Republic of Kenya

Republic of Kenya
Preparatory Survey on BOP business on
Rural Electrification Project
Using Digital Grid
In Republic of Kenya

Final Report
Executive Summary

May, 2015

**Japan International Cooperation Agency
(JICA)**

Digital Grid Solutions Inc.
The Digital Grid Consortium
University of Tokyo
Dentsu Inc.
Millennium Promise Japan (NGO)

1．The Purpose and Background of the Research

There are more than 600 million people who cannot use electricity in Sub-Saharan Africa including Kenya, and the number of these people is increasing today. Various off-grid solutions are considered, but still there is no succeeded case.

Considering this situation, Digital Grid Solutions Inc. developed new business named "WASSHA" to serve electricity to people living in low populated and low electrified areas such as Sub-Saharan Africa. The purpose of this research is making a business plan and verifying its effectiveness and its possibility of cooperation with JICA. We held macro and micro environmental researches and the pilot project to achieve our purpose.

Outline of WASSHA service

WASSHA is the name of our new business combining power distribution and developing services. WASSHA enables people to use electricity and promotes developing new services using electricity by using electricity controlling system "Digital Grid" from Japan and renewable energy.

We provide this service by cooperating with owners of Kiosk (small shops) to approach our end-users (the BOP) dotting in off-grid areas. We put Solar panel on the roof of Kiosk and provide following two kinds of services to our end-users visiting Kiosk.

1) Charging service for electronics our end-users own such as mobile phone.
2) Rental service of electronics which our end-users cannot afford because of the cost (e.g. LED lantern, Radio, Tablet, etc.).

As of the above 2), we suppose to let our end-users use LED lanterns and radios at their houses and tablets at Kiosk. In addition, we are considering other services to give our end-users various "new experiences" such as remote medical and education service.

The greatest feature of WASSHA is the electricity controlling system. It is the system developed by University of Tokyo and called "Digital Grid" controlling and supervising electricity by using internet. We can make a business structure preventing missed collection of payment from Kiosk owners by cooperating above mentioned system "Digital Grid" and mobile money[1] used by a lot of people in Africa. We also can remote supervise and control various data other than collection of money by using various functions.

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[1]It is a system which people can pay and get money through via mobile phones. M-PESA from Safaricom in Kenya is one of the most famous one.

Regular Kiosk

We install following items to each Kiosk.

The List of Installation Items

2. The Measure, Object, and Period of the Research

We conducted following three researches.

1) The trend and the prospects of competitors and cooperative companies based on macro business environment
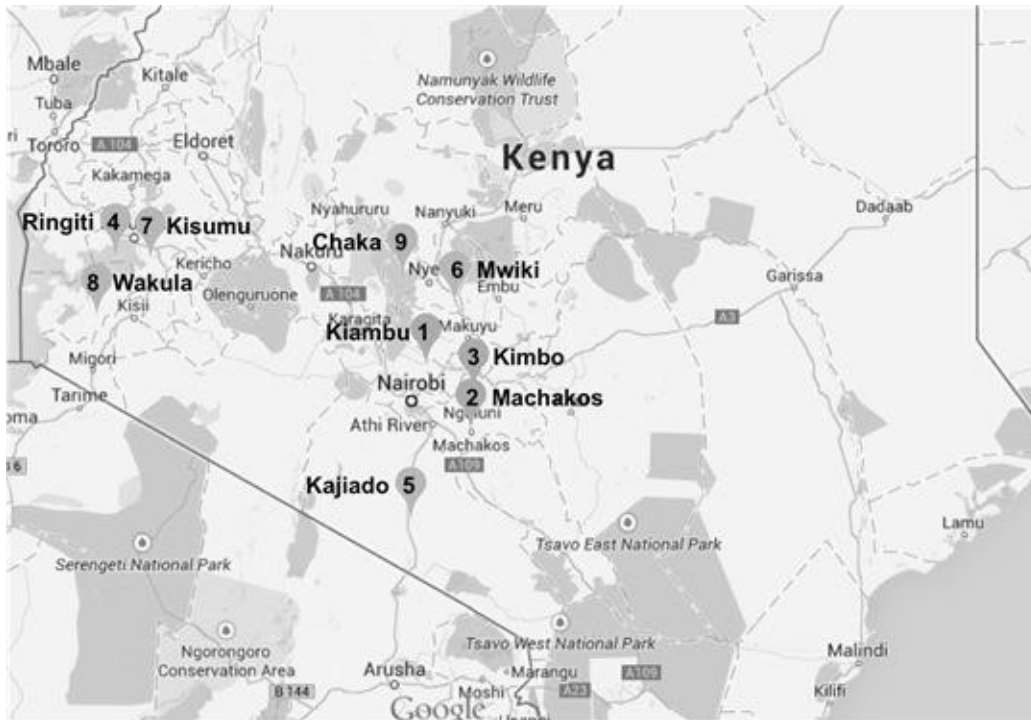
Items of research	Population trend, Economical trend, The state of electrify, Politic trend, Competitors and related technological trend
Measures of research	Desk research, Hearing concerned person
The period of research	From May to June, 2014 (for 5 weeks)

2) Actual life situation of the BOP and actual business situation of Kiosk in off-grid areas

Items of research	Economical activities of the BOP, The energy situation, Marketing channel, Actual business situation of Kiosk owners
Measures of research	• Questionnaire survey by visiting each household and Kiosk (The number of households: about 300) • Interview research by visiting each household and Kiosk (The number of households: 30, Kiosk: 15)
The period of research	From May to June, 2014 (for 8 weeks) ※Including preparation

3) Business model and efficient measures to verify and improve business model

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Items of research	**a) Business model：** Target customers, Value provided, Information about price, Marketing channel, Plans of promotion, Processes of business, Technology spec, Status of cooperation with partners, Profitability **b) Measures to Verify and Improve Business model：** Verifying approach, Frequency of feedback about results of verification, The order of priority of items for improve
Measures of research	The pilot project (Research and verify above mentioned items by practically conducting business at several places)
The period of research	From June, 2014 to February, 2015 (for 9 months)

Pilot Project sites

3. Results of Macro and Micro Environmental Research

The rate of electrify is only 19% in Kenya in today's economic growth and population increase. There are several competitors providing solar home system because Kenya has stable amount of intensity of solar radiation, but none of these competitors have been diffused yet.

As of each household, average of monthly income is about 14,000Ksh and 21% of it is used for utility expenses a month in the community within 100km from Nairobi. Most of people from this area use 720Ksh for kerosene lamps as indoor lighting a month.

More than 90% people own mobile phones in both on and off grid areas and they charge their phones at Kiosk or their own houses. As you can tell from this fact, the highest demanded way to use electricity is mobile charging phones and indoor lighting.
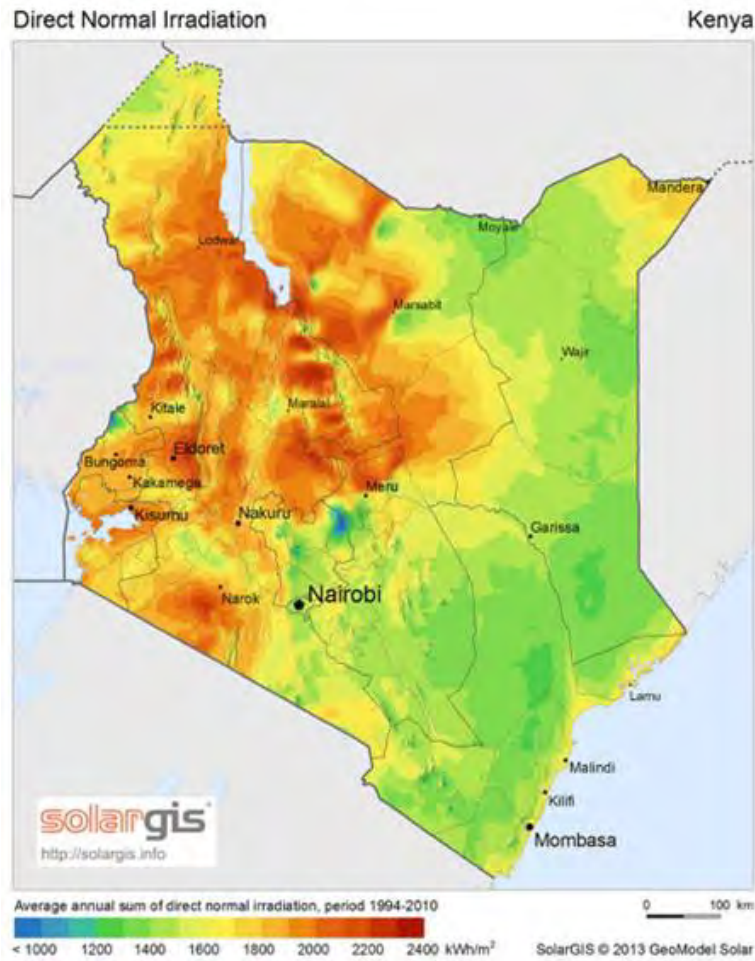
Quantity of Solar Radiation in Kenya (DNI)[2]

4. The Pilot Project

We separated our research to three cycles and verified business models every three months for the pilot project. According to the result of the pilot project, we figured it out that as of customer segment, the majority of our end-user is business users, and as of type of service, selling business is more popular than rental business in Kenya.

We are considering that providing our service at school, church, etc. other than Kiosk. We also try to expand our business by cooperating with NGO and local companies which can get profit by providing electricity to off-grid areas such as financial institutions, mobile companies, and Internet related companies.

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[2] GeoModel Solar, DNI of Kenya(Access date: September, 2014)

Verification of Provided Value

The majority of sales of WASSHA is held by lantern rental service. Considering that, it can be said that the value provided by lanterns meets our target customers' needs even though the total sales of whole Kiosks was decreased from July, 2014 to February, 2015.

What we need to consider is the way to provide our lanterns to customers. In Kenya rental service was not accepted by end-users, so we are going to verify "sales on the installment plan".
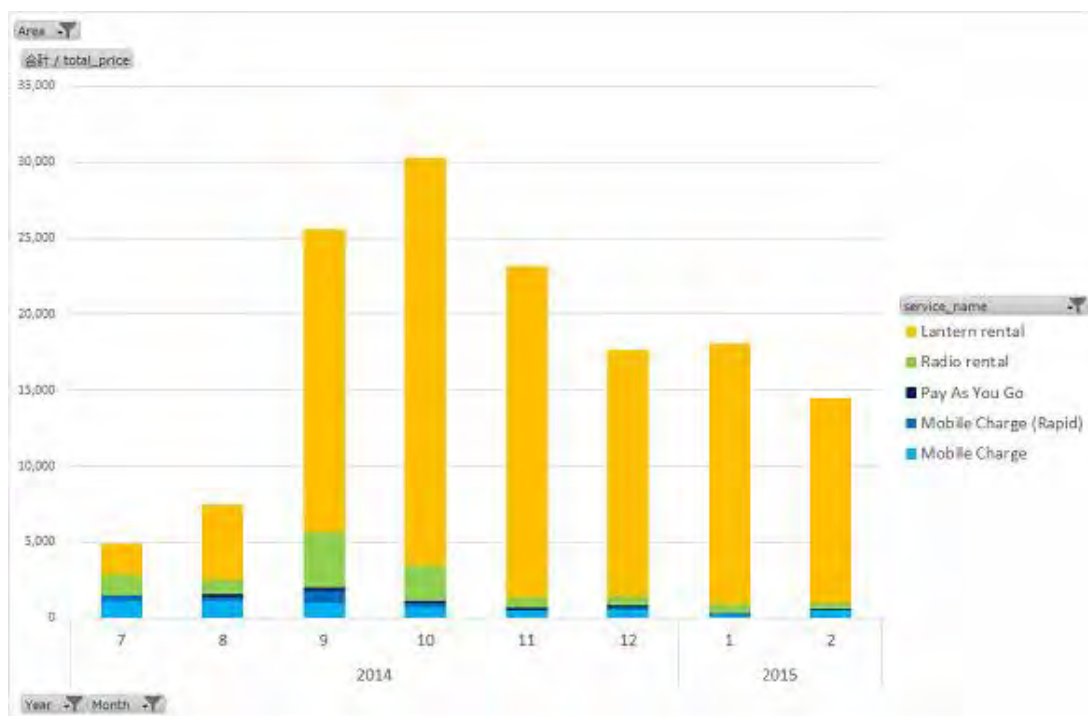
Improve the Relationship with Customers

The following graph shows frequency of service utility by customers at Kiambu, the Kiosk which got the most customers through this pilot project,. The vertical axis is for the number of utility of customers registered during all cycles from 1 to 3.

There were only eight customers who used WASSHA service more than once a week out of total 126 customers for eight moths. Also, there were only 42 customers used more than once a month for eight months, and the rest of 76 customers used few times, but these 76 people did not become repeat customers. We need to discuss plans to make inactive users holding the majority of our customers to be active users.
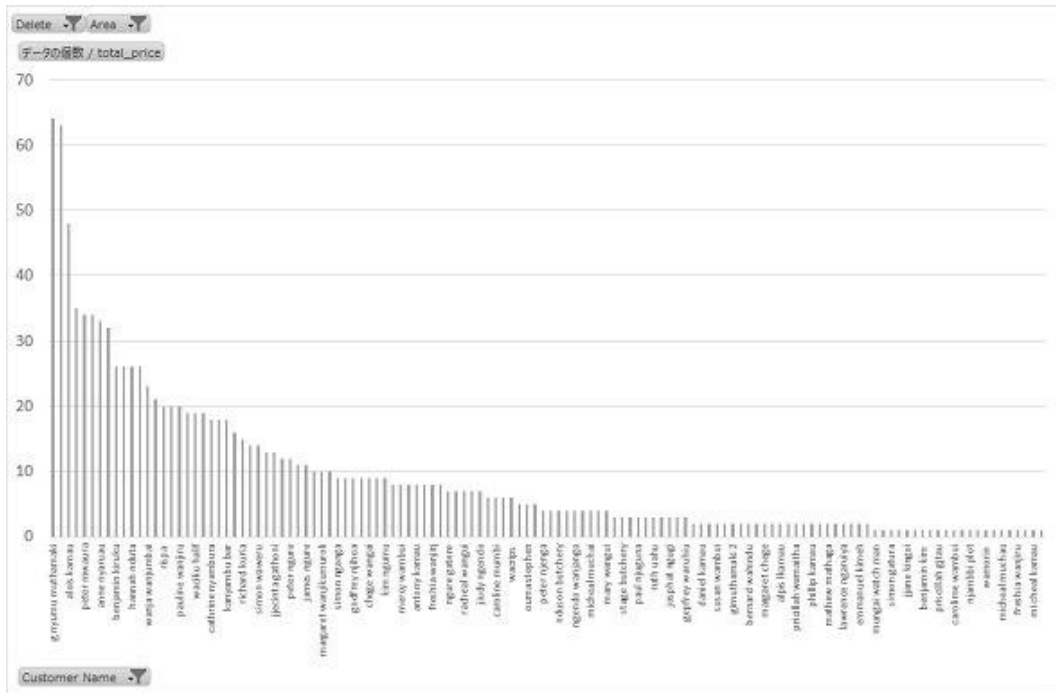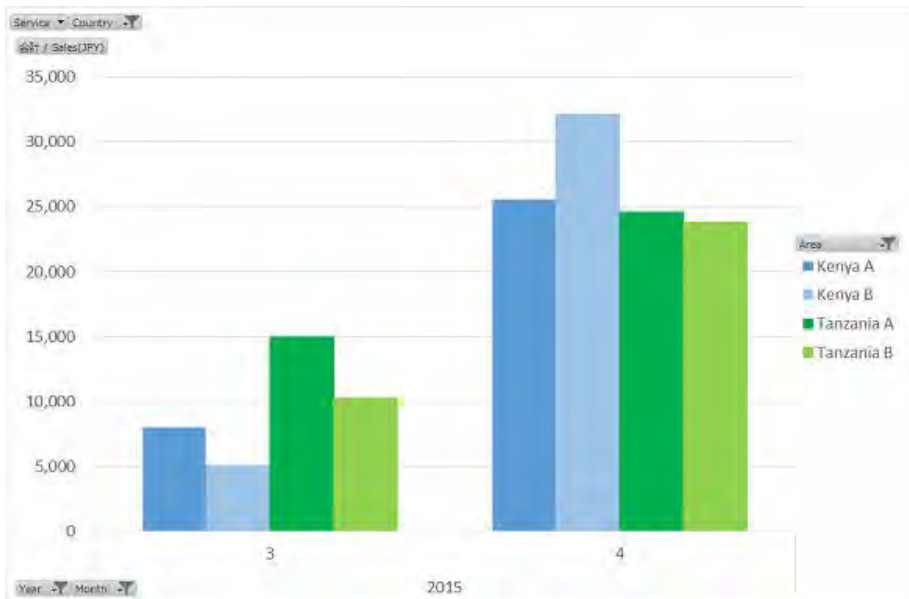
5．Business Plan

　Considering the results of the pilot project in Kenya and the research held in Tanzania around the same time, we have decided to keep proceeding with industrialization.

　In Kenya selling in installments is doing good, and in Tanzania lantern rental service is favorable.

Transition of Sales by Kiosk in Kenya and Tanzania
（from March to April, 2015）

CVP Analysis

We suppose break-even sales is 430 million yen and the number of installed Kiosk is 3,400 this time. Also, we calculated based on the premise of revenue share, we share a part of amount of initial investment and profits from Kiosk with partner companies, and the average sales per a Kiosk is sixteen-thousand yen.

The reason why we set the amount of sales per a Kiosk as sixteen-thousand yen is that two Kiosks in Kenya conducting selling in installments and two Kiosks in Tanzania recorded the average sales about twenty-seven-thousand yen. We introduced our service to all of them after we have done with the pilot project. If we set the rate of our sharing with our partners as 60%, our profit will be sixteen-thousand yen.

These Kiosks in Kenya and Tanzania were installed on March and recorded about twenty-seven-thousand yen as sales after two months from installation. After this, it will be an issue for us to increase the number of Kiosks being able to earn about the same level of the sales as previous mentioned Kiosks, but it is possible for us to solve this issue by selecting areas and Kiosk owners to be installed based on experiences from the pilot project.

We have already got about 170 million yen to invest which we need until we attain the break-even point from each companies such as venture capital the end of 2014. The use of funds is mainly for research and development, initial investment of WASSHA service, personnel, and sales and general administration expenses.

Operating Balance Forecast

(JPY)

Items	FY2015	FY2016	FY2017
Sales	34,470,000	354,110,000	1,264,048,000
WASSHA service	25,470,000	334,110,000	1,224,048,000
Marketing service	9,000,000	20,000,000	40,000,000
Sales cost			
Initial investment for WASSHA	61,100,000	101,000,000	180,000,000
Gross margin	(26,630,000)	253,110,000	1,084,048,000
Selling, general and administrative expenses			
Japan	40,800,000	53,040,000	79,560,000
Kenya	20,400,000	26,520,000	39,780,000
Tanzania	20,400,000	26,520,000	39,780,000
Research and development expenses	40,700,000	10,400,000	2,400,000
Operating profit	(148,930,000)	136,630,000	922,528,000

Future Issues

Our future issues are maximizing sales of Kiosk and decreasing the cost of hardware.

As of maximizing Kiosk's sales, we need to keep verifying customers segment and verifying the combination of customer segment and provided values they need.

As of decreasing the cost of hardware, we plan to make a hardware-prototype with minimum spec and promote cutting cost.

6. Verifying the Effect of Development

We verified the effect of development if WASSHA service is conducted at 3400 Kiosks. We did a trial calculation about how big impact previous mentioned each development effect index value has through the development of DGS's business and figured out that we can expect certain effect of development.

Premises：

• Suppose we get 3400 Kiosks reach break-even sales
• Suppose the number of beneficiary is 340,000 households or business users.

1) Cutting living cost of end-users by reasonable electronic rental service

• **Effectiveness indicator of productivity improvement**

Items	Objects of measurement	Measures of measurement	Result	Units
Extend business hours	Business users	Hearing	**3.5 hours**	hours/day
Increase sales	Business users	Hearing	**20～30USD**	USD/day
Extend study hours	Household users	Hearing	**2.5 hours**	hours/day

According to hearing to existing end-users, business users closed their shop at sunset. However, they can extend their business hours for about 3.5 hours in average by using lanterns. Also, they can earn additional 20~30 USD in average thanks to lantern usage.

• **Cutting living cost**

Items	Objects of measurement	Measures of measurement	Result	Units
Cutting cost of utility expenses	Household user	Hearing	**1.5～2USD**	USD/day

As of utility expenses, our end-users can save from 1.5 to 2USD a day by using lanterns as substitutes for kerosene lamps and phone charging.

2) Improve end-users' fitness by using lanterns as substitutes of kerosene lamps

- **Index of improve fitness**

Items	Objects of measurement	Measures of measurement	Result	Units
Discomfort（smell）	Household user	Hearing	○	-
Discomfort（soot）	Household user	Hearing	○	-
Ophthalmalgia	Household user	Hearing	○	-
Irritation in the respiratory organs and the throat	Household user	Hearing	○	-
Headache	Household user	Hearing	○	-

As of improve fitness, almost everyone answered that using lanterns improve all of items. Kerosene lamp users feel discomfort especially about smell and soot, and our lantern can improve these points very effectively.

3) Increase sales of Kiosk owners by introducing WASSHA service

Items	Objects of measurement	Measures of measurement	Result	Units
Increase sales	Kiosk owners	Dashboard and hearing	**245USD**	USD/month
Cutting cost	Kiosk owners	Dashboard and hearing	**195USD**	USD/month
Increase and decrease of profit	Kiosk owners	Dashboard and hearing	**50USD**	USD/month

Each Kiosk can get additional profit of about 50USD a month based on data of Kiosk's sales, cost, and profit in both Kenya and Tanzania from the pilot project and hearing survey about increasing the number of customers and sales of existing items by conducting WASSHA business.

4) Creation of new industries and job in off-grid areas

Items	Objects of measurement	Measures of measurement	Result	Units
The number of launch of new services	Business users	Hearing	**5100 times**	times
Increase and decrease of number of employees	Business users	Hearing	**1540 ~ 2550 people**	people

Majority of Kiosk owners in Kenya and Tanzania are entrepreneurs and they do not hesitate to try to conduct new business which they think they can make some money, and succeeded business are diffused very quickly. In case of that we install our WASSHA service to 3400 Kiosks, it can be considered as that more than 5,000 new services are launched by underestimating that half number of Kiosks launch new services about three times a year.

When it comes to try new services by oneself, people will get more fail than success. However, we assume if about 10% is succeeded and there will be from three to five new jobs in average per service out of 510 services, the total number of new employees will be from 1,530 to 2,550.

7．The Possibilities of Cooperation with JICA

There are a lot of possibilities to cooperate with JICA projects. Especially, it has the highestpossibility to cooperate with us that "AFRICA-ai- JAPAN Project : African Union - african innovation - JKUAT AND PAUSTI Network Project" in Kenya.

We already started to make some arrangements to cooperate with it and conducted a big workshop and a technological demonstration to the people related to the project and students. Concrete ideas for cooperation are following four items.

1) Joint study of local development and producing of hardware
2) Joint development of local development of software
3) Accept interns of students
4) Joint business at pilot sites

The workshop with people related to projects of JKUAT

The demonstration for people related to JKUAT project

We got many questions from teachers teaching technology. Also, teachers from off-grid areas said they want to conduct pilot installation at their hometown.

The presentation for students

About 100 students listening to the presentation

We put students in groups and ask them to make a plan of new business using WASSHA

8. Future plan / Next actions

On March 2015, as a part of expansion project, DGS has introduced new business model on a trial basis to Millennium Village in Sauri. We plan to expand our business model to the other Millennium Villages in other countries collaborating with MPJ, and consider collaboration with companies have a rural network so that we can increase the number of Kiosk as our agent.

Briefing for potential agents

Inspection of potential area before installation

Hearing survey at the meeting of farmers, our future end-users,

We explained our services to the residents in Sauri at a local meeting, and checked usage rate of mobile phone and competitive services. After the meeting, we got the positive feeling from local people.


Briefing for potential end users

We gave an issue to the potential agents should get 40 potential end-users before installation. And then, enthusiastic potential agents achieved the target number within a day. This photo shows Mr. Bernard, a potential agent, explained our services to his potential end-users.
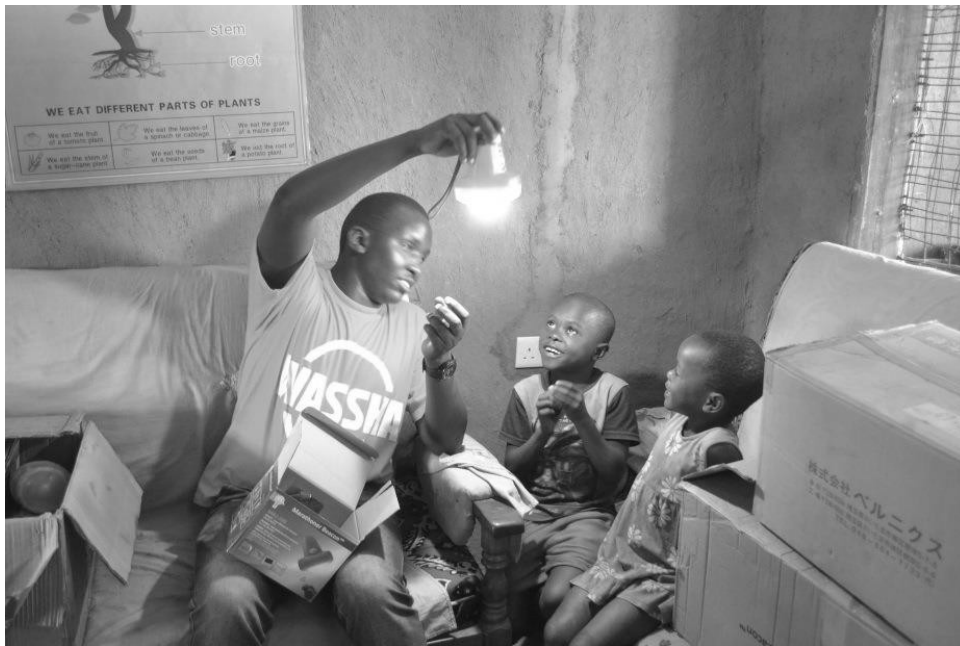
A scene of installation

We chose Mr. Bernard as our agent in Sauri and installed devices to his house.
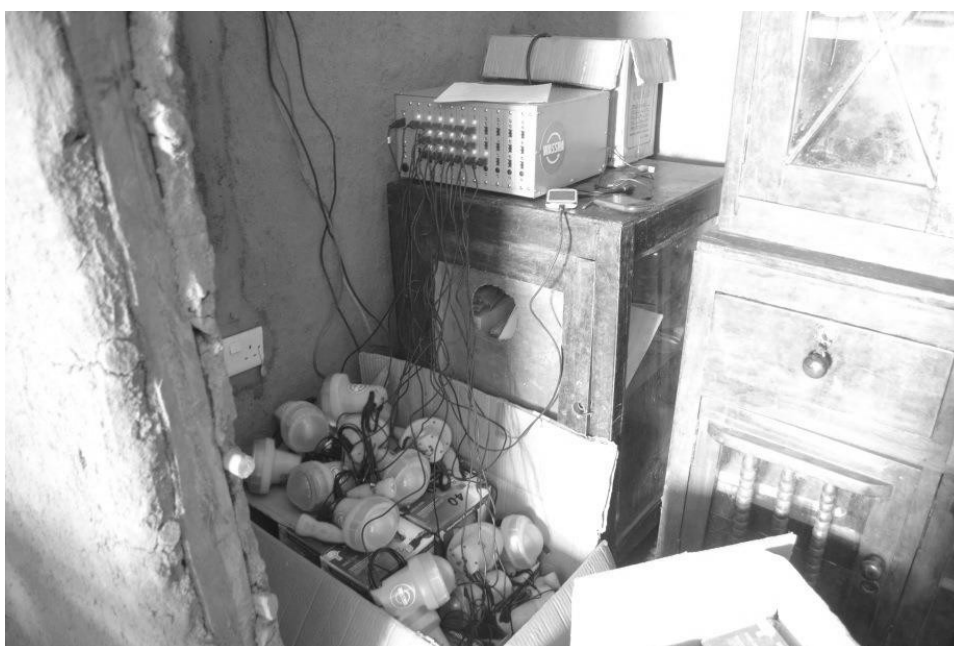
Start the operation

After installation, we checked every operation, 40 lanterns were leased so that all potential end-users can use lanterns. If you can see the red lamps on charger box, which means battery charge of lanterns goes on.

Our lanterns bring children happiness

DGS staff showed brightness of our lantern to the children of Mr. Bernard. Our lanterns make them smile, and they can study at night using our lanterns.

Our agent's mother is the first end-user

The first end user was mother of Mr. Bernard. She is not only just an end user, but also an influencer. Throughout the community network, end users would be increased.