



Market Evaluation: Viability of the SoLite3 in Uganda



Center for Science,
Technology, and Society



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Acknowledgements

We would like to thank Dr. Keith Warner and Dr. Thane Kreiner for giving us the opportunity to participate in unique and stimulating research through the Global Social Benefit Fellowship. We could not have done it without the ground support of our research mentor, Paola de Cecco. Ground support from home included Cyndy Ainsworth, Spencer Arnold, and the team at the Center for Science, Technology, and Society at Santa Clara University.

We would also like to thank Lesley Marincola, Victoria Arch, and Brian Silverthorn of Angaza Design for the opportunity to do this pilot and their wonderful support along the way. Katherine Lucey, David O'Connor, Doreen Kats, and the rest of the amazing team at Solar Sister were such lovely hosts during our time with them in Uganda, and we are very grateful for all their help in supporting our research.

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I. Executive Summary

This report was crafted with the intention of responding to the research question posed to the Santa Clara University Global Social Benefit Fellow (GSBF) team placed in Uganda during the summer of 2013. Angaza Design commissioned our GSBF team to take five units of its newest product, the SoLite3, to Uganda for a pilot using Solar Sister as a distribution channel. The purpose of this pilot was to evaluate whether Uganda is a viable market for the SoLite3.

Unlike other solar lanterns designed for the developing world, the SoLite3 is embedded with Pay-As-You-Go (PAYG) technology. PAYG allows customers of the SoLite3 to finance their purchase incrementally, while giving them immediate access to light and phone charging capabilities. PAYG technology is implemented through a mobile money platform, allowing customers to make payments on their lanterns when they have the money. However, when the time (equivalent to a certain amount of money) runs out, the light will shut itself off. When “shut off”, the SoLite3 will not give light or charge a phone, but can still charge its battery and accept further payments. At the time of the pilot, the SoLite3 was already selling in parts of Africa.

We set out with five units of the SoLite3 to use as a pilot with Solar Sister in Uganda. Our goal was to sell all five products through two or three Solar Sister Entrepreneurs (SSEs). We wanted to sell each product on a PAYG basis through an SMS-based activation system that mimics a mobile money platform. We aimed to keep in close contact with the SSEs we were working with. A concurrent goal we had was to survey the general Ugandan population to learn more about their usage of mobile money.

After giving the SSEs six weeks to sell the SoLite3s, only one SoLite3 had actually been purchased, but all five products had potential customers. We found that none of the customers wanted to use PAYG, preferring instead to wait until they had all the money saved up. We believe this distrust of PAYG is at least partially due to the poor mobile network infrastructure in Uganda that was a limitation for SSEs when demonstrating the SoLite3. Our general market surveys told us that there was widespread usage of mobile money in urban areas like Kampala, but this does not necessarily translate to rural parts of Uganda.

Based on our findings, we recommend that Angaza Design should enter the Ugandan market if MTN mobile network coverage continues to increase in rural areas. Based on the assumption that PAYG is in higher demand in rural markets with high mobile money penetration, we recommend Angaza consider entering Uganda and Tanzania with the same mobile network coverage, and expanding sales in Kenya.

We recommend that Angaza consider developing its own sales team to sell the SoLite3. We recognize that there would be challenges in forward integration and upfront cost, but there are also many advantages to having an internally-trained, dedicated sales team with no alternatives.

In selecting optimal outside distribution channels, we recommend that the choice be based on centralized product knowledge, ongoing support service, high sales volumes, and proper incentives. We believe that there is potential for Angaza to target urban markets by selling the SoLite3 without PAYG technology through the Solar Sister distribution network.

II. Introduction

Since their inception, the Millennium Development Goals (MDGs) have been widely recognized as the central tasks which, if accomplished, could lift billions of people out of poverty. However, the MDGs left out one very important goal: eradicating energy poverty. Access to clean energy has only emerged relatively recently as a necessary foundation for grappling with the eight official MDGs. The United Nations (UN) declared 2012 as the “Year of Sustainable Energy for All”. The UN went on to create a “Sustainable Energy For All” initiative that aims to ensure every person on earth has access to clean energy by 2030. Energy access is now an important driving force of UN initiatives and other international efforts.

Universal access to energy is, without question, an ambitious goal. Eradicating energy poverty will require many different sectors to work together. The telecommunications sector in developing countries is emerging as an important player in accomplishing a variety of MDGs. Mobile network operators (MNOs) have spread rapidly throughout Africa. In June 2012, there were twice as many mobile money users as Facebook users in sub-Saharan Africa¹. MNOs have developed a new type of infrastructure that continues to be leveraged in innovative ways. One exciting industry that has sprung out of mobile networks, largely in Africa, is mobile money. As of June 2012, there were 9.7 million active mobile money accounts in Eastern Africa. The second-largest market for mobile money was South Asia, with 3.8 million active accounts.

The mobile money landscape in Uganda shows promising trends. For the 36 million people living in Uganda², there are over 9.9 million mobile users³ and four mobile money networks⁴. However, according to studies done in 2012, only 21% of all Ugandan households use mobile money. This number drops to 16% in rural households. Uganda's population is 87% rural, compared to only 35% in Kenya, where mobile money has reached a higher level of penetration than in Uganda.⁵ Awareness of mobile money services among nonusers is relatively high, which is indicative of a strong opportunity for growth.⁶ MTN Uganda is the clear market leader in mobile money, capturing 81% of the market share of households with at least one mobile money user.⁷

Angaza Design, a Palo Alto-based design company specializing in Pay-As-You-Go (PAYG) technology, has developed a solar lantern. The SoLite3 incorporates PAYG to leverage existing mobile money infrastructure by accepting incremental payments to

¹ Pénicaud, Claire. *State of the Industry: Results from the 2012 Global Mobile Money Adoption Survey*. Rep. The Bill & Melinda Gates Foundation, The MasterCard Foundation, and Omidyar Network, 2012. Web. 2 Nov. 2013.

² "Population (Total)." Data. World Bank, n.d. Web. 12 Nov. 2013.

³ Ndiwalana, Ali, Olga Morawczynski, and Oliver Popov. *Mobile Money Use in Uganda: A Preliminary Study*. Rep.

⁴ *Mobile Money in Uganda: Use, Barriers and Opportunities*. Rep. InterMedia, Oct. 2012. Web. 2 Nov. 2013.

⁵ ibid

⁶ ibid

⁷ ibid

finance the purchase of a solar light. The SoLite3 has multiple brightness settings, versatile mobile phone charging capabilities, and is embedded with PAYG.

During the summer of 2013, our Global Social Benefit Fellowship team of three Santa Clara University students conducted research to test whether Angaza Design should sell the SoLite3 through Solar Sister distribution channels in Uganda.

III. Research Methods

The following section outlines how we conducted the SoLite3 pilot in Uganda. We transported five units of the SoLite3 from Palo Alto to Uganda in June 2013. Upon arrival at Solar Sister, we first trained the staff and resident technicians on the SoLite3 and its PAYG functionality. Together with Solar Sister, we then selected two sites for our pilot program based on proximity to and accessibility from Kampala. One site was located in Mutundwe, a suburb of Kampala, and the other site was located in Gulu in the northern region of Uganda. Mutundwe should be considered an urban site, while Gulu is fairly rural.

We then chose three Solar Sister Entrepreneurs (SSEs) to sell the SoLite3. The SSEs were chosen on the basis of sales history and mastery of English. After selecting the SSEs, we conducted a product training session in person with the two SSEs in Mutundwe to explain how the product functioned and how to use PAYG functionality with the SMS-based activation system. The instruction sheet we used in our training can be found in Appendix A. We created a price break out that allows a customer to pay in installments over a six month period until the product is fully paid off. This price break out can be found in Appendix B. After the training, we completed a feedback survey to ensure the SSEs understood how the product functioned. Acting on the advice of Solar Sister management and SSE request, we gave both SSEs in Mutundwe two SoLite3 units to sell. To train the SSE in Gulu, we conducted a training session with the Solar Sister regional coordinator managing Gulu, who then trained the SSE. The SSE in Gulu was given one SoLite3 to sell. Currently, we have received no feedback survey from this SSE.

Throughout the remaining five weeks in Uganda we maintained ongoing contact via weekly phone calls and two follow-up visits to Mutundwe. We completed follow-up surveys with both Mutundwe SSEs after four weeks to gather personal feedback from the SSEs on their experience so far selling the SoLite3. Pursuant to the SSE request in Mutundwe, we unlocked four of the five units during the sixth week of the test pilot. After we left, the Solar Sister technician took over primary responsibilities of providing any technical support for the SSEs selling the SoLite3. As of November 2013, we are still in touch providing support to the Solar Sister regional coordinators managing the SSEs with SoLite3 units remaining to sell.

In parallel with the SSE pilot effort, we conducted general market surveys in two urban marketplaces in Kampala. We interviewed shopkeepers to assess their use (or lack thereof) of mobile money. We completed 23 surveys in total.

As a caveat to the following report please note that our SSE sample size is limited and does not accurately represent all the SSEs in Solar Sister. As we mentioned, we selected only SSEs who were proven to be outstanding saleswomen with strong English language skills. This may have introduced a bias in our research, swaying our results to be overly

optimistic. Our sample is almost entirely from urban areas, although only 13% of Uganda's population lives in urban areas. As discussed in the Introduction, mobile money is more prevalent in areas close to Kampala than in remote areas. Our research was skewed because four of our five SoLite3 units were piloted in an urban site. In order to assess mobile money users in remote sites, Angaza would need to conduct trials in those areas. This process could delay market entry.

We used a specially-created SMS-based activation system for the purpose of evaluating PAYG in our research. This functions much differently than the mobile money system that Angaza Design currently uses in other countries. The SMS-based activation system imposed an additional barrier to testing the usability of the PAYG system. Had we used the mobile money system for PAYG, our results may have been different.

IV. Results

During the six week period of our test pilot, one SoLite3 was sold by an SSE in Mutundwe. Even though the customer was given the option to pay for the SoLite3 in smaller monthly increments, the customer preferred to pay for the SoLite3 in one payment. The customer paid the total price for the SoLite3 upfront in cash.

Although only one unit was sold during the two months we were in Uganda, the SSEs claimed to have four potential customers for the other four SoLite3 lanterns. All the other potential customers in Mutundwe were saving up their money until they were able to afford the total price of the SoLite3. From gathering the feedback of the SSEs, we found that customers wanted to pay the full amount instead of in monthly installments because they did not trust the new PAYG technology. Customers feared that the product would stop working, unless they bought it upfront. The SSE in Gulu is currently in the process of unlocking the SoLite3 to sell to a potential customer.

The data obtained from our general urban market surveys show that 78% of Ugandans surveyed used mobile money, and 52% used mobile money regularly.

V. Obstacles to Pay-As-You-Go in Uganda

The following section examines mobile money adoption in Uganda using observations from SSEs, survey data from urban markets, and outside resources. The SoLite3 requires customers to use mobile money through PAYG functionality. In order for the SoLite3 to thrive in the Ugandan market, there are two major requirements: a reliable mobile network with wide coverage, and customer understanding of mobile money. Our findings suggest that although many people are familiar with mobile money in urban areas, the unreliability of mobile networks and low mobile money penetration in rural areas may be a barrier to the success of the SoLite3 with PAYG in the Ugandan market.

Solar Sister entrepreneurs' experience with mobile networks

Since Angaza is considering Solar Sister as a distribution channel it is important that the SSEs fully understand, explain, and are able to demonstrate the functions of the SoLite3. The SSEs' experience with PAYG technology during training demonstrations indicated potential problems that could prevent SSEs from selling the SoLite3. The main problem we were able to observe through the pilot was the poor quality of the mobile network. Although we were able to demonstrate the functions of the SoLite3 smoothly, the SSEs were not able to repeat what we had shown them. Since we were located in Mutundwe, a city close to Kampala, we believe there is an even greater risk for mobile network problems in more rural parts of Uganda.

Follow-up surveys later showed that unreliable network response was an issue for SSEs when demonstrating the product to potential customers. We find this issue critical because it influences a potential customer's trust in the SoLite3's technological capabilities. This was likely a contributing factor in the customers' universal preference to pay in cash and all at once.

Preference to bypass Pay-As-You-Go

Since the SoLite3 uses PAYG technology, the customer has to use mobile money to make incremental payments until the solar lantern is fully purchased. This poses a limitation in rural areas where mobile money is not as common as in urban centers. We visited a small town in the foothills of Rukungiri for an informational session with potential SSEs. Out of the 10 women present, only one used mobile money. Although this is a small sample size, it is evidence that mobile money may not be widely used in rural areas. The PAYG technology's dependence on mobile money limits the customer market base in rural Uganda.

VI. Product Analysis

We were able to observe and gather feedback on customer satisfaction with the SoLite3 during our pilot. We discussed customer needs with the two SSEs selling the SoLite3 and the other SSEs we interacted with during field visits. This section will focus on the qualities of the product that we believe will either attract or deter a potential customer in Uganda from purchasing a SoLite3. The two areas of focus will be the product's features and ease of use.

Features

The SoLite3 is a very high quality solar lantern. In comparison to other solar lanterns in the Ugandan market, the SoLite3 stands out for its bright light. Among the SSEs that were familiar with Angaza Design, many of them commented on the exceptional brightness of Angaza Design's products. This positive feedback indicates that Angaza Design clearly has a brand image for selling bright solar lanterns in Uganda. We found that the brightness feature is an attribute that weighs heavily in the decision process of selecting a solar lantern to purchase. In our research, the option of paying in installments was not the reason customers chose to purchase the solar lantern. It was reported in a

feedback survey by the SSE who sold a SoLite3 that the main reason the customer bought the SoLite3 was because the product was brighter than any other solar lantern option.

Although it was not specifically referenced in our feedback surveys, we believe that the versatile mobile phone charging capabilities of the SoLite3 were also important considerations of the consumer. The SSEs were visibly excited by the phone charging splitter that comes with the SoLite3. Given the high level of competition for solar products in Uganda, phone charging is an essential feature of a successful solar light. The SoLite3 not only has phone charging capability, but caters to eight different types of mobile phones. The mobile phone charging capability and the brightness of the SoLite3 were both features contributing positively to its brand image in Uganda.

Ease of use

When we trained the SSEs to use the SoLite3, we found that they quickly picked up how to control the different brightness settings, the solar charging component, and the mobile phone charging capabilities. However, when the PAYG component of the product was introduced, the SSEs needed more explanation and practice. As previously discussed, we encountered some technical difficulties with the mobile networks. These external factors inhibited the SSEs from learning the complete process of creating an account and adding money to the account. The slow speed or unreliability of the networks also interfered with SSE demonstrations of the SoLite3 to potential customers. The problems encountered in our pilot made the SoLite3 difficult for the SSEs and customers to use, but technical difficulties aside, the SoLite3 would still have required significantly more training than any other product the SSEs were selling. The competing solar products that sell well with Solar Sister are cheaper due to not being sold under a PAYG basis, and require less time on the part of the SSE to learn. There is extra “hassle factor” involved in selling a PAYG product like the SoLite3. Although the SSEs we worked with saw the value of a PAYG system in increasing their potential target market, the hurdles under this limited pilot deployment proved too great, and the SoLite3 was essentially treated as a competing solar light without PAYG.

VII. Optimal Distribution Channels

Because there is a “hassle factor” involved in selling the SoLite3, Angaza Design must carefully select its distribution partners. We have identified four major areas of focus in selecting viable distribution channels:

1. Centralized product knowledge
2. Ongoing support service
3. High sales volumes
4. Proper incentives

Centralized product knowledge

The primary challenge that a SoLite3 distributor will face is training its employees to effectively teach customers how to use PAYG. Every time a new employee must be trained, the distributor will lose time and money in opportunity costs. We believe that the most important criterion in selecting a distribution partner is that this partner will be able to operate through a centralized salesperson with advanced product knowledge. It is imperative that the salespeople have good business and technical skills, as the SoLite3 is more complicated to use than products sold through simple upfront sales and appeals to people with business acumen. Because of the difficulty involved in training, distributors with a few points of sale will be better able to sell the SoLite3 than distributors with many points of sale.

Ongoing support services

Another important quality of a distribution channel we have identified is ongoing support services, which is a major component of Solar Sister's success. Angaza should focus on distributors who make themselves available to their customers on a regular basis. This is very important for the success of the SoLite3 because we found that our services were often required for support, even in the short six weeks we spent in Uganda. Based on our experience, the availability of ongoing support services also helps foster trust between a customer and a distributor.

High sales volumes

In order to justify having few points of sale with well-trained salespeople, each salesperson should have high sales volumes. Angaza should select distribution channels that have a few well-trained salespeople who can sell large volumes of SoLite3s.

Proper incentives

The fourth main focus area in choosing a distribution partner relates to incentives. Our research with Solar Sister confirmed that a financial incentive can be a highly motivating reason to sell the SoLite3. In order to combat the "hassle factor" the SoLite3's PAYG functionality presents, it is very helpful for distribution partners to have a sales team with no other alternatives besides selling the SoLite3. This would help incentivize salespeople to go to the trouble of explaining PAYG, which would increase sales of the SoLite3. It is important for Angaza Design that it chooses distribution partners who can properly incentivize their salespeople.

VIII. Suitability of Solar Sister

We believe that there is potential for Angaza to use Solar Sister to sell the SoLite3 in Uganda. If the partnership is properly executed, Angaza could increase their brand awareness in Uganda and make solar light available to those who couldn't previously afford it. SSEs use their local community networks to sell solar in geographically dispersed regions all over Uganda. This potential partnership with Solar Sister could add value and credibility to Angaza's brand, since Solar Sister is already a reputable organization

throughout Uganda. However, in order to integrate the SoLite3 into the Solar Sister product line the following factors should be addressed: training required and SSE incentives.

Training required

If Angaza were to use Solar Sister as a distribution channel, we recommend that Angaza conduct a training session with all the Solar Sister Regional Coordinators (RCs) and Solar Sister technicians. This would assure that all Solar Sister RCs and technicians understand the unique functionalities of the product. Angaza would work together with Solar Sister to make a training manual on the SoLite3 for individual SSEs, which the RCs would then present at one of their monthly meetings with their respective SSEs. Since the SoLite3 is a high touch product, it is critical that SSEs have the proper knowledge to demonstrate, sell, and support the SoLite3.

The Solar Sister technician is a newly added position within Solar Sister, and would be a critical link in the success of Angaza's integration with Solar Sister. The technician would provide technical support for any customer who has difficulties or problems with the SoLite3. Since the functionality of the product relies on mobile networks, we foresee potential technical problems using the SoLite3. To avoid customer dissatisfaction, we believe Angaza should provide extensive training for Solar Sister technicians on the SoLite3.

SSE incentives

The success of Solar Sister as a distribution channel will hinge on the SSEs' willingness and ability to sell the SoLite3. There needs to be a financial incentive that will motivate the SSE to sell the SoLite3 over other products. Since the PAYG technology is more complex to use than any other solar lantern SSEs currently sell, it requires more time, knowledge, and support from the sale agent. We refer to this added effort as the "hassle factor" the SSE faces when selling the SoLite3. The high cost of customer acquisition should be compensated for when the SSE makes a sale. Our research indicated that since the price of the SoLite3 is the highest among competing products SSEs sell, the SSEs will receive the highest commission from selling the SoLite3 (if Solar Sister policy remains unchanged).

Based on our research, we believe the increased profit from selling a SoLite3 will incentivize the SSE. The unique payment structure made possible by PAYG brings up questions for Solar Sister about how best to give the SSE her commission. There are two options that we considered: all at once, or a little at a time. "All at once" would mean the SSE would get the equivalent of a 10% commission on the whole cost of the product at the time of sale. The "a little at a time" option would mean the SSE gets 10% of each payment, which would add up to the same amount of money as the first option. In order to properly incentivize an SSE to make a sale and to continue to support her customer as further payments are made, we recommend using the second option, or "a little at a time". We recommend a higher upfront payment, from which the SSE receives 20% commission. After this first payment, the SSE would receive 10% of any further payments. This would help reduce the risk Angaza takes by releasing the SoLite3s before they are fully purchased. If a customer prefers to pay the full price of the product up front, then the SSE would get the equivalent commission all at once.

IX. Recommendations

Decision to expand in East Africa

After considering the mobile money markets of East Asia, Western Africa, South Asia, and Eastern Africa, we believe Angaza should focus on expanding market penetration of the SoLite3 specifically in Eastern Africa. Figure 1 shown below gives a visual representation of the number of registered and active customer accounts by region around the world.

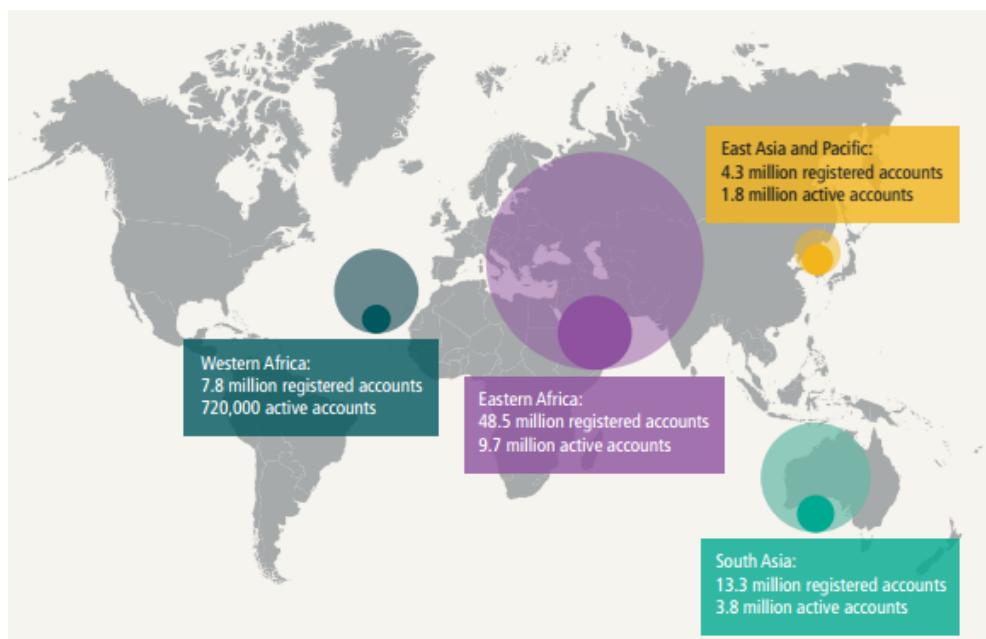


Figure 1: Number of registered and active customer accounts by region (June 2012)⁸

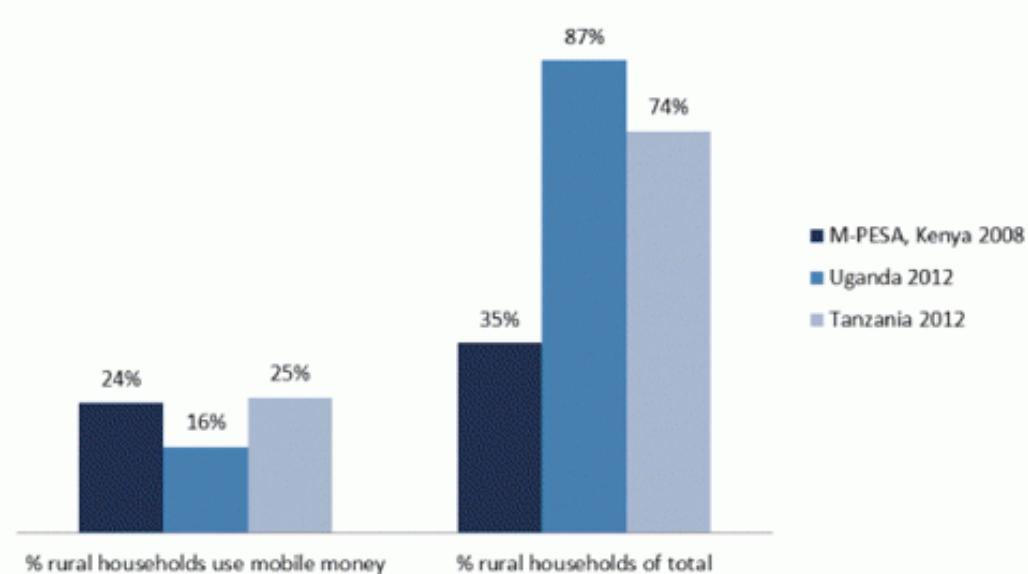
There are more than twice as many mobile money accounts in Eastern Africa as in the second most mobile-money-heavy region, South Asia⁹. We have identified three countries in Eastern Africa that Angaza should consider focusing on based on the following key characteristics: mobile money penetration, rural population size, and level of access to electricity. Mobile money penetration is important because it is an indicator of how many people will understand PAYG functionality on a SoLite3. We selected for rural population size because we believe rural populations are more likely to want the PAYG functionality. Finally, we chose countries that have low levels of access to electricity because these are the geographies that need solar light the most.

⁸ Pénicaud, Claire. *State of the Industry: Results from the 2012 Global Mobile Money Adoption Survey*. Rep. The Bill & Melinda Gates Foundation, The MasterCard Foundation, and Omidyar Network, 2012. Web. 2 Nov. 2013.

⁹ ibid

- Kenya:** More than 80% of cell phone users in Kenya also use mobile money. Kenya's mobile money platform, headed by M-Pesa, is the most developed mobile money system in the world.¹⁰
- Uganda:** 87% of Uganda's total population is classified as rural. MTN Uganda, the mobile money country leader, boasts 4.7 million users.
- Tanzania:** Tanzania has a large rural population (74%) and is increasing mobile network coverage in rural areas.¹¹ A higher percentage of rural Tanzanian households use mobile money than rural Kenyan households.

Shown below in Figure 2 is a graph depicting the percentage of Kenya, Uganda, and Tanzania's population that is rural, and the percentage of rural households in those countries using mobile money.



Source: CGAP Analysis using FITS 2012 surveys for Uganda and Tanzania and report prepared for CGAP by [Tavneet Suri](#) 2012.

Figure 2: Mobile money users in rural households in Kenya, Uganda, and Tanzania

Recommended growth strategies

¹⁰ "How Can the Mobile Revolution Lift up Tanzania's Poor?" *AfricaCan End Poverty*. N.p., 20 Nov. 2012. Web. 07 Nov. 2013.

¹¹ ibid

After considering Angaza's current operations in Kenya and potential market size in other countries, we suggest the following growth strategies:

Strategy 1: Continue expansion in Kenya

Strategy 2: Enter Uganda and/or re-enter Tanzania (where Angaza completed a successful pilot deployment in 2012)

Since our primary research was focused on Uganda, we will outline the options for entering Uganda that we believe Angaza should consider. However, many of these suggestions can also be applied to re-entering the Tanzanian market.

Entering the Ugandan market

We believe Uganda is a viable market for Angaza Design to enter because of its large rural population and the potential increase in mobile money penetration. However, we recommend that Angaza introduce the SoLite3 into the market when the mobile network infrastructure improves and further expands into rural areas.

If Angaza decides to enter the Ugandan market, we suggest that they leverage the SoLite3 product through multiple distribution channels. Angaza should first tap into an already-established distribution business for easy market access to rural customers. To reach urban and semi-urban populations, we believe Solar Sister would be an effective channel, but will likely yield lower sales volume. In addition, Angaza might want to consider developing its own sales team in a specific populous rural region that its other distribution channels do not reach, so as to avoid channel competition.

Rural distributor

Since the PAYG technology will be most successful in rural areas, selecting and partnering with an established business to carry the SoLite3 can be an effective way to reach potential customers. This will require a selection process to ensure this company has proficient skills and proper incentives to drive sales, since there will not be any direct oversight from Angaza. We recommend Angaza use the four focus areas previously discussed as a framework for choosing a viable distribution partner for the SoLite3: centralized product knowledge, ongoing support services, high sales volumes, and proper incentives.

Solar Sister

We believe that Solar Sister has the potential to be a distribution channel. If Solar Sister were to sell the SoLite3 in urban and semi-urban areas without the PAYG technology, we believe it could be successful. People with higher incomes who do not need (and do not want) to use PAYG will still find value in the lantern's exceptional brightness and phone charging capabilities. The drawback of using Solar Sister as a distribution channel is the average sales volume of an SSE each month may not be high enough to meet Angaza's needs. The average SSE sells roughly three solar products a month. Further calculations would need to be done to determine whether average Solar Sister sales volumes could create a viable distribution channel for Angaza.

Angaza sales team

We recommend that Angaza consider developing its own sales team in a specific rural region. This will require selecting and training local individuals to be effective sales agents with specialized product knowledge. We propose that Angaza implement a performance-based commission to foster a highly motivated team with drive to increase sales. We believe that employing an Angaza sales team that has valuable expertise will allow Angaza Design to penetrate the solar market in Uganda. In order to accomplish this, Angaza will need to develop and perfect the capability of hiring qualified salespeople in Uganda and create a training methodology. However, the process of selecting, training, and managing local human capital requires Angaza to forward integrate their business. This will be costly and time-consuming. The value of an Angaza sales team is that such a team would have no alternatives besides selling the SoLite3, which we believe would help them overcome the “hassle factor”.