clean energy.

Solar Sister's value proposition is straightforward: they are a direct sales, women-driven distribution business for solar energy that can power lanterns and charge mobile phones. These lanterns, ranging in price from about $15 to $50, replace kerosene lamps, which are not only poor sources of light, but are also hazardous to health, harmful to the environment and often constitute a significant portion of household spending (see Figure 3).

[2] More than 80% of Ugandans are Christian. The church represents a focal point for the social lives of many citizens, especially women. Because the church occupies a central position in many communities, non-profit organizations involved in grassroots development projects often partner with the MU and other ecclesiastical groups.

FIGURE 3: KEROSENE LAMPS (LEFT) AND SOLAR LANTERNS (RIGHT)

Though their business model has evolved over time (see Section 4.2), the core process has remained the same. First, Solar Sister sells a business in a bag, consisting primarily of lanterns, to their entrepreneurs, called SSEs (Solar Sister Entrepreneur). Through training sessions where they learn business skills and with marketing materials in hand, SSEs are empowered to sell the solar lanterns to friends, neighbors and colleagues in their local communities, earning a sales-based commission that augments household income. The underlying idea behind the Solar Sister model is that, compared to outsiders, these women possess crucial, implicit knowledge about local conditions and markets and that they have a level of credibility and ability to exploit social networks to reach last-mile customers who otherwise would never be reached. Since 2010, Solar Sister has recruited over 400 entrepreneurs in Uganda. Beginning in 2012, they launched a phase of rapid expansion, scaling their operations to Tanzania and Nigeria. By 2015, Solar Sister expects to recruit 3,000 new SSEs.

Like many mission-driven organizations, Solar Sister defines success not only by their organization's growth, but also by the socio-economic impacts of their work. This is why their product diffusion strategy is classified as hybrid: it combines elements of traditional business models with explicit social goals. Its principal goal is to empower women through economic opportunity and to facilitate economic prosperity shared broadly. Its second goal is to provide access to clean energy for last-mile users. Finally, its third goal is to use the revenues from lanterns sales to break even financially. According to the definition proposed by Yunus (2007), Solar Sister endeavors to be a *social business*, where their main objective is to maximize positive social impact, such that profits are greater than zero.[3]

The focus on women's role in achieving improved access to energy is based on the premise that women are the "energy managers" of their households - women and girls

[3] As opposed to a traditional *social enterprise*, where the main objective is to maximize profits, such that social impacts are greater than zero.

tend to be responsible for a household's cooking and heating needs. Since women are also responsible for most household chores, girls tend to be able to begin their school studies only later in the evening, and are thus in greater need of solar lanterns than their male counterparts. As a result, and though the lack of access to energy may be a development issue, it is also intimately linked to gender issues.

Solar Sister's decentralized business model emphasizes the local knowledge of women in their communities to leverage business opportunities. In particular, the organization is a grantee of the Development Innovations Venture (DIV) administered by USAID. They recently received Phase 2 funding of $1 million, which they will go toward their scaling efforts. While the organization continues to scale rapidly, it should be noted that our research is limited to Solar Sister's operations in Uganda only.

2.2. MANAGEMENT OVERVIEW

Solar Sister's management structure in Uganda can be divided into three main levels: headquarters, regional, and community (see Figure 4). Their headquarters in Kampala consists of 6 full-time staff that are responsible for the strategic, administrative, financial, and coordination efforts of the entire organization. It is also the staff's responsibility to interface with solar lantern manufacturers, and to ensure that the requisite amount of inventory is ordered and maintained. Senior headquarters staff members are responsible for setting and implementing the strategic vision of the organization, and are counseled by a 7-member Board of Directors and a 6-member team of Advisors.

FIGURE 4: ORGANIZATIONAL LEVELS AND RESPONSIBILITIES

Regional Coordinators (RCs) are Solar Sister's representatives throughout the country, and their primary task is to ensure the continued growth of the organization by recruiting new entrepreneurs and providing them with the skills and confidence they need to be successful. RCs act as the main conduit between entrepreneurs on the ground and headquarters staff, and thus represent the key communication channel through which information is propagated throughout the organization. Currently, there

are seven RCs throughout Uganda, overseeing Solar Sister operations in each of their respective geographies. Once a year, all seven RCs gather at a summit to learn about the challenges and opportunities in each region, and to learn from one another's experiences.

FIGURE 5: SSES FROM CENTRAL (LEFT), NORTHERN (CENTER), AND WESTERN (RIGHT) UGANDA

Solar Sister Entrepreneurs (SSEs) are the backbone of Solar Sister. It is through their sales and through their dissemination of knowledge about solar energy that capital stocks are transformed into income for the entrepreneurs and revenues for the organization. With their orange shirts and black shoulder bags (see Figure 5), they are the public face of Solar Sister in their local villages, transforming community members into paying consumers.

2.3. THE UGANDAN CONTEXT: DRIVING FACTORS

Uganda is a land-locked country on the northern shore of Lake Victoria in Eastern Africa with a population of about 35 million. Several demographic trends are relevant to solar lanterns, including electrical coverage, rural-urban population distribution,

According to the Ministry of Energy and Mineral Development (MEMD), Uganda's official electrification rate hovers at around 10% (5% in rural areas), quite low even when compared to other countries in Sub-Saharan Africa (IEA 2011). Where power infrastructure does exist, load-sharing, aging infrastructure and poor maintenance result in rolling blackouts, a particularly common occurrence during the rainy season. Even those with access to electricity may find tariffs and connection fees cost-prohibitive.

More than 85% of the Ugandan population lives in rural areas, where access to power infrastructure is limited and unreliable, and 25% of the population lives below the poverty line (see Figure 6). Other demographic factors play an important role. A significant gender gap is evident: a prime example is that women fall behind men in literacy rates - 65% and 83%, respectively (World Bank 2013). Uganda is a young society:

49% of the population is 14 years old or younger. As a result, most families spend significant amounts of household income on education expenses. In part because of the great expense, but also because Ugandans value education as a means to a better life, education is taken very seriously. The fact that solar lanterns extend the amount of time that children are able to study is a big selling point - a point eclipsed perhaps only by the ability of some lanterns to charge mobile phones.

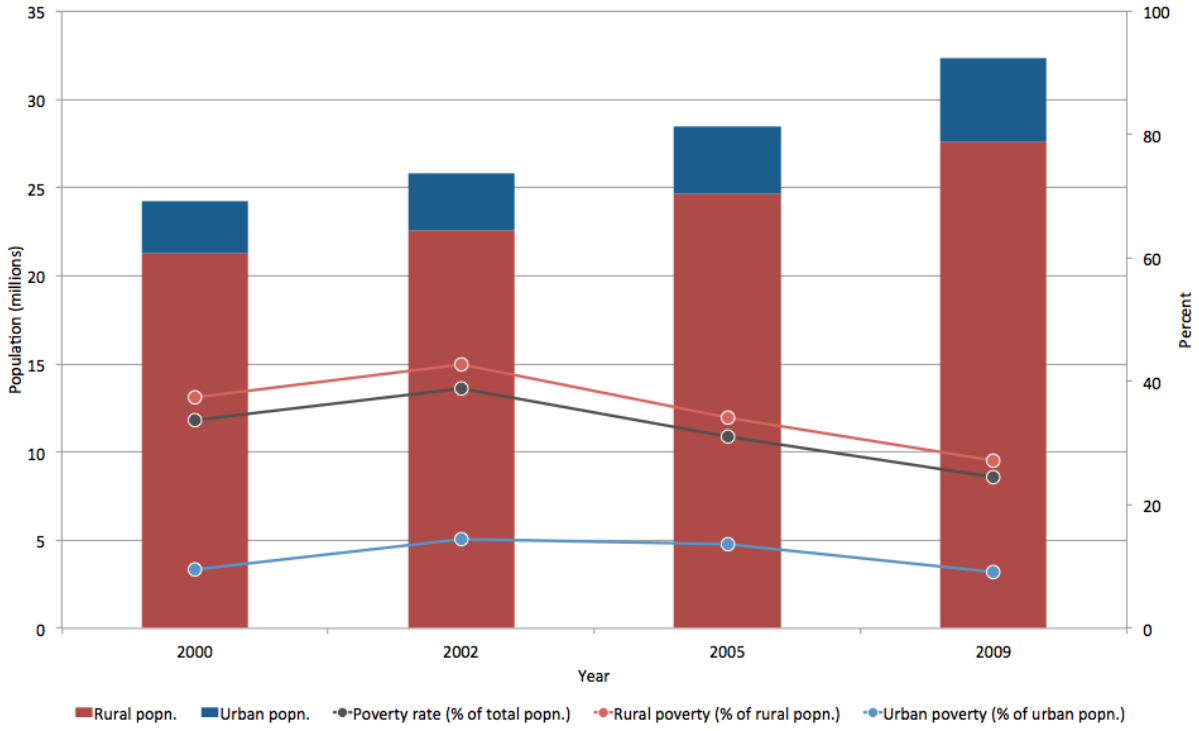

FIGURE 6: UGANDAN POPULATION AND POVERTY RATES (*SOURCE: WORLD BANK (2013)*)

Because the solar lantern sector is only five to six years old and has yet to penetrate fully into rural markets, knowledge about off-grid, household solar lighting remains low. This is despite the low prevalence of electrification and the need for alternatives to kerosene lamps, which (in addition to candles) is the most common source of light for those without access to, or unable to afford, electricity. The 2002 Ugandan census estimated that 75% of households used kerosene for lighting purposes (UBOS 2006). The International Finance Corporation (IFC) estimates that in Sub-Saharan Africa alone, over $10 billion spent annually on kerosene for lighting purposes (IFC 2010). There is often a significant disparity between the prices of kerosene in urban centers as compared to rural areas, where the typical purchase volume is much smaller (one or two liters a week, for instance) but the price for is much higher (Lighting Africa 2012). In addition to high prices, most rural consumers have to travel significant distances from to purchase kerosene.

In addition to the significant expense kerosene represents to low-income households, it also poses significant health risks. Respiratory problems can occur from prolonged

exposure to high particulate matter concentrations, particularly in enclosed areas with low air exchange, such as enclosed kitchens (Apple et al. 2010). Environmental risks from kerosene lights may not appear significant, but new evidence suggests that burning kerosene emits larger amounts of black carbon than previously estimated (Lam et al. 2012).[4] Kerosene lamps also carry physical risks: burning, of both children and the family dwelling, is still very common, and houses have burned down when kerosene lamps are left unattended.

Despite high official poverty rates coupled with low savings rates, the prevalence of savings and credit groups - Village and Savings Loans Associations (VSLA) and Savings and Credit Cooperative Organization (SACCO) - is substantial. Access to such informal financing is an important source of capital, given the seasonality of income earning for many households, particularly those is rural areas who are engaged in farming.

Indeed, though agriculture accounts for only a quarter of gross domestic product (GDP), the sector employs more than 80% of the country's l6.5 million-strong labor force. For these individuals, limited education and limited access to institutionalized, salaried jobs, in addition to the large household size (the average family is 4.7 people), means that household income can be very low, with the opportunity to increase income unlikely, especially in the face of high inflation (19% in 2011, 14% in 2012). The seasonality and uncertainty that comes with unsteady incomes means that households' cash availability is often "lumpy" - even a salaried employee such as a teacher may get paid once a month and has to stretch his/her earnings for the whole month. Therefore, energy poverty and the ability to earn a sufficient income, especially for women, represent significant challenges to Uganda's development and the well-being of its citizens.

The implication of low electrification and high poverty rates is straightforward: other energy solutions are required, in the interim at the very least. Though the potential market for non-grid energy solutions may be considerable - as high as 90% of the population - demand is tempered by cost, and product awareness and availability, especially for those at the bottom of the pyramid (BoP).

2.4. THE SOLAR SISTER NETWORK IN UGANDA

In Uganda, the Solar Sister network is broken down geographically into 7 regions. As shown in Figure 7, each region centers around a city, out of which its Regional Coordinator(s) operate (Kampala, the capital city, being the core of the Central region). The Central and Soroti regions were the first areas in operation, though, as seen

[4] Per unit of mass in the atmosphere, black carbon can absorb a million times more energy than carbon dioxide (CO_2) (EPA 2012).

in Figure 7, the geographic coverage of the Solar Sister network has since grown to cover the entire country.

FIGURE 7: SOLAR SISTER REGIONS

The majority of SSEs continue to be concentrated in the Central and Soroti regions. As shown in Figure 9, Central and Soroti together account for approximately 65% of all SSEs. In 2011, the Gulu and Rukungiri regions were established; in 2013, Jinja and Mbarara were established, while Fort Portal saw significant growth during that year. The rapid scale from the central and eastern region to the entire country saw a large increase in the number of SSEs recruited. In 2010, there were 4 SSEs; in 2011, about 150; 2012, about 350; and in 2013, over 430.

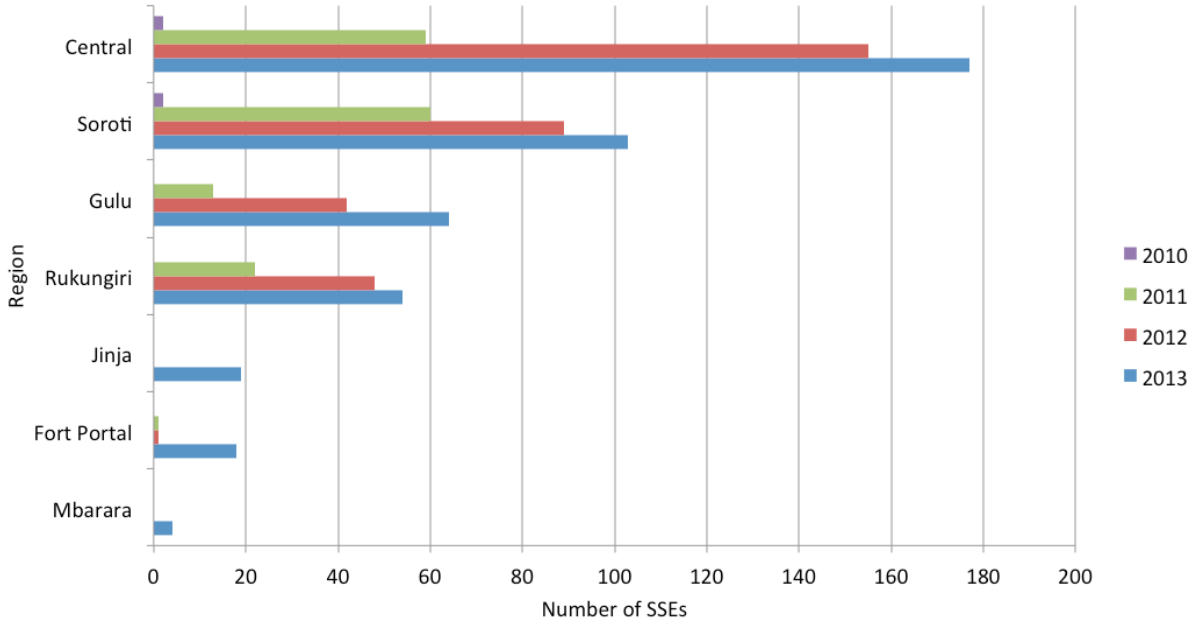

FIGURE 8: NUMBER OF ENTREPRENEURS BY REGION AND YEAR

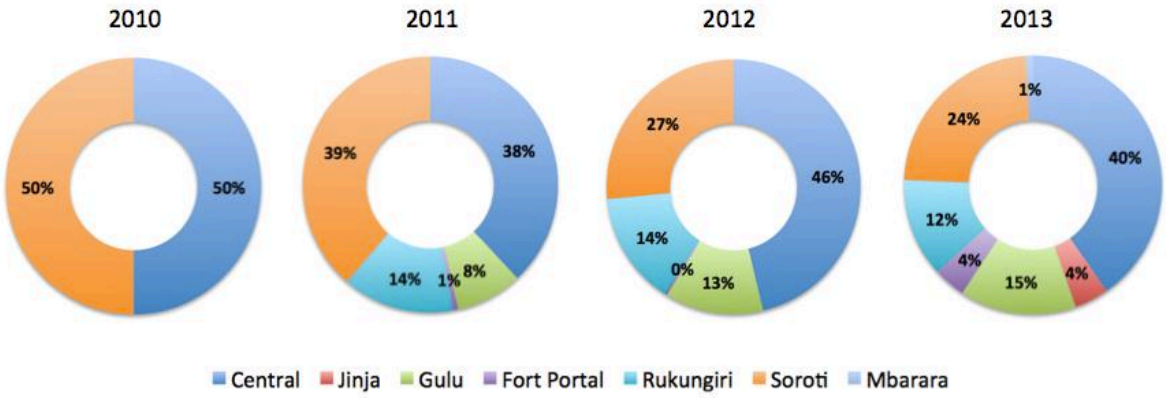

FIGURE 9: PERCENTAGE OF ENTREPRENEURS BY REGION AND YEAR

Figure 10 shows the location of main SSE groups, Regional Coordinators, and Uganda Headquarters staff, as well as the major transportation arteries that connect them. All of the solar lanterns sold by Solar Sister are manufactured in China and shipped to distributors in Kampala via Mombasa, Kenya with forward transport provided by regional freight forwarders. Once in Uganda, Solar Sister receives the lanterns at their headquarters in Kampala, which also acts as their primary inventory and warehousing facility. From there, the lanterns are shipped out to each Regional Coordinator, who is then responsible for further dispersing them to each individual SSE according to orders made. Currently, Solar Sister does not work with commercial trucking companies for transferring the products from Kampala to the regions, and relies instead on the national bus service (through informal agreements with the bus drivers) and on

"opportunistic shipping" by packing cars full of lanterns when RCs, HQ staff, and guest are visiting the regions.

FIGURE 10: SOLAR SISTER UGANDA DISTRIBUTION NETWORK

(note: this figure is being updated)

3. SOCIAL ANALYSIS: SOLAR SISTER AND THE UGANDAN CONTEXT

3.1. INTRODUCTION

In this section, we discuss the social and organizational factors that underpin how Solar Sister and its entrepreneurs operate. Solar Sister is, after all, a social enterprise whose core is the selling of solar lanterns through the personal networks of its entrepreneurs, with the aim of capturing end-mile users that purely market-oriented approaches have failed to reach. Here, we focus specifically on the experiences of individual entrepreneurs. What challenges do they face? What strategies are used to exploit and expand existing social networks? What characteristics do (successful) entrepreneurs tend to possess?

3.2. SOCIAL ENTERPRISE AND ENTREPRENEURSHIP

The social enterprise model involves the simultaneous pursuit of social and economic, and sometimes environmental, goals. Those who adopt this model are often viewed as filling an unmet need for improving community well-being, especially in contexts where market mechanisms and government policies have yet to address adequately pressing social needs (Prahalad 2004, Zahra et al. 2009). Increased privatization and marketization, linked to declining funding for publicly-provided social services, has prompted several organizations to adopt entrepreneurial business strategies in pursuit of social missions, leading to a rise in social ventures worldwide (Leadbetter 1997, Salamon 1999, Goerke 2003, Wolverton 2003, Dorado 2006, Thompson and Doherty 2006).

Despite its growth as a sector, and despite increased scholarly interest in the subject, there exists little consensus on the scope or definition of social entrepreneurship (Dees 1998, Hemmingway 2005, Mair and Marti 2006, Noya 2009). Table 1 presents a collection of definitions for social enterprise and entrepreneurship. A few commonalities emerge, namely:

- The need to be innovative and creative in order to discover and implement novel solutions to persistent problems;
- The ability to perceive and exploit opportunities;
- The inclination to work hard and be resourceful, given scarce assets;
- A willingness to accept a high degree of risk and uncertainty; and
- A desire to advance social change without sacrificing financial prudence.

TABLE 1: DEFINITIONS OF SOCIAL ENTREPRENEURSHIP AND ENTREPRENEURS

Definition	Source
The use of entrepreneurial behavior for social ends rather than for profit objectives, or alternatively, that the profits generated from market activities are used for the benefit of a specific disadvantaged group.	Leadbetter 1997
Social entrepreneurs are driven by a desire for social justice. They seek a direct link between their actions and an improvement in the quality of life for the people with whom they work and those that they seek to serve. They aim to produce solutions, which are sustainable financially, organizationally, socially and environmentally.	Thake and Zadek 1997
Play the role of change agents in the social sector, by: 1) Adopting a mission to create and sustain social value (not just private value), 2) Recognizing and relentlessly pursuing new opportunities to serve that mission, 3) Engaging in a process of continuous innovation, adaptation, and learning, 4) Acting boldly without being limited by resources currently in hand, and 5) Exhibiting heightened accountability to the constituencies served and for the outcomes created.	Dees 1998
Social entrepreneurs create social value through innovation and leveraging financial resources...for social, economic and community development.	Reis 1999 (Kellogg Foundation)
Social Entrepreneurship is the creation of viable socio-economic structures, relations, institutions, organizations and practices that yield and sustain social benefits.	Fowler 2000
Individuals constantly looking for new ways to serve their constituencies and add value to existing services.	Brinkerhoff 2001
A multidimensional construct involving the expression of entrepreneurially virtuous behavior to achieve the social mission...the ability to recognize social value creating opportunities and key decision-making characteristics of innovation, pro-activeness and risk-taking .	Mort et al. 2002
A major change agent, one whose core values center on identifying, addressing and solving societal problems.	Drayton 2002
Creates innovative solutions to immediate social problems and mobilizes the ideas, capacities, resources and social arrangements required for social transformations.	Alford et al. 2004
Entrepreneurs motivated by social objectives to instigate some form of new activity or venture.	Harding 2004
The work of community, voluntary and public organizations as well as private firms working for social rather than only profit objectives.	Shaw 2004
A professional, innovative and sustainable approach to systematic change that resolves social market failures and grasps opportunities.	Saïd School 2005
The art of simultaneously pursuing both a financial and a social return on investment (the "double" bottom line).	Fuqua School 2005
Applying practical, innovative and sustainable approaches to benefit	Schwab

Definition	Source
society in general, with an emphasis on those who are marginalized and poor.	Foundation 2005
The process of using entrepreneurial and business skills to create innovative approaches to social problems. "These non-profit and for profit ventures pursue the double bottom line of social impact and financial self-sustainability or profitability."	NYU Stern 2005
Process whereby the creation of new business enterprise leads to social wealth enhancement so that both society and the entrepreneur benefit.	MacMillan 2005 (Wharton Center)
Making profits by innovation in the face of risk with the involvement of a segment of society and where all or part of the benefits accrue to that same segment of society.	Tan et al. 2005
The creation of new models for the provision of products and services that cater directly to basic human needs that remain unsatisfied by current or economic or social institutions.	Seelos and Mair 2005
A process of creating value by combining resources in new ways...intended primarily to explore and exploit opportunities to create social value by stimulating social change or meeting social needs.	Mair and Marti 2006
Social entrepreneurship is exercised where some person or group.... aim(s) at creating social value... shows a capacity to recognize and take advantage of opportunities... employs innovation... accepts an above average degree of risk...and is unusually resourceful... in pursuing the given social venture.	Peredo and McLean 2006
Social entrepreneurship is the: 1. Identification of a stable yet unjust equilibrium that excludes, marginalizes or causes suffering to a group that lacks the means to transform the equilibrium; 2. Identification of an opportunity and developing a new social value proposition to challenge the equilibrium; and 3. Forging a new, stable equilibrium to alleviate the suffering of the targeted group through imitation and creation of a stable ecosystem around the new equilibrium to ensure a better future for the group and society.	Martin and Osberg 2007
Social entrepreneurship refers to the practice of combining innovation, resourcefulness and opportunity to address critical social and environmental challenges. Social entrepreneurs focus on transforming systems and practices that are the root causes of poverty, marginalization, environmental deterioration and accompanying loss of human dignity… their primary objective is to create sustainable systems change. The key concepts of social entrepreneurship are innovation, market orientation and systems change.	Skoll Centre for Entrepreneurship 2007
Social entrepreneurship encompasses the activities and processes undertaken to discover, define and exploit opportunities in order to enhance social wealth by creating new ventures or managing existing organizations in an innovative matter.	Zahra et al. 2009

While social entrepreneurs are typically cast in a positive light, some have raised concerns about their operation. In theory, the double- or triple-bottom line under which these organizations operate is meant to be self-reinforcing and contribute to a virtuous cycle that supports sustainable development (Seelos and Mair 2005; see Figure 11). However, the union of economic thinking with the desire to create social value has led some to question the model's underlying structural integrity. Zahra et al. (2008) note that a strong business approach clashes with many of the ideals of the public sector and NGOs who champion the public good, and may force focus away from social value creation to profit-making. Similarly, Eikenberry and Kluzer (2004) argue that mission-driven programs whose outcomes are uncertain, whose progress is slow and whose success is difficult to quantify may be severely limited in scope, or abandoned outright, when an entrepreneurial mindset is emphasized. The reasoning is that, far from bolstering one another, the multiple goals of social enterprise are at odds with one another, often engendering tricky trade-offs between social impact and economic health.

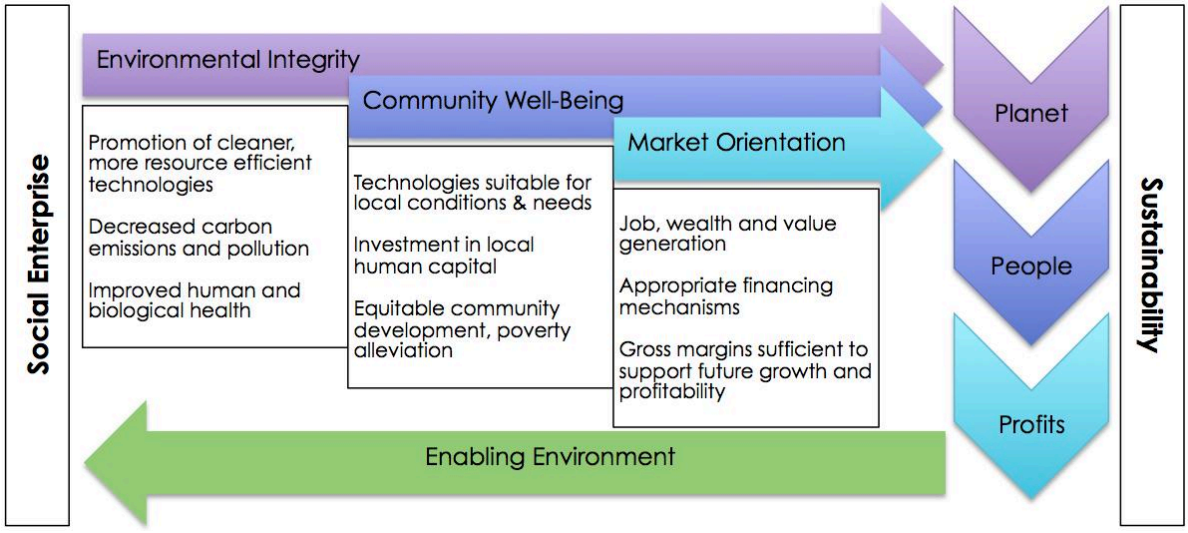

FIGURE 11: A VIRTUOUS CYCLE? THE SOCIAL ENTERPRISE-SUSTAINABILITY NEXUS

3.3. TECHNOLOGY ADOPTION AND ITS SOCIAL UNDERPINNING

Despite certain misgivings about social enterprise, it has been widely endorsed as a model that can effectively promote the spread of technology throughout society. This is consistent with the substantivist proposition, first put forth by Polanyi (1944) and built upon by others, that business interactions are embedded within social relations, such that social context plays a central role in economic activity (Granovetter 1985, Uzzi 1997, Dacin et al. 1999, Borch 1994, Starr and McMillan 1990). This is especially relevant to, and explicit in, the hybrid model that Solar Sister employs, where technology is disseminated directly via social networks.

The role of social learning and social networks to technology diffusion and adoption is a growing field of literature (Duflo and Saez 2003, Kremer and Miguel 2007, Beshears et al. 2011, Dupas 2013). In Ghana, Conley and Udry (2010) found evidence that farmers' communication patterns with their "information neighbors" positively impacted their uptake of new technologies. Banerjee et al. (2012) find that the diffusion of microfinance in India increases when injection points - people with leadership roles in the community - have higher eigenvector centrality, a measure of a person's influence within a social network. In one experiment, weather insurance adoption rates in rural China were driven primarily by diffusion of knowledge about the service through social networks (Cai 2013).

Generally speaking, social network analysis (SNA) involves the study of relationships between people and groups, how these relationships form and the subsequent consequences of their formation. There are two primary types of social network analysis: socio-centric and egocentric. Socio-centric SNA focuses on large groups of people and their patterns of interaction, while egocentric SNA focuses on an individual's personal network and its impacts on that individual (Roberts 2006). For the purposes of our research, we focus on the egocentric social networks of individual entrepreneurs. Network effect mechanisms fall under two broad categories:

- Information effects: the spread of knowledge about a technology, service, or idea; and
- Endorsement/peer effects: the spread of information about whether people in one's social network have adopted a new technology, service or idea, and their degree of satisfaction.

Social networks play a central role in standard models of technology diffusion, since word of mouth is considered a key driving force behind adoption (Bass 1969). The spread of information about a new technology from adopters to potential adopters via word of mouth can be conceptualized as a form of social contagion:

"As early adopters of new technology and early purchasers of a new product expose their friends, families and acquaintances to it, some are persuaded to try it or buy it themselves. In all these cases, those who have already adopted the product, idea or technology come into contact with those who have not, exposing them to it and infecting some of them with the idea, or the desire to buy the new product and further increasing the population of adopters. Any situation in which people imitate the behavior, beliefs or purchases of others, any situation in which people jump on the bandwagon, describes a situation of positive feedback by social contagion." (Sterman 2000, 324)

On a more individual level, the mechanism by which individual attitudes and societal norms form and change, as well as how these translate into tangible changes in

behavior, is also important to investigate when trying to understand technology adoption and transition. Convincing a society at large to prefer a new technology (solar lighting) over an older one (conventional kerosene lamps) requires understanding what motivates and compels individuals to change their behavior. Social acceptability of a technology - the degree to which it is known about, desired and meets local needs - has several important, interdependent dimensions that several scholars and academic traditions have attempted to understand through a variety of theories and models (see Table 2).

TABLE 2: THEORIES AND MODELS OF SOCIAL AND BEHAVIORAL CHANGE

Model	Description	Key Proponent
Diffusion of innovation	Adoption of a new idea, behavior or technology is dependent on whether an individual perceives it as new or innovative; this is what catalyzes and sustains diffusion, and is based on five main factors: relative advantage, compatibility, complexity, trialability and observability	Everett Rogers
Theory of planned behavior	Behavioral change in a certain place at a given time is contingent upon motivation (intention) and ability (behavioral control), driven by subjective attitudes about whether or not changes will yield expected outcomes and idiosyncratic understandings of risks and benefits	Icek Ajzen
Social cognitive theory	Learning occurs in a social context of dynamic, reciprocal interaction between the person, environment and behavior, with an emphasis on social influence through internal and external reinforcement	Albert Bandura
Transtheoretical model	Focuses on individuals' decision-making processes, arguing that behavior change occurs through a continuous and cyclical process consisting of six stages: pre-contemplation, contemplation, preparation, action, maintenance and termination	Jame Prochaska, Carlo DiClemente
Social norms theory	Aims to understand the environment and interpersonal influences that inform individuals' behavior change, with a heavy focus on peer influence and normative beliefs	H. Wesley Perkins, Alan Berkowitz
Complex sociotechnical systems theory	A holistic approach to change, which conceptualizes a complex system as interlinked components that: contain technology subsystems and components that are central to its performance; and have social, political and economic relevance, impact and feedbacks	Joseph Sussman

3.4. METHODOLOGY

The fact that technology adoption hinges heavily upon social learning through personal networks and changes in social norms and attitudes points to the important role that individuals play in periods of socio-technical transition. As a result, the core of the information used in this section comes from interviews with 80 entrepreneurs spread throughout Uganda. The interviews were semi-structured in nature, as the largely qualitative nature of our research goal demanded flexibility during the information-gathering process (Berg and Lune 2012; Neuman 2012).

The questions and prompts that comprised the semi-structured interview were developed based on literature reviews and consultations with scholars and Solar Sister staff, and was finalized based off of feedback provided during an initial pilot when the research team arrived in Uganda. The interview was divided into six sections, which covered demographic information, entrepreneurship background, decision-making process to become a SSE, on-the-job experience, as well as skills, capacity and community engagement (see Table 3).

TABLE 3: OVERVIEW OF SEMI-STRUCTURED INTERVIEW

Section No.	Section Name	Description
1	Background information	Basic demographic information about the individual and his/her household
2	Monetary, income and purchasing decisions	Information concerning household income and spending patterns, including how money made from solar lantern sales is used
3	Entrepreneurship background	Work background and exposure to entrepreneurship and/or entrepreneurs (especially women) growing up
4	Decision-making process	How individuals first heard about Solar Sister, and the factors and goals influencing their decision to become an entrepreneur
5	On-the-job experience	Individuals' experience selling lanterns, including successes, challenges, levels of communication and levels of effort required
6	Skills, capacity and community engagement	Skills learned since becoming an entrepreneur, and how and the degree to which individuals teach their communities about solar lanterns

Though the interview subjects were scheduled with the aid of Solar Sister staff and thus were not randomly selected, the entrepreneurs interviewed can be considered reasonably representative of SSEs throughout the country for two reasons. First, a wide geographic area was covered to help combat selection bias (we interviewed subjects

in all but the eastern Soroti region).[5] Second, the level of variation in demographics among interviewees shows significant heterogeneity.

In addition to the semi-structured interviews, key informant interviews were conducted with all Solar Sister staff, local lantern suppliers and organizations with similar business models to Solar Sister's social enterprise model (see Appendix C and Appendix D). We also attended and observed entrepreneur training sessions, in addition to one community entrance meeting.[6] One researcher in our group was also embedded with headquarters staff for two weeks to learn more about the Solar Sister's day-to-day operations.

In our results and discussion section, we begin with a demographic overview of the individuals we interviewed, followed by their on-the-job experiences. We then present a model of organizational information flows and offer an analysis of what factors seem to engender entrepreneurial success, including socioeconomic issues linked to Solar Sister's financial model.

3.5. Results and Discussion

3.5.1. Entrepreneurs' Demographic and Background Information

Table 4 shows the distribution of entrepreneurs interviewed according to geographic region and engagement level: prospect (first month as an SSE), entrepreneur, superstar (top 5% of SSEs according to sales), left program and unknown. Collectively, about half of SSEs interviewed were from the Central and Gulu (northern) regions. Approximately one-third of those we spoke to were prospective SSEs, two-fifths were entrepreneurs, slightly more than one-tenth were superstars and one-eighth had an unknown status.

TABLE 4: ENTREPRENEUR BREAKDOWN BY STATUS, UNIVERSE AND REGION

Region	Universe	Prospect	Entrepreneur	Superstar	Left Program	Unknown	Total
Central 1	Sample	0 (0.0%)	11 (31.4%)	3 (27.3%)	0 (0.0%)	1 (10%)	15 (18.8%)
	Population	14 (10.3%)	40 (32.3%)	5 (26.3%)	54 (35.5%)	0 (0.0%)	113 (25.8%)
Central 2	Sample	1 (4.2%)	4 (11.4%)	3 (27.3%)	0 (0.0%)	2 (20%)	10 (12.5%)
	Population	34 (25.2%)	18 (14.6%)	4 (21.1%)	7 (4.6%)	0 (0.0%)	63 (14.4%)
Gulu	Sample	6 (25%)	8 (22.9%)	4 (36.4%)	0 (0.0%)	5 (5%)	23 (28.8%)
	Population	20 (14.8%)	19 (15.3%)	4 (21.1%)	20 (13.2%)	1 (14.2%)	64 (14.6%)
Jinja	Sample	5 (20.8%)	1 (2.8%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	6 (7.5%)

[5] This was due to a change in management in Soroti, and we did not want our presence to act as a disruption.

[6] This is the first point of contact between Solar Sister and a community. In our case, this was done through a presentation on the organization and the products it sells to a women's community-based organization (CBO).

Region	Universe	Prospect	Entrepreneur	Superstar	Left Program	Unknown	Total
	Population	17 (12.6%)	2 (1.6%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	19 (4.3%)
Fort Portal	Sample	9 (37.5%)	3 (8.6%)	0 (0.0%)	0 (0.0%)	1 (10%)	13 (16.2%)
	Population	14 (10.4%)	4 (3.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	18 (4.1%)
Rukungiri	Sample	3 (12.5%)	8 (22.9%)	1 (9.0%)	0 (0.0%)	1 (10%)	13 (16.2%)
	Population	14 (10.4%)	22 (17.7%)	2 (10.4%)	16 (10.5%)	0 (0.0%)	54 (12.4%)
Soroti	Sample	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Population	22 (16.3%)	19 (15.3%)	4 (21.1%)	55 (36.2)	2 (28.6%)	102 (23.3%)
Mbarara 1	Sample	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Population	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (28.6%)	2 (0.5%)
Mbarara 2	Sample	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
	Population	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (28.6%)	2 (0.5%)
Total	Sample	24 (30%)	35 (43.7%)	11 (13.8%)	0 (0.0%)	10 (12.5%)	80 (100%)
	Population	135 (30.9%)	124 (28.4%)	19 (4.3%)	152 (34.8%)	7 (1.6%)	437 (100%)

Note: Central and Mbarara are split into two sections because each has two Regional Coordinators, who are responsible for a distinct geographical territory.

The vast majority of those interviewed (79%) had been SSEs for a year or less; 38% had been SSEs for six months or less (see Figure 12). One-third of SSEs were farmers, while one-quarter were engaged in some sort of small enterprise (e.g., market kiosk or shop, family restaurant) (see Figure 13). One-eighth of interviewees reported having more than one source of income.

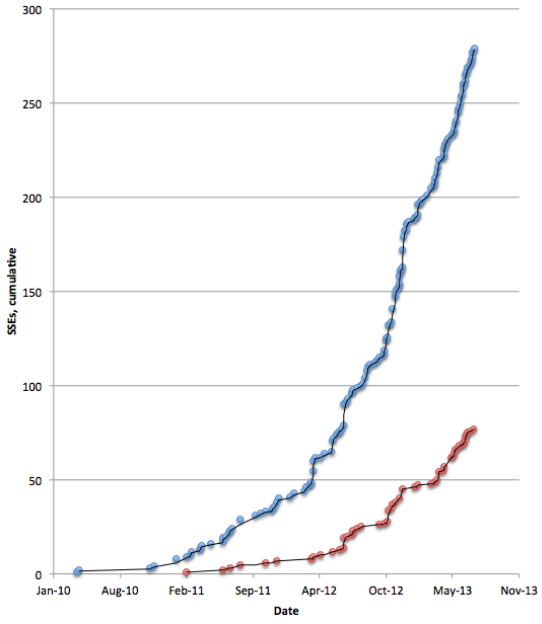

FIGURE 12: SSE, DATE JOINED (BLUE, ACTIVE POPULATION; RED, SAMPLE)

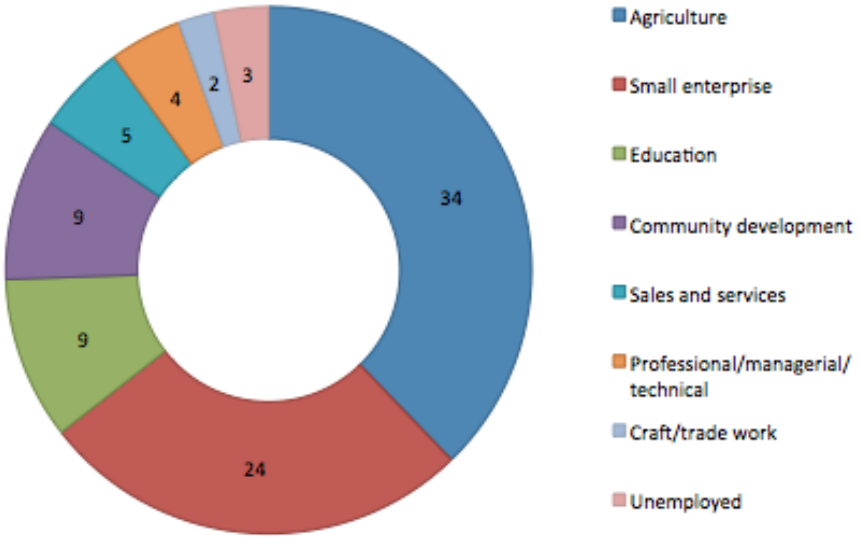

FIGURE 13: EMPLOYMENT BREAKDOWN OF INTERVIEWEES

As shown Table 5, SSEs ranged from 20 to 62 years old, and had a median educational attainment of secondary school. More than two-thirds were married, and the mean household size was 7.2, split equally among adults, male children and female children.

TABLE 5: HOUSEHOLD DEMOGRAPHICS

Variable	Min	Max	Mean	Median	Mode	Std Dev
SSE age	20	62	40.7	42	43	11.6
SSE Education attainment*	0	4	2.3	2	2	1.0
Marital status*	1	4	1.5	1	1	0.8
Household size	1	26	7.2	7	6	3.7
Males	0	20	3.5	3	3	2.7
Females	1	12	3.5	3	3	2.1
Adults	1	8	2.1	2	2	1.3
Children/dependents	0	25	4.8	4	3	3.7
Boys	0	20	2.6	2	2	2.7
Girls	0	11	2.1	2	1	1.9

*Note: For education attainment, 0 = no formal education, 1 = primary school education, 2 = secondary education, 3 = upper secondary education/diploma, 4 = university/tertiary education. For marital status, 1 = married, 2 = single, 3 = widowed and 4 = divorced.

Data collected on monetary status show wide variation in household earnings and spending. Savings rates are low, and median savings represent just 1% of median household income (see Table 6). Most entrepreneurs interviewed did not have

household access to the electrical grid, speaking to the prevalent need for solar lighting.

TABLE 6: HOUSEHOLD INCOME AND SPENDING PROFILE, UGX (USD)

Variable	Min	Max	Mean	Median	Mode	Std Dev
Household income, monthly	8,333 (3.3)	3,333,333 (1,333)	439,237 (175.7)	265,000 (106)	50,000 (20)	558,070 (223.2)
Contribution to household income, monthly	5,500 (2.2)	1,875,000 (750)	288,410 (115.4)	180,000 (72)	150,000 (60)	341,816 (136.7)
Spending on electricity, monthly	0	150,000 (60)	12,873 (5.1)	0	0	27,169 (10.9)
Spending on education, annual	0	15,500,000 (6,200)	2,714,730 (1,085.9)	1,500,000 (600)	900,000 (360)	3401,625 (1,360.6)
Spending on food, monthly	0	450,000 (180)	151,696 (60.7)	80,000 (32)	80,000 (32)	139,081 (55.6)
Spending (other), monthly	833 (0.3)	680,000 (272)	102,432 (41)	75,000 (30)	50,000 (20)	119,088.7 (47.6)
Savings per week	500 (0.2)	87,500 (35.0)	11,619 (4.6)	6,000 (2.4)	5,000 (2)	15,740 (6.3)

Notably, these summary statistics mask important temporal aspects of income and spending. For instance, income from farming is highly variable, but also seasonally dependent. Likewise, school fees (almost universally the largest spending item among households) are paid two to three times per year and represent large sums for most families. As such, liquidity is problematic for many families, and cash availability exhibits temporality. This impacts both SSEs, who must pay for their lantern inventories, as well as their potential customers, who may experience fluctuations in purchasing power. While the stated reason many individuals gave for becoming a SSE was to increase household income, many may do so to also combat against income temporality by having multiple earnings streams - an attempt to hedge against uncertainty.

3.5.2. BECOMING ENTREPRENEURS: EXPERIENCES SELLING SOLAR LANTERNS

Conceptualization of entrepreneurship among SSEs was diverse. However, as can be seen by Figure 14, when asked "What does it mean to be an entrepreneur?," most SSEs emphasized business, namely the ability to earn money by selling products effectively. Many, however, also noted the importance of finding opportunities to personally improve by helping others. Similarly, strong customer orientation and knowledge of products dominated the characteristics considered essential for successful entrepreneurship (see Figure 15).

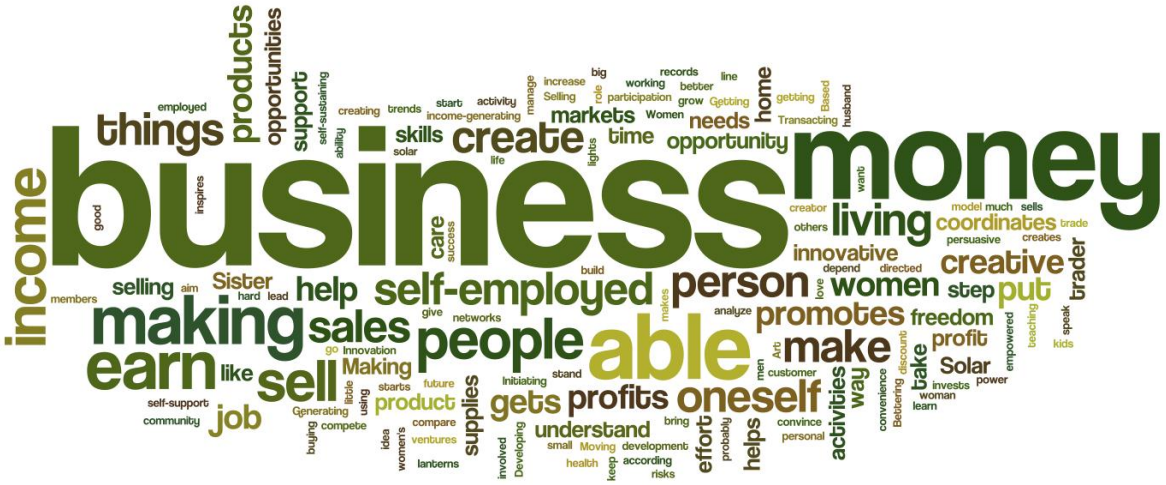

FIGURE 14: SURVEY-REPORTED DEFINITIONS OF ENTREPRENEUR

FIGURE 15: SURVEY-REPORTED CHARACTERISTICS OF SUCCESSFUL ENTREPRENEURS

In becoming a SSE, respondents noted similar benefits. Increased feelings of social status and pride were prevalent, as family members and friends generally reacted positively to the decision. Trainings are a key positive feature of being a SSE, yielding the opportunity to learn new skills and interact with other entrepreneurs. For SSEs, perhaps the most immediate financial benefit of joining Solar Sister is decreased spending on fuel, which becomes obsolete as solar lanterns replace kerosene-operated lamps. Prior to joining Solar Sister, entrepreneurs reported spending an average of $2.7 on kerosene; after joining Solar Sister, that cost dropped to an average of $0.43, an 84% reduction in spending (see Table 7). This is equivalent to saving 5% of average monthly income nearly half the average savings rate of those interviewed.

TABLE 7: WEEKLY SPENDING ON KEROSENE, UGX (USD)

Summary Statistic	Before Joining Solar Sister	After Joining Solar Sister
Min	0	0
Max	140,000 (56)	70,000 (28)
Mean	6,684 (2.7)	1,068 (0.43)
Median	3,000 (1.2)	0
Mode	5,000 (2)	0
Std Dev	18,011 (7.2)	8,032 (3.2)

Despite the positive aspects of entrepreneurship, nearly all entrepreneurs interviewed expressed the fact that the first few weeks of being an SSE were difficult. For one, having to find potential customers and convincing them of the product's value was often more problematic than anticipated. Another challenge was concern over growing competition from other sources - hawkers whose products are of poorer quality, which turn people off to the entire product family, but also private companies, such as Total, who have now begun to sell the same solar lanterns, often at cheaper rates. The most common frustration encountered was that consumers wanted to purchase the lanterns, especially ones with phone charging capability, but many cannot afford them. A list of categorized challenges SSEs noted during their interviews is shown in Table 8.

TABLE 8: RESPONSES TO, "WHAT IS (MOST) DIFFICULT ABOUT BEING A SOLAR SISTER?" (OPEN-ENDED QUESTION)

Response Category	N	%, Total
1. Lantern cost, customer complaints on price	33	21.9%
2. Transport and travel	23	15.2%
3. Finding and convincing customers	17	11.3%
4. People's lack of solar lantern knowledge	16	10.6%
5. Competition from other suppliers	14	9.3%
6. Stocking issues	9	6.0%
7. Customer payback	8	5.3%
8. None	8	5.3%
9. Time	7	4.6%
10. Insufficient profit margin	6	4.0%
11. No-credit policy (pay first, sell later)	6	4.0%
12. Long repair/replacement time	2	1.3%
13. Security	2	1.3%

While the need for solar lanterns is highest in rural geographies, price is also most restrictive in such areas. Need is lower in urban areas due to easier access to electricity,

but the market potential is much higher because of the higher population density and perhaps more sustainable over time, as SSEs can branch out of their established social networks more easily in the population-dense city environment. At the initial stages of entrepreneurship through Solar Sister, SSEs typically exploit "easy" networks - close friends, family, neighbors. Over time, as these networks are exploited, it becomes more difficult to find potential customers, requiring SSEs to venture outside of established networks and communities. This proves difficult for both social and economic reasons. While those who travelled far distances to find costumers expressed frustration, those same SSEs were often more successful. Likewise, SSEs who were continuously exposed to new people due to jobs, such as teaching and nursing, expressed greater ease in their ability to find and approach potential customers. As expected, entrepreneurs with existing businesses or strong ties within their communities through other community-based organizations (CBO) also tended to fare better.

Transportation, lantern price and convincing potential customers of the product's merits were consistently cited as the primary difficulties for SSEs. Difficulty in convincing customers to purchase lanterns may be a manifestation of the theory that social networks, especially in rural contexts, are better at knowledge diffusion, rather than influencing purchase decisions (Cai 2013). Though frustrating from the entrepreneurs' perspective, this is an important realization. Hence, awareness, in addition to attractiveness of the product(s), is a primary driver of technology adoption (Sterman 2000), and social networking within the consumer community may serve as a conduit to disseminate such awareness.

Accordingly, Solar Sister's community entrance strategy involves first initiating a connection with an organization already active in the community and then going through them to reach out to members of that community. As a result, most SSEs are already relatively involved in their communities and have active social networks. These social networks tend to center around church groups, existing businesses, agricultural communities, savings groups and health organizations.

3.5.3. *Organizational Information and Communications Flows*

An analysis of the communication and information flows within the organization yielded the overall pattern shown in Figure 6. First, the strongest levels of engagement appear to be: 1) laterally between Solar Sister staff; and 2) vertically between Regional coordinators and their entrepreneurs.. In order to do their jobs, staff members need to communicate with one another, while RCs need to communicate with their entrepreneurs on a regular basis. This also may be function of proximity; all staff members work in the same office, for instance. Second, two "weak" links appear to exist: laterally between entrepreneurs, and vertically between headquarters and entrepreneurs. In reality, both of these communication flows are virtually non-existent.

Lack of communication between entrepreneurs represents a missed opportunity to share knowledge and expand social networks, especially since informal lateral relations within multiunit organizations whose actors experience "coopetition"[7] have been shown to have a high positive effect on knowledge sharing and the diffusion of best practices (Tsai 2002).

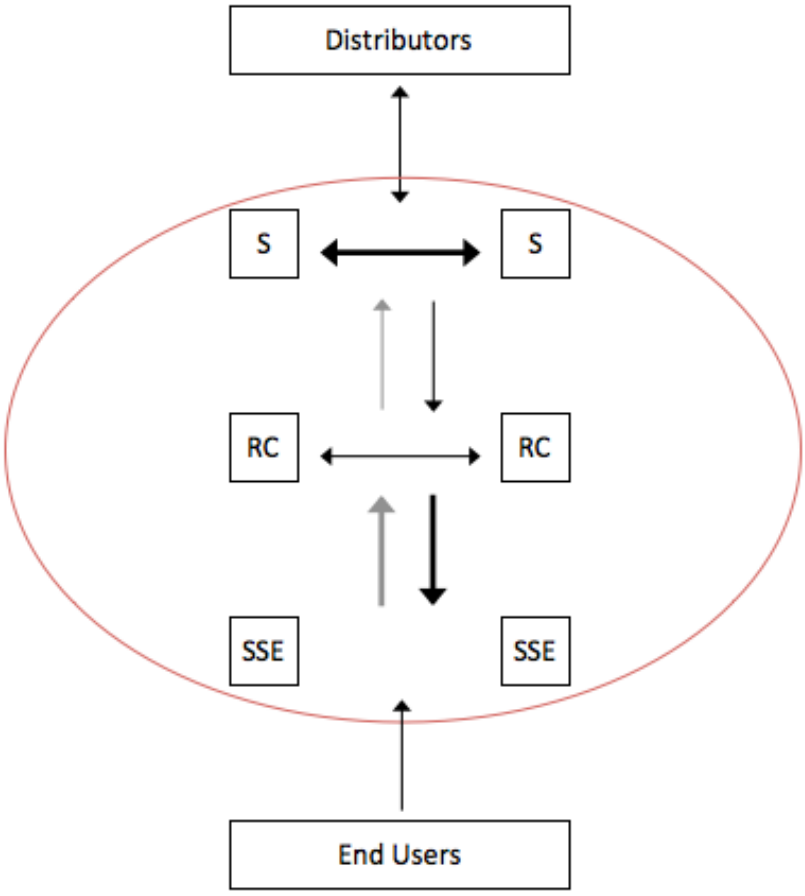

FIGURE 16: SOLAR SISTER'S ORGANIZATIONAL COMMUNICATION AND INFORMATION FLOWS

Note: "S" denotes Solar Sister headquarters staff. "RC" denotes Regional Coordinators. "SSE" denotes Solar Sister entrepreneurs. Arrows represent the directionality of communication. Line thickness represents level of engagement, or the degree of communication. Line color (black or gray) represents the relative influence (i.e., authoritative nature) of the information communicated. The red circle represents the system boundaries of the flows analysis.

Most entrepreneurs expressed a desire for more interaction directly between themselves and upper management. Because there exists no direct channel between headquarters and those selling lanterns on the ground, Regional Coordinators serve as the primary link through which most information is communicated. As such, there exist

[7] Defined as the need to both cooperate and compete with one's co-workers in order to do one's job effectively.

temporal delays in what information is communicated when. More importantly, lack of effective communication between those who create organizational policy and those most affected by it has the potential to undermine long-term organizational stability.

3.5.4. *Drivers of Success: Probability Analysis and Logistic Regression*

Part of our desire to understand the experiences of SSEs was to also identify what characteristics led to success among entrepreneurs. In a conventional commercial setting, success would be determined based off of sales performance. Given the 100% (and then 90%) credit model used by Solar Sister, the precise number of lanterns sold by each SSE is unknown. Self-reported numbers from the interviews, some of which could be triangulated against other data sources, proved too imprecise and inconsistent. Moreover, individual sales (and thus, individual success) would not necessarily translate into organizational success. Just because an SSE sells a large number of lanterns does not mean that she pays Solar Sister back for the merchandise she originally acquired on credit. With these considerations in mind, we chose to use paid-to-sales ratio as our metric of success, one that is applicable to both the SSEs and Solar Sister as an organization.

Despite the fact that the majority of interviewees claim to pay Solar Sister back for merchandise immediately after receiving payment for a lantern, sales data reveals that outstanding balances (accounts owed to Solar Sister) among entrepreneurs for their ordered inventory are high, especially relative to amounts paid back (see Table 9). The time Regional Coordinators must spend gathering money from SSEs is not only onerous, but also disheartening for Solar Sister staff, turning the organization itself into something of a collections agency. The generally low paid-to-sales ratio may speak to a larger, more systemic challenge - that entrepreneurs are overestimating their ability to sell lanterns.

TABLE 9: SALES DATA, UGX (USD)

Summary Statistic	Sales*		Paid		Balance	
	Sample	***Population***	***Sample***	***Population***	***Sample***	***Population***
Min	0	0	0	0	0	0
Max	4,653,000 (1,861)	4,653,000 (1,861)	3,908,550 (1,563)	3,908,550 (1,563)	1,629,700 (652)	3,076,600 (1,231)
Mean	810,002 (324)	404,594 (162)	546,274 (219)	214,386 (86)	263,728 (105)	190,208 (76)
Median	616,500 (247)	265,850 (106)	359,300 (144)	69,300 (28)	246,600 (99)	45,400 (18)
Mode	423,000 (169)	0	99,000 (40)	0	0	0
Std Dev	692,056 (277)	562,969 (225)	586,016 (234)	384,241 (154)	276,636 (111)	336,738 (135)

*Note: Sales represents the total invoiced value of the lantern inventory bought by an entrepreneur. Because products were initially distributed on a significant credit line (most had to pay 10% upfront, with a 30-day payback period), most of what is labeled here as sales reflects, in fact, outstanding payments on the part of the entrepreneur.

The median paid-to-sales ratio for SSEs was 0.68. Probability analysis and logistic regression were used to measure success - which was defined as "Paid-to-Sales Ratio > 0.68" - as a function of three factors: motivation, travel and communication:

TABLE 10: ENTREPRENEUR PROFILE VARIABLES

	Motivation, μ	**Travel, τ**	**Communication, γ**
1 (+)	Indicated intrinsic motivation to sell lanterns	Indicated far travel distance to sell lanterns	Indicated learning communication skills
0 (–)	Did not indicate intrinsic motivation to sell lanterns	Did not indicate far travel distance to sell lanterns	Did not indicate learning communication skills

TABLE 11: EIGHT ENTREPRENEUR PROFILES: FREQUENCY, TOTAL AND SUCCESSFUL

Profile	**Motivation, μ**	**Travel, τ**	**Comm., γ**	**Total**	**Successful***
1	+	+	+	12	11
2	+	+	–	3	1
3	+	–	+	9	7
4	+	–	–	6	3
5	–	+	+	12	6
6	–	+	–	7	2
7	–	–	+	5	1
8	–	–	–	7	0
Total				61	31

*Note: A successful entrepreneur is defined as an individual who has achieved a paid-to-sales ratio above the median value (within the sample population) of 0.68.

In this 2-dimensional 3-indicator probability analysis, 8 profiles emerge from the data as demonstrated in Table 11. For instance, Profile 6, [$\mu - \tau + \gamma -$], describes entrepreneurs who indicated no intrinsic motivation to sell lanterns, did not learn communication skills while selling lanterns and did not travel far to sell lanterns. Based on our sample data, this entrepreneur profile is represented 7 times (out of all, n = 61). Of these 7, 2 (out of n = 31) were above the median paid-to-sales ratio and deemed "successful entrepreneurs." A breakdown of the number of entrepreneurs in each profile category as described in Table 11 is visually represented in Figure 17.

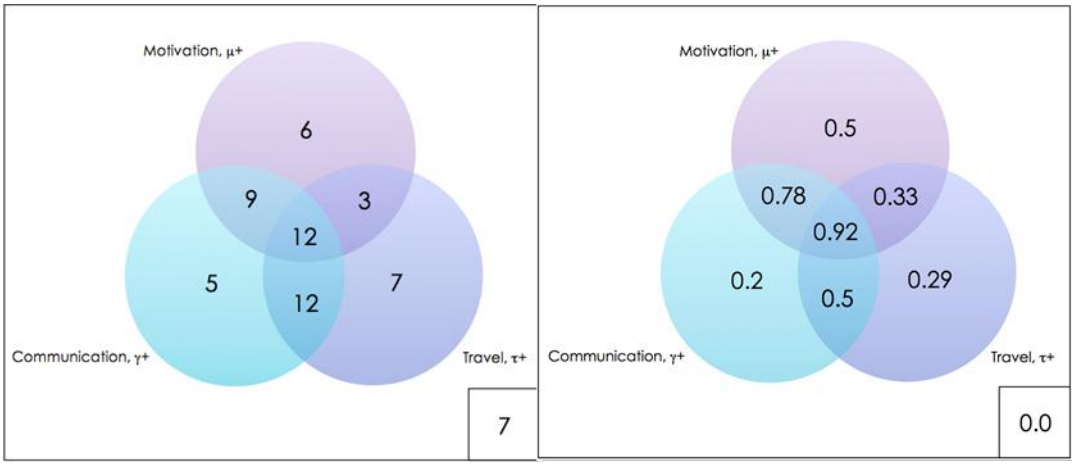

FIGURE 17: ENTREPRENEUR CHARACTERISTICS AND SUCCESS; TOTAL ENTREPRENEURS (LEFT); RATIO OF SUCCESSFUL-TO-TOTAL ENTREPRENEURS (RIGHT)

Figure 17 demonstrates the ratio of successful-to-total entrepreneurs for each profile category: for example, Profile 7, [$\boldsymbol{\mu}-\boldsymbol{\tau}-\boldsymbol{\gamma}+$], the ratio is 1 to 5, or p = 0.2. As shown in Figure 17, it appears that entrepreneurs with Profile 1, [$\boldsymbol{\mu}+\boldsymbol{\tau}+\boldsymbol{\gamma}+$], have the highest likelihood of becoming successful entrepreneurs out of all 8 entrepreneur profiles assessed while those with Profile 8, [$\boldsymbol{\mu}-\boldsymbol{\tau}-\boldsymbol{\gamma}-$], are least likely to succeed. The second-most likely-to-succeed is Profile 3, [$\boldsymbol{\mu}+\boldsymbol{\tau}-\boldsymbol{\gamma}+$] (p = .78), indicating that perhaps travel distance is less critical than the other two characteristics considered. Indeed, of the three characteristics, *intrinsic motivation* is the most important, followed closely by *communications skills*, and finally *travel distance*. This judgment can be ascertained simply by summing up the values for each profile that contains $\boldsymbol{\mu}+$, $\boldsymbol{\tau}+$, or $\boldsymbol{\gamma}+$ from Figure 17: Motivation, 2.53; Communication, 2.4; and Travel, 2.04.

Many SSEs expressed both hesitation and frustration in their first few weeks on the job because convincing people of the advantages of the solar lanterns proved more difficult than expected. This frustration, however, constituted a learning curve, whereby successful entrepreneurs were able to hone their communication skills and thusly, their persuasive abilities.

Of the three indicators used, the relationship between travel distance and success is perhaps most interesting. The need to travel far to sell lanterns was one of the most substantial challenges voiced by SSEs: it is time-consuming, physically taxing and takes away from other, potentially more productive or pleasurable activities. However, despite its negative perception, farther travel distances seem to be a key ingredient to success. Two complementary explanations exist for this phenomenon. First, SSEs who are willing to travel farther are also likely putting in more general effort to sell their lanterns – though whether the effort put in per unit of time is efficient or not remains up for debate. Second, traveling further grows an entrepreneur's network. From an ego-centric social network perspective, the relative size of one's social network is more

important than its density; increased network size and time spent networking are indicative of people in later stages of entrepreneurship (Greve 1995). A network that spans a larger geographical area has the added benefit of greater access to indirect contacts in independent social clusters. A diffuse social network may be especially important in overcoming one of the key challenges to sustainable sales for SSEs: local "market" saturation. Once they have sold products to all of their immediate friends, family, peers and colleagues, to whom can entrepreneurs sell? An extended network, which would require increased travel, likely facilitates longer-term sales better than a concentrated network.

The findings above are validated by the following logistic regression, which was run on the same data used for the probability analysis:

$$ln(Odds\ of\ Success) = -2.629 + 2.204(Motivation) + 1.585(Communication) + 1.053(Travel)$$

Here, "Success" is a binary outcome such that entrepreneurs that demonstrated a paid-to-sales ratio greater than 0.68 were coded as "1 = success" and those less than or equal to 0.68 were coded as "0 = non-success." "Motivation", "Communication" and "Travel" are binary input variables as defined in Table 9.

A test of the three-variable model against a constant-only model was statistically reliable (chi-square = 22.8, p <.001), indicating that the predictors reliably distinguished between entrepreneurs that were successful and those that were not. The explanatory power of the three variables, $\boldsymbol{\mu}$, $\boldsymbol{\tau}$, and $\boldsymbol{\gamma}$, appears to be quite robust, yielding 72.1% overall predictive accuracy (80.6% among successful entrepreneurs, 63.3% among non-successes). Moreover, variance in successes accounted for was sufficient, with a Cox and Snell R-Square of .311 and a Nagelkerke R-Square of 0.415. More complete logistic regressions that included other demographic factors - such as income, education, occupation, sales integration into one's daily life, direct exposure to entrepreneurship as a child, improved record keeping skills, and level of communication with one's Regional Coordinator - yielded negligible increases in predictive capacity relative to the parsimonious model presented here.

In this three-variable logistic regression, we find that the variables for motivation ($\boldsymbol{\mu}$) [p = .001], communication ($\boldsymbol{\gamma}$) [p = .018] and travel ($\boldsymbol{\tau}$) [p = .124] are, in descending rank order, significant indicators of an individual's success as an entrepreneur. By exponentiation of the regression equation, we reach the following conclusions:

- Entrepreneurs who had intrinsic motivation to sell lanterns were 9.06 times as likely to be successful compared to those who did not.
- Entrepreneurs who learned communication skills while working for Solar Sister were 4.88 times as likely to be successful compared to those who did not.

- Entrepreneurs who needed to travel far to sell lanterns were 2.87 times as likely to be successful compared to those who did not.

Based off of this model, it becomes clear that, among entrepreneurs interviewed by our research team, motivation is the most critical of these three attributes to success, with communication skills in second and travel coming in last. These findings are consistent with those presented in the probability analysis above.

Financial success is also impacted by entrepreneur makeup - namely, the proportion at which each entrepreneurial profile is present in a given region. With the understanding that successful entrepreneurs incur less debt, the following assertions can be made:

- As the proportion of **Profile 1 [$\mu + \tau + \gamma +$]** decreases cross-regionally, average debt per entrepreneur increases.
    - Logic: Intrinsic motivation, travel distance and communication skills are effective indicators of success among entrepreneurs.
    - Sense: All three values are positive in this profile category.
- Regions with less average debt per entrepreneur have higher proportions of **Profile 3 [$\mu + \tau - \gamma +$]**.
    - Logic: Travel is less critical to success among entrepreneurs; the other two indicators can effectively compensate for it.
    - Sense: Travel is the only negative value in this profile category.
- As the proportion of **Profile 5 [$\mu - \tau + \gamma +$]** increases cross-regionally, average debt per entrepreneur also rises.
    - Logic: Motivation is essential to success among entrepreneurs; the other two indicators cannot compensate for it.
    - Sense: Motivation is the only negative value in this profile category.
- Regions with higher average debt per entrepreneur demonstrate higher proportions of **Profile 8 [$\mu - \tau - \gamma -$]**.
    - Logic: Intrinsic motivation, travel distance, and communication skills are effective indicators of success among entrepreneurs.
    - Sense: All three values are negative in this profile category.

3.6. SUMMARY OF SOCIAL ANALYSIS FINDINGS

This section has attempted to understand individuals' experiences in selling solar lanterns through a social enterprise model. Our main findings are summarized below.

Because solar lanterns are such a relatively new technology, lack of awareness is a key stumbling black. Awareness-raising then becomes a key aspect of the work that entrepreneurs must do. This can be frustrating at times - individuals may be interested in learning about the product, but not buy it; entrepreneurs may have to spend significant amounts of time and effort finding potential customers - but is a necessary precursor to demand generation and market penetration.

Successful entrepreneurs appear to possess at least one of three important factors: intrinsic motivation, improved communications skills and increased travel distance to find potential customers (which may serve as a proxy indicator for effort, though there may be confounding variables). Of these three, intrinsic motivation seems most important, followed by communication skills, then by travel distance.

Though we caution against generalizing these findings, especially due to the smaller sample size, we do believe that the discussion and findings of our research are applicable to other countries or regions in the developing world with similar socio-economic and technological contexts to Uganda. By grounding our assessment in individuals' experiences, we believe that our findings offer an important, in-depth and rather rare window into the on-the-ground realities of pursuing social enterprise in the developing world.

4. THE ECONOMICS OF SOLAR SISTER'S MODEL

As mentioned in Section 1 a key characteristic of a Hybrid Diffusion Strategy is that the organizations working to diffuse the product have more than one measure of success, and most often both a desire to turn a profit on the sale of the product and a social goal to improve some aspect of the countries in which they work. In the case of Solar Sister, they have three measures of success for the organization, including 1) turning a profit on the sale of solar lanterns; 2) empowering women through the network of Solar Sister Entrepreneurs (SSEs); and 3) providing access to clean energy in rural areas where electrical coverage is low and alternatives to solar lanterns are harmful and/or expensive (e.g., kerosene/paraffin).

In this section, we will focus on the first measure of success and look at the current financial status of Solar Sister and identify potential challenges to their financial sustainability at scale.

4.1. DATA SOURCES AND ACCOUNTABILITY

The bulk of data used for the financial analysis was provided to the CITE team by the Solar Sister management team and was augmented with additional data from the Uganda staff. Since Solar Sister is in the midst of updating their accounting systems to handle the rapid growth they have been experiencing over the past three years, there are some discrepancies between the different data sets provided.

Initially, Solar Sister used a Google Doc to track sales of lanterns in Uganda; however, they have recently switched to Salesforce, which is a commercial online cloud computing platform for Customer Relationship Management (CRM)(Salesforce.com, 2013). All of the Regional Coordinators have been trained in the use of Salesforce and they seem happy with the platform, especially since they can look at the online dashboards and see how their sales compare to the sales of the other Regional Coordinators.

Solar Sister tracks expenses at the regional level and has provided the CITE team with their regional data for 2012. During the interviews with the Regional Coordinators, additional information was verbally provided on the breakdown of their monthly costs and this data was compared to the Salesforce data. Currently, the data is aggregated annually and therefore it was not possible to analyze trends in expenses over the course of a year. This analysis would be useful in the future, as it could show possible linkage between sales, RC expenses, and the seasonal variations in income that drive the behavior of end users in rural areas who are predominantly farmers.

In the following sections, an overview of Solar Sister's Revenues, Expenses, current Profitability and potential future Profitability is provided.

4.2. THE SOLAR SISTER BUSINESS MODEL IN UGANDA

Over the past four years, the Solar Sister business model has undergone several changes as the management team has incorporated lessons learned from its initial pilot and subsequent experiences in Uganda and beyond. This evolution offers an important lesson: appropriate financing mechanisms are key to achieving organizational success and to getting solar lanterns into the hands of as many end users as possible.

The subsections below outline this progression, detail the logic and reasoning behind the changes, and discuss their attendant implications.

4.2.1. MICRO-CONSIGNMENT MODEL

At the onset, Solar Sister used a micro-consignment model where SSEs were given solar lantern inventories on 100% credit. SSEs were given solar lanterns gratis, and were financially responsible to pay back Solar Sister for only those lanterns that they were able to sell to customers. Their remaining inventory could then be returned to Solar Sister penalty-free. The logic behind this model was to advance inclusiveness by keeping the barriers to entry for becoming a SSE as low as possible, allowing people from any and all socio-economic backgrounds to be able to reap the benefits of entrepreneurship.

It became quickly apparent that this model was untenable. In general, because SSEs shouldered no financial risks, they lacked any extrinsic incentive to sell to the best of their ability. Without a personal stake in the game, a culture of motivation was not cultivated, resulting in a lack of seriousness (some SSEs were serious, of course, but there was no filter to weed out the less serious). "I might as well try, and if I fail, there's no harm to me," was the basic logic from an SSE's point of view. A change in policy was required.

4.2.2. MICRO-FRANCHISE MODEL

To remedy the pervasive lack of motivation engendered by the 100% credit model, Solar Sister moved to a micro-franchise model where SSEs were required to provide a commitment fee upon ordering lanterns that was equal to 10% of the products' value. Within 30 days of the purchase order, SSEs were required to pay Solar Sister for the remaining 90%. By requiring an upfront capital investment and financial responsibility for purchase orders, SSEs would incur financial risk and would only do so if they understood the business rationale of selling lanterns - you do not become an entrepreneur without investing your time and money. The hope was to create a system whereby personal investments would make success far more necessary and failure far more detrimental, leading to an unleashing of innovation, creativity and the entrepreneurial spirit.

In addition to the 10% upfront–90% within 30 days model, and based off of Greenlight Planet's positive experiences in India, Solar Sister instituted a policy requiring all new SSEs to buy a lantern for themselves when they joined the organization. This not only acts as an additional hurdle to weed out less serious applicants, but also gives SSEs a more intimate, first-hand understanding of the benefits of lantern usage - knowledge they can use when approaching potential customers.

While a marked improvement over the micro-consignment model based on 100% credit, Solar Sister continued to face challenges. In particular, while the 10% commitment fee was paid upfront, payback of the remaining 90% proved not only arduous and time-consuming, but also bred ill will between SSEs and RCs, who essentially had to act as debt collectors. In addition, because their performance reviews were based, in part, on the volume of product distributed to their region, RCs had a perverse incentive to order more and more lanterns, irrespective of their SSEs' ability to sell such increased volumes. Combined, these two factors led to a situation in which payback periods were extended far beyond the 30-day requirement.

4.2.3. NO-CREDIT MODEL

Because of the problems with full and timely payback, and based off of successful experiences in their Nigeria and Tanzania operations, Solar Sister is now transitioning to a no-credit policy in Uganda. Instead of paying 10% upfront, SSEs must now pay for 100% of their product upon placing a purchase order. This functionally renders Solar Sister as solely a sales and distribution organization, with no financial assistance offered to SSEs. This allows staff and RCs to focus their time and attention on more positive activities, such as finding more business-savvy recruits and building stronger relationships with existing SSEs by teaching them skills and supporting them through mentorship.

While Solar Sister Uganda may improve its financial health by transitioning to a no-credit model, there is a chance that one of their core tenants - women's empowerment - may be negatively impacted in the process. This very tension that Solar Sister is experiencing in their pursuit of multiple goals – both commercial and communal – is part and parcel of the social enterprise model (Eikenberry and Kluver 2004). Indeed, many of the SSEs we interviewed expressed concern over the new policy, saying that they do not know where they will get the money to buy lanterns before they sell them. At present, entrepreneurs who work for Solar Sister Uganda are poorer than the average Ugandan. Among interviewed entrepreneurs, median household income was 300,000 UGX ($120); the current median household income in Uganda as a whole is 413,484 UGX ($165) (Uganda Bureau of Statistics 2010, 93). "Successful" entrepreneurs make more than the average entrepreneur at a median of 350,000 UGX ($140), but still sit well below the national median.

As a result, Solar Sister does recognize the need for access to financing for many individuals who wish to become SSEs and has been actively pursuing partnerships with banks, SACCOs, VSLAs, and MFIs, including the well-known organization, Kiva. The intent is to give SSEs ample opportunity to obtain credit, but not through Solar Sister itself, since doing so distracts from its core function - giving enterprising women the knowledge and skills to reduce energy poverty in their communities.

4.3. SUMMARY OF SOLAR SISTER FINANCIAL STATUS FOR THE UGANDA PROGRAM

Solar Sister has been growing rapidly over the past year. It has gone from 2 to 7 Regional Coordinators in Uganda (Lucey, 2013) and has added programs in Tanzania and Nigeria. For this report, we are considering only the Uganda operations. A comparison of the social and economic aspects of Solar Sister's new operations in Nigeria and Tanzania to the Uganda operations would be a compelling area for future research; however, it is outside the scope of this report.

As shown in Table 12 and Figure 18, the Income and Expenses for CY2012, Jan – Aug 2013 and CY2013 (estimated) in Uganda suggest that the financial strength of Solar Sister Uganda is not as strong in 2013 as it was in 2012. This is due to many reasons, including personnel problems and a changing credit model, discussed in-depth elsewhere in this report (see Section 4.2 and Section).

TABLE 12: INCOME AND EXPENSES

Account	CY2012	Jan - Aug 2013	Jan - Dec 2013 (EST)
4200 Program Income	$ 87,139	$ 57,473	$ 86,210
4999 Intercompany Operating	$ 69,934	$ 63,742	$ 95,613
4290 Misc Income	$ -	$ 49	$ 73
5100 Travel	$ 19,482	$ 14,829	$ 22,243
5200 Consultants and Professional Services	$ 39,239	$ 32,627	$ 48,941
5250 Furniture & Equipment	$ 4,157	$ 3,865	$ 5,798
5300 Commodities	$ 15,626	$ 43,458	$ 65,187
5320 Shipping and Handling	$ 3,332	$ 8	$ 12
5500 Marketing	$ 2,728	$ 5,810	$ 8,714
5580 Program Related Training/Conf	$ 1,421	$ 1,864	$ 2,796
5600 Other Direct Costs	$ 8,603	$ 9,809	$ 14,714
5011 Salaries		$ 10,593	$ 15,889
5021 Employer Social Security NSSF		$ 2,131	$ 3,196
5902 Intercompany Expense Uganda		$ 1,025	$ 1,538
80000 Ask My Accountant		$ (53)	$ (79)
Total Income	$ 157,073	$ 121,264	$ 181,896
Total Expense	$ 94,589	$ 125,965	$ 188,947
Profit/Loss	$ 62,485	$ (4,700)	$ (7,051)
Percent of Income from Donations	45%	53%	53%

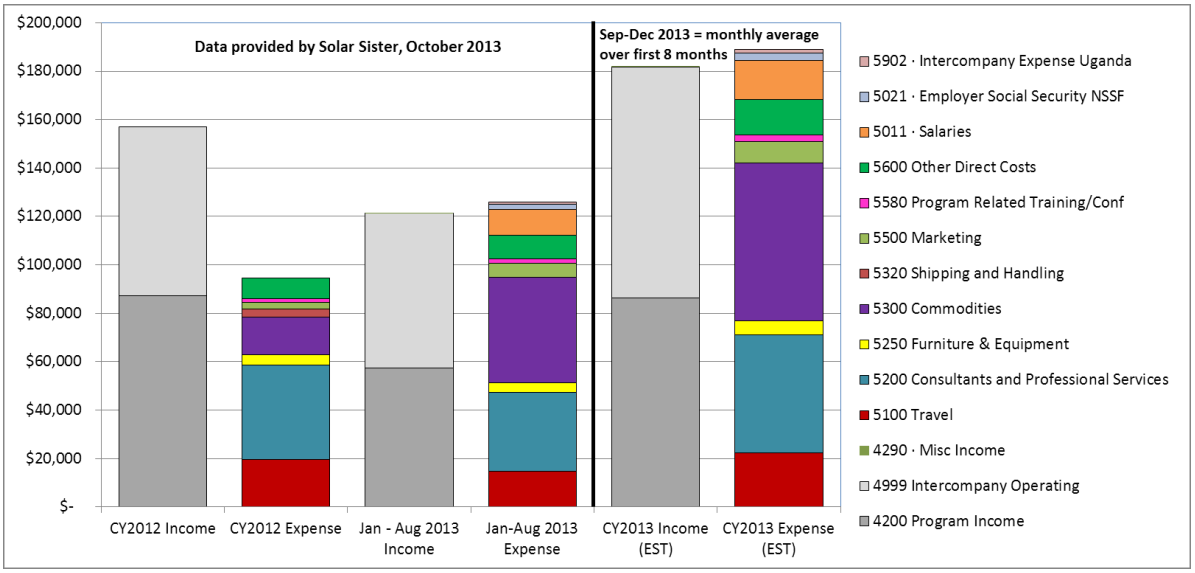

FIGURE 18: INCOME AND EXPENSES

It is important to note that the values in the Table and Figure above only include the income and expenses for Uganda. In Uganda, income is only generated through the sale of solar products. The "Intercompany Operating" expense account is then used to

record the transfer of funds from the US to Uganda to cover the remaining expenses not covered through commercial sales alone.

In order to understand the changes in Solar Sister's finances as it grows as an organization, the following section discusses the expenses and sources of income in more detail.

4.4. Overview of Revenues and Sources of Income

According to Katherine Lucey, Solar Sister's revenues come from the commercial sale of solar lanterns and grants and other donations from a variety of sources including USAID, ExxonMobil, National Geographic and others. They also receive some services pro bono; however, this is primarily attorney and other legal services and they expect this to continue in the future.

Based on the financial dataset provided to MIT by Katherine Lucy on October 14, 2013, for 2012, the total income from the sale of solar products in Uganda was $87,139 and for January – August 2013 it was $57,473, and the total for 2013 is expected to be just slightly less than 2012. This is of concern since the number of Regional Coordinators and Solar Sister Entrepreneurs has increased substantially over the past year and therefore the lack of growth in total sales would indicate a reduction in the individual sales of the entrepreneurs.

While the organization has grown significantly, in terms of both product volume and SSEs, ratio metrics seem to have remained relatively constant since 2011. On an aggregate level, approximately 70% of lanterns purchased by Solar Sister from manufacturers were sold (sold is defined as lanterns distributed to SSEs, for which they are financially accountable). Lantern sales per entrepreneur have remained even over the last two years at around 19. Likewise, SSEs' average annual commission, $55 in 2013, has changed only marginally since 2011.

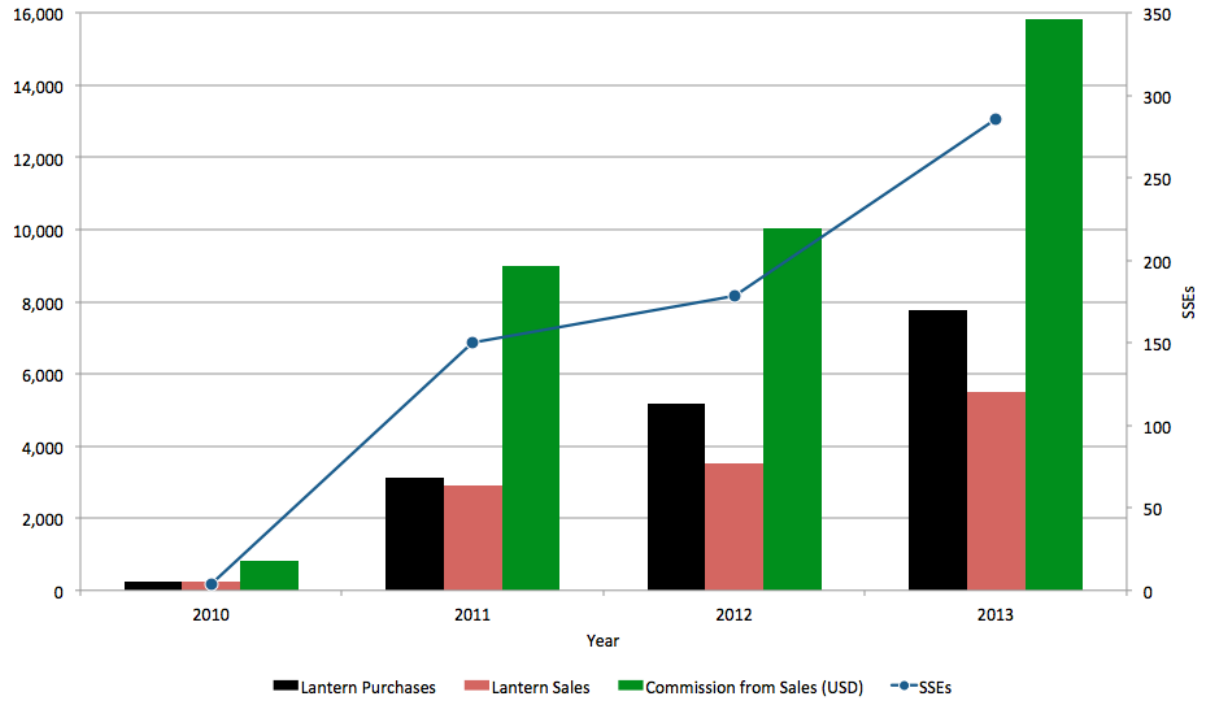

FIGURE 19: SOLAR SISTER - GROWING RAPIDLY

Note: 2013 data are projected from January-February 2013 data. "Purchases" are lanterns sold to Solar Sister from manufacturers and distributors. "Sales" are lanterns sold and distributed to entrepreneurs from Solar Sister.

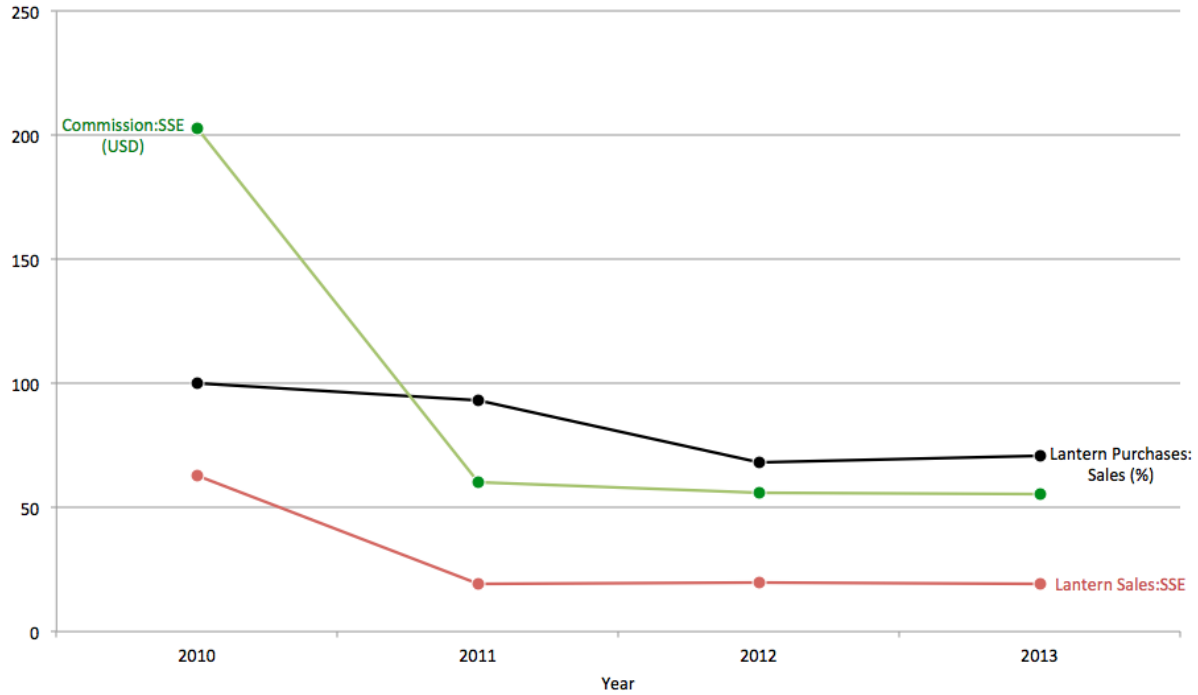

FIGURE 20: RATIO METRICS

Note: 2013 data are projected from January-February 2013 data. "Purchases" are lanterns sold to Solar Sister from manufacturers and distributors. "Sales" are lanterns sold and distributed to entrepreneurs from Solar Sister.

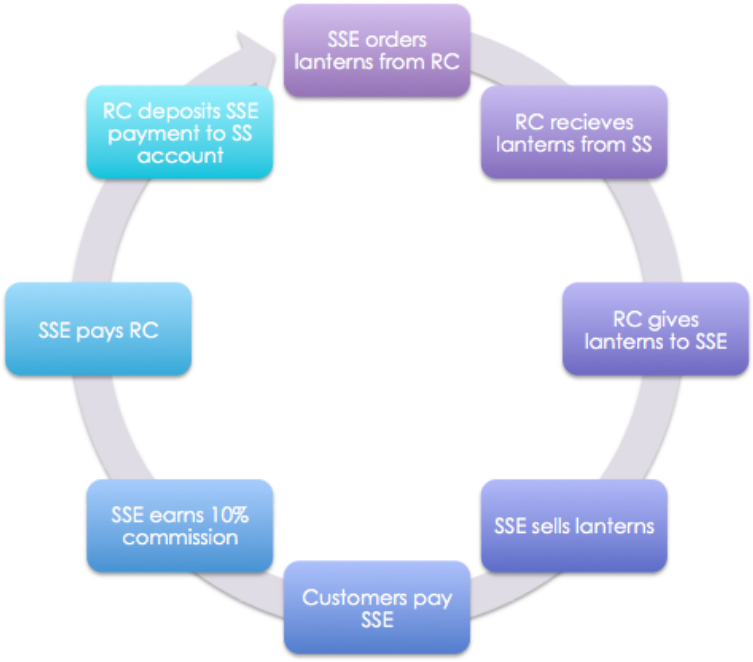

FIGURE 21: THE SOLAR SISTER SALES CYCLE

4.5. FINANCIAL PERFORMANCE BY LANTERN MODEL

Since 2010, Solar Sister has made efforts to diversify the types of lanterns that it purchases from suppliers to ascertain whether some lanterns sell better than others.

At its start, Solar Sister primarily purchased Kiran and Nova lantern models with a small number of Firefly Mobile lanterns, as shown in Figure 22. 100% of all lanterns purchased by Solar Sister in 2010 (n=251) were successfully "sold" – or distributed to entrepreneurs (see Table 13). Perhaps due to this success, Kiran and Nova also comprised the majority of Solar Sister's purchases in 2011; a small number of Firefly Mobile and D.light S1 lanterns were also purchased. Over 90% of each of these four models was distributed to entrepreneurs in 2011 and early 2012, resulting in a cumulative sales ratio of 92%. All four models were repurchased in substantial numbers the following year; however, several other models were also introduced in 2012, including the SunKing Pro.

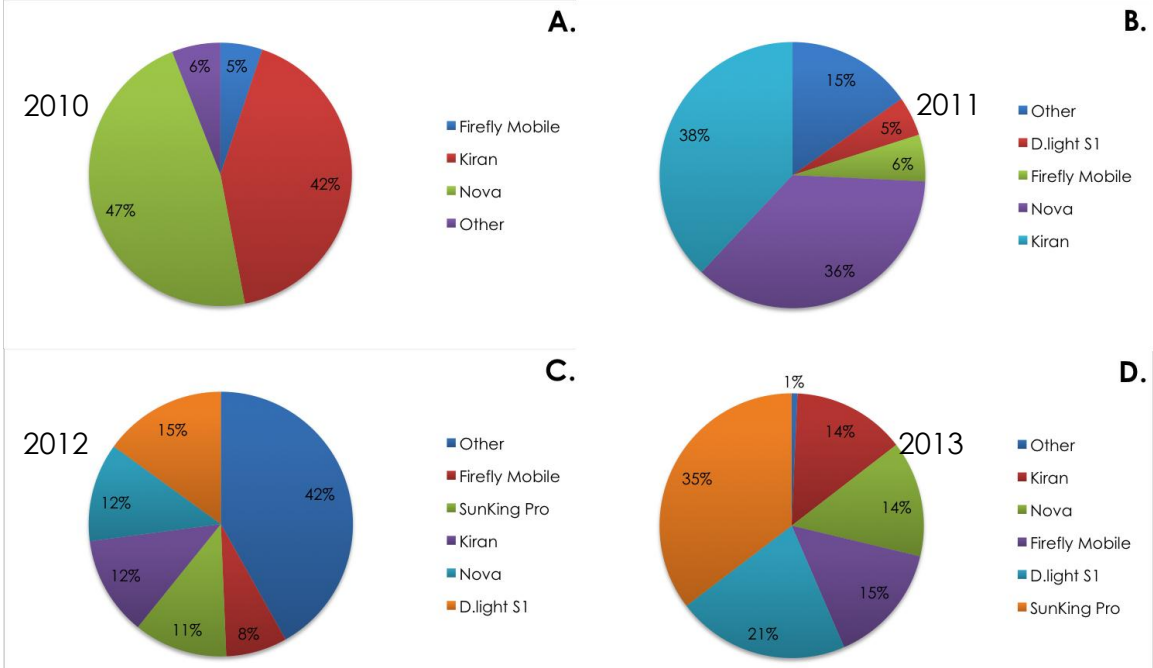

FIGURE 22: LANTERN MODEL DISTRIBUTION OF SOLAR SISTER PURCHASES IN: A. 2010 (N=251); B. 2011 (N=3122); C. 2012 (N=5164); AND D. 2013 JANUARY THROUGH FEBRUARY ONLY (N=848)

The SunKing Pro performed better than all other models in terms of sales, closely followed by the other four listed models, as shown in Table 13. Unfortunately, the other newly introduced models performed very poorly, yielding less than 50% in sales and amounting to a cumulative sales ratio of 66% in 2012. Likely because of this, in the first two months of purchase and sales data available from 2013, Kiran, Nova, Firefly Mobile, D.light S1, and SunKing Pro comprised 99% of Solar Sister's purchases. In the first two months of 2013, 26% of the lanterns purchased in 2013 were distributed to entrepreneurs, indicating the amount of time a lantern spends at the warehouse before being sold to an entrepreneur may be longer than desired.

TABLE 13: PERCENTAGE OF LANTERNS SOLD TO ENTREPRENEURS (NUMBER PURCHASED BY SOLAR SISTER) BY MODEL AND YEAR

	2010	2011	2012	2013
Firefly Mobile	100% (13)	92% (177)	84% (397)	36% (126)
Kiran	100% (105)	98% (1187)	82% (637)	58% (120)
Nova	100% (118)	99% (1144)	76% (654)	0% (120)
D.Light S1	N/A	97% (150)	73% (799)	12% (180)
SunKing Pro	N/A	N/A	87% (600)	30% (300)
Other Models	100% (15)	62% (464)	48% (2077)	0% (0)
Total	100% (251)	92% (3122)	66% (5164)	26% (846)

4.6. FINANCIAL PERFORMANCE BY REGION

4.6.1. *LANTERN MODEL DISTRIBUTION BY REGION*

Of the five regions that have distributed lanterns to entrepreneurs, Central has purchased the largest number of lanterns at 3316 units; as expected, yearly model distributions in Central are similar to the pie charts shown in Figure 22. Comparatively, in Soroti and Gulu, an unusually large number of "other models" were purchased in 2011, followed by an unusually small number in 2012 (see Figure 23). SunKing Pro was overrepresented in 2012 in Gulu and Rukungiri, while not present at all in Fort Portal until 2013. Meanwhile, as of February 2013, Gulu had purchased only Kiran and SunKing Pro lanterns while Rukungiri and Soroti had purchased none at all. Central and Fort Portal had, however, purchased at least a few units of all five top models by February 2013.

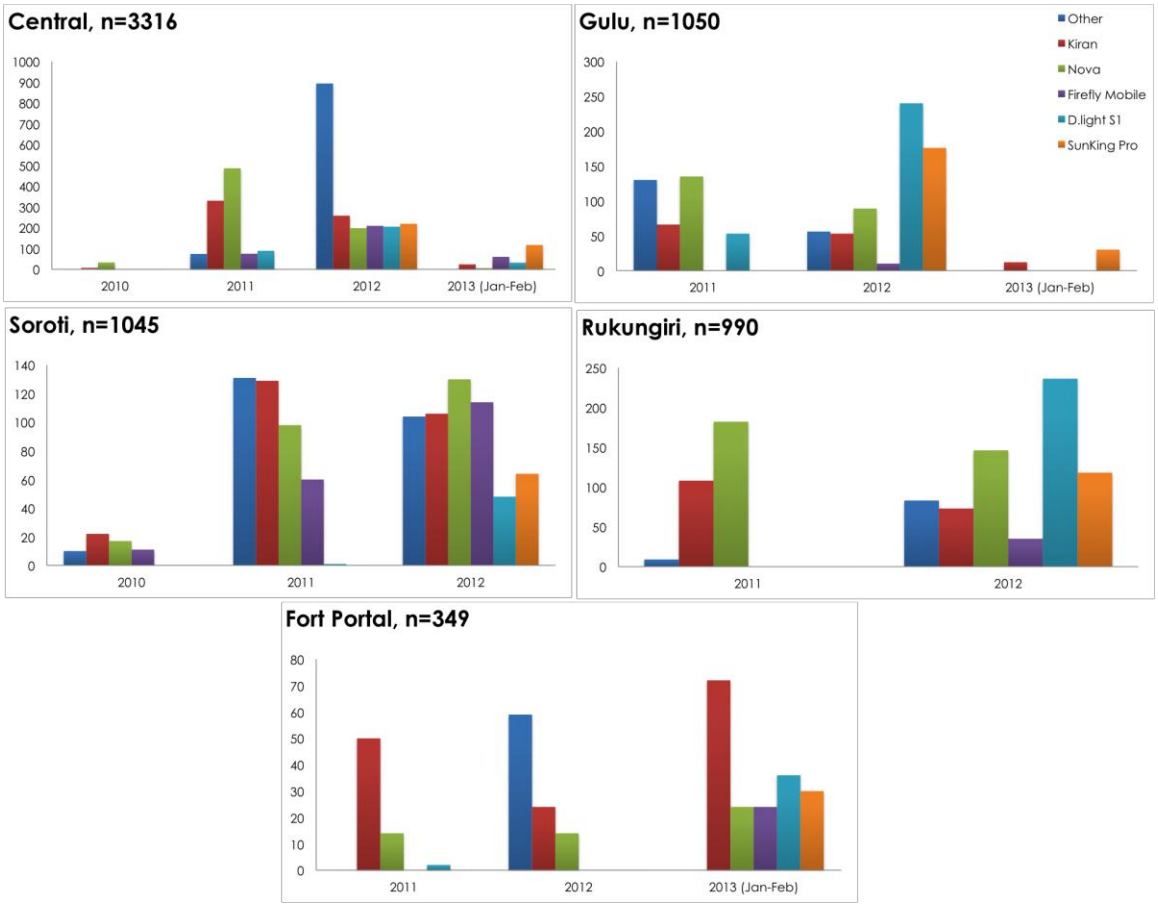

FIGURE 23: LANTERN MODEL DISTRIBUTION AMONG REGIONS OVER TIME

4.6.2. *SALES PERFORMANCE BY REGION*

In 2010, only Soroti and Central were active; Gulu, Fort Portal, and Rukungiri were initiated in 2011; and Jinja joined in 2012. Between 2010 and 2013 the regional

coordinators at Central have managed to distribute a larger proportion of purchased lanterns to their entrepreneurs than the rest, which may be due to longer-term involvement with Solar Sister (Table 14). Soroti follows Central in its sales performance, successfully distributing 87% of its purchased lanterns to its entrepreneurs from 2010-2013. Gulu and Rukungiri are not far behind at a cumulative sales ratio of 77% and 79% respectively, but Fort Portal lags at only 44%. Of the lanterns purchased for bulk sales and inventory upkeep at headquarters, 40% had been sold as of February 2012, and none of the lanterns purchased by Jinja had yet been distributed to entrepreneurs. From these observations, there appears to be somewhat of a correlation between the length of time that a region has been involved with Solar Sister and sales ratio, suggesting that – in time – this metric may improve for more recently-initiated regions such as Jinja and Fort Portal.

TABLE 14: PERCENTAGE OF LANTERNS SOLD TO ENTREPRENEURS (NUMBER PURCHASED BY SOLAR SISTER) BY REGION AND YEAR

	2010	2011	2012	2013	Overall
Soroti	100% (60)	90% (419)	85% (566)	0% (0)	87%
Central	100% (40)	100% (1054)	97% (1983)	75% (239)	96%
Fort Portal	N/A	100% (66)	39% (97)	26% (186)	44%
Gulu	N/A	92% (384)	72% (624)	0% (42)	77%
Rukungiri	N/A	100% (299)	70% (691)	0% (0)	79%
Jinja	N/A	N/A	0% (105)	0% (114)	0%
Other*	100% (151)	84% (900)	6% (1098)	0% (265)	40%
Total	100% (251)	92% (3122)	66% (5164)	26% (846)	67%

*Bulk Sale, Inventory

5. CONCLUSIONS AND RECOMMENDATIONS

Solar Sister's particular hybrid model seeks to achieve social good - empowering women and enhancing equitable access to clean energy - while also performing well against traditional business metrics for success. As has been shown from this report, balancing these two goals can be very difficult in practice. What have we learned?

To begin, Solar Sister's model is fundamentally a social model (even its relations with suppliers are quite personal in nature). Its success revolves around its SSEs and their ability to use their personal networks to sell solar lanterns. Because Solar Sister recruits resident women and empowers them to sell directly to friends and neighbors without any intermediaries, Solar Sister becomes embedded in local communities. Such change agents who are woven into the social fabric of their communities are best suited to convince people of a product, especially one that is new. That said, it would be naïve to treat all potential recruits as equally embedded and active in their communities. Indeed, striking a balance between recruiting a large batch of SSEs and finding highly-motivated and qualified applicants is a tension built into the model.

Significant challenges exist in maintaining this model, especially when the target population rests at the bottom of the pyramid. Pricing and the cost of the lanterns was a primary difficulty the SSEs we interviewed mentioned. Despite the prevalence of savings groups, and the fact that most SSEs noted most people they spoke with liked the product and understood its value, getting people to buy the lanterns is tough. Finding customers in the first place can be difficult.

Retaining SSEs is another challenge, as evidenced by the one-third dropout rate. Finding the "right" person is not an easy task, and even those who are initially interested may find themselves either doing poorly or neglecting other priorities, and therefore lose interest. The ability to recruit and maintain SSEs lies at the core of Solar Sister's model, and determines a large portion of the success and viability of their organization.

Based on our interviews, observations, and experiences as summarized above, we put forward the following recommendations.

5.1. GENERAL RECOMMENDATIONS

Streamline accounting and purchasing processes. Not only is the current process onerous with many steps and therefore time-consuming, it also places burdens on staff to track the money at various stages. Moreover, it forces RCs to act as debt collectors, which is not and should not be within the bounds of their responsibilities. Simplifying (and, where possible, automating) the process would go a long way toward increasing the efficiency of the organization.

Supplement RC-SSE communication with more staff-SSE and SSE-SSE communication. Many of the SSEs interviewed wanted to join Solar Sister in part because they wanted to

do good and to feel like they were part of something bigger than themselves. The lack of direct communication with those who set the vision of the organization is a missed opportunity - not only for morale, but also as a way of getting feedback about what works and what does not straight from the proverbial horse's mouth. Additionally, many of the women we interviewed expressed a desire to interact more with other SSEs, including ones outside of their region. For instance, some SSEs even suggested mentorship and penpal-type programs as a way to better connect with other SSEs.

Take advantage of the prevalence of mobile phones. More than four-fifths of those we interviewed owned mobile phones. By harnessing this technology, Solar Sister could not only gather more and better information, but could also communicate directly with SSEs and even customers.

Continue to learn from other experiences. Solar Sister has demonstrated a high degree of willingness to adapt and be flexible as they grow. While this has caused some consternation on the part of SSEs - particularly the recent change in credit policy - it is a necessary part of the growth process. They have drawn from their experience in Nigeria and Tanzania, as well as similar organizations in Uganda and elsewhere.

Reward good performance through incentives. Currently, there is one, across-the-board incentive to sell solar lanterns: the commission one earns from each sale. Implementing a more complex, perhaps tiered, system of incentives and privileges would give SSEs goals for which to strive. For instance, some SSEs expressed a keen interest in selling larger systems and products, such as cook stoves. Having to earn the ability to sell larger products by proving one's entrepreneurial acumen would provide SSEs with additional motivation to go out and sell lanterns.

Implement metrics that reflect relative, not absolute, growth. Growth is an important metric, but ratio metrics (*x* per unit of *y*) may be more useful as indicators for organizational sustainability, especially over time and in the long-run. For instance, tracking operating costs per SSE captures more about the sustainable growth of the organization than would reporting these two metrics in isolation.

5.2. K-FACTOR RECOMMENDATIONS

(pending)

6. FUTURE WORK

This report represents our first foray into the evaluation world. It is certainly not comprehensive, but it is a first step toward that goal. In our efforts to learn from and improve upon our work to date, we plan to expand our research along several dimensions.

First, we plan to incorporate market and consumer research more fully into our evaluation process and our parameters/indicators for sustainability. Despite broad-based acknowledgment of the importance of markets, our understanding of consumer behavior and preferences remains elusive, especially when it comes to the poor in developing countries. Our research may include market trend, demand, and segmentation analysis; user needs assessments; and consumer motivations, attitudes and behavioral studies.

Second, we would like to develop a Sustainability Assessment Tool (SAT). The purpose of this tool will be to expose strengths and weaknesses across several dimensions (e.g. Socio-economic, organizational, environmental, technical, political, etc.) given particular technologies, geographies, and product diffusion strategies. This will provide a snapshot in time, which will then serve as a basis for analysis and informed decision-making.

Third, in order to refine and calibrate the SAT over time, we will continue to collect more data and begin to build models that will simulate the interaction between various driving factors. These models will draw from a breadth of analytical approaches and methodological traditions, including systems engineering, economics, management, and the social sciences broadly.

As we move forward, our research will be guided by the core systems engineering belief that structure drives behavior. Contextual elements, which collectively form systems of rules and incentives that are embedded within our social fabric, influence how individuals and institutions act and think in certain ways, resulting in particular outcomes. Technological adoption is a process that requires a systems approach to understand its complexity, and we intend to infuse our work with that perspective and approach in mind.

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APPENDIX A: PROFILE OF LANTERNS SOLD BY SOLAR SISTER ENTREPRENEURS

Included as a separate attachment in the electronic version

APPENDIX B: INTERVIEW SUMMARIES OF SOLAR SISTER STAFF AND REGIONAL COORDINATORS

Included as a separate attachment in the electronic version

APPENDIX C: SNAPSHOT PROFILES OF INTERVIEWED SOLAR SISTER ENTREPRENEURS

Included as a separate attachment in the electronic version

APPENDIX D: INTERVIEW SUMMARIES OF SUPPLIERS AND OTHER ORGANIZATIONS

Included as a separate attachment in the electronic version

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APPENDIX A: PROFILE OF LANTERNS SOLD BY SOLAR SISTER ENTREPRENEURS

Product Name and Photo	Manufacturer	Distributor	Price to Solar Sister	Price to SSEs	Price to Customers	Features
S1, " Student Light" 	d.light	d.light	UGX 24,000 $10	UGX 30,000 $12	UGX 33,000 $13	Swivel base LED light Solar and AC charging options 4 hours of light on full charge
S20, "Kiran" 	d.light	Ultratec	UGX 25,000 $10	UGX 27,500 $12	UGX 33,000 – 35,000 $15 - $17	Self-contained unit Metal handle for hanging 2 brightness settings 8 hour run time on full charge
S300, "Nova" 	d.light	d.light	UGX 79,000 $32	UGX 100,000 $40	UGX 110,000 $44	4 brightness settings 12 hours of light on full charge Phone charging (only when light is not charging)
Firefly mobile	Barefoot	Barefoot	UGX 55,000	UGX 70,000	UGX 77,000	LED light

	Power	Power Uganda	$22	$28	$31	3 brightness settings Phone charging from panel 2 hour charge time 8 hours of light on full charge
PowaPack 5W 	Barefoot Power	Barefoot Power Uganda	UGX 274,000 $110	UGX 340,000 $136	UGX 375,000 $150	4 LED lights, 5 Watt panel 3 year battery life Phone charging 10 hour charge time, 24 hours (1 lamp) or 7 hours (4 lamps) run time
PowaPack Junior Matrix 	Barefoot Power	Barefoot Power Uganda	UGX 166,000 $66	UGX 210,000 $84	UGX 230,000 $92	2 LED lights 2.5 Watt panel Phone charging from panel
SunKing Pro 	Greenlight Planet	Small Solutions	UGX 90,000 $36	UGX 112,500 $45	UGX 125,000 $50	2.5 Watt panel 2 brightness settings Charges phone Display shows how many hours of light remain until next charge is needed
SoLite3 kit	Angaza	Angaza	UGX 90,000 $36	UGX 112,500 $45	UGX 125,000 $50	3 Watt panel 6 hour charge time 8 hours of light on full

						charge 5 year battery life Phone charging
Crestone N200 	Nokero	Nokero	UGX 20,000 $8	UGX 25,000 $10	UGX 27,500 $11	Light bulb design Panel integrated with light 2 brightness settings Small and simple to use Clip for easy hanging 8 hour run time
UTL-1 	Unite to Light	Unite to Lite	UGX 25,000 $10	UGX 31,000 $12	UGX 35,000 $14	Lightweight and compact Adjustable neck provides focused light Fours hours of light on full charge 8 hours of light on full charge Battery lasts for 2+ years

APPENDIX B: INTERVIEW SUMMARIES OF SOLAR SISTER STAFF AND REGIONAL COORDINATORS

Date	Name	Position	Organization
July 27, 2013	Andrew Kent	Sales and Marketing Consultant	Small Solutions, Bboxx
August 2, 2013	Ritah	Solar Sister HQ Staff	Solar Sister
August 2, 2013	Mary	Regional Coordinator	Solar Sister
August 2, 2013	Zaina	Regional Coordinator	Solar Sister
August 5, 2013	Evelyn	Uganda Country Director	Solar Sister
August 5, 2013	Doreen	Training Coordinator	Solar Sister
July 25, 2013	Virginia Echavarria	Project Manager, Nordic Climate Facility Support to ICSEA	Uganda Carbon Bureau
August 6, 2013	Tamsin	Partner Development Manager	Living Goods
August 5, 2013	Flordeliza Andres & Timothy Cowman	Team Lead & Timothy Cowman	CDM Regional Collaboration Centre
August 5, 2013	Elizabeth Begumisa	Head of Solar PV	CREEC
July 23, 2013	Jayne Opitto	Regional Coordinator	Solar Sister
July 27, 2013	Dickens Manyindo	Regional Coordinator	Solar Sister
August 2, 2013	Provia Natukunda	Regional Coordinator	Solar Sister

Mary Nankinga: Solar Sister Regional Coordinator

August 2, 2013

Mary Nankinga was Solar Sister's first regional coordinator, and is currently one of two regional coordinators in the Central region. Mary joined Solar Sister in March 2011, having been recruited by Katherine Lucey, Solar Sister's CEO, who had previously worked with Mary on a Solar Lighting For Africa trip.

Currently, Mary manages over 60 Solar Sister Entrepreneurs (SSEs), but considers only 25 to 30 of those SSEs to be active. In her experiences, she has found that the most common reason people chose to become SSEs is then opportunity to earn a commission, an additional stream of income; she has also found that the most common reason people decline the opportunity is lack of capital. Mary also has 3 'Superstars' in her cadre of SSEs, individuals who have sold over 50 products since joining Solar Sister. When asked her opinion on the distinguishing characteristics of a Superstar, Mary explained that Superstars are individuals, who go out of their way to be active, think outside the box, are hardworking, and are good communicators.

In her experiences to data, Mary reported that while she receives payment in a variety of ways (mobile money primarily, as well as bank deposits or in cash), a very small percentage of her SSEs pay the full amount owed to Solar Sister on time. While the majority of people will have some money to pay when Mary contacts them, she finds that because most of the customers pay the SSEs in installments, Solar Sister also receives its money incrementally. While following up with SSEs for payment does occupy a lot of her time, in her own words: "If I call to remind you of payment, I shouldn't feel bad. It's my job. "

The biggest challenge Mary faces in her region has been that people have had bad experiences with Solar in the past and it is very hard to change their minds about solar technology when they have previously spent their money on something that didn't work. To try to overcome this challenge, Mary encourages her SSEs to talk about the quality and durability of the products with potential customers, and tries to ensure that if there are issues with the products provided from Solar Sister, they can be resolved as soon as possible.

Zaina Tusiime: Solar Sister Regional Coordinator

August 2, 2013

Zaina Tusiime joined Solar Sister in June 2012, and is one of two regional coordinators in the Central region. With previous experience working in Solar, Katherine Lucey, CEO of Solar Sister, whom she knew through Solar Lighting For Africa, recruited Zaina. Zaina has 30 active SSEs who she works with regularly (defining 'active' as an SSE who makes at least one sale a month), and 4 Superstars including Sarah Serunjongi, Solar Sister's top performing Superstar across all regions. Zaina considers superstars to be individuals who have sold more than the initial first bag of lanterns they receive upon joining (the 'business in a bag'), and/or individuals who make sales of at least 500,000 UGX every month (approximately $190 USD).

Zaina usually finds new groups of potential SSEs though connections in communities, or referrals from other SSEs or people familiar with Solar Sister. After introducing Solar Sister and the products to the new community, Regional Coordinators start working with an 'anchor woman,' the first person in the community to get the business in a bag who tries out the market in the community. Should that initial foray prove successful, the anchor then helps the regional coordinator find other business-minded women amongst the community group that showed initial interest. They are trained, given businesses in a bag, and start selling with Solar Sister.

Zaina sees a lot of reasons why individuals are often eager to join Solar Sister. Foremost, people join because of the opportunity being offered - Women are usually marginalized in these communities, so giving them this opportunity to earn some money for themselves and to own their own business is something that people want to take on. In Zaina's view, the starting capital required isn't a lot, so women don't need a lot of money to start as SSEs, which also attracts them to Solar Sister. In a similar vein, Zaina emphasized how important electricity and power is in Uganda, and yet often people in the rural areas are not even aware that solar technology exists. So the opportunities for new SSEs to be the first person in their homes and communities to have these products, as well as the opportunity to spread these beneficial products to their community, are also things that make women want to be part of SS and part of the business.

Officially, Solar Sister has a 30-day repayment period after an SSE has taken new product (having paid the 10%). However, enforcing this 30-day period has challenges in the field. Zaina usually finds that the SSEs have customers that have deposited on the products, but not completed payment. Given the products can't be taken back (nor is this what Solar Sister wants to do), and the SSE might not have all the money by the end of the month, she finds she often has to give a grace period of 15 days or another month, for example. Rarely, if ever, do SSEs receive partial or full payment for a lantern and not pay Solar Sister. For Zaina, the biggest challenge of her job is debt collecting,

especially when sales are seasonal and the customers' ability to have money to make payments also varies with the season (incomes typical fluctuate with the harvest). It consumes a lot of time, but the SSEs are told to expect it in the trainings. This isn't pleasant per se, but something that needs to be accomplished: "Not an easy thing to be calling about money, but you have to do it, it's your job."

Jayne Opitto, Solar Sister Regional Coordinator

July 23, 2013

Jayne Opitto joined Solar Sister in June 2012, and is the regional coordinator in the northern area of Uganda (Gulu). She joined because she wanted to work with her community, and to help 'make people happy.' She also had some familiarity with solar technology. Currently. Jayne has between 25-30 active Solar Sister Entrepreneurs (SSEs) – people who pay Solar Sister on a regular basis and who stay in touch with her – and 8-9 superstars. Jayne considers a superstar someone who communicates well, is honest, and doesn't make up reasons why she doesn't have the money but rather makes timely payments. Her superstars tend to be more outgoing and social, and can be outspoken and convincing. They are also, in her opinion, friendly and very much of the 'get up and go' mentality.

Based on her experiences, people usually decide the join solar sister for the opportunity to earn extra money, but also the health benefits from having their own solar lantern (and decreasing on kerosene use). The most common reasons why people decide to not join Solar Sister is that they don't have the initial capital (10% required).

In Jayne's experiences, less than 50% of her SSEs pay Solar Sister on time. Most will pay after one phone call as a reminder. Typically, if they don't have the money, it is because the end-user hasn't completed payments. Jayne estimates that 60 to 70% of her time each week is spent trying to get payments for the lanterns. The most common form of payment is via mobile money.

Jayne considers the biggest challenges she faces in her region to be the fact that people are very used to donations, and subsequently think they should also get the lanterns for free. Also, transportation is a very large challenge. Distances are very long, it can be risky, there isn't always buses available, products can get easily damaged, etc.

Dickens Manyindo, Solar Sister Regional Coordinator

July 27, 2013

Dickens Manyindo joined Solar Sister in March 2013, and is the regional coordinator in the Fort Portal (or Western) region. He is also Solar Sister's only male regional coordinator. He joined Solar Sister because he was interested in the dynamics of such a large region (it's a large territory), and because he liked that Solar Sister is a community-based organization focused on the development of women and providing them opportunities to increase household income. Currently, Dickens has 18 Solar Sister Entrepreneurs (SSEs), 5 of which are active, 8 prospects, and 1 superstar. Dickens considers an 'active' SSE to be someone who communicates and who understands the products, and who feels like she need to make sales and can talk to people. For him, a superstar is a very social person, someone who isn't afraid to approach people and sell the product. They also have no problem talking to a crowd, and are very much 'go-getters.' To find new potential SSEs, Dickens does surveys, talks to local leaders, or church leaders.

Dickens tries to mentor his SSEs by staying in touch with them regularly. Some think of him as a boss, others think of him as a partner. Dickens estimates that he helps with about 40% of sales (for instance, if they are selling to a school, he will go with them, to help explain the differences between Solar Sister products and others).

His SSEs pay him in both cash and in mobile money. He estimates that 30 to 40% have paid since they instituted the no-cash policy (if they can't pay, they have to return the products in good condition). Typically, most people will pay him after one call to remind them. He keeps records in his diary and in SalesForce. One of the biggest challenges in his region is transport – there are limited options to get to remote areas.

Provia Natukunda, Solar Sister Regional Coordinator

August 2, 2013

Provia Natukunda joined Solar Sister in February 2012 and is the regional coordinator for the Southwestern region. She joined Solar Sister for the employment opportunity, and because she wanted to help people in her village get access to clean energy. Currently she has around 50 Solar Sister Entrepreneurs (SSEs), of which about 20 are active. Provia considers an 'active' SSE to be one that when she gives them products, they sell them and they stay in contact with her and attend the meetings. Provia also has 4 superstar SSEs. For her, superstars are individuals who don't operate on credit, and are reliable with their payments. These women also tend to be leaders in their communities, more educated, and sell in towns.

To find new potential SSEs, Provia visits already established groups in the communities in her region.

In her experience, the most common reasons why people chose to become SSEs are the opportunity to earn money, and because they want to help their villages. Conversely, the most common reasons why people chose to not join Solar Sister is because they don't have all the capital needed to purchase the lanterns (she estimates that only 10% have the money, and that another 3 out of 10 that sign up might be able to find the money eventually). Provia considers her relationship with her SSEs to be one of both a friend and mentor, seeing them in person at least once a month. Most of her SSEs pay her via mobile money, though some give her cash when she sees them.

For Provia, the biggest challenge in her region has been the extension of hydropower into the villages – which is direct competition for solar lanterns. There is also lots of competition from similar solar products, which appear cheaper but have unknown durability or quality. Many of the potential customers are farmers, so demand and the ability to purchase (and pay) is seasonal.

Ritah Kiyai: Solar Sister Headquarters Staff

August 2, 2013

Ritah joined Solar Sister in July 2012, having found out about the job opening via Twitter, and is primarily responsible for handling the inventory. She also handles most of the administrative work - restocking, monthly accounts, management of the expense receipts of the RCs (which must balance to zero before they get new expense money), sending inventory to upcountry RCs, and work around the office works (receive visitors, telling people about SS, one-time buyers). When the Country Director is not in the office, she also stands in for her. Inventory tracking in Salesforce is what takes up the majority of her time – e.g. making sure that the Regional Coordinators (RCs) enter their deposits when they receive money and that those amounts tally with the inventory she released to them.

A challenge for Ritah is making sure that she stays on top of the inventory organization with the RCs. This isn't a big challenge, more something she can manage. When asked what she considers Solar Sister's biggest challenge to be, she responded debt collection. Additionally, some SSEs (Solar Sister Entrepreneurs) are reluctant or careless with the products they take, and don't pay for them or bring them back in bad conditions – this becomes a loss for Solar Sister. Ritah hopes that the introduced no credit will correct the debt collection problems, and that having the SSEs pay 100% upfront will help reduce Solar Sister's outstanding debts.

Doreen Tumuhimbise, Solar Sister Headquarters Staff

August 5, 2013

Doreen has just recently joined Solar Sister, in January 2013, and is their Training Coordinator. She designs the training modules, and organizes the trainings that RCs (regional coordinators) give. She is responsible for coordinating trainings for the whole of Uganda. She is also multipurpose staff in the rest of her time in the office. She spends the majority of her time travelling – visiting the different regions and helping with the trainings. She also communicates daily with the Regional Coordinators (RCs) and with headquarters.

Her biggest challenge is the difficulty in planning her schedule (for training visits), to coordinate with the various schedules and training requirements of the different RCs. This means it is crucial that she carefully allocates her resources to who most critically need them and does her utmost to avoid scheduling conflicts at the last minute (and if there is a conflict, trying to determine which of them is the most pressing visit can also be a challenge). In her opinion, the biggest challenge facing Solar Sister is converting prospects into real, successful SSEs, and then helping them to maintain a constant level of success.

Evelyn Namara, Country Director – Solar Sister Uganda

August 5, 2013

Evelyn joined Solar Sister in February 2011. Initially, in the early days of Solar Sister, Evelyn was doing a little bit of every (figuring out the recruiting process, working with the product partners, developing the network, working on distribution channels, HR, inventory, business…"Literally doing everything in Uganda"). Now, her primary role is to manage the team in Uganda (determining their daily roles, addressing their challenges, addressing the business model – what is going right/wrong, to address growth, etc.). She does still do some HR, but is moving away from that now that the organization is more structured. She is also responsible for managing the finances here in Uganda, managing partner relationships, and buying inventories.

Evelyn considers her biggest challenge to be working with some of the policies that Solar Sister has in place. Solar Sister has certain policies and sometimes it can be challenge to make the policies work with the model and the specific context on the ground. For instance, sometimes there are policies in place, but there are real reasons why they don't work. So does that mean that Solar Sister is failing, or that the policies need to be readjusted? Tackling these challenges and determining the causes of certain issues can be difficult. Similar to this, Evelyn sees the biggest challenge facing Solar Sister is finding something that works, and then figuring out how to make it work everywhere.

Evelyn considers Solar Sister to be a space that has opened her up to think differently. One always has to be thinking outside the box, and including the people one works with, to come up with solutions. She has also had the opportunity to increase her communication skills, not just with the staff in Uganda but also in taking the info she learns every day and translating it to those working in the USA – communicating how the plan on paper differs in real execution, or how to deal with issues on the ground, etc. Evelyn has also had many other interesting opportunities since joining Solar Sister, including receiving the Anita Borg award and receiving a scholarship to participate in the Center for Education, Population and Development (CEDPA) workshops.

APPENDIX C: SNAPSHOT PROFILES OF INTERVIEWED SOLAR SISTER ENTREPRENEURS

RESPONDENT #: 1505

Demographic overview

Date of interview: 07/12/13 Region: Mutundwe, Central

Gender: Female Age: 55 Education: S4 Occupation: Farmer (chickens)

Marital status: Married Household: 7 total—self, husband, 2 children (1 daughter, 1 son), 2 grandsons, younger brother

Solar Sister entrepreneur since: August 6, 2011

Solar lanterns sold thus far: Can't remember, but hasn't sold any in 2013.

Interview summary

Respondent 1505 was motivated to join Solar Sister for very personal reasons. The idea of replacing candles with solar lanterns was very attractive to her, noting that children often fall asleep without extinguishing them, which is very dangerous. In fact, she noted that when Mary (her Regional Coordinator) first visited her village in August 2011 to talk about solar lanterns, she found herself thinking about her sons and daughters and the possibility of her own house burning down. By joining Solar Sister, she wanted to help herself—by making money, and keeping her children safe—and her community. The fact that using solar lanterns "make you feel clean and comfortable," whereas paraffin "makes your clothes dirty and black," was an added benefit.

Her initial experience as a SSE was positive: she had bought a nova and people kept asking her what it was; her husband, son and daughter each bought a lantern. Since most people in her community do not have electricity, people were interested in her work and the organization. At first, she found it difficult to handle people—to talk to them and tell them about the lanterns—but with the trainings, all of which she has attended and likes very much, she finds it to be much easier now. Her sales strategy has been to sell at events: funeral rites and weddings, in particular, though she does incur travel costs, estimated at 20,000 UGX for a round-trip taxi. She noted that she can often sell more after harvest time and in December, when people want new things and

children are not in school so there are no fees to pay. Price and affordability came up a few times during the interview: her bestselling lantern is the firefly, in part because the price is cheaper than other options (such as the nova, which she thinks is a better light, but more expensive); she does not increase the price of lamps to account for travel costs because she has to keep prices as low as possible in order to be competitive; and she used to allow customers to pay in installments, but no longer does, because most failed to pay back the full amount. The issues of product stock and social dynamics also came up, when she related the fact that her and a few other SSEs will sell for one another when they have an interested customer, but do not the actual lantern(s) on hand. However, she has yet to sell any lanterns in 2013. It appears that she may have sold solar lanterns to her family members and friends, but then stopped actively selling. Indeed, when asked if she would be comfortable selling lanterns to strangers, she answered in the affirmative, but added the caveat that it is easier to sell to people you know.

RESPONDENT #: 1585

Demographic overview

Date of interview: 07/13/13 Region: Nambeya (Luwero/Nakaseke), Central

Gender: Female Age: 33 Education: S1 Occupation: Farmer

Marital status: Married Household: 5 total—self, husband, 3 children (2 boys, 1 girl)

HH income: 350,000 per season Contribution to HH income: 100,000 per season

Solar Sister entrepreneur since: Prospective SSE

Solar lanterns sold thus far: n/a

Interview summary

Several questions—namely those relating to on-the-job- experiences selling lanterns—were not applicable to Respondent 1585 because she was a prospective SSE at the time of the interview. However, we did gain some valuable insights into the thought and decision-making processes undergone when one is considering joining Solar Sister as an entrepreneur.

She first heard about solar lighting two years ago, and then about Solar Sister in June 2012. Though she wants to, she has yet to join because she says that she does not yet have the requisite capital to buy the lanterns from Solar Sister, even at the 90% subsidized rate; this is also largely due to the fact that she is a farmer and her monetary flow is highly variable, both in absolute terms (amount), as well as temporally (by season), which also makes her savings habits highly variable and unpredictable. Her stated goal for wanting to join Solar Sister is to help others in her community benefit from this technology, as well as an aspirational goal to improve her living standards and the welfare of her household (at present, she says she lives a "basic" lifestyle and wants to add luxury to her life—for instance, by being able to buy spices to put in her cooking). If she does join Solar Sister, she hopes that the additional money she would be able to earn would help her to start a salon business, as she was trained as a hairdresser.

At the end of the interview, she reiterated the fact that she thought solar lanterns were a good technology and that Solar Sister was a good organization, but that she was most worried about coming up with the upfront capital needed to buy the lanterns

from Solar Sister. This "first hurdle" of a financial nature may be a key limiting factor to Solar Sister's future scalability, as it prevents some who clearly want to join from being able to do so. It also speaks to the fact that creative financial solutions—ones that spread the cost of joining over a period of time, or that encourage increased savings—may be required in the future.

RESPONDENT #: 1305

Demographic overview

Date of interview: 07/13/13 Region: Kasambya A, Central

Gender: Female Age: 62 Education: S4 Occupation: Local Councilwoman (level 3)

Marital status: Married Household: 1 total—self, 0 children

HH income: 30,000 per month

Solar Sister entrepreneur for: 8 months

Solar lanterns sold thus far: 12

Interview summary

It was clear that Respondent 1305 was very much driven by a desire to be a leader, and to be seen as such, in her local community. This first became apparent when she listed her occupation as a local councilwoman, but then later revealed that her primary income-earning activity is as a farmer. Thus, when asked why she decided to become a SSE, she said that she wanted to be an example for others and wanted to "set the pace." This means that Solar Sister is perceived as progressive, and as an organization meant for those who are good examples for the community, at least by this Respondent. Leveraging that reputation will be key for growth, both in terms of SSE recruitment, but also in customer sales.

Despite being mainly motivated to join as a marker of social status, she also reported an economic benefit: in the eight months since becoming a SSE, she reported a 37.5% increase in monthly income, most of which she saves through her local women's SACCO, and also no longer spends money on paraffin. However, this initial benefit may have been overestimated: when asked how many lanterns she would have to sell annually to sustain herself and her family, she responded by saying that would be impossible because it is too little money for too much time spent selling. Her first few weeks were not easy because of "fake" lanterns—cheap, lower quality imports primarily from China—on the market, which caused people to be skeptical that her products were similar. This may be part of the reason that it took her three months to sell her first lantern, though seasonality may have played a role as well (she noted that it was easier to sell the lanterns post-harvest season, when people have money). Unlike most other

respondents interviewed, she noted that she does at times try to increase the cost of the lanterns to make up for travel and airtime costs; this, however, is tempered by the customers' bargaining power.

RESPONDENT #: 1321

Demographic overview

Date of interview: 07/13/13 Region: Nakaseke, Central

Gender: Female Age: 25 Education: S1 Occupation: Resaurant Owner

Marital status: Married Household: 5 total—self, husband, sister, 2 children (1 boy, 1 girl)

HH income: 25,000 per month Contribution to HH income: 6,000 per month

Solar Sister entrepreneur since: December 2012

Solar lanterns sold thus far: 6

Interview summary

Respondent 1321's primary motivation for joining Solar Sister was to make profits, though she also mentioned "self-development." Since she joined in December 2012, she reported a 100% increase in her contribution to household income: from 3,000 UGX per month before joining Solar Sister, to 6,000 per month after joining Solar Sister. Most of the money she makes from selling lanterns goes toward paying school fees for her children, a fact she was proud of because her husband was the only one contributing to school fees prior to her joining Solar Sister. Going forward, should profits from selling lanterns continue, she hopes to invest in other farming projects: in her chickens and piggery.

She described her first few weeks as a SSE as "very easy" because it was a new product and people were excited about it and wanted to buy it; just two days after she joined, her husband bought a lantern. However, her ability to sell lanterns is constrained by the time demanded by her other income-earning activities. Six days per week, she spends over ten hours at her restaurant, which means that she is only able to sell lanterns when she is not doing other work—that is, one day per week on Sundays, the one day she is not at her restaurant. It may be because of this time constraint that she has sold primarily to her family and neighbors, though she noted that she has had to travel far to other villages in order to find potential customers.

RESPONDENT #: 1120

Demographic overview

Date of interview: 07/13/13 Region: Metunya, Central

Gender: Female Age: 32 Education: P5 Occupation: Farmer (pigs)

Marital status: Married Household: 9 total—self, husband, 7 children (4 boys, 3 girls)

HH income: 80,000-96,666 per month Contribution to HH income: 6,000 per month

Solar Sister entrepreneur for: 1 year

Solar lanterns sold thus far: 6

Interview summary

For Respondent 1120, the way in which she heard about Solar Sister was instrumental in her decision to join. She first learned about Solar Sister through a neighbor, but then subsequently heard about it through her Mother's Union. Though she hoped to supplement her earnings, the main thrust behind her decision to join was because the church had introduced her to the organization, and she trusts the church. Her husband, a priest, also liked the organization and decided to join as well. The money she makes selling lanterns goes toward school fees, investing in farming projects, and in buying household items that her husband used to buy exclusively, such as clothing and sanitary pads.

At two points during the interview, the issue of cost was brought up. When asked if she would be comfortable selling lanterns to strangers, she said that would not be a problem, though people tend to complain that they are expensive—the implicit statement being that it is easier to convince those you know that the product is worth the price. She had also allowed some of her customers to pay in installments, but has had trouble collecting payments, and has had to keep reminding them to pay her.

RESPONDENT #: 1057

Demographic overview

Date of interview: 07/13/13 Region: Timuna, Central

Gender: Female Age: 42 Education: NoneOccupation: Farmer

Marital status: Married Household: 11 total—self, husband, 9 children (7 boys, 2 girls)

HH income: 50,000 per month Contribution to HH income: 20,000 per month

Solar Sister entrepreneur since: December 2012

Solar lanterns sold thus far: 4

Interview summary

After hearing about Solar Sister through a presentation given at a meeting of her Mother's Union, Respondent 1057 realized that, through lantern sales, she could help takes some of the financial burden off of her husband and better support her household. Since joining, she has reported a 5,000 UGX increase in contribution to household income, from 15,000 per month to 20,000 per month. With the money she makes from selling lanterns, she puts it primarily toward her piggery, though in the future, she hopes to buy another piece of land to expand their farming. She described her first few weeks as "exciting" because she was "doing a church service." Like Respondent 1057, the fact that she heard about Solar Sister through her church seems to have been a highly influential factor in her decision to join. Not only that, but her primary customers have been relatives and church members. Her sales strategy has been to focus on selling the lanterns after the harvest season, because most of her friends and neighbors are farmers as well. She also expressed "happiness" at the prospect of selling to strangers because it would be an opportunity to expand her social group. She noted that she will go to community gatherings and demonstrate the lanterns, and that she has gained confidence and the ability to talk better to strangers as a result of being a Solar Sister. However, she does not spend much time selling lanterns—only one day every two months—and she concentrates on areas closest to her to cut down on transport costs and the time it takes to sell lanterns.

RESPONDENT #: 1424

Demographic overview

Date of interview: 07/15/13 Region: Lukindu, Jinja

Gender: Male Age: 51 Education: S4 Occupation: Farmer, Community Change Agent

Marital status: Married Household: 9 total—self, wife, 7 children (2 boys, 5 girls)

HH income: 300,000–800,000 per season Contribution to HH income: 224,000 per month

Solar Sister entrepreneur for: 1 month Solar lanterns sold thus far: 4

Interview summary

It was apparent throughout the interview that Respondent 1424 was more engaged in the idea of solar and what it means for his community than most. This was in keeping with his position as a community change agent. It was also clear that he had ambition: when asked what it meant to be an entrepreneur, part of his response included noting that "the more effort you put in, the more success you will have." Moreover, with the money he earns from selling lanterns, he would like to build a new family house (for which he was already bought some materials), but he would also like to invest in his education, ideally receiving a university degree to obtain "life skills."

After hearing Bridget's (his Regional Coordinator) presentation to his farmer's association, which included a cost calculation on paraffin and its negative effects on health, he was persuaded to join. Despite his enthusiasm, his first week was "very, very difficult:" People thought he was a conman because they were not familiar with the product, and therefore suspicious; his family and friends were a bit skeptical as well due to prior bad experiences, and inquired into the nature of the products and the organizations. By the second and third weeks, however, people started becoming less doubtful and began asking him for demonstrations, and eventually some people became interested in buying.

He expressed interest in selling to organizations, especially schools, but noted that they often want to order in bulk, which he is unable to provide because he cannot pay Solar Sister for all of them prior to a sale of that magnitude. One of his target customers are fishermen who could use the lights before dawn and after dusk, but he remarked that they were as far as 10 kilometers away, highlighting one of his main challenges as a SSE:

mobility and transportation costs. He liked the idea of selling other products in addition to solar lanterns through Solar Sister because people's differing tastes demand different types of products, and accommodating those makes good business sense. For him, trust is a large component of his sales approach: it is why he said he does not change lantern prices to account for travel costs.

When asked if he add anything to add at the end of the interview, he had several things to say. First, he said that, given the community he is in (i.e., low-income), most people complain about price. He also said that if at all possible, Solar Sister should help SSEs with transportation costs, even providing a bicycle or a small loan to help buy one. He also related the fact that he could sell more lamps if customers were allowed to pay in smaller installments over a longer time horizon. Again, he brought up the issue of trust as a very important issue, and said that opening up local shops would be a sign, to him, that Solar Sister trusted and had faith in him and other SSEs in the community.

RESPONDENT #: 1948

Demographic overview

Date of interview: 07/15/13 Region: Jinja, Jinja

Gender: Female Age: 46 Education: University Occupation: Restaurant Owner, Farmer

Marital status: Married Household: 5 total—self, husband, 2 children (2 boys), 1 household helper

HH income: 300,000 per month Contribution to HH income: 120,000 per month

Solar Sister entrepreneur for: 2.5 weeks

Solar lanterns sold thus far: 4

Interview summary

Respondent 1948 is a businesswoman, and that is the approach and lens through which she is looking at her membership with Solar Sister. She was attracted to becoming a SSE because she tested out the lamps and they were easy to use and because of the 10% profit margin. She sells lanterns primarily to church members and friends, but also her restaurant customers. Selling to strangers would be more difficult, she said, but she would be willing to do so. Since she is still fairly new to being a SSE, she noted that she is "seeing how it goes" and will reassess in the near future whether it is a good venture for her or not.

Her main difficulties as a Solar Sister are maintaining stock levels (i.e., having the correct lantern on-hand when someone wants to purchase it) and educating people about solar lighting. Indeed, one of the main skills she has learned as a SSE has been to explain products better and to understand the importance of customer relations. Her main point of contact with the organization is with her Regional Coordinator, with whom she speaks with at least once a week. Beyond that communication, she does not spend much time actively selling lanterns (though she does selectively move from house to house with her bag): she announces at church that she sells them and that people should come to her if they are interested; and she has posted self-made signs throughout her restaurant advertising the fact that she is a Solar Sister and their products are available at her establishment. Indeed, at the end of her interview, she mentioned that not only did she need more stock on hand, but that a significant

limiting factor to her ability to sell lanterns was a lack of marketing materials and advertisements, including display units.

RESPONDENT #: 1658

Demographic overview

Date of interview: 07/15/13 Region: Jinja, Jinja

Gender: Female Age: 55 Education: Diploma Occupation: Farmer (chickens)

Marital status: Married Household: 6 total—self, husband, 4 children (1 boy, 3 girls)

HH income: 25,000 per week

Solar Sister entrepreneur for: 1 week

Solar lanterns sold thus far: 0

Interview summary

Because Respondent 1658 has only been a SSE for one week, many of the interview questions did not apply to her, especially because she had yet to sell a lantern or participate in any training sessions. Having said that, she was motivated to join Solar Sister primarily to stay in touch with her family. When she saw that some of the lanterns could charge phones, she was drawn to them, because her children often were not able to call her because their phones, or her phone, would not be charged. Joining SSE, according to her, "made her life change," because she was now no longer worried about her phone battery dying, and was no longer worried about running out of paraffin about having to be in the dark for the night.

She has tried to sell lanterns mostly to friends and customers at the chicken market, and has spent about two hours per day over the last week trying to sell lanterns, and has spoken with several groups about solar lighting, including her savings group and church. Moving forward, she would like to be able to sell other solar products (doing so would make her "feel good") because it would allow her to expand her income. Specifically, she mentioned a desire to sell cook stoves, which she noted would be an attractive alternative to traditional cook stoves for more elderly people like herself, who struggle to collect firewood (of do not like spending the money to buy firewood).

RESPONDENT #: 1559

Demographic overview

Date of interview: 07/16/13 Region: Ndifakulya, Jinja

Gender: Female Age: 52 Education: Occupation: Farmer, Tailor

Marital status: Married Household: 6 total—self, husband, 4 children (2 girls, 2 boys)

HH income: 90,000 per week Contribution to HH income: 18,000 per week

Solar Sister entrepreneur for: 1 month

Solar lanterns sold thus far: 4

Interview summary

Respondent 1559 was eager to become a SSE, especially because she was dying to stop using paraffin: it cost too much and the smoke was terrible. Her initial interest was tested during her first few weeks, which she described as "too hard." Selling the lanterns required moving around too much and explaining too much; she said that people would sometimes even laugh at her and ridicule her. Now, however, she says that interest in the lanterns is high, and that people are excited when they see the lights, especially at night. She has enlisted the help of her husband to sell the lanterns, and he is often the one who takes the lanterns to other villages ("in town, it is not easy to sell lanterns"). As of yet, she has had no travel expenses related to selling lanterns, but believes that she will need to travel farther and farther in the future, which will necessitate spending on transportation. She was very intrigued and interested in the idea of selling other solar products; she had never heard of a solar cook stove before. This SSE was one of the few who changed her price, and not because of sales-related costs: if a customer starts taking too long to pay her back or the payments themselves are too small, then she increases the price. She noted that she was able to translate the record keeping skills she learned through Solar Sister to her farming business by making and keeping records for her ginger crops and for her cattle. She said that she teaches her community about solar lanterns by going to community group meetings and speaking about the lanterns; interestingly, she noted the fact that most of these groups were women's groups, and expressed concern about this, saying that this could be a limiting factor in her ability to make sales (i.e., she's missing half the population). She has received several inquiries about bigger solar panels that can run TVs, radios, fridges, etc.

from the community, expressing concern that she did not have this knowledge and did not know what to do besides call her Regional Coordinator. A challenge she noted was that stock is not always readily available, and so even when you have a potential customer, after time, they tend to lose interest and the sales opportunity passes.

RESPONDENT #: 1946

Demographic overview

Date of interview: 07/18/13 Region: Gonve (Katosi), Central

Gender: Female Age: 43 Education: S3 Occupation: Farmer

Marital status: Married Household: 12 total—self, husband, 10 children (5 boys, 5 girls)

HH income: 150,000 per month Contribution to HH income: 70,000 per month

Solar Sister entrepreneur for: 1.5 years

Solar lanterns sold thus far: Never counted, but "very many"

Interview summary

Respondent 1946 was made aware of Solar Sister through a presentation given to her savings group, the Katosi Women's Development Trust (WDT). After learning about solar lanterns, she decided to join Solar Sister in order to make and save money, but also to help save lives. She has taken her self-definition of entrepreneurship—"the ability to create opportunity for oneself"— to heart. While she does use some of her earnings from selling lanterns to pay for school fees, she has also learned how to build and sell biosand filters and water tanks, and was able to invest in those businesses partly through her lantern sales. Moreover, she says that she has been able to use her connections from Solar Sister to find potential customers for these filters and water tanks. She also expressed the desire to sell other products through Solar Sister, mentioning a solar iron specifically.

Overall, her experiences have been fairly positive, saying that she is now "recognized" in the community because of her association with Solar Sister. Her husband liked the lanterns so much that he bought one (sun king). She described her first few weeks as a SSE as "very good" because she had light, she was not using paraffin, and she was able to easily charge her mobile phone. Her sales strategy has been opportunistic, attempting to sell the lanterns at most social gatherings or events, including burials, parties, and at churches, but also complements this by targeting groups that she knows personally, such as through the Katosi Women's Development Trust. For both methods, she sticks to areas closer to her, spending about 6 hours per week (spread over two days, usually at nighttime) selling lanterns. Her bestseller is the sun king, and she uses the

words themselves to help as a marketing tactic, saying that this lantern uses the power of the sun and that this lantern is the king (i.e., leader/best) of all lanterns. Despite improving her communications skills and learning how to use mobile money through the Solar Sister trainings and feeling more confident about her ability to talk to customers, she notes that it is still difficult to sell lanterns—not because people do not want them, but because they cannot afford them.

RESPONDENT #: 1693

Demographic overview

Date of interview: 07/19/13 Region: Nakasongola, Gulu

Gender: Female Age: 23 Education: Diploma Occupation: Accountant at a restaurant

Marital status: Single Household: 7 total—self, 6 brothers

HH income: Not sure Contribution to HH income: 350,000 per month

Solar Sister entrepreneur since: April 2013

Solar lanterns sold thus far: 9

Interview summary

Respondent 1693 spends seven days per week at her job; finding the time to sell lanterns is therefore one of her biggest challenges, though she tries to sell lanterns at least once per week (her place of work also sells the lanterns, so she is able to work while also selling lanterns). Additional difficulties she enumerated included convincing people that what she was selling was better than alternatives available in the market (which required considerable amounts of explanation and talking) and traveling long distances to find customers. Regarding traveling, she mentioned that she moves to other surrounding villages in order to try to sell lanterns, and even inquired as to whether she was allowed to sell outside of her region (she may have brought this up because, while she works in the Northern region, her home where she lives with her brothers is in the Central region). All of these coupled together may explain why it took her so long, three months, to sell her first lantern. In addition to these, she identified the time it took to fix a lantern in disrepair to be too long, especially since the customer must go without that light for the duration that it is being serviced.

Perhaps because of her accounting background, she seemed to have a stronger appreciation for the need to keep sales records than most other SSEs, and also for the need to save a portion of her additional earnings. Moreover, all nine of the lanterns she has sold were paid for in installments—typically, a customer would pay 50%, she would give him or her the lantern, and within a month they would pay her the remaining 50%—which also may have necessitated keeping close track of what lanterns were sold,

to whom, and the outstanding balance owed. Her communication with other people within the organization is low: she does not interact with any SSEs beyond those who work where she does, nor has she had any interaction with Solar Sister staff; when she does communicate with her Regional Coordinator, it is strictly about business, and only when she specifically needs something (e.g., order lanterns, report a complaint). It is worth noting that this Respondent was part of a mentoring program for young women when she was growing up.

RESPONDENT #: 1715

Demographic overview

Date of interview: 07/19/13 Region: Nakasongola, Gulu

Gender: Male Age: 45 Education: Diploma Occupation: Farmer (beans, cassava, cattle)

Marital status: Married Household: 9 total—self, wife, 7 children (3 boys, 4 girls)

HH income: 7,000,000 per season Contribution to HH income: 7,000,000 per season

Solar Sister entrepreneur for: 2 months

Solar lanterns sold thus far: 0

Interview summary

Respondent 1715 sells lanterns through a group, which is why he reported having sold zero lanterns: all potential sales he directs to the group leader, who then handles all sales transactions (after a year of saving the profits from the lanterns sales, the plan is to split the profits among the group members equally). He first heard about Solar Sister three months ago, and was attracted to the idea of not using paraffin and being able to use a lantern to charge his mobile phone; he also wanted to help others to minimize their expenditure on paraffin and to be able to stop missing their calls due to uncharged mobile phones.

He is active in his community through several agricultural organizations, and is hoping that these connections will provide a good customer base to sell lanterns, or other solar products through Solar Sister ("I am ready. I want to sell as many products as possible" was his response to how comfortable he was selling other products beyond lanterns). He noted that several of his family members and friends want to join Solar Sister, but that they are unable to because the lantern prices are too high and they cannot afford to pay for them in advance. The only real communication he has with the organization is with one other SSE, who he meets with once a week; he has had no direct contact with Solar Sister headquarters, or with his Regional Coordinator. At the end of the interview, he suggested having larger meetings as a way to foment more engaged communication and to teach the community about solar. He also inquired about other business opportunities available through Solar Sister, which is also perhaps why he brought up multiple times the idea of allowing him to teach people (potential solar

lantern customers?) about farming and agriculture—even offering the interviewer a copy of his course certificate showing that he had passed a course to teach farming techniques—despite being a non sequitur to the current conversation. However, it should be noted that a language barrier was evident throughout the interview, and this may have been part of the reason for this deviation in topic.

RESPONDENT #: 1648

Demographic overview

Date of interview: 07/19/13 Region: Bujaabe (Nakasongola), Gulu

Gender: Female Age: 50 Education: S2 Occupation: Contractor

Marital status: Widow Household: 13 total—self, 12 children (10 boys, 2 girls)

HH income: 300,000 per month Contribution to HH income: 300,000 per month

Solar Sister entrepreneur for: 3 months

Solar lanterns sold thus far: 15

Interview summary

Respondent 1648 sells lanterns through a group, and so her number of 15 lanterns sold reflects the total amount of lanterns sold as a unit, and not as an individual. The social dynamic of the group was interesting: all sales were directed through one person, who was also responsible for keeping the money secure for a year, at which point the money will be divided among the group equally. Though we were not able to discern such an effect explicitly, there may be potential for social tension, as sales and effort may be disproportionate to the amount of money doled out after year.

She noted little difficulty in her experience thus far selling lanterns, save for a few lanterns that were not working properly. In general, people are excited about the lights, she said, and the fact that buying one means that they can charge their phones and not spend money on paraffin. She has made the choice to focus selling lanterns only to people she knows. Four people she has sold lanterns to have paid in installments, and she only gives them the lantern after full payment is received. This is in keeping with her general observation that people are very satisfied with the lanterns, but that most say that the prices are high, and are only able to afford them over time. Everyone in this group seems to not have received a receipts book, either, despite the fact that this is generally included in the business in a bag. When asked if she would be comfortable selling other products through Solar Sister, she answered in the affirmative, but was quick to add that were she to do so, those products must also come with a warranty similar to the ones of the solar lanterns, as this is a big selling point.

RESPONDENT #: 1943

Demographic overview

Date of interview: 07/19/13 Region: Bujaabe (Nakasongola), Gulu

Gender: Female Age: 60 Education: P6 Occupation: Farmer (maize, cassava, potato, chickens)

Marital status: Widow Household: 26 total—self, 25 children and grandchildren (20 boys, 5 girls)

HH income: 100,000 per year Contribution to HH income: 100,000 per year

Solar Sister entrepreneur for: 1 month

Solar lanterns sold thus far: 4

Interview summary

Respondent 1943 learned about Solar Sister through a presentation given to her SACCO in May 2013. During that presentation, she was encouraged by the quality of the lanterns (she "believes" in them) and the fact that the lanterns could replace paraffin use. To her, selling lanterns seemed like interesting work, and she thought that doing so would create an opportunity to make connections with other women in her community. Yet, she has yet to interact with any SSEs outside of her group, and she knew most people in her group prior to joining Solar Sister (primarily through her SACCO). One day, she hopes that she will be able to buy solar lanterns and solar panels that will be able to light and power her entire house.

She related the personal story of how she felt good during her first weeks as a SSE, especially when her young grandchild saw that the light was weak and said, "Grandma, please put out the solar panel out in the sun so that we can have more light." Thus far, she has sold lanterns to neighbors—all of them women—and she plans to sell only to people she knows, but is also hopeful to sell to organizations, who tend to buy lanterns in bulk orders. She spends about one day per week selling lanterns, and all the people she has sold to have paid in installments. Though she normally does not increase the price of the lanterns, she has when a customer was late in paying, adding a 1,000 UGX fee, which she claimed was the group's internal policy.

RESPONDENT #: 1446

Demographic overview

Date of interview: 07/20/13 Region: Abuga Lacor, Gulu

Gender: Female Age: 48 Education: University Occupation: School Teacher

Marital status: Divorced Household: 3—self, 2 children (1 boy, 1 girl)

Solar Sister entrepreneur since: June 2013

Solar lanterns sold thus far: 8

Interview summary

Respondent 1446 is a teacher who is a strong advocate for women's rights and empowerment, and community growth and inclusion more generally. This was evident is several of her responses: her definition of an entrepreneur was "someone who is innovative and promotes women's participation in development," and the successful characteristics of an entrepreneur included "being able to identify a problems and make a collective effort to solve them." She is very active in her community, through the school but also through other organizations. When she was present at the presentation where she first heard about Solar Sister, she was not interested in the product. By the end of the presentation, which she described as "inspirational," she was convinced of the need for solar lanterns in her community and so took the time to contact the Regional Coordinator and apply to become a SSE. Indeed, she was quite effusive in her praise for her Regional Coordinator, saying, "I adore her;" "Business has made us become more like sisters;" and "My problems become her problems." Her approach to selling lanterns has been strategic, her first goal being to sensitize people to the technology first—she would simply talk about the lanterns without pressuring people to buy them. She has primarily sold lanterns to people who work at her school—kitchen staff, teachers, staff, children—then relies on them to talk about the lanterns in their communities and within their own social networks.

Her primary challenge to date has been proper payment because people are not able to pay for the lantern in one installment. Because of this, she did not like the change in policy to not allow payment in installments. At the same time, she also acknowledged that people who pay in installments also tend to drag their feet in paying her back, which makes it so that she cannot buy the next batch of lanterns to sell. The precarious nature of the availability of money for customers was made apparent when she related

the fact that teachers she has sold lanterns to have not been paid in several months due to a strike.

Beyond the lanterns themselves, the warranty is a big selling point, and she noted that, were she to sell other products through Solar Sister, that they should also have warranties. Though not hesitant per se, after asking a few times, she failed to give any specific numbers on household income or spending, except to say that her salary as a teacher was "not very much." Hence the reason why no financial data is available for this respondent.

RESPONDENT #: 1011

Demographic overview

Date of interview: 07/20/13 Region: Pabbo, Gulu

Gender: Female Age: 39 Education: University Occupation: Tailor

Marital status: Married Household: 5 total—self, husband, 3 children (2 boys, 1 girl)

HH income: 1,400,000 per month Contribution to HH income: 0 (not earning anything right now; in a volunteer position)

Solar Sister entrepreneur for: 1 month

Solar lanterns sold thus far: 0

Interview summary

Respondent 1011 is strongly motivated by a desire to help people—she quit her job to devote her full attention to volunteering—which led her to join Solar Sister. Indeed, her stated life goal is "to support other women in any way that I can." She first heard about the organization in May through a presentation given at a women's entrepreneur camp. Her first few weeks were a mixed bag: it was exciting because she was learning new things and she enjoyed that, but is was also difficult because she was exposing people in her community to solar lanterns for the first time, and they were resistant because they knew little about the technology; what often constituted their knowledge about solar lanterns was generally through the purchase of cheap Chinese lanterns. Additionally, people she spoke with thought the lanterns were too costly and did not have the money available to buy them. In addition to price, her primary limiting factor has been finding the time to sell lanterns—she spends less than a day per week selling lanterns. Thus far, she has sold to neighbors, friends and relatives, and is unsure and hesitant about selling to strangers.

She expressed a desire for her communication with Solar Sister staff, her Regional Coordinator, and other SSEs (to date, she has had no interaction with another SSE) to be more frequent and more social, though the issue of time constraints may prevent her from interacting with them as much as she would like (which has been the case over the past month that she has been a SSE). Price came up several times as a limiting factor, noting that issue as a primary one she would like to talk to Solar Sister

headquarters staff about. The problem, she noted, is most certainly not demand—half of the people in her community do not have access to electricity, so the need for solar lanterns is high—but is striking a balance between quality and affordability.

RESPONDENT #: 1927

Demographic overview

Date of interview: 07/20/13 Region: Gulu, Gulu

Gender: Female Age: 25 Education: Diploma Occupation: Accountant (but currently not working)

Marital status: Single Household: 1 total—self

HH income: 100,000 per month Contribution to HH income: 100,000 per month

Solar Sister entrepreneur for: 2 years Solar lanterns sold thus far: 30

Interview summary

Respondent 1927 first heard about Solar Sister in June 2011, and joined to get additional income and to promote good health in her community. Her customers, both men and women, include family members, friends, neighbors and colleagues (targeting those with monthly incomes), primarily soliciting people who live or work near her; in this way, she keeps travel costs down. During a sales pitch, she highlights the warranty and claims that this is what makes the lanterns sell. Post-sale, she follows up with most of her customers, because this not only builds rapport and trust, but can also help her with sales (a repeat buy or a referral). She spends about five to six hours per week selling lanterns, saving most of the money. The biggest challenge she faces is difficulty dealing with customers and prompt payment (several customers pay in installments). As an SSE, she has learned how to keep records and manage risks; as a result, she has become more organized and better able to prioritize tasks in her life generally.

Despite being a superstar (top 5% of all SSEs in terms of sales), she has little interaction with other SSEs or Solar Sister headquarters. She wants that to change ("Information is important"), and so put forward two ideas: a mentoring program among SSEs, where new SSEs could be paired with a more seasoned entrepreneur; and a cross-regional SSE exchange. She also thought it beneficial were Solar Sister to open up an office in town, which could serve as a central meeting point and a place where the solar lanterns (and the organization itself) could be on display permanently. In the future, she would like to solicit organizations, especially schools, because they buy bigger systems, though she acknowledges time to sell as a constraint.

She also spoke passionately about the impact of Solar Sister's work and related a personal story: "Solar Sister, they are doing very good work in terms of support because it's not all about selling something and getting the money, but what is the impact of what you're doing in the community. This is what Solar Sister is trying to achieve: to eradicate the problems we have in our communities in terms of lighting. The impact of these lanterns to those whom we have sold to so far is big: someone says, 'I don't think about paraffin' or 'I don't care about how much it costs,' that's the impact of Solar Sister products. Mothers out there don't waste their time anymore thinking about their kid in the night, thinking, 'how am i going to take care of my child?' I've seen these impacts with my grandparents: I don't need to worry about them. Their phones are fully charged. You call them in the village and their phone is always on. They have light, and even when they don't have money, the sun is always there so the lantern can charge."

RESPONDENT #: 1839

Demographic overview

Date of interview: 07/21/13 Region: Kangangoga B, Gulu

Gender: Female Age: 43 Education: Diploma Occupation: Nurse

Marital status: Married Household: 10 total—self, husband, 8 children (4 boys, 4 girls)

HH income: Not sure Contribution to HH income: 800,000 per month

Solar Sister entrepreneur since: December 2012

Solar lanterns sold thus far: 10

Interview summary

Respondent 1839 has a full-time job, as well as being a farmer and an on-call nurse, so time is a significant constraint for her in selling lanterns. As a result, she does not spend much time selling lanterns (3 to 4 hours per week), nor does she travel very far, doing most of her selling to colleagues at work. Despite this, including the fact that she joined primarily because she thought her peers would be interested in buying the lanterns, she cited movement and travel as her biggest difficulty in selling lanterns ("Being a good SSE means that you have to travel far"), with the price of the lanterns as a close second. Moreover, despite having a clear business outlook toward the enterprise of selling lanterns, she seems to be motivated by the status that comes with being a Solar Sister, and not necessarily in making profits (despite saying that she wanted to be the best SSE in her region).

At the close of the interview, she reiterated that time is a constraint in her ability to sell lanterns, saying that she is traveling farther and farther to reach potential customers. She would like bigger training sessions that would involve the entire community and new SSEs. She also suggested a SSE mentoring program or exchange visit that would pair one new SSE with one more experienced SSE.
Notes and observations: Interviewed at her home. Showed me her Sun King. Seems to be motivated primarily by the status that comes with being a Solar Sister, not making additional money. She became unique, she said, when she joined, especially from her colleagues at work, which made her feel "great" because people were looking for her and interested in what she was doing and selling.

RESPONDENT #: 1888

Demographic overview

Date of interview: 07/21/13 Region: Gulu

Gender: Female Age: 24 Education: S4 Occupation: Business Lady (sells clothes)

Marital status: Married Household: 3 total—self, husband, 1 child (1 girl)

HH income: 400,000 per month Contribution to HH income: 100,000 per month

Solar Sister entrepreneur for: 8 months

Solar lanterns sold thus far: 5

Interview summary

Respondent 1888 decided to join Solar Sister to make money and to "help bring women out of poverty." Her first few weeks were hard because she lives in a remote village and no one was familiar with the product and many who were interested could not afford to pay in full; indeed, she noted that "money is the only problem" in her ability to sell more lanterns (though she also did mention having to travel far distances to find potential customers). It may be because she lives in such a remote area and had to travel afar—mostly on foot, as far as three kilometers—to find customers that it took her three weeks to sell her first lantern. Despite these difficulties, she likes being a Solar Sister because it distinguishes her from everyone else in the community; her friends and family were impressed, especially to be doing this at her age. Because few to no people in her village have electricity, lanterns that charge phones are her bestsellers. Another challenge she noted was that, despite the clear need, few people know about solar lanterns, and that it takes too much time going door to door to explain and demonstrate it to each household.

Also likely due to her isolated location in her village, she has had no communication with other SSEs (she communicates with her Regional Coordinator primarily via phone), but would like to. Were she to have the opportunity to speak to those at headquarters, she would ask them to make transportation and movement easier because it is difficult for her to find potential customers.

RESPONDENT #: 1802

Demographic overview

Date of interview: 07/22/13 Region: Gulu

Gender: Female Age: 30 Education: P7 Occupation: Business Lady (sells eggs)

Marital status: Married Household: 5 total—self, husband, 3 children (3 boys)

HH income: 280,000 per month Contribution to HH income: 550,000 per month

Solar Sister entrepreneur for: 3 years

Solar lanterns sold thus far: 30

Interview summary

Respondent 1802 decided to join Solar Sister because a relative knew the Regional Coordinator and told her that selling lanterns would help empower her, which appealed to her because she wanted to be able to not depend on her husband as much (she defined entrepreneurship as the ability "to have the freedom and money to support oneself). Since joining, she reported that she now contributes 50,000 UGX more to household income per month, though she was quick to point out that sales from selling lanterns is highly variable. In the beginning, people were "ignorant" and complained that the prices was too high, which required a bit of marketing; it was also difficult for her to come up with the money to buy the lanterns from Solar Sister. Another issue she pointed out was that carrying the bag provided to her by Solar Sister was not easy because of its design: a backpack would be much better, in her opinion, and would allow her to carry the lanterns in rain, and she would be able to carry other bags at the same time as well. She made a specific point about transport in that the challenge is not going to somewhere in the first place, but it is the return leg that is difficult because it is at the end of the day and she tends to be tired and does not want to carry the bag full of lanterns. Thus, getting one big room in the center of town to display the lanterns would be a big help selling lanterns, and would make it so that she would not have to always carry the lanterns around with her. Interestingly, she related the fact that more people in her village used to use electricity, but now, solar lanterns are overtaking it because it is cheaper and more reliable, and also because people also do not like having the electrical grids and wires pass over their households, as they are dangerous if they break.

She has a stall in the center of town where she sells her eggs, and uses the stall to sell her lanterns as well; she does not travel to sell her lanterns. She was quite specific, however, in her estimated time spent selling lanterns: she estimated that she spent about 10 to 20 minutes with each potential customer when they stopped at her stall, and that about seven to 10 people were interested per day. She works at the stall for four days, so this amounts to a range of 4.6 to 13.3 hours per week selling lanterns. She wants more contact with Solar Sister headquarters—she only met one staff member briefly—because it is "weird" to work for someone you do not met.

RESPONDENT #: 1296

Demographic overview

Date of interview: 07/22/13 Region: Kakoge B (Lira), Gulu

Gender: Female Age: 26 Education: University Occupation: Volunteer, Children for Hope (NGO)

Marital status: Single Household: 2 total—self, sister

HH income: 500,000 per month Contribution to HH income: 50,000 per month

Solar Sister entrepreneur for: 1 month

Solar lanterns sold thus far: 2

Interview summary

Respondent 1296 decided to become a SSE because, "When opportunity comes, I don't let it go;" in addition to being able to make money, she wanted to help her community gain access to cheap solar lighting and to stop using paraffin. Since joining Solar Sister, she reported a 20,000 UGX increase in her monthly contribution to household income, from 30,000 to 50,000 UGX, most of which goes toward buying food. Her first few weeks as a SSE were "really not easy" and discouraging: people would complain about the price, to which she would respond that the product is not the same as others in the market and that it comes with a guarantee.

Despite her life goals of opening her own food business and starting an orphanage, she sees herself with Solar Sister for the long-term. Her primary difficulty is looking for and finding customers—despite the fact that most people in her village do not have electricity, she estimates that only about 10% know about solar lanterns. When she does travel far to seek them out, she raises the lantern prices by about 5,000 UGX in order to recover those travel costs; doing so lessens her competitiveness, however, and so she requested help form Solar Sister to help with transport and airtime costs. Because she has to seek out customers so often, she would prefer a bag that travels better: one that closes so the products are safe during inclement weather.

RESPONDENT #: 1369

Demographic overview

Date of interview: 07/22/13 Region: Angwet-Angwet A (Lira), Gulu

Gender: Male Age: 25 Education: S2 Occupation: Business Man (sells shoes and agricultural products, mostly rice)

Marital status: Single Household: 6 total—0 children

HH income: 500,000 per month Contribution to HH income: 600,000 per month

Solar Sister entrepreneur for: 6 months

Solar lanterns sold thus far: 5

Interview summary

Respondent 1369 first heard about Solar Sister in June 2012 and decided to join because when he saw the lanterns they were selling, he saw the difference in quality from ones he had seen previously; he believes in the products. He noted that, during his first few weeks as a SSE, he had to expand to whom he spoke to and had to interact with more people; he liked this because he was learning new business skills. In fact, and despite only having actually sold lanterns to neighbors and friends, he said that he feels "so, so happy" about trying to sell lanterns to strangers because it is an opportunity to meet and interact with new people. He seeks out organizations as well, because he believes that they tend to pay in full. He primarily is able to sell lanterns after the harvest season, but also takes his bag regularly to surrounding markets throughout the year. Though he typically travels to communities within five kilometers of his village to sell lanterns, he has traveled as far as 180 kilometers.

Primary challenges include transporting the lanterns, and restocking and repayment issues, which both discourage customers from buying lanterns. When he runs out of stock, he referred to this as a "squandered opportunity" because people want them, but he cannot provide them with the product. He thinks that this issue is so large, in fact, that he claims that he would be able to sell three times the amount of lanterns per year were (re)stocking more efficient (he maintained that it could take weeks, even months to receive stock).

At the close of the interview, he had several suggestions, including that lanterns should come in a variety of colors in order to appeal to people's different tastes. He also recommended that Solar sister should have one place to display and stock their lanterns, which would be very beneficial and simplify purchasing because people would come from the villages to a central location and would be able to buy there immediately; he would not, as a result, have to travel to them and carry the lanterns all day. To echo what he said earlier, he said that he would be able to sell lanterns better if there were better and more constant restocking, if the lantern prices were reduced, if there were means of advertising and if he had better, more reliable transport means.

RESPONDENT #: 1758

Demographic overview

Date of interview: 07/25/13 Region: Kitumba, Fort Portal

Gender: Female Age: 34 Education: S4 Occupation: None, stays at home

Marital status: Single Household: 3 total—self, 2 children (1 boy, 1 girl)

HH income: 3,000 per 2 lanterns sold Contribution to HH income: 3,000 per 2 lanterns

Solar Sister entrepreneur for: 4 months

Solar lanterns sold thus far: 2

Interview summary

Respondent 1758 first heard about Solar Sister in 2011, but only became serious about it two year later, when she bought a lantern herself and learned more about the business opportunity. At the time, she did not have a job, and so needed to earn money, her primarily goal in being a SSE. She has sold at market places, shops and school, as well as at events such as weddings.

It took her 3 weeks to sell her first lantern, which she said was not due to the fact that people were not interested, but that people did not have the money to buy the lanterns. She also described people as "green"—that is, they did not know about the lanterns in the first place. In selling products, she notes that there is a significant amount of walking and travelling (she has traveled as much as 25 kilometers), which can be frustrating when a sale is not made and when there is inclement weather. She related an experience where she once arrived home so late after a day of traveling that her children had to go hungry because she did not have time to prepare dinner. On average, she says that she spends 6 hours per day every day selling lanterns.

With the money she has made from selling lanterns, she supports her children by providing school and household items (books, pencils, food) and plans to put some of her future earnings toward her community savings group. She likes her interaction with other SSEs, who she says encourage each other to work hard and sell more products. She meets with her RC on a weekly basis, but has yet to speak with anyone from Solar

Sister staff (though she would like to). The trainings she sees as beneficial, because she learns more about Solar Sister each time, as well as the lanterns themselves.

RESPONDENT #: 1281

Demographic overview

Date of interview: 07/25/13 Region: Fort Portal

Gender: Female Age: 23 Education: S4 Occupation: None

Marital status: Single Household: 1 total—self, 0 children

Solar Sister entrepreneur for: 4 months

Solar lanterns sold thus far: 6

Interview summary

Respondent 1281 first heard about SS from an announcement at her church, followed by a second announcement the following week. After having heard about the organization, she decided to buy a lantern and after having used it, decided that is worked well and that she was willing to try selling them to others. Thus far, she has sold lanterns only to friends, though she has attempted selling to strangers in neighboring villages, schools, hospitals, and markets. She has sold three products: the kiran, student light, and SunKing. The people she has spoken with say they prefer the kiran because it is able to light up an entire room. With the money she makes from selling lanterns, she was able to buy shoes, more airtime for her mobile phone, and rice, an upgrade form chips or matoke.

It took her one week to sell her first lantern, and she noted that "villages are hard to sell to. Many would like to buy, but need more money." In general, she spends about 2 hours per day, 4 days per week selling lanterns, and has traveled as far as 5 kilometers away. One-third of her customers so far have paid in installments. She communicates regularly with her RC and other SSEs, discussing a range of topics including lanterns, transport, pricing, selling tactics, and customer care. At the end of the interview, she iterated that "Solar Sister has been good, but price is a real problem. People need the lanterns but can't afford them."

RESPONDENT #: 1494

Demographic overview

Date of interview: 07/25/13 Region: Kagote, Fort Portal

Gender: Female Age: 29 Education: P5 Occupation: Matron at a primary school

Marital status: Divorced Household: 4 total—self, 3 children (3 boys)

HH income: 180,000 per month Contribution to HH income: 180,000 per month

Solar Sister entrepreneur for: 4 months

Solar lanterns sold thus far: 9

Interview summary

Monetary information

Respondent 1494 first heard about SS at her church, where she learned that it was an organization that was started by an American businesswoman and that it supported women. She decided to join because it was easy to join and there were no upfront costs, and because it was easy to have her regular job while also being able to sell lanterns. Despite the ease of joining, she did reveal that her first few weeks as a SSE were difficult because people did not know about the products and, as a result, it was hard to convince people to buy the lanterns. Some of the people she has spoken with, however, have requested other products from her, including solar cook stoves and bigger solar products. Though many people in her community have electricity, many would like to purchase solar lanterns in order to lower their electricity bills.

Her strategy is to try selling more at the end of each month, when salaried workers are paid. She also puts more efforts into selling during the weekends, and at the end of the harvest season, when farmers have more cash on hand. She sells primarily in markets, but also has gone to schools and weddings. With the money she has made from selling lanterns, she has been able to buy basic needs for herself, including a hen. Her customers so far prefer the kiran because it is cheap and diffuses light well, and the firefly mobile because it is relatively cheap and can charge mobile phones. The most challenging part of being a SSE is transport: moving to far places takes time and effort,

and often she is not able to even sell anything. Half of the people she has sold to have paid in installments.

RESPONDENT #: 1606

Demographic overview

Date of interview: 07/26/13 Region: Ntoroko West, Fort Portal

Gender: Female Age: 34 Education: S4 Occupation: Busines Woman (sells medicine, second hand clothes, and shoes)

Marital status: Married Household: 5 total—self, husband, 3 children (1 boy, 2 girls)

Solar Sister entrepreneur since: April 2013

Solar lanterns sold thus far: 2

Interview summary

Respondent 1606 was introduced to SS by attending a training offered by the RC in her area. There, she learned that SS was an organization started by women meant to support women, and that it helps people save by not having to pay for kerosene. She joined because she wanted to teach her community about solar and how it could save them money. Her family was very happy that she became a SSE, saying, "Where have [these lanterns] been? Why were they not here earlier?" Despite the lanterns' popularity and appeal, the respondent had several people "fear" her products because they thought that they were fakes; she noted that it was particularly difficult to convince these people to buy.

She has many income-earning activities, including renting property, selling clothing, and selling shoes. The respondent spends time selling lanterns every day, and displays them in her shop in the evening when they are easily visible. So far, she has sold lanterns to fellow church members and people who come to her shop, though she is not opposed to selling to strangers ("I want to sell products. It doesn't matter to whom."). She used to travel some, but has since stopped because transport was too expensive and the profit margin was too small. Basic needs, such as sugar and pocket money for her children, are bought with the money she earns from selling lanterns. Transport is a key challenge, which she added can also be linked to hunger, because you are walking a lot and do not necessarily have time (or the money) to eat. She also said that the price of the lanterns can be expensive, and that she felt that she had little

bargaining power with her customers, because she believed that she does not have authority as she cannot change or lower the price.

RESPONDENT #: 1135

Demographic overview

Date of interview: 07/26/13 Region: Nyahuka (Bundibugyo), Fort Portal

Gender: Male Age: 45 Education: University Occupation: Social Worker, owns supermarket

Marital status: Married Household: 5 total—self, wife, 3 children (2 boys, 1 girl)

HH income: 2,500,000 per month Contribution to HH income: 1,875,000 per month

Solar Sister entrepreneur for: almost 2 years

Solar lanterns sold thus far: 15+

Interview summary

Contrary to most SSEs, respondent 1135 actively sought out membership in Solar Sister. He heard about Solar Sister from a friend and asked for the contact information of the RC in his area. He decided to join Solar Sister because he is very interested in energy and environmental protection, and also has a strong desire to help transform communities and people's lives in a positive way. He is very motivated and effusive in his passion for solar energy, saying such things as "to have total happiness, people need light" and "solar lamps promote partnership: I've never seen any other technology that does this." In response to a question asking him his life goals, he said that he wanted to become a specialist in solar energy and open a solar center where people can learn about the technology. Becoming a SSE has allowed him to invest more in his supermarket (buy more stock and new products) and has allowed him to support financially the education of children in his extended family.

He is very deliberate in his approach to selling lanterns. Because he has a background in social work, he began with sensitization techniques to generate interest and familiarity with the product; that is, at he did not even attempt to sell lanterns to people, but rather just wanted to have people learn about the technology. This sensitization was coupled with side-by-side demonstrations of the lanterns with traditional kerosene lamps, which often included him putting a piece of paper above each as a very visual way of exhibiting the danger of the kerosene lamps. Such demonstrations, he said, elicited very emotional responses, and served as a good visual for those who may be illiterate. He also targets three specific populations: children, who need to study and

read; parents, who want their children to succeed in school; and teachers, who want to see improved results for their students. In addition to going out and selling lanterns in the community, he also sells solar lanterns at his supermarket.

The respondent was one of the most affluent and educated people we interviewed. His education level, in particular, became evident when he began discussing several issues related to motivation, impact and his role within Sola Sister. At the close of the interview, for instance, he noted that he wanted to know more about Solar Sister as an organization: i.e., what's in development? What is management thinking? He mentioned several times throughout the interview that there should be more emphasis on figuring out how to document the level of transformation and impact within a family who has purchased solar lanterns (that is, looking beyond the purchase of the product to what it allows people to do), and that he would be very much interested in trying to help create and implement such documentation. He noted that he would be able to sell lanterns better if both he and his community writ large had access to more literature and information on solar technology, though he also noted that the price was a concern for many customers.

RESPONDENT #: 1060

Demographic overview

Date of interview: 07/27/13 Region: Kirongo, Fort Portal

Gender: Female Age: 35 Education: S2 Occupation: Farmer, Business Woman (sells food at shop)

Marital status: Married Household: 7 total—self, 7 children

HH income: 70,000 - 100,000 per month Contribution to HH income: 20,000 per month

Solar Sister entrepreneur for: 3 months

Solar lanterns sold thus far: 2

Interview summary

Respondent 1060 first heard about Solar Sister at a church meeting, and was convinced to join because she liked the products and thought that she could make money fairly easily. She was also already heavily involved in her community through various civic organizations and activities, so she had targeted customers in mind from the very beginning. Despite her targeted population and optimism, the first few weeks were a bit hard because people were discouraged by the prices of the lanterns; many people thought they were too high. It took her one month to sell her first lantern, and she noted that she has had to walk long distances in order to find potential customers. She tends to spend six hours per week selling lanterns.

He main point of contact within the organization is her RC. She noted that she has had no communication with other SSEs, but that this would be beneficial to discuss sales strategies and experiences. She would like to sell more products, but says that she needs more capital to do so and a higher profit margin.

RESPONDENT #: 1618

Demographic overview

Date of interview: 07/12/13 Region: Central

Gender: Female Age: 54 Education: Diploma Occupation: Savings Group Manager

Marital status: Single Household: 4 total – Self, older brother, 2 children (1 girl, 1 boy)

HH income: 900,000 per month Contribution to HH income: 550,000 per month

Solar Sister entrepreneur since: 2010 (almost 3 years)

Solar lanterns sold thus far: Unsure

Interview summary

Respondent 1618 first heard about Solar Sister in 2011, and was motivated to join by the quality of the products, the way her Regional Coordinator explained the opportunity, and most crucially, the chance to raise her standard or living, or to get "something in your pocket." She has also greatly benefited from using the lanterns herself: "when the power goes off, we don't get that same darkness." Respondent 1618 is clearly willing to work hard. Although 'retired' she previously worked for Uganda Railways for 26 years, and since retiring has been the manager at her local cooperative, manager her own rental unit business, and become a Solar Sister Entrepreneur (SSE).

Respondent 1618 doesn't devote time explicitly to selling solar lanterns, but rather combines selling solar lanterns with the other activities she engages in – bringing the products with her to church, or to meetings, or into work at the cooperative. Similarly, although travel is inevitably involved in the selling of lanterns, this travel is again for some other activity that she is able to include selling solar in. In her own words, "When I go far, it isn't purposely to sell lanterns." Respondent 1618 gave, as an example of travel costs the price of a bodaboda trip around town is approximately 1500 UGX. However, she does not increase the price she sells the lanterns at to cover any costs incurred through transport. Similarly, she doesn't change the price of the lantern for customers who pay in installments, though she does keep the lantern until total payment has been made.

RESPONDENT #: 1428

Demographic overview

Date of interview: 07/13/13Region: Central

Gender: Female Age: Education: P7 Occupation: Farmer

Marital status: Married Household: 11 total – Self, husband, 9 children (5 boys, 4 girls)

HH income: 100,000 per month Contribution to HH income: 40,000 per month

Solar Sister entrepreneur since: 2013

Solar lanterns sold thus far: [Question wasn't on survey at time of interview]

Interview summary

The first time Respondent 1428 heard about Solar Sister, she wasn't interested in joining. However, once her husband heard about it and spoke favorably to her, and she talked to an SSE and her Regional Coordinator, she was swayed. Respondent 1428 ultimately decided to join so she could save on fuel by using the lanterns in her own home, and so that she could independently earn money as a woman. Since joining, she has reported a 10,000 UGX increase in her contribution to monthly household income from 30,000 to 40,000 UGX per month. She is using the additional money from selling lanterns to help pay for school fees, or to make some of the variable household purchases that arise occasionally (for instance, medicine, clothes, salt, sugar…). In the future, she hopes through hard work she will be able to save up enough to open a shop where she will be able to sell lanterns.

In a typical week, Respondent 1428 will spend 2 days trying to sell lanterns in addition to her regular farming activities. She reports occasionally having to travel to sell lanterns, typically using a bodaboda at 6,000 UGX per trip. She does also incur airtime costs, of around 5,000 UGX on the days that her Regional Coordinator restocks her lantern supply, contact customers. She does report through increasing the price she sells the lanterns at to cover these costs, usually by around 3,000 UGX. She doesn't, however, increase the price of the lanterns if customers pay in installments. Respondent 1428 reports selling the most lanterns in the period after harvest season, as this is when households typically have more disposable income at hand. Her sale strategy at this

point seems to focus on selling to her community and in villages, as she finds it takes more time to convince strangers about the benefits of buying a lantern.

RESPONDENT #: 1871

Demographic overview

Date of interview: 07/13/13 Region: Central

Gender: Female Age: 49 Education: S1 Occupation: Saleswoman

Marital status: Single Household: 5 total—self, mother, 3 children (1 boy, 1 girl, 1 nephew)

HH income: 130,000 per month Contribution to HH income: 130,000 per month

Solar Sister entrepreneur since: December 2012

Solar lanterns sold thus far: [Question wasn't on survey at time of interview]

Interview summary

Respondent 1871 was already a saleswoman prior to joining Solar Sister, selling food supplements and herbal medicine for a company called Green World; so adding the lanterns as additional products was a compliment to her existing business. She joined Solar Sister because she saw it as an opportunity for self-development and to earn a profit. She was also eager to own a light herself, so she could reduce her spending on lighting and so she would have the ability to charge phones. She is happy, because she owns and knows she is selling a genuine product that helps improve welfare. She is hoping to make enough money to buy a plot of land and build a house for rental income.

As she is a saleswoman, she typically spends a significant amount of time selling all her products – usually 9am to 5pm, Monday to Friday. Most of the time she is trying to sell locally, so will walk as her means of transportation. Respondent 1871 did report though, that if she does incur a significant cost in transport or airtime related to selling a lantern, she would increase the price by approximately 15% to cover the difference. While some of her customers do pay in installments, she doesn't change the price for them. However, they must complete all the payments before she releases the lanterns to them. She reports that she pays Solar Sister routinely at the end of the month, via mobile money.

RESPONDENT #: 1691

Demographic overview

Date of interview: 07/13/13 Region: Central

Gender: Female Age: Education: P6 Occupation: Farmer

Marital status: Married Household: 7 total – self, husband, 5 children (2 boys, 3 girls)

Solar Sister entrepreneur since: November 2012

Solar lanterns sold thus far: [Question wasn't on survey at time of interview]

Interview summary

Respondent 1691 is a farmer who also makes handcrafts on the side, in addition to selling solar lanterns. She initially found out about Solar Sister through the Mother's Union in her community, and was intrigued by watching others selling the lanterns. She joined to access the network she saw forming in her community – the connections of friendship and companionship, as well a people she could talk with and who she hoped would listen to her. She sells lanterns primarily to her community, as well has having sold to her family (her husband is happy she is a Solar Sister –the family is no longer spending on kerosene, but buying from her instead). She uses the money she earns from Solar Sister to buy things for her children.

Respondent 1691 spends 1-2 days a month travelling to sell lanterns, generally to people who have already heard about the lanterns and are aware of what she sells. Typically, she travels by walking. She also spends around 5,000 UGX a week in airtime costs related to selling lanterns, so consequently will increase the price she sells the lanterns at to cover this (by 5,000 – 10,000 UGX). While she doesn't change the price for customers who pay in installments, she only lets people she trusts and knows well pay over time. Respondent 1691 reports that she pays her regional coordinator at her monthly meetings, which is also where she picks her any new lanterns she requires and has previously ordered

RESPONDENT #: 1414

Demographic overview

Date of interview: 07/13/13 Region: Central

Gender: Female Age: 45 Education: S2 Occupation: Farmer

Marital status: Widow Household: 8 total—self, 7 children (4 boys, 3 girls)

Solar Sister entrepreneur since: November 2012

Solar lanterns sold thus far: [Question wasn't on survey at time of interview]

Interview summary

Respondent 1414 is a businesswoman, which came across easily during her interview. She is a farmer, she sells the produce – coffee, milk, bananas – she grows, and she is a salesperson for a company, GNLD, which sells herbal medicine. This is in addition to her Solar Sister activities. She was motivated to join Solar Sister because of a personal encounter with the dangers of candles in dwellings. Her house caught on fire because of candlelight, and her children were burnt. She was connected with her regional coordinator just one week prior to joining, but was eager to participate once she she learned about the lanterns as a way to avoid the dangers of candles (and kerosene). In this regards, her goals when starting were equally important: to keep her kids alive, to earn some additional income, and be happy with what she does. In the future, she hopes to be able to afford a bigger solar system, eventually to have a vehicle so as to not have to walk.

Respondent 1414 reports that she is able to sell the most lanterns during harvest season – when people have more money and where the lanterns can be used for harvesting after dark – and when children start going back to school – as the lanterns are very popular for studying. While she does sometimes have to travel to sell the lanterns, anywhere from 2 to 10km, and uses airtime to call her customer, she states that she is unable to increase the prices of her lanterns. There are many SSEs in the area, so customers are aware of the prices for particular lanterns and she would spoil the market for herself if she tried to raise prices. She uses the money she does earn to pay for school fees or to contribute to household purchases.

RESPONDENT #: 1560

Demographic overview

Date of interview:07/18/13 Region: Central

Gender: Female Age: 43 Education: Diploma Occupation: Teacher

Marital status: Single Household: 3 total—self, 2 children (2 boys)

HH income: 500,000 per month Contribution to HH income: 500,000 per month

Solar Sister entrepreneur since: 2012 (approximately 1 year)

Solar lanterns sold thus far: 30 (self-reported)

Interview summary

In addition to selling Solar Lanterns, respondent 1560 is a full time teacher working 10 hours a day Monday to Friday, and is also a salesperson for the women's savings trust in her community. She joined Solar Sister because she wanted to help her community. She saw that many people were suffering because of the negative side effects of using kerosene, and she wanted to do something to address that. Her goal when she joined was to change her community, helping them move away from the dangers of kerosene to solar. She was also attracted to the opportunity to earn some additional income. Initially she struggled convincing people how good the products were, as many thought they were the cheap 'knock-off' versions of the lanterns.

Respondent 1560 sells mainly to women in her community – churchgoers, school kids (and parents), traders, shop keepers, teachers, etc. – because she keeps her lanterns with her all the time. The most difficult thing for her is transport over long distances, particularly if the customer doesn't have all the money when she visits, or if she has to make more than one trip. She also reports that 50% of her customers pay in installments, but that she doesn't increase the price to cover any transport or airtime costs, or for those who pay over time. Overall, Respondent 1560 is quite happy as a Solar Sister and reports that Solar Sister is helping her community as well – people are saving money on lighting costs, and are no longer travelling great distances to charge their phones.

RESPONDENT #: 1775

Demographic overview

Date of interview: 07/18/13 Region: Central

Gender: Female Age: 59 Education: P7 Occupation:

Marital status: Farmer Household: 8 total—self, husband, 6 children (4 boys, 2 girls)

HH income: 400,000 per month Contribution to HH income: 270,000 per month

Solar Sister entrepreneur since: 2012 (approximately 1 year)

Solar lanterns sold thus far: 24 (self-reported)

Interview summary

Respondent 1775 first heard about Solar Sister through the Woman's Trust in her community. After speaking to the regional coordinator, she bought into the idea of Solar Sister. She initially became a consumer, later becoming an entrepreneur. Her goals when she first started selling were to increase her income, and to both buy a bigger solar system for herself and to sell them to customers. When asked about the difficulties she encounters as a Solar Sister Entrepreneur, she replied that she had no challenge at all. She uses the money that she makes from lantern sales to help pay her children's school fees.

Respondent 1775 reports that she sells on average 1-2 lanterns a month, and she typically does not travel far in her sales activities. She walks most places, as she sells to mainly women in her community (teachers, shop keepers, farmers), as well as some schools and churches. She also only spends a small amount (around 2000 UGX/week) on airtime. However, she does not increase the price she sells the lanterns at to cover these costs, nor does she alter the price for customers who pay in installments. As soon as she receives payment from a customer (full or partial) she pays Solar Sister. Overall, she is very happy having become an Solar Sister Entrepreneur, and feels this opportunity has given her three distinct advantages: she no longer has to buy kerosene, she is no longer worried about the danger of a fire from a kerosene lantern or a candle, and she has no more troublesome soot in her house.

RESPONDENT #: 1116

Demographic overview

Date of interview: 07/18/13 Region: Central

Gender: Female Age: 43 Education: P4 Occupation: Farmer

Marital status: Married Household: 6 total—self, husband, 4 children (2 boys, 2 girls)

HH income: 250,000 per month Contribution to HH income: 120,000 per month

Solar Sister entrepreneur since: 2012 (approximately 1 year)

Solar lanterns sold thus far: 10 (self-reported)

Interview summary

Respondent 1116 was convinced to join Solar Sister after attending one of the trainings/community presentations given by the regional coordinator in her area. Her goal was to earn income to help pay for school feels, which is exactly what she spends the money she earns from selling lanterns on. Respondent 116 is a farmer – of both livestock and produce, and since becoming a Solar Sister she has been able to increase her contribution to monthly household income by 50,000 UGX, from 70,000 to 120,000. Eventually, she would like to earn and save enough money to buy a plot of land on which she can build rental houses for additional income.

Respondent 1116 has sold the majority of her lanterns to farmers, mainly female. She reports that sales are strongest in the months when people are taking their kids to school for the new semester. Consequently, she sells a lot of d.light S1 lanterns (the Student light). She does report that it can be challenging getting to customers to pay all of their installments in a timely fashion, and that over 60% of her customers pay in installments. As she doesn't spend money on transport or airtime, she doesn't change the prices she sells the lanterns at to cover additional costs or for those who pay in installments. Similarly, because she doesn't spend on airtime, she pays in cash and orders more lanterns when she sees her regional coordinator at her monthly meeting.

RESPONDENT #: 1837

Demographic overview

Date of interview: 07/18/13 Region: Central

Gender: Female Age: 47 Education: P5 Occupation: Farmer

Marital status: Married Household: 9 total—self, husband, 7 children (3 girls, 4 boys)

Solar Sister entrepreneur since: 2012 (approximately 1 year)

Solar lanterns sold thus far: 17 (self-reported)

Interview summary

Respondent 1837 was convinced to join Solar Sister after a presentation from the regional coordinator in her area. Her goals at the start were to save on kerosene, and to have her children be able to use the solar lights for reading and studying. She is hoping going forward that she will be able to raise more capital, so as to buy and sell more lanterns. Respondent 1837 uses the money she earns from selling lanterns to pay for school fees primarily. This additional income has also allowed her to purchase new things, such as poultry. She is a farmer, and also sells the milk and produce that she grows. She also owns a shop with her husband, where he works full time.

Respondent 1837 reports having sold to mainly men – shop owners, households, bars/restaurants, etc. Some of the biggest challenges she has to overcome as a Solar Sister are potential customer's hesitancy about the products, in particular about how expensive they are and how difficult it is to convince people that the savings are worth it. To sell, she will either walk or take a bodaboda, which can cost 4,000 UGX per trip. She also estimates spending around 3,000 UGX per week on airtime related to trying to sell lanterns. As a result, she will increase the price of the lanterns by around 4,000 UGX. When asked if she had any other suggestions or comments about Solar Sister, she replied that she thought it would be good for Solar Sister to sell stationary solar bulbs, where the panel would still be outside, but the bulbs would be stationed like the electric ones in rooms inside the house. She also mentions that some of the Solar Sisters have eye problems and difficulty seeing, and as such it would be nice if Solar Sister provided them with glasses (which she thinks would make writing receipts easier…).

RESPONDENT #: 1862

Demographic overview

Date of interview: 07/22/13 Region: Gulu

Gender: Female Age: 60 Education: S5 Occupation: Owns a transport business

Marital status: Married Household: 10 total—self, husband, 8 children (3 boys, 5 girls; children aren't at home but other family lives with her)
Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: Not exactly sure, but "many" (less than 50)

Interview summary

Respondent 1862 is a Gulu Entrepreneur, who was in Kampala at the time of her interview. She was interested in joining Solar Sister because of the opportunity to purchase lanterns herself – she wanted everywhere in her house to be lit: "I am going to make my place look beautiful – I am going to have enough lighting" – and as a chance to try a new type of entrepreneurship: "I like venturing into new things, I like learning." In addition to owning and operating a transport business (and employing others), she runs a farm and earns interest off her savings (she saves at least 12,000 UGX per week), so business is something she is quite familiar with. Additionally, already being familiar with solar technology itself, she recognized that these smaller, less expensive systems presented an opportunity to help others.

Initially, Respondent 1862 found selling solar lanterns to be challenging because she had to explain and demonstrate about the lanterns continuously, as they were very new to her community (and as such, 'justify' what was perceived to be a high price). She had to spend a lot of time sensitizing people to solar lanterns before she could convert them to customers. She now sells to a variety of people: "To villagers like me, to police, to a director of a school, to farmers. I started selling to women; men picked up later…Men take time to understand - women realize it's a necessity." She is from a very rural area, at least 90km from Lira, and finds that her sales are seasonal, corresponding to the harvest.

She explained a few of the challenges that she faces selling solar lanterns: There are a lot of other solar technologies coming out now, with prices that are lower than Solar Sister. This is making it more difficult to sell lanterns. She also thinks that it might be worthwhile for Solar Sister to study the customers who are purchasing these other solar

products. She also finds transport to the trainings to be a considerable burden. Additionally, a company came to her village selling solar products, and tried to recruit her to sell solar lanterns for them. They offered to pay her 100,000/month to sell products, and were also going to facilitate her transport. Out of loyalty to her regional coordinator, she hasn't accepted the offer yet. This companies lantern lantern prices appeared cheaper (although she couldn't tell the quality). They were selling the Kiran for 20,000 UGX compared to the Solar Sister which recommends selling it at 29,000 UGX, and the Junior pack for 250,000 UGX.

RESPONDENT #: 1622

Demographic overview

Date of interview: 07/22/2013 Region: Gulu

Gender: Male Age: 55 Education: S6 Occupation: Health Worker

Marital status: Married Household: 8 total—self, wife, 6 children (2 boys, 4 girls)

HH income: 1.2 – 1.5 M per month

Solar Sister entrepreneur since: 2011

Solar lanterns sold thus far: 60

Interview summary

Respondent 1622 was first introduced to Solar Sister while employed as a health worker in Gulu. Part of his job included working with women's groups in poor villages in the surrounding area, people who typically lived on very little, with income-generating programs. Once familiar with Solar Sister, he thought it would fit well to connect the women in these groups with Solar Sister, so that they could sell the lanterns and earn income to support themselves, or pay for more expensive things like school or medicine. At the beginning, he operated very much like his own RC - working with the women's groups he knew, giving them the lanterns to sell and letting them keep the 10% to earn some income. Since his contact ended, he now sells the lanterns himself, in addition to the consulting work he does and an orphanage he runs. He primarily uses the money that he makes selling lanterns to help pay for school fees. He has also given all of his family members lights

Initially, Respondent 1622 found it challenging to convince people of the benefits of solar technology, as they weren't familiar with it. They also thought that the lanterns were the cheap varieties that don't last, or that the price was too high. Moreover, once people were convinced to invest in a solar lantern, it takes a long time for many customers to complete all the payments, which necessitates a lot of effort on his part to track down the payments. Additionally, transport is expensive in the communities where he sells. It is often the case that it might cost more than the 10% commission to travel for a sale, which discourages pursuing the sale. He has found that it is better to go to

places like women's groups meetings, where there are many potential customers in one place.

RESPONDENT #: 1438

Demographic overview

Date of interview: 07/23/13 Region: Central

Gender: Female Age: 57 Education: S4 Occupation: Farmer

Marital status: Married Household: 10 total – self, husband, 8 children (only one still at home). Also has three grandchildren

Solar Sister entrepreneur since: 2010

Solar lanterns sold thus far: Can't remember

Interview summary

Respondent 1438 joined Solar Sister because she was impressed with the lanterns themselves, which she wanted to use, and for the opportunity to earn some extra money. Her goal going forward is to sell enough lanterns to set up another business (chicken rearing). Respondent 1438 uses the money she makes from selling lanterns to help purchase the normal things she needs for around the house. This extra income source has also allowed her to save more. In addition to selling lanterns in the area that she lives, she has a daughter at Makerere University in Kampala, who she gives the lanterns to so she can sell them on campus. Consequently, she has sold a lot of the 'student light,' the d.light S1.

Respondent 1438 has found it has become more challenging to sell her lanterns because of the increased competition from other solar sellers, who appear to have lower prices, irrespective of quality. As a result, she finds it hard to convince people that she has a quality product, and doesn't feel has the skills to talk about the quality or technical ability that make them better lanterns. She also mentioned that other solar sellers have shops in town, which are central and visible to many people. Others still, publicize their products (in cars with megaphones), whereas the Respondent 1438 feels that Solar Sister Entrepreneurs only have villages to sell to, which is a smaller pool of potential customers.

RESPONDENT #: 1111

Demographic overview

Date of interview: 07/23/13 Region: Central

Gender: Female Age: 58 Education: P5 Occupation: Business Woman

Marital status: Married Household: 11 total—self, husband, 9 children (5 boys, 4 girls)

HH income: 5 M per year

Solar Sister entrepreneur since: Doesn't really remember; "From the time Solar Sister started in her area"

Solar lanterns sold thus far: 17

Interview summary

Respondent 1111 first heard about Solar Sister when her regional coordinator first approached her area. Her group leader encouraged her to join, and she made a quick sale – convincing her to stay a part of Solar Sister. She adds the money she earns selling lanterns to her other business, a retail shop. She has also contributed some of that money towards a house that she is currently building. In addition to her shop, she is also a farmer and owns rental units. She says she loves being a Solar Sister, and making the additional money, and that in the future she hopes to continue to make more of it. She is also happy because Solar Sister has helped her diversify her business, and because it is providing jobs and some income to the community.

Respondent 1111 doesn't travel much to sell lanterns, as she is able to do so from her shop (which she also can't leave during the day). If she does have to travel, she will take a bike or a car, which can cost 8,000 UGX per trip. She also estimates that the most she will spend is 500 UGX a week on airtime related to selling lanterns. However, she doesn't alter her prices to include these costs. Similarly, even though all of her customers pay in installments, she keeps the price the same for them too.

RESPONDENT #: 1711

Demographic overview

Date of interview: 07/23/13 Region: Central

Gender: Female Age: 32 Education: Diploma Occupation: Teacher

Marital status: Married Household: 5 total—self, husband, 3 children (2 boys, 1 girl)

HH income: 400,000 per month Contribution to HH income: 250,000 per month

Solar Sister entrepreneur since: 2010 (approximately 3 years)

Solar lanterns sold thus far: 8 (self-reported)

Interview summary

Respondent 1711 joined Solar Sister for the opportunity to earn some extra money, in addition to her full time teaching job. Respondent 1711 uses the money to buy herself new clothes, and for items for them home, including things she didn't previously purchase a lot of, like sugar. In the future, she wants to continue to work hard, get more customers, more profit, and eventually start her own business.

When she first started, Respondent 1711 found it easier to sell lanterns, because the cheaper fake versions weren't yet on the market. She finds that she does sell more lanterns during the rainy season, when the power in unstable and people are more eager for a reliable alternative. Although she does incur some travel and airtime costs related to selling lanterns, she does increase the price that she sells them for. She also typically starts with a higher price, because many customers want to negotiate the final price. In addition to the challenge of her prices appearing higher than rest of market (because of the fakes), with the commitments, she doesn't feel she has much time to invest in Solar Sister. She also doesn't have a lot of ready capital, so cannot purchase many lights at once (when she started, Solar Sister didn't require capital).

RESPONDENT #: 1992

Demographic overview

Date of interview: 07/23/13 Region: Central

Gender: Female Age: 36 Education: Diploma Occupation: Primary school teacher

Marital status: Married Household: 6 total—self, husband, 4 children (2 boys, 2 girls)

Solar Sister entrepreneur since: 2010 (approximately 3 years)

Solar lanterns sold thus far: 20 (self-reported)

Interview summary

Respondent 1992 first heard about Solar Sister in church, where the pastor explained about the organization and the advantages of solar as compared to kerosene (it doesn't cost a lot of money to use, as it is only a one-off purchase, it is better for your health, etc.), which convinced her to join. In the future, she hopes to travel to other places to demonstrate the goodness of lanterns, because she believes in them and Solar Sister. To her, Solar Sister helps women, as it gives them something to do and a source of their own income. It also helps people reduce on the use of kerosene, which is dangerous, and are a source of light in areas with no power.

Respondent 1992 typically spends about 8 hours a week trying to sell lanterns. To do this, she either walks or bikes, with a bike trip costing around 1,500 UGX per trip. She doesn't alter the prices to cover this cost, and doesn't use airtime related to Solar Sister. She uses the money she earns selling lanterns to buy clothes for her kids and herself. She has found it to be challenging at times to make sales because of the fake products available, which causes customers to complain her are expensive (she loses sales because of this).

RESPONDENT #: 1790

Demographic overview

Date of interview: 07/24/13 Region: Central

Gender: Female Age: 60 Education: S6 Occupation: Small business owner

Marital status: Married Household: 6 total—self, husband, 2 children (2 sons), 2 helpers to look after cows

HH income: 950,000 per month Contribution to HH income: 300,000 per month

Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: 10 (self-reported)

Interview summary

Respondent 1790 joined Solar Sister for the opportunity to ear addition income, and because the idea and the technology piqued her interest and she was very curious to learn more (and expand her knowledge base). She is very happy as a Solar Sister, because she feels she has responsibility now – "you take something, sell it, and you have to make sure you return the money." Respondent 1790 uses the money she ears from selling lanterns to add to the other business she owns, and has also used it to purchase a solar lantern for herself. In addition to her small business, Respondent 1790 also raises and sells cattle. Eventually, she wants to earn enough income to construct rental houses, and wants to take care of children.

Respondent 1790 indicated that she most commonly sells during the times of load sharing during the year, where there is no power and people are looking for alternative sources of light. She sells mainly to households, mainly to women, but she also has a contact in Juba, South Sudan, who purchases the lanterns from her to sell in that area. In her area, she does spend money for transport – 5,000 UGX per day, on the days she has to travel – and airtime – 1,000 UGX per week – but she doesn't alter her prices to cover this. Unlike her other clients, some of whom pay in installments, her client in Juba sends the full payment at one time. She has found that it can be difficult convincing people to buy the lanterns, for a variety of reasons. Also, her client in Juba wants more and bigger systems, and she is unsure of the appropriate next steps.

RESPONDENT #: 1034

Demographic overview

Date of interview: 07/24/13 Region: Central

Gender: Female Age: 58 Education: Diploma Occupation: Rental-business owner

Marital status: Widow Household: 9 total—self, 8 children and grandchildren (3 boys, 3 girls, 2 grandsons)

HH income: 840,000 per month Contribution to HH income: 840,000 per month

Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: 10

Interview summary

Respondent 1034 joined Solar Sister within the last year, and primarily because she recognized the good it could do to her community: helping save people from burning houses, or kids getting hurt with kerosene or candles (which is very common when kids are left alone at home). Her goals when she started were to make money and help those without power. In the future, she wants to sell many more lanterns: "When I reach a stage of selling boxes of lanterns, I'll be powerful in money and our people will be benefiting." She also thinks that Solar Sister should push even deeper into the rural villages, where Solar Sister's services are really needed and they don't have power.

Respondent 1034 has found it difficult to sell lanterns at time, because although people are interested, they often find the prices too high. It is also very time consuming to explain all the about products and its benefits to new clients. She often tries to sell to those who are building new houses, and haven't built in electricity yet. She uses the money she earns from selling lanterns to purchase clothes for herself (ready-made clothes).

RESPONDENT #: 1171

Demographic overview

Date of interview:07/24/13 Region: Central

Gender: Female Age: 43 Education: S4 Occupation: MFI employee

Marital status: Married Household: 10 total—self, husband, 6 children (4 boys, 2 girls), 2 maids

Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: 10

Interview summary

Respondent 1171 first heard about Solar Sister through the leader of the Solar Sister group in her community. Her leader explained many of the benefits of being a Solar Sister and the advantages of using Solar (like saving on electricity, decreased risk of fire, etc.). Her goal when she started was to decrease the size of her power bill, avoiding fires at home. In the future, she wants to earn enough money to she can buy enough lanterns to stop using electricity altogether, and strictly use solar. She finds that she can sell more lanterns when there is a lot of load sharing in the area, but that during drought season, people often don't have much money and it is difficult to makes sales. Her Solar Sister trainings have helped her learn the skills she needs to be better able to convince customers to make purchases.

In addition to her Solar Sister activities, Respondent 1171 owns rental houses and works for a micro-finance institution (MFI). She does most of her selling from the office where she works, so people come to her to make purchases. Typically her husband drives her into the office, or if necessary she will take a bodaboda to the office (or to make another sale), which costs around 2,000 UGX per trip. Respondent 1171 uses the money she earns from selling lanterns to purchase her own solar product, and to purchase the household products she needs.

RESPONDENT #: 1373

Demographic overview

Date of interview: 07/26/13 Region: Central

Gender: Female Age: 53 Education: Diploma Occupation: Community Development Coordinator, Mother's Union

Marital status: Widow Household: 8 total—self, 7 children (6 boys, 1 girl

Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: 50

Interview summary

Respondent 1373 joined Solar Sister after speaking to the regional coordinator in her area, and learning about the benefits of both Solar Sister and the usefulness of solar. In this respect, her goals when becoming a Solar Sister Entrepreneur were straightforward: to "uplift my standards of living and even the community." Respondent 1373 uses the money she earns selling solar lanterns to help cover the costs of her normal household purchases. With her additional income, she has also been able to buy a cow. Her target for the future is to get a (solar-powered) television for herself, and to help every woman in her community have a solar lantern, and thus to minimize the accidents that happen with kerosene or candles. In addition to Solar Sister, she had a garden that she works in and is able to sell produce from, she works as a translator, and because she is a widow she often receives money from people she knows (her children, the local MP, her bishop).

Respondent 1373 has encountered some challenges as a Solar Sister. Often when she is trying to make a sale, potential customers want to see variety in the types of lanterns. She feels Solar Sister only gives her limited quantities, and she doesn't have the capital to stock up on more so would have the variety to demonstrate with. This is a problem, because "if you move with many [lanterns], the more you sell." Respondent 1373 typically spends a few hours a day selling solar, 5 days a week. The most she will travel is 30 km to sell a lantern, in which case she will get a lift from a friend or take a taxi or bodaboda (which can cost 10,000 to 12,000 UGX per trip). She also spends a varying amount on airtime. She does, however, increase the price of the lanterns to cover these costs, proportional to what she spends in travel and airtime. Respondent 1373 is feels she has benefited a lot as a Solar Sister – she has learnt a lot, met new people, is now

very comfortable dealing the Solar Sister products, and is no longer worried about the dangers of kerosene.

RESPONDENT #: 1362

Demographic overview

Date of interview: 07/27/13 Region: Gulu

Gender: Female Age: 30 Education: University Occupation: Small-business owner

Marital status: Single Household: 8 total—self, mother, 3 sisters, 3 brothers.

Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: 4

Interview summary

Respondent 1362 joined Solar Sister after having been a customer herself: "After buying the product, Sunking in particular, I liked it and it was nice. I really liked it, it worked, so I started carrying it around, showing it to friends." Her goals when she joined were to "better my life, make ends meet (one job is not enough)." In the future, she wants to work hard on creating more market for herself, provided the products remain of a good quality.

Respondent 1362 uses the money she earns from to 'spoil herself' with nice things, or to take her younger siblings out. She has also injected some of the money into her other business, which is a shop in Kampala that sells peanuts and honey. Although she is a Gulu entrepreneur, Respondent 1362 is in the process of moving to Kampala because of her current business and opportunities she feels are more available there. Additionally, she makes jewelry to sell and also works as a mobile money agent, so is very familiar with sales in general. So far, she has sold to former workmates or friends of hers. She brings the products with her to the shop during the day, and will occasionally travel if she has to meet someone and sometimes spends on airtime related to selling lanterns (up to 2,000 UGX day if she coordinating a sale). As a result, she will increase the price of the lantern to cover the costs she incurs, usually by 5,000 UGX. She found it has been easy to sell during times of load sharing. In general, she finds the most difficult thing is trying to persuade someone to buy something, convincing him or her that the product is good. In general though, everyone always says the products work perfectly; she has never had any complaints. Respondent 1362 does think it would be great if Solar Sister has a low cost product that was still high quality - people really like the

current products, but often can't afford them. She has also run into some problems with the cheap knockoffs causing people to be hesitant to pay her higher prices.

RESPONDENT #: 1259

Demographic overview

Date of interview: 7/15/13 Region: Jinja

Gender: Male Age: 45 Education: Diploma Occupation: Teacher

Marital status: Married Household: 10 total—self, wife, 8 children (2 girls, 6 boys)

HH income: 380,000 per month Contribution to HH income: 266,000 per month

Solar Sister entrepreneur for: 1 month

Solar lanterns sold thus far: 2

Interview summary

Respondent 1259 joined Solar Sister because he wants to be an example for other people in his community; he life goal is to help with development while also being able to earn a decent income. In addition to being a SSE, he is a Community Change Agent (CCA) for his district farmer's association. In general, he spends about two hours per day selling lanterns, and has traveled as far as 10 kilometers away on his bicycle trying to find customers to whom to sell. When traveling such distances, he does increase the price of the lanterns by about 1,000 to 2,000 UGX to make up for travel costs.

He finds that it is easier to sell lanterns during harvest time when people have more money, as well as during the Christmas holiday season, though he is always telling people he meets when he is out in public about solar lighting. He hopes that, in addition to the current lanterns he sells, that he could be able to sell bigger home systems consisting of two to six lights, as well as solar radios. His customers include family members and to the school where he is a teacher. Even though he has told many people about the lanterns and they liked them, they say that they cost too much, even though the everyday costs of using kerosene add up quickly to the cost of a lantern. ("They don't do the total accounting. They are suffering from ignorance.") In terms of skills development, he noted that he would benefit from more training on record keeping, though his communications skills have improved on account of selling lanterns. At the end of the interview, he inquired as to whether there was an opportunity for Solar Sister to help fund the school where he works.

RESPONDENT #: 1466

Demographic overview

Date of interview: 7/15/13 Region: Jinja

Gender: Female Age: 46 Education: University Occupation: Entrepreneur

Marital status: Married Household: 8 total—self, husband, 3 children (2 boys, 1 girl)

HH income: 800,000 per month Contribution to HH income: 400,000 per month

Solar Sister entrepreneur for: 6 months

Solar lanterns sold thus far: 10

Interview summary

Respondent 1466 decided to join Solar Sister because it was option to get free money—little capital was required—and because the presentation she heard from the Regional Coordinator was inspiring, and because she wanted to be self-employed and to support other women become empowered and independent. Since joining, she has reported a 200,000 UGX monthly increase in household income, half of which she contributed. The extra earnings from selling lanterns has allowed her to put more into her savings, buy more household supplies, and help start up her new juice business.

Her first few weeks as a SSE were fairly positive—it took her less than a week to sell her first lantern, and hold sold six in the first three weeks; her customers include friends and colleagues, though some who expressed interest in buying could not due to the price. Beyond affordability, another main constraint in her ability to sell lanterns (especially to organizations) is that she has a full-time job that commands eights hours of her day, so her sales strategy is to sell whenever there is an opportunity, (e.g., when people come to the internet café, when people come to visit her). Two additional difficulties she noted were entering markets where similar products are already sold and competing with cheaper, subsidized lanterns. Thought she praised the organization because it promotes good health and livelihoods, she observed that the products are expensive, which means that the initial payment to buy the lanterns from the organization is prohibitive for several people who would otherwise wish to join.

RESPONDENT #: 1832

Demographic overview

Date of interview: 7/18/13 Region: Central 1

Gender: Female Age: 35 Education: P5 Occupation: Farmer

Marital status: Widow Household: 9 total—self, 6 children (5 boys, 1 girl)

HH income: 200,000 per month Contribution to HH income: 200,000 per month

Solar Sister entrepreneur for: 1 year

Solar lanterns sold thus far: 20

Interview summary

Respondent 1832 first heard about Solar Sister two years ago, and her goal was to teach people how to use solar, "save them from the darkness" and help families be safe from house burning. School fees amount to more than 2,000,000 UGX per year, and this is primarily where the money made from selling lanterns goes, though it also goes toward uniforms, shoes and sometimes medicine.

She is able to sell more lanterns during the harvest season; off-season, there are no sales. The amount of time she depends selling lanterns is also seasonally-dependent and based on perceived demand. Customers have included relatives, schools and strangers—most of whom have been women—and she has sold lanterns at events, including handing out her contact information at burials. She has traveled up to three miles to sell lanterns, and has increased the price of the lanterns to account for airtime and transportation costs; she also increases the price when demand is high (during the dry season). Her bestselling lantern is the sun king because it is able to charge at night. In terms of skills development, she particularly appreciated the training on bookkeeping.

She talks to other SSEs regularly, but has rarely communicated with Solar Sister staff, talks with her Regional Coordinator once per month and engages with customers only if they contact her with problems. She also has new friends through Solar Sister, and would like to have more projects like it in her community, even inquiring how possible this would be.

RESPONDENT #: 1894

Demographic overview

Date of interview: 7/19/13 Region: Gulu

Gender: Female Age: 56 Education: S4 Occupation: Farmer

Marital status: Widow Household: 15 total—self, 14 children and grandchildren (3 boys, 9 girls, 2 granddaughters)

HH income: 50,000 per month Contribution to HH income: 50,000 per month

Solar Sister entrepreneur for: 1 year

Solar lanterns sold thus far: group

Interview summary

Respondent 1894 is part of a group that sells lanterns collectively. Ideally, this is a stepping-stone for her: with the profits she hopes to earn from selling as a group, she would like to transition to becoming an individual SSE (she currently does not have the necessary capital to do this). The group she sells through is structured such that all sales go through one person, which makes her primary job advertising and bringing customers to the group. This structure also means that she has had no interaction with her Regional Coordinator, or other SSEs outside of the group; similarly, she has not attended any Solar Sister trainings.

She advertises primarily at events, such as weddings, burials, community trainings, and church functions, as well as on an ad hoc, opportunistic basis when talking to people she meets or when she is traveling for other reasons. She has yet to solicit schools or other organizations. A recurring challenge that she has faced in trying to attract customers is that they want to see and try out lanterns first before buying it, a request she is not able to accommodate; price complaints have arisen frequently, as well.

RESPONDENT #: 1804

Demographic overview

Date of interview: 7/19/13 Region: Gulu

Gender: Female Age: 42 Education: P6 Occupation: Farmer

Marital status: Married Household: 12 total—self, husband, 7 children (1 boy, 6 girls), 3 girls from late brother's family)

HH income: 83,333 per month Contribution to HH income: 66,667 per month

Solar Sister entrepreneur for: 3 months

Solar lanterns sold thus far: Group sales

Interview summary

Respondent 1804 first heard about Solar Sister in May 2013, and shortly thereafter joined as part of a group. She hopes to increase her income through lantern sales in order to help pay for school fees, which amount to 1.8 million UGX per year. After the government brought electricity to rural areas but not to individual houses, she was able to set up a big solar system in her house that provides light and allows her to charge mobile phones. When the system was first installed, people in her village were surprised to see the light and that such a small panel can provide so much power, and came to her and asked how she got it; as a result, she sees herself as a role model for others to follow.

Because she finds it difficult to travel, she focuses on selling in areas within or close to her village, though she has traveled as far as seven kilometers on her bicycle trying to find potential customers. Every week, she spends about nine hours selling lanterns, typically spread out over three days. While she attended one training and found it useful, she was told that they would be taught how to install big systems, or that they would receive technical assistance, which has not occurred. She would like her Regional Coordinator to come and teach her group about wiring such systems. She points to this as an area of concern, as other companies exist who sell solar systems that provide technical support. As a result of being a SSE, she has developed customer relationship skills, which help her advise and teach people about solar.

RESPONDENT #: 1924

Demographic overview

Date of interview: 7/20/13 Region: Gulu

Gender: Female Age: 20 Education: University Occupation: Student

Marital status: Single Household: 9 total—self, mother, father, 8 children (2 boys, 6 girls)

Solar Sister entrepreneur for: 7 months

Solar lanterns sold thus far: 18

Interview summary

Respondent 1924 uses the money she earns through lantern sales to help pay for tuition, as well as for occasional medical expenses. Deciding to become a SSE was a difficult decision because most of her time goes into her studies (she also makes and sells food items, and works at her family's bar), but ultimately she believes that everyone should "go solar." Overall, she is happy with her decision: she said that it is fun being a Solar Sister: she likes going to the meetings and meeting new people; to her, it is like a family. Growing up, she was exposed to a variety of women entrepreneurs, including her mother, a hotel owner, and a woman who owned a mobile money shop and another shop for cosmetics—the latter being a major inspiration to her. Indeed, like this woman, she wants to one day open her own shop ("boutique") that sells cosmetics and clothing.

Her first few weeks as a SSE were hard because people thought the lanterns were knock-offs and it was a struggle to teach people; even now, her primary difficulty is having people understand the lanterns—what they are and their benefits—which takes time. Though her family was supportive—she heard about Solar Sister through her father, who had met her area's Regional Coordinator—her friends were not at first, telling here that it was a bad decision to join. She sold her first lantern in a week and a half, and has since sold to doctors, local government employees and members of her local community, most of whom have been women, and most of whom she did not know prior. Some of her customers have paid in installments, and she has raised the price for some of these customers by 5% to 10%, though has done so rarely. She has noticed that there is an end of year surge during Christmas and New Year's when people are more interested in buying lanterns. This is in contrast to May, when she claims there is a dearth in demand due to a lack of money on the part of households. She would like to sell

pother products through Solar Sister because they provide a warranty, which in turn helps bolster security and customer confidence.

She has regular, almost daily, contact with her Regional Coordinator, talks to other SSEs as often as she can, checks in with new customers weekly to get status updates on the lanterns she has sold them and talks to groups in her community about solar lighting. From the Solar Sister trainings, she has learned marketing skills, the need for accountability and how to keep sales records.

RESPONDENT #: 1096

Demographic overview

Date of interview: 7/21/13 Region: Gulu

Gender: Female Age: 29 Education: University Occupation: Social Worker

Marital status: Married Household: 4 total—self, husband, 2 children (2 girls)

HH income: 400,000 per month Contribution to HH income: 400,000 per month

Solar Sister entrepreneur since: 2012

Solar lanterns sold thus far: 20

Interview summary

Respondent 1096 first heard about Solar Sister through her sister-in-law, and decided to join because she was convinced that she could save money and protect her household from potential fires by not having to use kerosene. She initially saved all of the money from her sales, then combined it with her other earnings to buy a piece of land. She also uses the earnings to meet various household needs, especially between monthly paychecks. Her first few weeks as a SSE were good, but she suffered from a lack of knowledge and could not answer several of her customers' questions about the lanterns; she is more familiar with the products now, so this is no longer an issue. Her goal is to expand her market, including soliciting schools, and to get more customers, which have thus far included work colleagues, friends, family members, neighbors and a health center. About one-quarter of her customers returned to buy more lanterns, either for themselves or for friends and family members. She tends to sell more during harvest time and in December when people "break their bank" and spend their savings.

Convincing people of the value of the lanterns continues to be her biggest difficulty in selling lanterns because of concerns over quality and fakes, and people tend to not understand how much they can save when they no longer have to use kerosene. She is also concerned about new competition from businesses, who sell solar lanterns at better prices; at the same time, she would also like to earn a higher commission from her sales. She has had issues with people wanting to take the lanterns first to try them out and to pay later. For those who pay in installments, she adds a flat rate of 5,000 UGX to the lantern price. She has found the trainings to be helpful, especially the one on recordkeeping, but could use a refresher on how to talk to customers and marketing

skills. Her negotiating skills have also improved during her time as a SSE: she tends to not tell customers a specific price, but starts high and bargains down.

RESPONDENT #: 1542

Demographic overview

Date of interview: 7/22/13 Region: Gulu

Gender: Female Age: 36 Education: University Occupation: Teacher

Marital status: Widow Household: 8 total—self, 3 children (1 boy, 2 girls), 4 other women relatives

HH income: 700,000 per month Contribution to HH income: 700,000 per month

Solar Sister entrepreneur for: 2 years

Solar lanterns sold thus far: 8

Interview summary

Respondent 1542 decided to join Solar Sister after hearing a presentation from her area's Regional Coordinator and due to her personal experience with using a solar lantern, which she said "prevented her from living a miserable life." The money from lantern sales goes toward school supplies and household necessities, such as soap. Her children were very happy when she bought her first lantern and wanted her to buy more; thus far, she has three.

She experienced several challenges in her first few weeks as a SSE: it was not easy to advertise, people said the prices were high and people thought the lanterns might be Chinese products that would not last long; in general, there was considerable criticism. Perhaps because of these initial challenges, it took her more than one month to sell her first lantern, and she notes that sales are highly variable and selling can be very slow at times. Lanterns have been sold primarily to teachers, as well as a few farmers, most of whom have been women. She follows up with her customers to see how the lanterns are doing, but also to get referrals to other potential customers. She does raise the price of lanterns to cover sales-associated costs (she would like to be able to be reimbursed for transportation costs), as well as a couple times when customers have paid in installments. Though she has benefitted from the trainings and learned several skills—how to run a business, how to talk to people—she would like help in learning how to best expand her sales to new areas.

RESPONDENT #: 1556

Demographic overview

Date of interview: 7/22/13 Region: Gulu

Gender: Female Age: 29 Education: Diploma Occupation: Accountant

Marital status: Married Household: 6 total—self, husband, 2 boys, 2 children (2 girls, 1 biological child)

HH income: 410,000 per month Contribution to HH income: 410,000 per month

Solar Sister entrepreneur for: 2 months

Solar lanterns sold thus far: 4

Interview summary

Respondent 1556 decided to join Solar Sister based on the business case that was presented to her, and because having one source of income was not enough to sustain her household; personal health problems stemming from paraffin use was also a motivating factor. She reported a 60,000 UGX increase in monthly household income since joining Solar Sister, and uses that extra income to pay for school fees (she was also able to pay the first 50% installment for a 4-light solar system).

Her initial experience as a SSE was characterized by excitement: since she does not have electricity in her home, the solar panels can help provide power for a TV for her family to watch. She has sold to friends, relatives and neighbors, and, while she is comfortable selling lanterns to strangers, she notes that people you know trust you, which counts for a lot. However, she is always talking about the lanterns: to people that come into the shop, to people at her workplace, when she is working with others in the field (for her work, she travels to various areas). People tend to buy the kiran because it is cheaper (it is also good for use in catching white ants, which can be sold as a food item), but people would prefer to buy a lantern that can charge their phones. For those that can afford to pay a bit more, they tend to go for the firefly, because it is the cheapest lantern that can charge mobile phones.

Presentation matter a lot in making sales, she noted. One has to be approachable, positive, compassionate and trusting so that they will believe you when you say you are confident that the product you are selling them is good and worth it to buy. At the

close of the interview, she revealed that she does not like the bag given to them by Solar Sister to carry the lanterns around because it is bulky and not good for travel, especially when riding on a boda boda (local motorcycle taxi); instead, she would prefer a backpack.

RESPONDENT #: 1878

Demographic overview

Date of interview: 7/22/13 Region: Gulu

Gender: Female Age: 31 Education: Diploma Occupation: Accountant

Marital status: Married Household: 6 total—self, husband, 2 boys, 4 other women

HH income: 450,000 per month Contribution to HH income: 357,700 per month

Solar Sister entrepreneur for: 3 months

Solar lanterns sold thus far: 1

Interview summary

Respondent 1878 uses the money from lantern sales to pay for school fees and sometimes for food as well. She decided to join Solar Sister because she was impressed by the products—how they could charge mobile phones, reduced the risk of injury and improved standards of living—and because of the 10% commission. Though she has sold only one lantern so far, her friends and family have promised to buy lanterns after they sell their crops after harvest. Competition from another company that sells lanterns in her town is a significant challenge she is facing, because they sell at a cheaper price. However, she maintains that Solar Sister products are "better and more advanced."

Generally, she spends about two hours per week selling lanterns. When she travels for work, she also brings her lanterns along to try and make sales with people she meets. Despite the 10% commission, she often incurs transportation and airtime costs when selling lanterns, so that her net profit is much lower in reality. For example, her typical airtime and travel costs amount to 6,000 UGX per sale. Thus, when she sells a lantern for 75,000 UGX, the 10% commission of 7,500 UGX turns out to be 1,500 UGX once costs are accounted for, equivalent to a 2% commission rate. However, she says that this is acceptable to her. This may be due to the fact that she understands that part of being a SSE involves risk and not knowing how much money you will make—attributes she included in her response to the definition and characteristics of an "entrepreneur."

RESPONDENT #: 1337

Demographic overview

Date of interview: 7/25/13 Region: Fort Portal

Gender: Female Age: 25 Education: S4 Occupation: Nurse/Student

Marital status: Single Household: 8 total—self, mother, 6 children (4 boys, 2 girls)

HH income: 300,000 per month

Solar Sister entrepreneur for: 1 year

Solar lanterns sold thus far: 6

Interview summary

Respondent 1337 became a SSE because she wanted to help people stop using kerosene, thereby preventing the risk of starting fires in houses and schools. She also was attracted to Solar Sister because of the profits that could be made, which she used to help pay for school supplies, medical bills and the purchase of some chickens. Her long-term goal is to have and work in her own medical center to treat people and to use solar lighting there. Her family was happy when she joined because they like the lanterns and could use them for reading and do not cough as much because there is no smoke, as was the case with kerosene lamps.

She has tried selling her lanterns at several events and to organizations, including funerals, weddings, schools and hospitals, and her customers include shopkeepers, teachers, doctors, nurses and family and friends. She finds it more difficult to sell to people she does not know, noting that it is also more problematic to give credit (which she refuses to do because the people break the lanterns regularly) or allow payment in installments to people you do not know personally. She tends to sell more during the rainy season when the lights tend to go off more frequently, though she notes that sales are good year round in the rural villages where most people do not have electricity. However, it is difficult, time-consuming and costly to get to such remote areas, and there are times when she must travel to a rural location several times. Other difficulties and challenges she noted include traveling to insecure areas, needing food during traveling and keeping lanterns at home, which is problematic because she does not have a lock box and is worried that they may be stolen. She also said that people often

promise to buy lanterns but never end up doing so, and that it can take as long as three weeks to sell a lantern to someone. Skills development primarily consisted of budgeting and recordkeeping, which she was able to apply to her household budget to help control costs.

When she puts on the Solar Sister t-shirt and carries the bag, she is a new person; "[being a Solar Sister] has changed my lifestyle."

RESPONDENT #: 1032

Demographic overview

Date of interview: 7/25/13 Region: Fort Portal

Gender: Female Age: 27 Education: S5 Occupation: Business Lady

Marital status: Single Household: 6 total—self, 2 children (1 boy, 1 girl)

HH income: 500,000 per month Contribution to HH income: 250,000 per month

Solar Sister entrepreneur since: March 2013

Solar lanterns sold thus far: 10

Interview summary

Respondent 1032 first learned about Solar Sister through her area's Regional Coordinator, whom she has known for years, and decided to join because she felt that it would be good for her and that she could make money. She sold a lantern her first day as a SSE, and her initial experience was positive overall: she spent time walking around to show and teach people about the products, and her family and friends were happy that she had joined because they thought doing so would take her far and help her achieve her goals (to build a house, care for her daughter, expand her business).

She sells lanterns locally in the market where she works and in the city (both individuals and organizations, such as schools), but also travels deep into villages to find potential customers. Sometimes, customers return to buy another lantern, either for themselves or for their relatives who live in the village. Her bestseller is the sun king, and she thinks this is the case because of its original design, which also makes it less prone to cheaper, lower quality duplication (as has been the case with some of the other lanterns).

By being a SSE, she has afforded her a new title and identity within the community; she is a Solar Sister and is, by virtue of that title and identity, "bigger" (i.e., more important). In addition to the increase in social status, she has also learned new skills through several training sessions that she has attended, including wiring, how to interact with customers and general communications skills. Though she notes that "Solar Sister has been good for me," she wants to be able to sell bigger systems with bigger panels that can power appliances, such as TVs, refrigerators, cook stoves and irons.

RESPONDENT #: 1463

Demographic overview

Date of interview: 7/25/13 Region: Fort Portal

Gender: Female Age: 25 Education: University Occupation: Teacher

Marital status: Single Household: 3 total—self, 1 daughter, 1 sister

HH income: 210,000 per month Contribution to HH income: 210,000 per month

Solar Sister entrepreneur for: 7 months

Solar lanterns sold thus far: 4

Interview summary

Respondent 1463 decided to join Solar Sister because she thought that it could help her be a strong businesswoman, that it would empower her financially and that it would help her expand her social network and make new friends. She has reported a 10,000 UGX monthly increase in her household income since joining, and was able to use some of those extra earning to help start a new pig business.

It took her three weeks to sell her first lantern, and during those first few weeks, she discovered that most people did not know about solar lighting, and those that did had often had negative experiences with cheap or generic lanterns, resulting in skepticism about the quality of her products. Customer doubts concerning the lanterns due to bad prior experience continues to be her primary difficulty in being able to make sales. Thus far, she has sold to university students, village members and organizations (nursery school). Three-quarters of her customers have been women. In general, she spends about 15 hours per week selling lanterns, as has traveled as far as eight kilometers to other areas in order to sell lanterns. She tends to increase the price if she has traveled far, though this depends on the community (e.g., if it is a richer community, she will definitely raise the price). Several of her customers have paid in installments. She believes that she would be able to sell other products. Specifically, people have voiced a desire for solar systems that can run big appliances like TVs, computers and cook stoves.

Overall, she is proud to be a Solar Sister.

RESPONDENT #: 1219

Demographic overview

Date of interview: 7/26/13 Region: Fort Portal

Gender: Female Age: 28 Education: University Occupation: Director of School

Marital status: Single Household: 15 total—self, mother, father, 2 brothers, 1 sister, 1 child (1 boy), 4 nieces

HH income: 700,000 per month Contribution to HH income: 700,000 per month

Solar Sister entrepreneur since: April 2013

Solar lanterns sold thus far: 4

Interview summary

Respondent 1219 first heard about Solar Sister in 2012 from her peers, and eventually decided to join because she wanted to earn more income and to help provide communities with light that currently do not have any. She also wanted to be a role model in her community. The reaction from her friends and family was mixed: some told her to go ahead, but others accused her of selling poor Chinese products. She puts all of the money she earns on her mobile money account.

It took her one month to sell her first lantern, in part because she learned that people tend to have a bad opinion of lanterns, thinking that they are all fakes, because most are made in China and this is automatically associated with cheap or poor quality products (indeed, she was concerned about the "Made in China" label on the lanterns; perhaps this can be replaced with "Designed in America?"). To combat this, she would do demonstrations and tell people that she uses the same product that she is selling them. Beyond finding customers and convincing them of the quality of the lanterns, she also faced competition from another organization who used the same sales model but was selling the lanterns at a lower price. Additionally, she believes the profit margin to be small, especially given the amount of effort it takes and the travel costs incurred to sell one lantern (she lives in a very remote village and transportation costs often exceed the 10% commission rate). She spends most of her weekend selling lanterns, traveling to neighboring villages. One important skill she has learned to help sell lanterns is to co-locate with an existing business, such as a shop, as a way to gain additional customers.

In terms of communication, she wants to talk to Solar Sister headquarters staff directly (i.e., not through her Regional Coordinator), as well as other SSEs in other regions.

RESPONDENT #: 1223

Demographic overview

Date of interview: 7/27/13 Region: Fort Portal

Gender: Male Age: 45 Education: P7 Occupation: Farmer

Marital status: Married Household: 13 total—4 adults, 9 children (4 boys, 5 girls)

HH income: 575,000 per month Contribution to HH income: 575,000 per month

Solar Sister entrepreneur for: 2 months

Solar lanterns sold thus far: 2

Interview summary

Respondent 1223 first heard about Solar Sister six months ago, but was already familiar with solar products at that point. He decided to become a SSE because he wanted to make money, and wanted to be able to pay for his children's school fees. While his friends and family encouraged him to join Solar Sister, his initial experience selling lanterns was difficult because he was trying to teach people things they did not know and there was resistance.

Sales tend to be seasonal, since most of the people where he lives are farmers, and dependent on whether harvests are good or bad (this year, the season was very bad due to poor weather conditions). He has sold two lanterns so far, and both customers seem satisfied; he is hopeful that they will return to buy bigger systems. He finds convincing strangers at first to be difficult, though it gets better as you talk to them more. Another difficulty is that, as an agent, he has very few products on hand. He thinks that there will be demand for lanterns in bars and restaurants in villages, so he plans on targeting those soon. Currently, though, he sells the lanterns in his shop, where he always has them, and brings them to market days to sell every week. He owns his own motorcycle, so has traveled to other areas to sell lanterns, as afar as ten kilometers away.

RESPONDENT #: 1834

Demographic overview

Date of interview: 7/31/13 Region: Rukungiri

Gender: Female Age: 53 Education: S4 Occupation: Business Lady

Marital status: Married Household: 9 total—4 adults, 5 children (3 boys, 2 girls)

HH income: 700,000 per month

Solar Sister entrepreneur for: about 2 years

Solar lanterns sold thus far: 16

Interview summary

Respondent 1834 joined Solar Sister as a SSE because she attended a training session and liked it, liked what she heard about the organization, wanted to light her house and wanted to help people not spend money on paraffin. She sells kitchenware and plastics, and puts most of the money she makes from lanterns sales toward investments in that business, though she also sometimes uses the earnings to help pay for school fees.

She spends 60 hours per week at work, and sells the lanterns through her shop, spending an additional two hours per day selling lanterns in places other than the shop. Her customers have mostly been farmers, and she has attempted to sell to churches and schools. She tends to sell more during the end of the coffee season, but also tries to venture out to burials and funerals in order to sell lanterns. She is very concerned about the no-credit policy, citing it as her primary difficulty: she will not have enough capital to buy the lanterns. It also takes about two weeks to get lanterns when she runs out and needs to order more. Through the trainings, she has learned several business skills, such as how to keep records and how to handle people.

RESPONDENT #: 1050

Demographic overview

Date of interview: 7/31/13 Region: Rukungiri

Gender: Female Age: 34 Education: P7 Occupation: Farmer

Marital status: Married Household: 6 total—self, husband, 4 children (3 boys, 1 girl)

HH income: 250,000 per season Contribution to HH income: 150,000 per month

Solar Sister entrepreneur since: October 2012

Solar lanterns sold thus far: 10

Interview summary

Respondent 1050 first heard about Solar Sister through contacts from her parish, and eventually decided to join because she learned that she could make money and save by not spending on paraffin, and wanted to help others enjoy these benefits as well. With the money she makes from selling lanterns, she helped pay for school fees and the purchase of farm animals. She reported a 75,000 UGX monthly increase in her contribution to household income since joining Solar Sister, though this is likely a significant overestimation.

Her initial experience as a SSE was good because it coincided with harvest season and she was able to sell lanterns. After that, however, she had to wait until the next season for sales to pick up again. She sells to other people in her community, though she prefers to sell primarily to people she knows (it is harder to sell to strangers). She spends about six hours per week selling lanterns, though, as she mentioned, her sales are seasonal, so the time she spends selling fluctuates considerably according to the time of year. She incurs no travel costs because she only walks when going out to sell lanterns. Were Solar Sister to provide her with financial support for transportation, however, she would be able to travel farther and sell more lanterns. Her communication with other members of the Solar Sister organization is fairly infrequent: she speaks to her Regional Coordinator and other SSEs about twice per month.

She likes the trainings, not only because they have taught her about the lanterns and how to sell them effectively, but also because of the social networking opportunity that it affords her.

RESPONDENT #: 1543

Demographic overview

Date of interview: 8/1/13 Region: Rukungiri

Gender: Male Age: 48 Education: S2 Occupation: Council Chairman

Marital status: Married Household: 5 total—self, wife, 3 children (2 boys, 1 girl)

HH income: 210,000 per month Contribution to HH income: 150,000 per month

Solar Sister entrepreneur for: 1 year

Solar lanterns sold thus far: 12

Interview summary

Respondent 1543 decided to join because he wanted to make more money and be able to use the lights and charge his mobile phone, and to promote solar and bring it to the people in his village. In his first few weeks as a SSE, he focused on talking to his neighbors and exposing them to solar lighting. With the money he earns from lantern sales, he pays for school fees and buys school supplies for his children.

Thus far, he has sold to neighbors and people he met at the market. He spends a lot of time trying to sell lanterns and travels quite a bit (50% of his profits go toward transport costs), and he tends to sell more lanterns during harvest time. He also brings up solar lighting during council meetings. The most difficult aspect of selling lanterns is transport, though selling to strangers is another challenge that he noted. Unlike most other SSEs, he has no desire to sell products other than solar lanterns. Some people have paid in installments, paying 50% of the cost to get the lantern and paying the remaining 50% after one month. Thus far, everyone has paid him back in full (this is tends to not be the case for other SSEs, and may be due to the fact the he is also a local councilman and therefore a local figure of authority). When he sold bigger systems, he wired them himself. People associate him with solar lighting now, yelling, "Solar, solar!" when he passes by.

RESPONDENT #: 1995

Demographic overview

Date of interview: 8/1/13 Region: Rukungiri

Gender: Female Age: 31 Education: S4 Occupation: Farmer

Marital status: Married Household: 6 total—self, husband, 4 children (4 girls)

HH income: 225,000 per month Contribution to HH income: 112,500 per month

Solar Sister entrepreneur for: 7 months

Solar lanterns sold thus far: 6

Interview summary

Respondent 1995 decided to join because she wanted to benefit from having more income and using solar lanterns. In her first few weeks as a SSE, she focused on attending community gatherings and meetings, exposing people to and teaching them about solar lighting. With the money she earns from lantern sales, she invests in farming projects and was able to buy a solar lantern for herself. She reported a 12,500 monthly increase in her contribution to household income since joining Solar Sister. Her family and friends reacted positively when she joined, saying that she was helping develop the community.

So far, she has sold only to neighbors and friends that she knows, though she is comfortable with selling to strangers and organizations. Her sales are mostly seasonal, but she also attempts to sell at events during the off-season. Of the lanterns she has sold, elderly people seem to prefer the S1, while the sun king is also popular because it is good for reading and charges phones. Her main challenge is transport and carrying the lanterns with her when traveling to other villages. Additionally, people like the products but the prices are too high for many (there is a perception that the price is so high for such a small product and small panel). She has yet to attend any trainings or learn any skills from being a SSE.

RESPONDENT #: 1247

Demographic overview

Date of interview: 8/1/13 Region: Rukungiri

Gender: Female Age: 43 Education: P7 Occupation: Farmer

Marital status: Married Household: 6 total—self, husband, 4 children (3 boys, 1 girl)

HH income: 250,000 per month Contribution to HH income: 250,000 per month

Solar Sister entrepreneur for: almost 1 year

Solar lanterns sold thus far: 8

Interview summary

Respondent 1247 first heard about Solar Sister through another SSE in the region who explained how the organization works and about solar lighting, and decided to join because she wanted to see whether she would make a good businesswoman and to also make a difference and be seen as someone who works for a good organization. Her friends and family wondered at first at how she was able to join, and some who wanted to join were dissuaded by the amount of travel required to look for potential customers. She buys school supplies with the earnings from lantern sales, and would like to one day buy a bigger solar system for her house, but says that the profit from selling lanterns is not large enough for her to be able to afford one.

It was difficult selling the lanterns at first because people were not familiar with the products. As time went on, and as people bought lanterns, word of mouth spread and it became easier to talk to people because they had learned about solar lanterns. Sales are higher during harvest time, though she has also solicited people at church at all times during the year and spends part of most afternoons selling lanterns. At present, she is eating the cost of transport and airtime (i.e., not increasing prices, so they are functionally being deducted from her commission rate) in order to build up her business and be competitive, the hope being that in the future she will be able to sell more lanterns and use transportation less. The biggest customer complaint has been that prices are too high, to which she responds that these are products of quality ("original products") that are better than your average lantern that can be found ubiquitously.

She notes that it is hard to sell to strangers because they automatically think that what you are selling are fakes. There are several cheaper products on the market, and competing with them is a primary difficulty noted by this SSE. Her customers prefer to pay in installments (typically two of equal amount, to be paid at the beginning and end of the month), though this requires her to follow up in order to ensure payment (no defaults thus far).

Trainings occur once a month, and she has learned not only skills such as marketing, but more general knowledge, such as what "well-being" means; the trainings also help to encourage and empower her.

RESPONDENT #: 1906

Demographic overview

Date of interview: 8/2/13 Region: Rukungiri

Gender: Female Age: 56 Education: S4 Occupation: Farmer, Deputy Mayor

Marital status: Married Household: 8 total—self, husband, 6 children (4 biological; 3 boys, 3 girls)

HH income: 250,000 per month Contribution to HH income: 125,000 per month

Solar Sister entrepreneur for: 1 year

Solar lanterns sold thus far: 20

Interview summary

Respondent 1906 first heard about Solar Sister a year and a half ago and decided to join because she thought she would be able to make money and because the lanterns provided good light and reduced kerosene use. After buying more lanterns to sell, she uses the income from sales to buy small household items and school supplies for her children. One the skills she learned as a SSE was better savings practices, which also allowed her to buy some chickens. In her first few weeks as a SSE, she focused on mobilizing people in her community through telling them about the organization and demonstrations of the lights where she would discuss their benefits. Her family and friends like the lanterns and especially like the big systems, but they do not want to pay the advertised prices for them.

Her sales are seasonal: more can be sold during harvest time at the beginning of the year; conversely, it is very hard to sell during the time when school fees are due. She sells mostly during nights and weekends, spending about six hours per week in total selling lanterns. Her customers have included neighbors, church members and various organizations. She will not sell to complete strangers because she wants to have a link to the person to whom she is selling: it is easier to convince people you know to buy a lantern and when you do sell them one, they are able to recommend people they know as potential customers. Her primary difficulty in selling the lanterns is the price—people want the products, but they simply cannot afford them, especially when one lump-sum payment is required—especially now that other businesses and people are beginning to sell the same lanterns at cheaper prices (she gave the example of the

kiran being sold for less by others, though she also mentioned that her customers tend to not like the kiran because the light is not as strong as other lanterns and because several have broken down or required repairs). She allows her customers to pay in installments, though she remarked that recovering the money owed is not easy, as people pay little by little. She has learned much on the benefits of lanterns from the Solar Sister trainings, and would like to have more trainings, especially one on other income-generating activities available.

APPENDIX D: INTERVIEW SUMMARIES OF SUPPLIERS AND OTHER ORGANIZATIONS

Elizabeth Begumisa, CREEC Labs at Makerere University

August 5, 2013

CREEC, the Center for Research in Energy and Energy Conservation, works with College of Engineering, Design, Art and Technology (CEDAT) at Makerere University. Their work focuses on four main areas – Bioenergy, Solar PV, Pico-hydro and Energy management. Their Solar PV work includes the testing of small solar products like lanterns, including some of the models that Solar Sister distributes. They also work with local Solar Sister supplier, UltraTec. For their testing, CREEC follows the Lighting Africa procedures, but is not part of their lab network, and are more of an independent lab in Uganda.

CREEC does not do testing of lanterns that have been field previously; it only tests new lanterns. They don't consider the price of the model in their testing and evaluation. However, their recently established Solar Energy Kiosk (which rent lanterns) does collect feedback on the use of the lanterns from the customers who rent by the night. Each test that CREEC performs costs around $300, and they require 3 samples of the product for testing.

Additionally, CREEC does technician training (for businesses, NGOs, etc.), which typically last a week a cost around $125 per participant, and awareness-raising campaigns. These campaigns focus on the promotion of solar lanterns, mainly to replace kerosene lamps and candles. They have only recently started (mid-June) the campaigns in Kampala, promoting good-quality lanterns, typically outside a grocery store, talking to customers coming and going. These campaigns also partner with the companies that produce the lanterns, which sell their products as part of the campaign.

During our meeting, Elizabeth also discussed the Photovoltaic Targeted Market Approach (PVTMA) program, run by the Rural Electrification Agency (REA) in Uganda, along with the World Bank, to partially subsidize solar technology. For instance, a participating company would install the lantern or solar system, the REA follows up with an audit and provided all the criteria are adequately met, the Agency will release the subsidy to the solar company (e.g. 20,000 UGX subsidy on a 120,000 UGX lantern). Elizabeth noted that there had been complaints from the companies involved about the length of time the audit takes to complete, and hence the delay in receiving the subsidy. Companies that participate include UltraTec and Barefoot Power, both Solar Sister partners.

Flordeliza Andres & Timothy Cowman, CDM Regional Collaboration Centre

August 5, 2013

The CDM Regional Collaboration Centre in Kampala is a relatively new office (opened in May, 2013), focused on promoting CDM (clean development mechanism) projects and on promoting under-represented regions (LDCs and small island regions). Their main goal is to identify projects, or help existing projects move through the system more quickly, by overcoming the typical barriers to success (financing, investment, technology, etc.)

In general, there are two types of CDM projects – those that are standalone, and those that are a program of activities (such as the types of projects the Uganda Carbon Bureau runs) – frameworks that set out the criteria for a project to be added as part of the 'umbrella' of the PoA. The benefit of these PoA is the reduction of transaction costs: because there is an elaborate project approval process, this only needs to be completed once for the PoA, and not for every additional project that is added to the 'umbrella'. Comparatively, standalone projects, regardless of scale, must cover all the approval and auditing costs.

Typically, the major demand for carbon credits is in Europe, from companies that that have to reduce emissions, which they can do by buying credits. These companies want low risk, large scale projects to buy their credits. Other buyers are interested in 'sustainable development projects' (for corporate social responsibility purposes, etc.) and they are interested in buying their credits from the smaller PoA projects. For instance, many of the cookstove projects here have a lot of sustainable development added benefits, so in these situations it isn't simply the credits that are being sold, but also the story. Hypothetically, if they found a good buyer who is interested in the story and the credits, Solar Sister could have a viable project at any size, provided they can cover the cost. As an estimate of these costs, if the methodology is simple, and straightforward, and has been done before, typically it is $20,000 to $40,000 for consultant fees; the auditing for validation is usually between $10,000 – 25,000.

For new CPAs falling under an existing a PoA it doesn't typically much time to go through the approval project (e.g. 3-6 months to develop the project). Finding the buyer for the credits can be the more time consuming aspect. Similarly, in East Africa, the project implementation process can actually be longer and harder (compared to the approval process).

Every CDM has the requirement to get a letter of approval from the host country – usually the project needs to prove that it is contributing to the sustainable development of the country. For the ownership of the credit itself, it's a market-based mechanism that determines the owners and recipients of the credits. Whatever the contract in place stipulates determines who owns the credits, provided that there is no double

counting, and that the credits are being produced (i.e. the emission reductions are happening). Anyone therefore can own the credits (The WB, investment banks, the project itself, etc.) – depending on who bought the credit and took on the risk determines who gets the credits when it is produced.

Virginia Echavarria, Uganda Carbon Bureau
July 25, 2013

The Uganda Carbon Bureau (UCB), located just outside Kampala, is a donor-funded, private company (registered in 2006) that has been working with Solar Sister exploring the possibility of becoming a CPA (Component Project Activity) under their Program of Activities (PoA) umbrella for clean cookstove carbon credit generation. For any project falling under the UCB's umbrella, the CPA is responsible for the manufacture, import, or local assembly and distribution of the clean cook stoves. These clean cookstoves generate carbon credit through the replacement of three-stone fires or charcoal stoves and the subsequent reduction of CO_2.

The UCB "technology agnostic" when it comes to the type of cookstove used in the project; the CPAs choose the stove that works best for them within the context of their project – provided that it is efficient (20% thermal efficient, has been tested in lab). The UCB also doesn't sell or distribute the stoves – that is the responsibility of the CPA. Once the stoves have been sold, a UN auditor performs an inspection (of some statistically significant sample size of the project) to check that the stove is still in use, year after year, and generating the credit. Each stove has a unique serial number, tied to the information of the customer who purchased the stove, which is how the stoves are tracked and monitored over their lifetime. When the stove is sold, this information is collected, and at the same time the there is a transfer of the carbon credits from the user to the CPA (carbon credits belong to the user until transfer).

All the carbon credit revenues go to the project, not to UCB. However, the projects must have the same fair trade ethos that UCB supports – including that the sharing of revenues from carbon finance must be more equally distributed amongst the CPA, the community, and the end user. The transfer of the credit usually results in a reduction of the price for the end user; the CPA absorbs the risk of the credits that have not yet been generated. A stove can generate 3 carbon credits a year, and generate credits for 21 years. The average carbon credit is sold at $10 in voluntary market, which means that the stove can generate $30 a year (when maybe it costs $8 to locally manufacture), typically making the risk acceptable to the CPA. The UCB helps in the process of proving to the auditor that the stove is continuing to generate credits, by collecting data, writing the requisite reports, paying for the auditors (out of the coordinating entity fee the CPAs pay to participate in the PoA), etc. The UCB does their best to charge reasonable fees so that the CPAs can be sustainable. The UCB hopes to be cash positive within the next three years, which is when they predict to reach scale.

Solar Sister is investigating a possible project with the Phillips Stove – the most efficient stove on the market (top loaded, with a fan, and a battery, that can be solar charged). The advantage of an imported stove is that they tend to be more efficient, as production is standardized (which is advantageous for monitoring and carbon credits. Imported stoves are made to last longer (with refractory bricks – efficient and last longer). Quality is a problem with locally manufactured red stoves – they are semi-artisanal, so many of the stoves can be poor quality. UCB will provide them with training (data collecting, handling, implementation) and help based on their prior CPA designs (piggybacking on current activities they have to minimize the costs). The UCB will make sure they are following what is in the sales agreements (legal agreements), and that they mandatory info is captured at point of sale. Solar Sister would then carry on with normal activities, having just adding new product to their catalog. Currently the UCB doesn't have a methodology for a registered PoA for carbon credits for solar lighting.

Tamsin Chislett, Living Goods

Living Goods (LG) currently operates with two distinct business models in Uganda: LG Select and LG Open. In the first model, agents are community health workers who go through a very selective recruiting process, given a working capital loan, and a business-in-a-bag kit on consignment to start. They have 7 branches around Uganda for implementing this model, which have been part of the model since it's launch, and their partner BRAC has over 100. Currently, LG takes a wholesale margin that covers everything but headquarters operating costs (which is currently covered by donor funding) and there is a retail margin for the sellers. On average, the wholesale margin is 30% for LG and the retail margin is 20% for agents. However, on a specific product, the margin can range from 2% to 100% for LG.

The goal of the second model, LG Open, is to be more profitable at a faster rate, with many more agents per branch, thereby spreading the fixed costs over as many agents (contributors) as possible. Recruitment is ongoing and open to anyone to join, as potential agents need to purchase products with their own capital.

Similar to Solar Sister, UltraTec is the LG supplier for d.light products, Small Solutions is their supplier for Green Light Planet products, and the Barefoot Power (BP) Uganda office supplies their BP products. For their solar products, LG has recently introduced a 'solar savings bank' – similar to the pioneering "Toyola Moneybox," like a piggybank where the savings from using the product, which is lent to the customer on credit, are deposited and after a period of time the customer has the choice of returning the stove or purchasing it with the money saved (which is usually considerable.

LG has also recently streamlined their products offering, eliminating those with too low a margin or low impact or cross-sale effects. LG's does think that the variety of products in their catalog is an advantage – an "economy of assortment" – as it can be hard to

keep an entrepreneurs attention with just one product. Agents can get multiple sales per customer and opportunities to keep the lines of communication open if there are a variety of potential sale opportunities. LG specifically keeps lower margin products like like soap in their catalog so that the agents can still sell something when they visit a customer, which helps them keep up their confidence level, and gives them the opportunity to keep talking about the other products or needs (like solar or fortified foods). However, LGs also recognize that there are successful and profitable examples of companies with just one product focus (like Toyola, with their cookstoves).

Andrew Kent, Small Solutions and Bboxx

July 27, 2013

Andrew has recently joined Bboxx, and at the time of the meeting only had a few weeks left with Small Solutions. As such, he was able to give an overview of both Bboxx and Small Solutions. Bboxx's focus is on distributing larger systems – 2 lights and up – and accessories. They are trying to develop a customize product choice system that will allow users to combine lights and accessories of their choosing, at various price points. Bboxx also has two storefronts thus far (having only recently opened in Uganda) and is also trying to do what SS does – in addition to working with partners like SS – by distributing the products themselves with a network of sales agents. Bboxx isn't targeting the bottom of the period, but rather the middle and upper rural class. Solar Sister has bought 6 of their second biggest system, retails for over $600 USD. There can be a lot of money in the villages, especially around harvest time, which is what Bboxx target.

Bboxx has also established a separate entity – Bboxx Capital – with a grant from the World Bank and some outside investment. Its role is to offer end user financing – credit officers will sign up customers, who pay 20% down and then have a year of payments. In a basket of goods, price can have an impact (the relative price, as in the Solar Sister case, of one product versus another), but in the case of agents just selling one product (where there isn't a bunch to compare to – which is what the Bboxx direct selling model focuses on) absolute price doesn't really factor into the purchasing decision as much (100,000, 110,000, 120,000, 130,000 UGX – all of these prices are very expensive for the average Ugandan). It is the ability to pay with a stream of payments is a game changer in Andrew's opinion – 40% interest rate with Bboxx; this is a pretty typical rate here (compared to MFIs and the like).

Payments spread over a year, paid monthly – but it is flexible, people can pay more in one month than others. It isn't communicated as a 'loan', rather it's a 'payment plan' – people don't like loans, the word doesn't have positive connotations, people think it's expensive. They are also installing remote monitoring technology inside the products so if customers don't make their payments, Bboxx will be able to shut down the system remotely. For example, if there is no payment for 2 months, the system will be turned off;

if there is no payment for 3 months, Bboxx will collect the system (and try to sell it as a used system).

Small Solutions has been importing for almost 4 years now, and has three channels of product distribution: an Agent Network that they manage themselves, Institutional partners (like Solar Sister) who buy their products and distribute through their own network, and finally partnerships with MFIs (microfinance institutions) to sell the products.

Abhay Shah, UltraTec

July 11, 2013

UltraTec is a technology importer, and represents several producers of various products. They are primarily an outlet for factories, with their core competency being to support other companies. They also work the works with manufacturers to test and modify products to help them suit local contexts. They are ISO certified, and have a big focus on quality differentiation and training: "a good product not operated correctly loses its value very quickly." UltraTec has helped train some of the Solar Sisters as well. `

UltraTec benchmarks different producers (Uganda National Bureau of Standards) UNBS and Lighting Africa guidelines, as well as testing them, to determine the best lanterns for the best context. For the testing they have two on-staff technicians; in general, testing is very basic – trying to determine if the product does what the brochure says it will. (Many cheap products looks like the robust products with the latest tech). They have also worked with Makerere University's Center for Research in Energy and Energy Conservations (CREEC). Testing is part of ensuring the robustness of the UltraTec brand - "Brand comes with responsibility"—the brand adds value, especially in terms of credibility and reliability. Testing also helps ensure they invest properly in high quality products.

UltraTec's model is purely commercial, but works on very small margins for solar lanterns; essentially solar lanterns are subsidized by larger products that UltraTec sells. They are poised to break even with the d.light in October 2013. As solar lanterns expanded beyond just Kampala, UltraTec realized that people's expectations would need to be managed especially with respect to level of solar insolation (most in northeast; least in southwest) and lantern performance. Sunlight in Uganda is very different in different parts – under two hours of sunlight in the northeast, 6-7 hours in the southwest.

UltraTec has franchisees in some smaller towns (UltraSolar is their franchise brands) that only distribute d.lights. They had considered other products, but really liked the d.light products and story of the company. All in all, UltraTec sells three to four containers per year of d.lights, and each container is 20,000 lanterns. Abhay estimates total market to be one million. D.lights should last about 5 years – downside to selling a good product, is that you don't get resale.

Their importing process is roughly as follows: order, pay, wait for a few weeks (if the stock is there) depending on the model and quantities, have the shippers inspect it, ship to Mombasa from Shenzhen. No tax and not VAT on solar products, but the experience at the border can be hard to predict. UltraTec ships with a Swiss company (SPEDAG) that provides end-to-end logistics for their entire supply chain. The big challenge when supplying to Africa is that it requires patience and determination (also nerve and some confidence) – it takes 3 weeks to ship from Australia to Mombasa (1/2 of cost for first 10,000 km), and takes 3-8 weeks from Mombasa to Kampala (1/2 cost for last 1,200 km). Insurance is much more expensive for last 1,200 km due to increased risks and liabilities. They have blanket insurance from their freight company, because their goods come from all over the world. The UNBS inspection adds significant time and money. The efficiency level, infrastructure, mindset, etc. all contribute to the long time it takes to import. UltraTec did look into Dar es Salaam, but the port isn't ready yet.

UltraTec owns 2 warehouses in Kampala; it is necessary to have security presence, which add additional costs. One of the warehouses is on site where the office is, and the other warehouse is in the industrial center. The insurance requirement means they have to pay for guards and CCTV (They use a Ugandan insurance company – that they have been with for 15 years). They determine warehousing needs by looking at historical figures on sales, but also increase stock to buffer against eventualities. UltraTec has been 10-11 years in business now, so they have a system tracking sales, to determine how much to stock.

Thus far, Abhay hasn't observed any strong trend in seasonality of demand. Most of their other products aren't at the fast-moving consumer end of the market, so more project based and less seasonal. In general, they get a variable ordering patterns from Solar Sister (SS): sometimes SS orders 20-30, sometimes 200; this variability constitutes a logistical challenge (i.e., unpredictable). Most of the d.light customers are like that was well. Sales at UltraTec aren't about products any more, it's about safety in doing business – they nurture their customer base. Everyone in the chain must make something out of it to keep it motivated, otherwise there will be a weak link and the chain will fall apart.).

Abhay describes UltraTec as a "commercial business with a small heart." Personal relationships matter a great deal, especially in the African context where trust goes hand in hand with reliability; everyone in the chain must do their part to keep things moving. In the case of Solar Sister and UltraTec, "Katherine and I [Abhay] clicked." Moreover, "villages talk to each other"—the social aspect matters on a very personal, face-to-face level; poisoning the market can happen. With a bad experience: no one buys, it's a challenge to introduce your product. However, if people have a positive experience, then you will find that there is money there to buy something that you thought might not have been affordable previously.

When it comes to whether to repair or replace lanterns with problems, it depends on what makes economic sense and the status of the warranty of the product. If it's simple issue and in warranty, then they fix it; if not, they replace. The manufacturer will either replace or credit, depending on the number and their preference. It is relatively easy, because good support infrastructure for d.light

exists (UltraTec won't sell sun kings, for instance, because same level of support is not there). The purely commercial model, such as UltraTec's, is not on a level playing field with other organizations that get funding from donors and philanthropic organizations. While "there is no free money in our supply chain," it does help to create predictability. For instance, SS has an account with UltraTec, so they don't pay and take; they pay at some point later on. For UltraTec with solar lanterns, with increasing volumes of lanterns sold, the margin decreases. Currently, lanterns represent 0-7% of sales over the last 12 months, will probably be >10% this year. Until October, it is actually negative revenue being subsidized by all Abhay's other products, but they expect to make this up in the next 12 months

Solar lantern as an aspirational good: "people want to be able to switch on the lights." Over the next five years the primary goal is awareness raising in communities. Once people have a feel for something that is useful and valuable, they will buy more. Plus, with lamp access at home, several people can use one lantern, so the economic and health impacts are magnified and multiplied. Education is the greatest thing hindering Africa's development; light has real potential to impact education levels, especially for the rural poor. When asked if he could think of any negatives to using solar lighting, Abhay replied that he couldn't think of any significant negatives, compared to the benefits, "otherwise, we would all be using paraffin in our homes, wouldn't we?"

Anne Kaggwa, Barefoot Power

July 11, 2013

Two engineers who had worked in Papua New Guinea started barefoot Power (BFP) in Australia. They saw that electrical grids/connections were bypassing poor, rural communities; solar made sense, but is costly. They recognized that there was need for a sustainable, low cost solution. There wasn't a lot of small affordable solar, so they came up with a design that could be (and is) manufactured in China. Product development occurs in Australia; sourcing, testing, and quality control occurs in China. Their pilots ran in Papua New Guinea and Uganda – Uganda set up in 2008 (2005 idea, 2006 design). Now they are operating in Kenya, West Africa, and India too. They started with 2-3 staff, now have 80 staff worldwide with 24 in Kampala. They are currently going through a major restructuring; have laid off lots of people, trying to streamline operations.

In terms of growth path, 2009 was about teaching the community about solar; 2010 was about adoption, recruiting distributors and technology uptake; 2011 was a boom year and everyone started getting on the bandwagon; 2012 was when Chinese products of cheap quality started showing up in the market: 20,000 copies of the firefly were sold that stopped working in 3 weeks and had no warranty, which turned a lot of people off to solar lanterns. Now, it is getting very competitive in the solar market: originally it was just Toughstuff, d.light, Greenlight Planet, and BFP – now there are logs of others. BFP has also had trouble with people not believing the warranty was real. BFP also had bad batch of (authentic) fireflies in 2012 that were bad for business. Their first year in operation, 2009, BFP sold a few hundred lanterns; second year, 2010, they sold a few thousand; third year,

2011, they sold 100,000. They would like to sell hundreds of thousands annually, but sales are already starting to level out.

BFP works through distributors (dealers/shops, mission-driven NGOs, corporations) – they don't really sell to end users; work with partners to get to the last mile customers, and they all come with their own terms. The benefits for all these companies is that they all get a margin, and buying in bulk gets a larger margin. BFP has also trained micro-entrepreneurs, including Mary and Evelyn (who disseminate that information within SS). They look for people with little to no business background or social enterprise experience to train. They give them marketing materials and a business in a bag. So far, they have trained 100 local entrepreneurs throughout the country, who are meant to sell from their bags to their communities, but sometimes they have actually grown to small business owners. For instance, in 2011, sales was divided between 60% micro-entrepreneurs and 40% institutions (mission-driven); in 2012, it was the reverse. BFP has noticed some seasonal variance in sales: entrepreneurs do best during/toward the end of the agricultural season.

BFP also has services centers in Uganda. There have been challenges with usage and user knowledge (people using electronics for the first time). BFP found they needed to train technicians to provide local support and troubleshooting (so people don't have to come all the way to Kampala). They originally had partners to service, but they couldn't control quality. Currently, BFP is in the process of training they two new Solar Sister technicians.

BFP's dead time is about 3 months, to get product to end-user. They process if maritime shipping from China to Mombasa; cargo then travels by truck to Kampala, and once cleared, travels to BFP HQ. Logistics companies do the transport, and they have general insurance from the shipping company. Uganda was the hub for warehousing originally, but now it has switched to Nairobi. Customers can buy from the office, or send mobile money and bank account and it gets sent via bus; bulk orders will get sent in a van (BFP owns a van). One problem with shipping is that sometimes the lanterns can turn on en route, which affects battery life and sometimes makes the lanterns totally useless upon arrival. They have a new product, Barefoot Connect (home lighting system, many lights, supporting TV's and computers…), which is rolling out next month to address several issues, including the lanterns being turned on in transit.

BFP in Uganda orders lanterns from the manufacturer every 3 months. The potential lead times + regular orders + seasonality + best moving products determines how many lanterns to order. If they are just ordering from the hub in Nairobi, it takes about 2 days to arrive in Kampala. Solar Sister tends to order from BFP every 2 weeks, depending on the need.

Solar Sister has a dedicated account manager, Joel, at BFP. Trainings are available upon request and are primarily technical in nature. Joel is in the process of setting up a bigger training session in Kaptchura [at time of the interview]. BFP works with Regional Coordinators (RCs), not the Solar Sister Entrepreneurs (SSEs). RCs bring broken lamps to BFP to be repaired or to exchange it, or they work with the technicians to fix the problem at SS. BFP estimates that 5% of products (small lights) are returned with problems.

Other general challenges include poor infrastructure, which especially matters for that last mile to get to the end user (and getting it back if there is repair to be done). Sometimes, getting it back and replacing it makes more sense, but BFP likes to know what the problems are, so that they don't replace the same product multiple times.

BFP's financing model is 50% credit (and customers much pay for the 50% in 2 weeks). They have a high non-repayment rate at 50%, and expect to need a credit assessment in the future. Of course, they would prefer payment on or before transfer of lantern. BFP is 100% for-profit, but trying to develop micro entrepreneurs. Trainings for micro-entrepreneurs are half price. Partner with about 30 other organizations like SS, but Solar Sister is on the bigger end. Their biggest partners are UNICEF, WWF, Save the Children. Additionally, sometimes hold inventory for SS gratis (for average of about one month, on average). They have 5 rooms for storage, with on-site security. They could be leasing the extra rooms at $350-$400 per room per month.

When asked about the difference between BFP and Solar Sister, Anne replied that SS has a focus on women's empowerment, and their funding structure is different; BFP got some early grants from the EU and DOB, but have been commercial ever since, whereas SS has a lot of money coming from various grants and donors. And when asked about the size of the solar market, she estimated that given 85% of population has no access to electricity, about 34 million people, 60% of that 34 million constitute the market. There is only 10% market penetration so far for solar, so lots of opportunity for growth still exists.

Laurens Friso, Greenlight Planet

July 17, 2013

University of Illinois students started Greenlight Planet (GLP) in 2008. The founder still works as CTO, and lives in China. He did an internship in India with Engineers Without Borders. He worked on a project connecting a rice-husking machine to diesel generator. He left and came back later to find that the community had disconnected it so they could have power for their homes. This was his 'ah ha' moment – there is a great need for lighting in their homes – so her created a prototype with funding from an angel investor, which became the Sunking.

They started with commercialization in India (a natural starting point). Now, 45% of sales/revenues are from Africa, 45% from Asia, and 10% from the rest of the world. GLP's sales growth has been as follows – year 1: 5,000-10,000; year 2: 40,000-50,000; year 3: 100,000-200,000; year 4: 600,000 (total sales).

In India, they have a direct sales model through a network of Saathis ("friends," i.e., entrepreneurs). They have around 3000 direct sales people, with exclusive rights for both product and territory (transportation is more accessible in India), and GLP is exclusive in return to them. The bulk of the Saathis have other jobs, including also selling other products door-to-door. GLP's main personnel

hub is in India, and it includes a specific, structured sales team to support Saathis. In total, they have 450 staff worldwide: 25 in China for R&D and quality assurance (CTO is there), 10 in Africa (primarily Nairobi), and rest in Mumbai including 300 on the sales team providing direct support.

In Africa, Greenlight sells through partners (SS is a partner in Tanzania and Uganda). Their partnerships were developed from a very practical perspective – wanted to get into Africa, but didn't have the financial or organizational capacity to copy paste the model from India. Also, they didn't know if the demographics would work out the same way (they don't). They idea with the partnerships is to minimize financial and capital costs as much as possible. The population is more dispersed in Africa than in India, is more risk averse, and has less disposable income, so overall the risks are higher). People tend to be more myopic in their thinking: no long-term vision, planning ahead; may be part cultural, but also largely due to the fact that many have to live on a day-to-day basis. GLP does believe the model from India can work here, but not copy paste directly. They are working with SS to leverage their resources and their knowledge/experience on the ground in Uganda. Both are benefiting from each other. If they did it separately, SS wouldn't have these great products, and GLP wouldn't have that experience.

GLP also works with MFIs, but it has been a mixed bag: they are not mandated to sell products and loan officers are not used to the idea of selling products; suppliers have fight for to get the attention of loan officers. In India, it does work well, MFI loan officer are very excited, incentives are well aligned. Greenlight also working with other organizations who sell products through village agents; want to have multiple distribution channels to get to market in as many ways as possible.

The primary GLP importer in Uganda is Small Solutions. They import from China, where GLP is physically in the factory (hire production runs for the products), and where GLP sources the materials themselves (so they know they don't have low quality components or products and can actually guarantee the warranty). GLP has a distribution hub in Nairobi (new – will have products in 2-3 weeks, outsourced warehousing to logistics company), and warehouse in India. The logistics company from Nairobi does it for razor thin margin. End to end distribution for East Africa. They have been talking with SS about potentially having an East African warehouse.

GLP has also introduced a partner profile/rating system (gold level, silver level, etc.). The levels come with minimum order agreements, varying levels of access to warehouse stock. One-third of a container must be ordered every two months in order to be charged the lowest prices. GLP would expect a gold partner to turnover a full container every six months. Partners must also order all at once, and have to store locally once shipped. One benefit from a local warehouse would be much lower wholesale prices. Greenlight is in its early stages of development, so is still trying to figure out the market and demand. Right now, buying in bulk in Kampala is $33, which is limiting the margin the partners can make from what the suggested retail price is. Ideally, those products could wholesale for $28 a piece. In a saturated market or a mature market, SS maybe becoming a competitor to Small Solutions would be an issue, but not in this market – there is so much room for growth. Plus SS adds value – they have their own distribution channels, have relations with the Sisters.

GLP works with Livings Goods and Up Energy, which have similar social enterprise distribution models. They also work with farmer cooperatives, MFIs, unions, and NGOs. GLP tries to avoid having them give the product away for free, or subsidized, so as to not distort the market (i.e. by having them include financing component within the price of the product).

Like many other companies, GLP is also fighting against the problems that come with the cheap knockoff versions of solar lanterns. It is a problem throughout Africa in general, across all sectors – markets are inundated with cheap Chinese products. For instance, if the maximum someone can provide is ½ year warranty, then that's a pretty good indicator of bad quality. In Laurens' words, "We will win the battle; it will just take a long time and a lot of resources" to introduce high quality to the minds of the people (products that work, with warranty, and the warranty actually being honored). There are 150 million in East Africa with no access to electricity, and currently only 4-5 million solar users, so the market potential is very large; lots of opportunity. For instance, GLP has sold 150,000 products in East Africa; d.light has sold about triple that.

GLP finds that Solar Sister is unique, not only in being their only partner with a gender-focus, but in that they are reaching to very distant rural areas. SS is doing a very tough job, which is why they are needed. Some of GLPs partners reach into urban, peri-urban areas, but don't get to rural areas. Moreover, People have an alternative for light, even in the rural areas, but no real alternative for phone charging. People need phones more and more for their businesses as well as personal/social life. Rural citizens rely on FM radios on their phones to be connected to the wider world; rural farmers are dependent on phones for information on pricing and markets, etc. From a cost-benefit standpoint for sellers, it makes sense to push the bigger, more expensive lights, but pricing and affordability becomes an issue. On the flip side, margins are smaller with the smaller products. Developing a high volume, standardized, lower cost sales model would be highly advantageous.

Product Statistics:

1. Sun King Eco: $12 MSRP, two year warranty, 5 year lifespan
2. Sun king Pro: $45 (125,000 UGX)