MECS Final Project Report (public version)

Using solar kiosks to distribute ECOCA electric cookers to rural women groups

ECOBORA COMPANY

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Executive Summary

22 million women and girls in Kenya use firewood to cook for their families on a daily basis. The traditional cooking methods come at unproportioned social, environmental and economic expenses, especially for women who bear most of the monetary and health costs with expenditures on wood fuel of Ksh150 every day and furthermore, walking long distances to forests to collect firewood, apart from that the cooking techniques themselves harm women and their families' health because of poisonous smoke from open fires which annually results to 21,560 female deaths annually.

Considering the precarious economic situation and no infrastructure, clean alternatives to the traditional cooking methods cannot reach these communities. They are regarded as risky markets from investor / solar energy technology suppliers.

To overcome these gaps in infrastructure, Ecobora worked with selected and vetted women groups where we trained them on the usage, benefits and even repair and maintenance services to ECOCAs electric stoves. The stoves were stocked in their solar kiosks as the last-mile distribution points and sold to the group members and the community.

Building on Ecobora's existing consumer database, we used pay-as-you-go technology to sell and distribute along with distribution kiosks to reach last mile customers. The impact of solar kiosks which stocked and sold other solar products, agricultural products and even life changing products created traffic so that purchasing power of these women groups could go higher.

This was a grant driven pilot project which utilised Ecobora's networks. 20 women received the ECOCA, and are paying over 5 years for the system on a pay as you go basis, secured by their membership of their local women's group. Savings to their monthly fuels expenditure have been made and repayment rates are steady however the sample is small. 2 of the 20 ECOCA failed during the time of the project. The repayment projection of 5 years is only possible because the project was a grant and does not include any cost of capital (ie no interest rate on the initial finance required for Ecobora to obtain the systems) – this would change in a scaled response. There is qualitative data on stove use from surveys, but no measured use data presented.

Ecobora with support from PESITHO trained the 5 women groups, 15 solar kiosks operators, 10 youth ambassadors and the community on ECOCA. The first training focused on the 10

ambassadors to understand how the product works, how the repair and maintenance would be done and even on objectives of the project and their roles.

The second training focused on the women groups and together with the ambassadors we trained all the women in each group on how the product works, the benefits of the products and even on best practices when they market and sell the ECOCA to community women. This training was followed by cooking demonstrations in each solar kiosk during market days where the community learnt how the stove works and even see the stove cook their local delicacy, allowing them to taste the cooked food.

The report outlines many of the challenges faced by the project.

Finally, the qualitative survey data on the ECOCA usage and the payment default rate helped Ecobora consider a sustainable supply chain of selling and distributing ECOCAs through women groups powered by solar kiosks in rural communities in Kenya. While demand seems to be high (there are 744 women who expressed interest to get such systems) Ecobora concludes that they will not seek to raise capital for substantial scaling until

- The prices of ECOCAs can come down to $250
- Ecobora would be able to break even with sale of ECOCA at 24 months

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1. INTRODUCTION

350,000 families in rural Nyamira are forced to walk long distances to access few shops to purchase essentials which are overpriced denying these communities essential goods and services. Women in Nyamira face gender-based discrimination at workplaces where from the community cultures women are required to remain at home and fend for their children and work in the small family gardens but kept away from running micro-enterprises and thus, they are in dire need of platforms to improve their economic status.

Energy solutions such as electric cook stoves and other solar power life changing solar products such as solar pumps, solar lanterns are difficult to reach and these households.

Ecobora has been working with rural marginalized women groups where for the past 6 years Ecobora has being developing strategies to supply and distribute energy products and life changing products to rural marginalized women and communities.

During this process, Ecobora discovered firsthand challenges rural women faced to access and afford clean cooking technologies as most providers of these products saw these women as a risky market because they wouldn't afford to embrace new solar cooling solutions due to low purchasing power.

Ecobora in partnership with Pesitho who have been manufacturing and supplying ECOCAs in African markets decided to help the rural women groups overcome these gaps.

ECOCA AND HOW IT WORKS

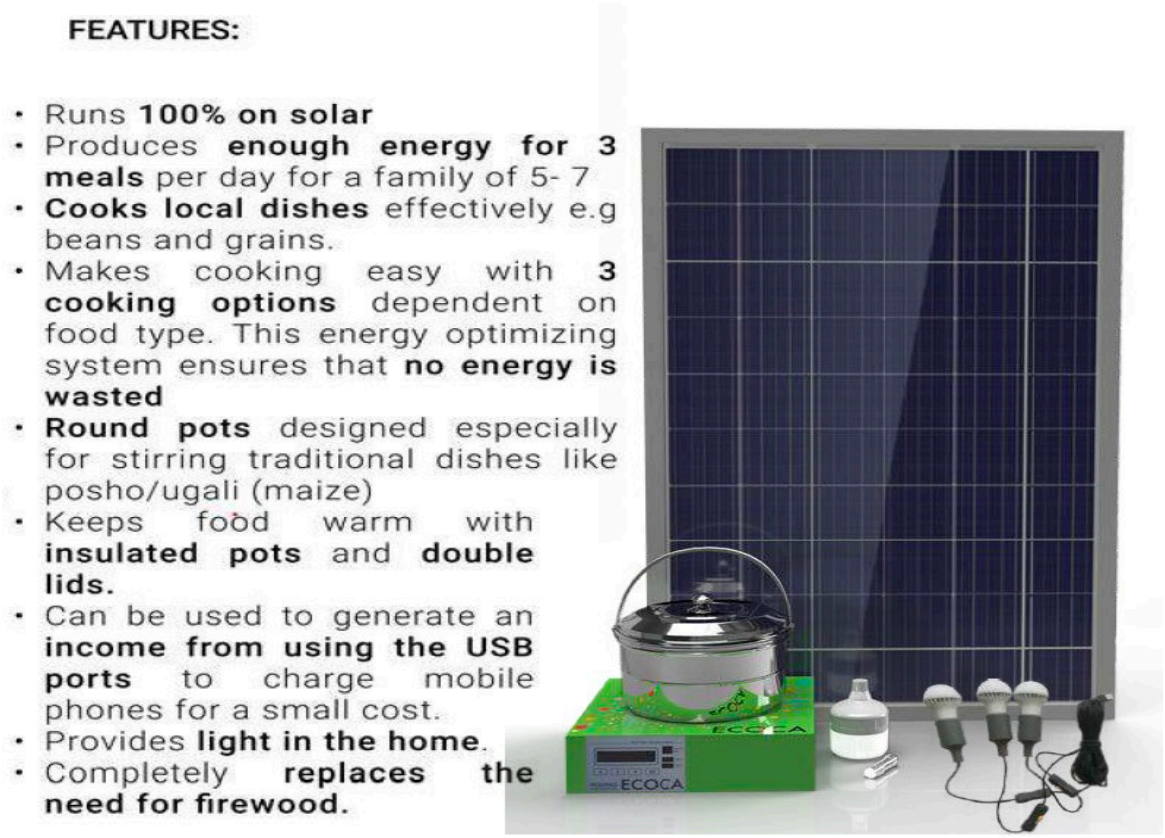
ECOCA a product of Pesitho and is a solar powered stove that runs on 100% solar. It has three parts names: solar panel, the stove and cooking pans of 5 litres each. During the day, the solar panels capture the sun and the energy is stored in the battery inside the stove where at the evening it is used to provide energy and cook food.

- Technical specifications: Energy capacity of solar panel, run-time when fully charged and no. of devices that can be recharged using energy from solar panel

The ECOCA has 3 parts i.e. solar panels, cooker and the cooking pots. The solar panel that powers the ECOCA is 300W and the ECOCA comes with 1 panel. The cooking pots are 2 in number, and they are five litres each that can serve a family of up to 7 people.

The number of meals cooked per day using ECOCAs rely on the specific solar panel and the weather. Ecobora's women groups, say they comfortably cooked 2 meals a day i.e lunch and supper, although it is known that it depends on the energy balance on a sunny day and the energy balance on a non-sunny day. While Ecobora had some data supporting the assertion that energy obtained from 200W solar panel can cook 3 meals a day, this data is not presented.

The following advert for the Ecoca suggests the system produces enough energy for 3 meals a day, but the project was unable to substantiate this with evidence.



We believe the ECOCA has been successful in our 5-target region for the following reasons:

ECOCA is 100% solar powered taking away the need for the women to buy fuel to cook their foods.	Most respondents stated they had reduced their other fuel consumption but not eliminated it

The excess energy from ECOCA offers lighting to our women reducing their spending on purchasing paraffin to light their lanterns.	There were no records or data available on the other uses of the panel and the reduction in paraffin purchase.
We fitted the ECOCAs with Pay go allowing the women to pay for the energy they would need per day.	There are records and evidence of consistent payments being made for the system.
Ecobora capacity built all target women through demos and ensured a smooth change from firewood to ECOCAs.	There is evidence that women know how to use the system.
Lastly, Ecobora has been working with these women groups for more than 5 years.	This project was limited in scope and did not include reporting on the 5 years of work.

The failure rate of Pesitho cooking stoves, based on usage and current data is **about 10%.** The company's ability to offer repair and maintenance services to customers using ECOCA is illustrated by the adequate training provided to technical staff and customer facing personnel (brand ambassadors). As per current company records (Solar-powered cooking stoves delivered to customers in March 2024):

- 10 brand ambassadors have been trained on how to effectively provide repair and maintenance
- Based on total number of trained personnel, 3 are women
- About 2 cooking stoves broke down, requiring repair and maintenance
- 18 solar-powered cooking stoves were functional, hence did not require any repairing services or maintenance

The breakdown rate for ECOCA is about **10%** ([2 / 20] * 100; computation is based on 20 cooking stoves). This is a good baseline rate that depicts the good quality of the product and

effectives of customer support services provided by Ecobora. Consumers are assured of effective customer support, thus strengthening their trust in the cooking stove brand (ECOCA). The breakdown rate can be reduced in future as demand for the cooking stoves increases thus ensuring customer experience associated to ECOCA brand is positive.

During these project Ecobora faced a few challenges:

- We only had 20 ECOCAs to give to 5 women groups but during the process, we had 706 women register to pay to also get the ECOCAs. Therefore, Ecobora was unable to procure the additional ECOCAs to offer its women groups. The cost of the ECOCA was 500 pounds, which was very expensive and the cash flow generated from the 20 ECOCAS was unable to finance a new set of order. The current paygo model gives Ecobora a 60-months breakeven.
- Assuming the break-even is 60 months and customers are price-sensitive, the number of cooking stoves available would be sold to the clients based on the current PAYGO pricing model. There would be no future price increases for the 60 months (5 years) it takes for the client to fully own the Pesitho stove.
- Based on the current company data detailing distribution and usage of 20 Pesitho cooking stoves, the repayment schedules of users of the cooking stoves can be forecasted below:

Up Front Payment	**Year 1**	**Year 2**	**Year 3**	**Year 5**	**Year 6**
$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48
KES 1400 per month KES 16,800 per year	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48

*Currency exchange is $1 =130.6	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48

It can be noted that at the start of the project the groups were offered other options for repayment, most of which were discounts on the full system cost. However, in order to recover the full system cost, the repayments were set as above.

Available repayment schedules and marketing conditions

These vulnerability groups were all offered the option among five different repayment plans, with the expectation that their choice would differ. The repayment plans reflected in the below table were presented as an introductory price with limited units available for sale. It was clearly communicated that it was unknown when ECOCAs again would be for sale and that the price offered might be higher in the future. The total price is higher the longer the repayment period chosen to cater for the additional costs of offering credit, in order to ensure financial sustainability of the repayment models.

Up front	**1 YEAR**	**2 YEARS**	**3 YEARS**	**5 YEARS**
$0 per month Total: $175	$16 per month Total: $192	$8,5 per month Total: $204	$6 per month Total: $216	$4 per month Total: $240
UGX 0/month Total UGX 700,000	UGX 64,000/month Total UGX 768,000	UGX 34,000/month Total UGX 816,000	UGX 24,000/month Total UGX 864,000	UGX 16,000/ month Total UGX 960,000

- The activity "purchase, importation and distribution of ECOCAs to our 5 vetted women groups" was delayed starting because the supplier had wanted the full payment of 10,000 pounds so that they could begin manufacturing and supplying them to Ecobora. The ECOCAs were supplied from PESITHO to their Ugandan office where Ecobora went and picked the 20 ECOCA units. We had lengthy discussions and negotiations with them where we collectively agreed Ecobora send 5,000 Pounds so that they can make our order of ECOCAs and deliver it to Ecobora in a month's time and the balance shall be paid to when Ecobora receives the next disbursement. This delayed the beginning of the project.
- We also had huge transport and boarder clearance cost at the Uganda-Kenya border to transport and cross over the ECOCAs from Uganda to our offices in Kenya.

FIG: Firewood stocked outside one of the women's homes who was given an ECOCA

Our supply chain activation plan involved:

- Working directly with these marginalized communities where the core part of the model involved using existing Ecobora solar kiosks as last mile distribution points.
- Stocking and distributing the ECOCA stoves to women members and the community making our women groups product ambassadors and supporting their selling process, after sales, community education and also offering repair and maintenance services to their customers.

Aims of the project

We selected 5 women groups and 5 solar kiosks from our data base from the target region where on average each group has 65 women members. Each group provided 1 solar kiosk where the 4 sets of ECOCAs were stocked and sold to members and the community.

The selected 5 solar kiosks were able to serve a village area of 7500 people. These women groups and solar kiosks were vetted and selected based on a number of factors:

- Their past solar kiosk sales performance of their agricultural products

- Number of community members the solar kiosk could reach
- The collective amount of group savings per month
- The potential members
- The close proximity with each other so that Ecobora could create a concentrated market to make it easy to sell the ECOCAs and offer training and capacity building.

For the above factors that informed our selection of women groups, each selected group had to meet the following threshold conditions:

- Their past solar kiosk sales performance of their agricultural products was at least $50 per month per solar kiosk.
- The solar kiosk could reach could serve a community of at least 1,500 community members
- A group that is able to make at least $60 as savings per month
- The group must at least have 30 registered and active members
- The close proximity with each other where groups could lie between a 10km radius so that Ecobora could create a concentrated market to make it easy to sell the ECOCAs and offer training and capacity building.

Objectives of the project

Our overall objective was to work with selected and vetted women groups in rural Kenya to distribute ECOCAs through our network of solar kiosks acting as last mile distribution points in these marginalized communities.

The following were the specific objectives of our project.

- Create a supply chain activation plan which involves working directly with these marginalized communities.

- Target women groups in the central region of Kenya villages where Ecobora has 13 solar kiosks with more than 652 women as members.

- Select 5 women groups and 5 solar kiosks from our data base to participate in our project from this target region where on average each group has 65 women members. With each group providing 1 solar kiosk where the 4 sets ECOCAs will be stocked and sold. The selected 5 solar kiosks will be able to serve a village area of 7500 people.

- Enroll 2 existing Ecobora ambassadors and 10 youth ambassadors who will be trained to support our solar kiosks and women groups with ECOCA sales and inventory management.

- With support from PESITHO, train the women groups, 15 solar kiosks operators, 10 youth ambassadors and the community on ECOCAs.

2. METHODOLOGY

We used our sales and inventory management system to collect data on supply and demand from PESITHO to ECOBORA then to our SOLAR KIOSKS to predict demand.

We used the sales channel information of assembling the ECOCAS in Kenya to develop a business and financial model analysis tool that we optimized to enable us plan how to scale the ECOCAs from 20 women to 700 plus women in our data base.

We used the current data on our solar kiosk performance, distribution costs of our solar products and PESITHO's unit cost economics which we integrated with the new data. This allowed us to verify our sales and market reach assumptions. This helped to distribute and sell ECOCAs via our women groups powered by our solar kiosks.

The unit economics of the business are displayed below as time taken to break-even and unit price paid per month. It should be noted that this research grant was unable to kick start a sustainable supply chain. Since PAYGO was being used, the cost recovery of the systems does not occur until year 5. The payment schedule also has not taken into account the real cost of forward money (the interest rate of borrowing capital to execute such a scheme at scale).

Based on the current company data detailing distribution and usage of 20 Pesitho cooking stoves, the repayment schedules of users of the cooking stoves can be forecasted below:

Up Front Payment	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48
KES 1400 per month KES 16,800 per year	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48	$10.79 per month Total per annum: $129.48
*Currency exchange is $1 =130.6	$10.79 per month	$10.79 per month	$10.79 per month	$10.79 per month	$10.79 per month

	Total per annum: $129.48	Total per annum: $129.48	Total per annum: $129.48	Total per annum: $129.48	Total per annum: $129.48

Purchasing power

We equipped each women's group with 4 ECOCA stoves and challenged them to sell to their members using pay-as-you- go model. We used their group savings as security. Using the pay-as-you-go we collected data on ability to purchase. This data combined with data on how much the women were spending on charcoal and firewood per day i.e $1.5 to cook meals for their families allowed us to determine their purchasing powers. By also accessing the women group's savings, we were able to determine the stocking value of each women's group.

Data was collected on ability to pay by our target women by checking and analysing the time the stove was used, duration and amount paid and the number of days used per month. This data helped with pricing, marketing and even offering sales incentives to increase our sales. By analysing each group's savings per month through our sales growth tool kit, we were able to determine and focus our capacity building and sales rewards accordingly.

Analysing the performance of each kiosk is important for Ecobora; tracking sales margins and volume displays the women group's ability to pay monthly recurring fee thus de-risking the chances of payment defaults from customers in the women group using ECOCA.

Data for the current women group's kiosk for the months of January and April (fiscal year 2024) has been analysed to ascertain the kiosk's performance.

The output of the analysis is detailed below:

- Total revenue generated by the 5 women groups from January – April was KES 336, 270
- The best performing women's group was **Kaptich Widows.** Total revenue generated by Kaptich Widows was KES 90,750.

REVENUE GENERATED BY ALL WOMEN GROUP FOR PERIOD JAN - APRIL 2024	
Row Labels	**Sum of Revenue**
Thiranga Women	Ksh49,950.00
Getembe Women	Ksh52,640.00
Heroes of Faith	Ksh68,650.00
Tumain Women	Ksh74,280.00
Kaptich Widows	Ksh90,750.00
Grand Total	**Ksh336,270.00**

Figure 1: Revenue generated by women groups

- Total savings of all women group for the period January – April 2024 was KES 55,500
- The best performing women's group in terms of total savings was **Heroes of Faith**. The total amount kept as savings by Heroes of Faith was KES 14,000.

TOTAL SAVINGS BY ALL WOMEN GROUP FOR PERIOD JAN - APRIL 2024	
Row Labels	**Sum of Savings**
Getembe Women	Ksh8,000.00
Thiranga Women	Ksh8,000.00
Tumain Women	Ksh12,000.00
Kaptich Widows	Ksh13,500.00
Heroes of Faith	Ksh14,000.00
Grand Total	**Ksh55,500.00**

Figure 2: Savings generated by women groups

We used the past information on using pay-as-you-go on selling ECOCAs to minimize risks and to ECOCAs breakdown and even repairs. We integrated the available data to minimize our product risk by having MOUs with the women groups and using their savings as security.

Use of sales & inventory management system

Each solar kiosk acted as our last mile distribution point and was equipped with an android mobile tablet with a sales & inventory management software that was accessed by Ecobora and the women groups.

We observed the ability to record their inventory and sales on the sales tool kit and tested the number of orders that was generated through the mobile tool. The sales tool analysed each solar kiosks performance allowing us to determine the inventory turnover, most selling goods, high traffic hours, and number of items taken on loan.

We determined the number of defaulted ECOCA payments and lastly we accessed, through in-depth interviews with the groups, the ability and eagerness to use our sales tool. We also used existing data of the number of women groups and their solar kiosks to predict and manage our sales process to minimize losses and defaults by members.

FIG: Ecobora distributing ECOCAs to selected wom

Effect of ECOCA on cooking culture

The women groups conducted communal cooking in their solar kiosks, serving local food and offering food tasting. We collected information on the food tasting with a food taste data sheet.

Ability to pay

We collected data on ability to pay by our target women by using our excel sheet generated data from the women with ECOCAs.

We learnt the time the stove was used, duration and amount paid and the number of days used per month. These data helped with pricing, marketing and even offering sales incentives to increase our sales. By analysing each group's savings per month through our sales growth tool kit, we were able to determine and focus our capacity building and sales rewards accordingly.

Past learning on using pay -as-you-go on selling ECOCAs was used to help Ecobora design a pay go pricing model to help reduce default rates by Ecobora women who were given the ECOCAs.

The available data was integrated to ensure we minimized our product risk by having MOUs with the women groups and of using their savings as security. We used data on the women's savings to qualify which woman could be issued with an ECOCA. They group savings were used a security where in case a woman defaulted payment or damaged the ECOCA.

FIG: Cooking using the ECOCA stoves

Cost of saving

Women groups were equipped with ECOCAs where they used pay-as-you-go to access energy and cook. For a period of 4 months, we gathered data by using our inventory software and pay-as-you-go data.

We collected data on number of days the women used our ECOCAs, the amount of money they paid for the appliance, and compared with the cost saving data from Pesitho from their existing customers and combined with Ecobora data on spending on our ECOCAs and other fuel like charcoal and Ecobora briquettes.

With these data we calculated the cost saving for each family and women group on switching to ECOCA.

Key assumptions guiding the computation of cost of savings for the three cooking solutions available for use by the women groups entail:

- Comparing cooking costs of ECOCA, charcoal and firewood per cooking event in a month (a month is assumed to have 30 days)
- Common household foods cooked include: Ugali, Vegetables, Rice and Beans

- Frequency of cooking for any given household is assumed to adhere to the following schedule:
    - Twice per day during weekdays (Mon-Fri)
    - Thrice per day during weekends (Sat-Sun)

The visual below (See excel appendix: Cost of Savings) illustrates the total cost per month for the three sources of energy:

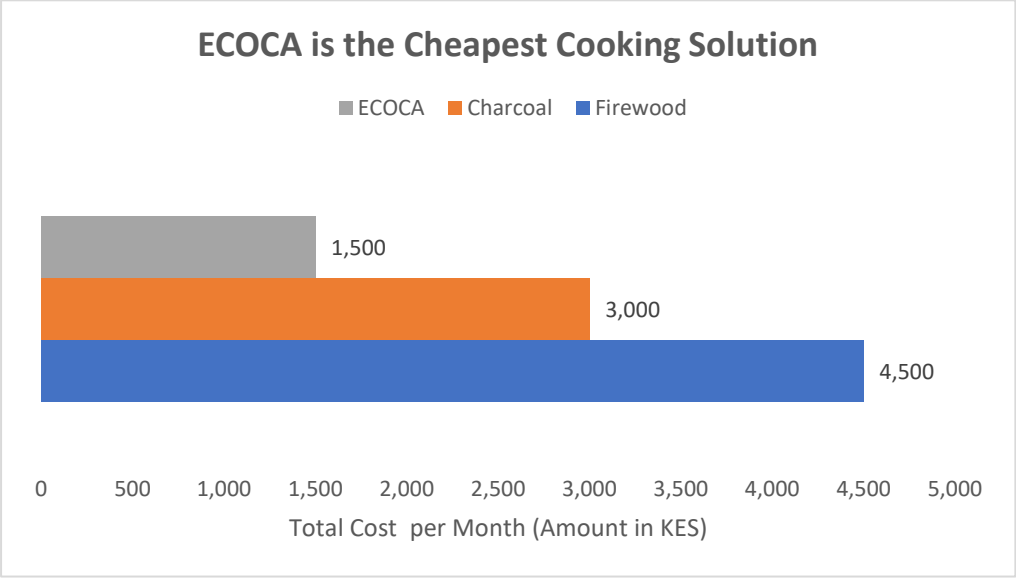


Figure 3: Segmenting Cooking Solutions in terms of Total Cost per Month

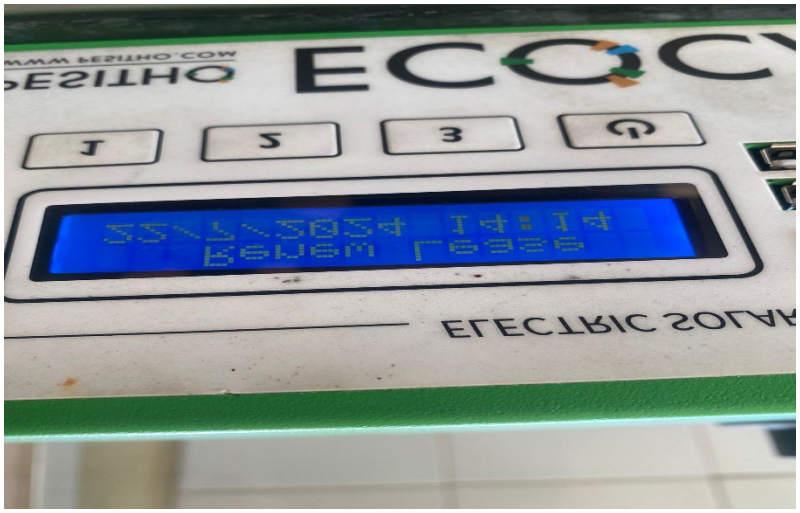
Based on the output of the visual above, ECOCA is the cheapest coking solution. Total monthly cost paid by a customer for using Charcoal is **twice the cost of ECOCA**. Conversely, total monthly cost of using firewood is about **300% more** than the total monthly cost of using ECOCA. This means the incentive to switch from firewood and charcoal can be accelerated by the cost-saving benefit of using ECOCA, thus increasing the uptake of ECOCA in new target markets.

Repair and maintenance capacity.

Pesitho trained Ecobora with the ECOCA repair and maintenance, enabling us to develop an assembly and repair methodology which we used to test the effectiveness for local repair by Ecobora and its ambassadors.

To date the ECOCA has only faced the following breakdown challenge:

2 ECOCAs facing system reset where the ECOCAs wanted a “Renew Lease” of the system as shown below.



Ecobora got maintenance support where PESITHO provide Ecobora with a quick support where the above repair issue required PESITHO to send Ecobora a Bluetooth device where Ecobora required to install the app the could reset the malfunction.

PESITHO team also took Ecobora team through a session on product usage and repair and maintenance so that Ecobora could support the women groups with any repair challenges.

Pesitho used their manufacturing manual to train Ecobora staff and test their performance to effectively repair the ECOCAs. Ecobora also supported their youth ambassadors to in turn offer repair support to our women groups allowing the women to focus on sales and distribution of ECOCAs. By combining the skills and knowledge on repairing of ECOCAs, and data from the 4-month capacity building of Ecobora staff and ambassadors, we created a repair and maintenance process that can be used by other ambassadors and even other women groups to support scale up of ECOCAs.

FIG: Women being trained on technical aspects of ECOCAs

Outline of the concept

The concept

The geographical focus area of this project was in the central Kenya region targeting villages where Ecobora had women groups and solar kiosks. In this region Ecobora had 13 solar kiosks with more than 652 women as members.

The selected women groups have a grid connection passing near their communities and homes. The biggest challenge they face with grid connection is the grid is expensive and unreliable with at least 7 days of total blackout per month. This makes it so appealing to them to want an ECOCA as it relies on the solar panel to provide cooking energy. This gives them assured of them cooking unlike the unreliable grid.

Ecobora built on 3 years of work experience in the region with extensive social and economic understanding of the needs of the local community as well as abilities to cater to those needs through the solar kiosk network.

The solar kiosks used to sell agricultural products such as maize, bananas, milk, vegetables and potatoes. The solar kiosks also stocked and sold fast moving consumer goods such as

cooking flour, soap, bread and sugar and lastly, they stocked life changing products like solar lanterns and solar phone charging machines.

Ecobora introduced ECOCA stoves in 5 selected solar kiosks in this village creating a concentrated marketplace.

Intellectual Property Rights

All the Intellectual Property Rights belonged to Pesitho. Ecobora was just a distributor of the product make and supplied by Pesitho.

Assumptions made.

The following are the assumptions we had made in our project:

I. Ecobora could receive the ECOCAs from Pesitho on time and run the project.

II. All the selected women would adapt and switch from using firewood to ECOCAs.

III. No ECOCA would breakdown or spoil during the project.

IV. No ECOCA could be lost to theft.

V. The women groups shall use pay go to pay for all the ECOCAs.

VI. The ECOCAs will not change the taste of local food for our women groups.

VII. Women groups' savings would be the security for the ECOCAs.

VIII. The solar kiosks would act as a last mile distribution point for ECOCAs.

Validity of Assumptions

Project Assumptions	**Validity of Assumption**
Ecobora could receive the ECOCAs from Pesitho on time and run the project	Ecobora did not receive the Ecocas on time as they have a fixed time to put a manufacturing order that led to delays in manufacturing of the units and delivery them to Kenya.

All the selected women would adapt and switch from using firewood to ECOCAs	The 5 women groups are using the ECOCAs at they homes . We have seen some of the women stack the Ecoca with firewood.
No ECOCA would breakdown or spoil during the project	2 Ecoca had a malfunction that rendered them functionless until they had to check by an expert from Ecobora
No ECOCA could be lost to theft	No ECOCA has been lost to theft
The women groups shall use pay go to pay for all the ECOCAs	The women are using paygo to make their payments.
The ECOCAs will not change the taste of local food for our women groups	So far we have had no comments from the women. This is evidence by the women using ECOCA to cook their traditional food meaning that they taste was not affected.
The solar kiosks would act as a last mile distribution point for ECOCAs	Yes. Ecobora solar kiosks are last mile distribution points for ECOCAs.

3. IMPLEMENTATION

The work conducted.

Selecting and vetting 5 women groups

With the help of our youth ambassadors, we selected and vetted 5 women groups who acted as our pioneer champions to test and distribute our ECOCAs to their villages and community members.

FIG: Solar kiosk run by women groups

From selecting and interviewing our target women groups, we created a data base of our 5 vetted group where we on boarded them to our project database creating a list of members of women group with their contact details.

Product training to women and youths

Ecobora with support from PESITHO trained the 5 women groups, 15 solar kiosks operators, 10 youth ambassadors and the community on ECOCA. The first training focused on the 10 ambassadors to understand how the product works, how the repair and maintenance would be done and even on objectives of the project and their roles.

The second training focused on the women groups and together with the ambassadors we trained all the women in each group on how the product works, the benefits of the products and even on best practices when they market and sell the ECOCA to community women.

This training was followed by cooking demonstrations in each solar kiosk during market days where the community learnt how the stove works and even see the stove cook their local delicacy, allowing them to taste the cooked food. Through these demo cooking series, we got feedback on the product and allowed potential customers to experience the product before purchasing it.

FIG: Ecobora ambassador training women groups on use of ECOCAs

Travelling to kiosks to offer Business support.

We made 20 interactions with our vetted women groups and solar kiosks where we have had open discussions on our proposed business model of distributing ECOCA with them. We have offered business support on their other sales on the solar kiosks because a vibrant solar kiosk can create traffic to uptake ECOCA when they will be stocked. We offered continued business support to our vetted women groups upon arrival of the ECOCA so that collectively we can build sustainable supply chain of ECOCA to these rural communities.

FIG: Ecobora carrying out cooking Demo to community women

Inventory management mobile tablets.

The selected 5 solar kiosks run by each women group were equipped with 1 android mobile tablet that supported them with inventory management and allowed them to collect mobile money from each of the ECOCAs through pay-go technology. The mobile tablets allowed them to keep and manage inventory of the ECOCA, other solar products and their agricultural products allowing us to monitor sales of the ECOCA s compared to other products and in the various solar kiosks.

Data collection and analysis

The data analysis was carried out by a data analyst who worked with Ecobora to gather primary, relevant and recent insights on the plan to distribute and sell ECOCAs in Kenya using Ecobora's network of women groups.

Data collection and project evaluation was carried out through the following ways:

i. Collecting surveys: During the training and capacity building sessions, we collected feedback through surveys that Ecobora staff and our ambassadors administered in the local dialect.
ii. Informal data gathering. Ecobora team and ambassadors collected feedback by having conversations through word of mouth with our women groups, solar kiosk operators to get feedback and better understanding of their needs to prepare them for the ECOCAs roll out.
iii. In-depth interviews: Our team and ambassadors carried out in-depth interviews using questionnaires with selected women from each solar kiosks and the women solar kiosk operators to collect feedback as our project progressed.
iv. Lastly, we used pictures and videos to collect data on ECOCAs usage, cooking activities and impact on our women groups.

FIG: Magina women group chairlady carrying out cooking demos to other women in her kitchen

We saw most women complement the use of ECOCA where most used firewood and charcoal alongside ECOCA. Some meals like bean that take a long time to cook consumed more energy from the ECOCA and so the women complimented their cooking with firewood and charcoal. 2 women used LPD as a complementing fuel.

At the women's homes, they used firewood kettle, charcoal stoves and or LPG as a complementary fuel.

We carried out monitoring activities of our project with the support of our youth ambassadors where we had 20 interactions with our selected 5 women groups and collected feedback through surveys, word of mouth and in-depth interviews to ensuring that the needs of our target women groups are met and that they are part of every phase of the project. There has been no unintended or negative consequences that have risen as a result of our activities to date.

The project findings

Project findings

The primary objective of the project comprised of conducting product analytics of the solar-powered cooking stove using data collected on the users' purchases, and behaviours to achieve the following goals:

- Use the data-driven insights in sourcing product financing of the cooking stoves from investors.
- Subsidize the unit cost per day paid by customers.
- Increase the scope of Ecobora's target market by providing more women groups with clean cook stove solutions leveraging on Ecobora's solar kiosks.
- Work with strategic partners in delivering clean cooking solutions to different rural markets in Kenya and beyond Kenya's borders.
- Help consumers finance for purchase of ECOCAs.

Key Findings

Key findings that were derived from answering data analytics questions were as follows:

About **82% of the customers** have only expressed verbal commitment towards paying for and using the solar-powered cooking stove. Only **11% of the customers** have financially committed to owning and paying for the cooking stove. The cause of the low commitment is

because the sales campaign at the phase of the project target members of the women groups. We did not want to collect commitment fees from more women as we have not figured who will pay for the upfront cost of the ECOCA. The women wanted paygo model.

- In relation to ownership time (time taken by a consumer to acquire ownership rights of the cooking stove):
  Under the current PAYGO model (unit cost per day is KES 50), it will take the client approximately 5 years (60 months) to own the solar-powered cooking stove.
  Under the proposed PAYGO model (unit cost per day is KES 30), it will take the client approximately 7.7 years (93 months) to own the solar-powered cooking stove.
- Based on current waiting list of 700 potential customers:
  Expected revenue for PAYG model charging a unit cost of KES 30 per day for the first month would be **KES 630,000.**
  Expected revenue for PAYG model charging a unit cost of KES 50 per day for the first month would be **KES 980,000**.
  This means the PAYG model charging a unit cost of KES 50 would generate **KES 350,000** more than the PAYG model charging a unit cost of KES 30 per day.
  Even though the current PAYG model generates higher expected revenue, the price-sensitiveness of the clients in the waiting list implies that they would be receptive to accepting PAYG model charging a unit cost of KES 30 per day.
- Financing purchase of 700 solar-powered stoves would be a big challenge for Ecobora because the company does not have finances to pay for the stoves upfront. The company is facing hurdles delivering cooking stoves to 20 women who have already committed financially due to lack of financial manpower to order new cooking stoves from the supplier.
- Ecobora's current market share is about **0.01%.** The market potential is huge for the company to expand and increase its current market share based on number of solar-powered cooking stoves
- The total funding amount Ecobora would require from investors or donors to subsidize the cost of 700 cooking stoves by 60% would be **KES 35,070,000**.
- Under the current PAYG model (unit cost per day is KES 50), it will take approximately **2 years (24 months)** for a client to own the subsidized cooking stove (if funding amount of KES 35,070,00 is acquired to subsidize the cost)

- Under the proposed model, it will take approximately **3.1 years (37 months)** for a client to own the subsidized cooking
- If the company acquires funding to subsidize the product for the 700 women in the pipeline, ultimately for the current PAYG model and the proposed PAYG model, Ownership time would be **reduced by 60%.**
- We had seen a demand of efficient cooking stoves at 98% of our operational solar kiosks where our women groups wanted to access a clean cooking solution and with their feedback we collectively designed a supply chain of using their solar kiosks to distribute and introduce ECOCAs.

FIG: Demonstrating of how ECOCAs are time effective

How can the results help us move forwards with the solution to the problem you originally identified?

The results of the pilot project will help Ecobora move forward and scale the introduction of ECOCAs using women groups and we have generated the following ideas on how we can move forward to address the problems that we had identified previously (page??):

I. Assembling of cooking stoves can be done locally.

II. Subsidize the cost of solar-powered cooking stove by 60%.
III. Expand the pilot to other regions and demographics and use a big data size to get more data on supply chain activation of ECOCAs.
IV. Raise funds for financing the cost of the solar-powered cooking stove.
V. Launch 2-tiers of products based on usage and payment.
VI. Assess the feasibility of partnering with local manufactures for in-house production versus outsourcing overseas.
VII. Partnering with financial institutions who can provide consumer financing.

Limitations of the innovation/approach/design/system

1. Targeting individual women, who are not part of Ecobora women groups, did not happen due to their financial risks. This is because Ecobora only work with women groups that we vet and have capacity built. Once this is done we introduce our energy products. We mitigate this by relaying on our vetted women groups to recommend and connect Ecobora with trusted and vetted women groups whom we could serve.
2. Long hours of heavy cooking requirement where ECOCAs cannot endure due to limited sunshine hours and limited battery size. This was overcome by training the women to embrace best cooking practices like soaking maize and beans before cooking.
3. Cooking for a big family of more than 10 members is limiting due to the size of ECOCA cooking pans. This could be overcome by having a larger cooking pan, a larger solar panel and a larger ECOCA storage battery to ensure that larger families can still cook.
4. Cool and wet areas of Kenya with heavy rainfall where the sun's irradiation could affect the performance of ECOCAs. Better installation of the solar panel to ensure good irradiation to ensure the ECOCAs cook efficiently to our women groups.

4.GOVERNMENT TRANSITION TO CLEAN COOKING

Kenya faces a formidable clean cooking challenge: the majority of the population (81%) still relies on polluting fuels such as firewood (65%), charcoal (10%), and kerosene (6%) for their cooking needs. This has led to an array of interlinked development challenges: in Kenya, 21,560 deaths/yr are caused by household in-door air pollution; 8-11Mton/yr. wood fuel and biomass is lost due to forest degradation, and 13.6 MtCO2e/yr is emitted.

Women and girls are disproportionately affected, with greater exposure to cooking smoke, as well as the burden and corresponding dangers when collecting firewood and lighting/tending fires, which results in higher risk for injuries and chronic diseases through the threats to health. In addition, they have missed educational and economic opportunities because of time consuming activities associated with traditional cooking methods over open fire using fossil fuels.

Switching to ECOCAs presents a transformative opportunity for Kenya's clean cooking sector to break out of this 'business as usual' cycle. Currently, 1% of Kenyan's use electricity as their primary cooking fuel. This highlights the enormous untapped potential, as 75% of the population is now connected to some form of electricity but doesn't yet use for the majority of their cooking needs. Meanwhile, Kenya Power is desperately trying to stimulate demand for its almost exclusively renewable electricity, as the Last Mile Electrification Programme has connected many new customers with very low demand.

5.NEXT STEPS (e.g. beta or field testing and implementation; more development etc)

Time taken to own ECOCA under current PAYGO model.

	Amount in pound	**Amount in KES**
Monthly recurring fee		1400
Cost of purchasing 1 stove, 2 cooking pans, 2 bulbs	500	
Current exchange rate of 1 pound in KES	167	
Total cost of purchase in KES		83500

Number of months needed to offset the cost of purchase and fully own the stove: **60months** (approximately **5 years**)

Time taken to own ECOCA under proposed PAYGO model (Unit cost is Ksh30)

			Amount in KES
Monthly recurring fee based on 30 days	30	30	900
Total cost of purchase in KES			83500

Number of months needed to offset the cost of purchase and own the stove is **93 months** (approximately **7.7 years**)

Note from the above PAYGO model tables:

The monthly recurring fee is based on charging KES 30 for 30 days.

The time taken to acquire full ownership of the cooking stove based on the proposed model is longer than the current model by **2.7 years.**

Comparing monthly revenue of 700 women for different unit costs

Unit Cost is KES 30		
Monthly recurring fee		Ksh900.00
Number of Women	700	
Expected monthly revenue		Ksh630,000.00

Unit Cost is KES 50		
Monthly recurring fee		Ksh1,400.00
Number of women	700	
Expected monthly revenue		Ksh980,000.00

Difference of expected revenue from the 2 PAYGO models is Ksh350, 000.00

Cost, time and resources required.

i. Market share

Number of customers in the pipeline (inclusive of those who have shown interest in the product is **740**

Total market demand (number of customers that Ecobora can serve) **6,200,000** and the market share is **0.0119%.**

Market share formula:

(No of customers Ecobora currently serves/ Total number of customers the company can serve) * 100.

ii. Ecobora's Forecasted Demand

Current demand	740
Expected growth rate	5%
Expected demand	777

Expected demand formula:

Current demand * (1+ growth rate)

Financing needed by the Ecobora Company to subsidize costs by 60% for 700 women.

Number of cooking stoves	700
Cost of 1 cooking stove	Ksh83,500
Total amount of purchasing cooking stoves	**Ksh58,450,000**
Amount needed to subsidize product cost by 60%	**Ksh35,070,000**
Final cost of the product charged to final consumer	Ksh23,380,000
Subsidized cost of 1 cooking stove	**Ksh33,400**

Time taken by consumer to own a subsidized solar-powered cook stove at the current PAYG model (Cost per unit Ksh50)

Monthly recurring fee	Ksh1,400
Cost of 1 subsidized cooking stove	Ksh33,400
No of months needed to offset buying price	**24 months**
That is approximately:	**2 years**

Time taken by consumer to own a subsidized solar-powered cook stove under the proposed PAYG model (Cost per unit Ksh30)

Monthly recurring fee	Ksh900
Cost of 1 subsidized cooking stove	Ksh33,400
No of months needed to offset buying price	**37 months**
That is approximately	**3.1 years**

Our funding plans.

Currently, we are in talks with the following organizations to explore avenues to raising more capital to expand our distribution model to serve more rural marginalized women in Kenya:

I. Charm Capital
II. Acumen
III. Equity Group Foundation
IV. Carbon Financing organizations

Kindly note:

We shall not get additional funding until:

- The prices of ECOCAs can come down to $250
- We are able to break even with sale of ECOCA at 24 months

Partnership developments

Currently, we are in talks with rural community-based organizations and Mwangaza Light Company where we are exploring partnerships to supply clean energy products leveraging on each other's distribution channels.

Dissemination Plan

We conducted local dissemination of our ECOCA project in our five local regions where we had our women groups that received the ECOCAs.

We conducted live cooking demos among the target women groups that acted as capacity building and training sessions to the women to help us collect cost of cooking data and listen to testimonials from various women and the community at large.

In these live demos, we informed our women participants and other community members present on the technical and functionality of the ECOCAs. This covered how it is assembled to how it is repaired and maintained. We demonstrated how to cook their local meals in the ECOCAs and the best practices to enable a better experience with ECOCAs. Lastly, we took them through sessions on the benefits and cost effectiveness of using the ECOCAs instead of firewood.

We shall share project reports to key stakeholders and funders through emails.
Lastly, moving forward we shall plan to carryout international dissemination using our website and online webinars to key stakeholders and the funders to share results from our supply chain activation plan and even the success of the project with plans to scale the model.
The target audience responded well with our dissemination where we were invited and carried our 7 more training to other groups that did not receive the ECOCAs, we have generated an interest from more than 700 women from our women groups that also want to be supplied with the ECOCAs and lastly some women have even made down payments as commitment to want to purchase the ECOCAs.

6.CONCLUSION

Rural marginalized women groups are in dire need of clean and affordable energy solutions. Ecobora should find a sustainable way to introduce ECOCAs to this communities while giving them training and repair support to ensure a sustainable supply chain, one that meets the women at their points of need while breaking the barriers of accessibility and affordability.

Lastly, the pilot should be expanded to reach other regions where Ecobora has women groups and a cooking diary needs to be created to support various meals from these diverse communities ensuring that ECOCAs meet the cooking needs of our women groups.

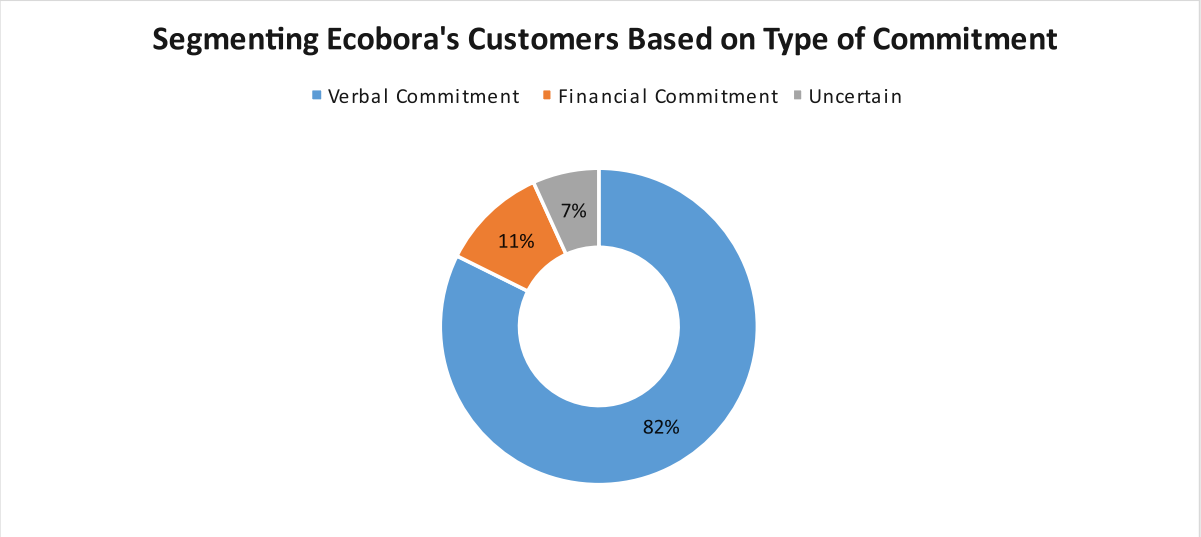
7. APPENDICES

Appendix A

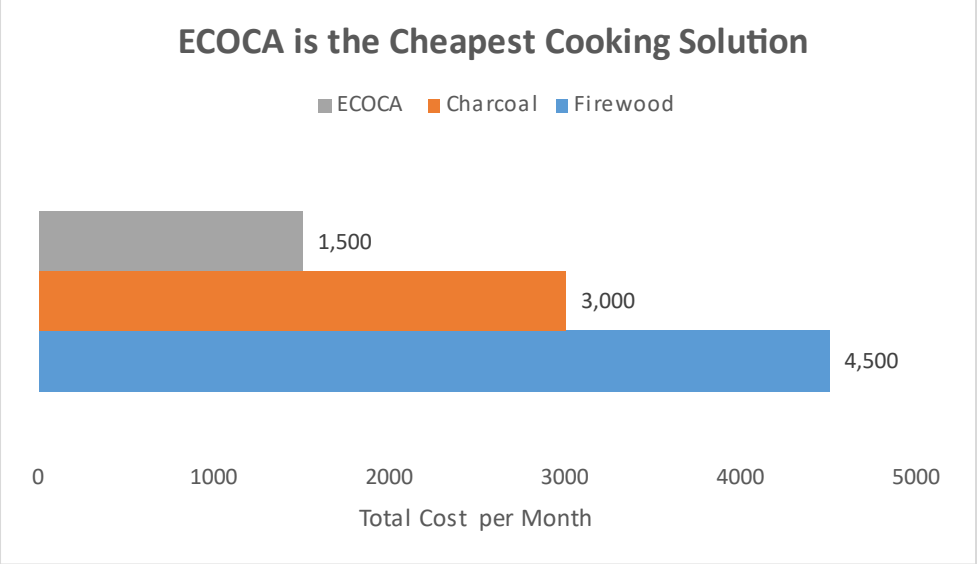
ANALYSIS OF ECOBORA COOKSTOVE DATA

Analysis of Ecobora's Cookstoves Data 202

DISTIBUTION OF CUSTOMERS



COST OF SAVINGS



Appendix B

PICTORIAL PRESENTATION OF PROJECT


USER MANUAL
ECOBORA
Energy for impact


HOME3
ECOCA
ECOBORA
TRUE TO THE MISSION


ECOBORA
energy for impact


but rejoices
protects,
ECOCA