

# Running a business with Solar PV

Analysis of products available on the market and opportunities to run a solar business in Tanzania



# Introduction

## Purpose of this study

### Objectives

- Present the Solar PV Systems available on the market suitable for use by micro-businesses.
- Analyze the phone charging and other types of possible businesses.
- Propose recommendations for entrepreneur in Tanzania.

### Content

- First data about suppliers. How many phones have to be charge to at least cover the cost of the solar PV?
- Phone charging analysis → opportunities to diversify the business developing Mobile Money Agent, Airtime, Barber Shop, Solar Lantern Leasing or entertainment. What are the financial challenges?
- Which businesses should the entrepreneur develop and how?
- Field study to test the results of the analysis.
- Other alternatives for phone charging.
- Trend of mobile phone and internet access → influence on phone charging business.
- Final recommendations.

### Data

- The exchange rate used in this document is \$1 = TZS 2,145.
- The data used in this document results from field studies (Tanzania, Mwanza), from interviews with solar PV system suppliers and from a literature review (References).

### Study period

- From September 21<sup>st</sup> to November 20<sup>th</sup> 2015.

# Introduction

## Author

- This analysis was produced by Marc Laperche (Objectif Développement Durable\*, School Centrale Paris, France) during an internship with GVEP International, August to November 2015
- Contact for any question: [marc.laperche@student.ecp.fr](mailto:marc.laperche@student.ecp.fr)

## Active contributors of the mission

- Simon Collings (GVEP), Shashank Verma (GVEP), Godfrey Sanga (GVEP)
- Field Study in Tanzania: Leo Msanga (GVEP), Ackson Madiga (GVEP), Apolinary Mahilane (GVEP)

## Contributors of the mission

- Zakayo Cyprian (GVEP), Victor Hakuzwumuremyi (GVEP), GVEP team in Nairobi and Mwanza, Thibault Lesueur (Eternum Energy), Lindsay Caldwell (Angaza), Helene Smertnik (GSMA), Gijs Opbroek (Barefoot Power) and Julia Barnes (Azuri)



\*Objectif Développement Durable (literally « Destination Sustainable Development ») is a non-profit French organization where students realize missions on sustainable development: [www.oddurable.org](http://www.oddurable.org)

# Contents

## Background

**Phone Charging Business**

**Phone Charging + Other businesses**

**Businesses Synthesis**

**Field Study: Verification and Correction**

**Other Alternatives for Phone Charging**

**Trend**

**Final Recommendations**

**References**

# Solar PV Systems

## Products available on the market

### Traditional System

- Solar panel + battery + charge controller
- Technical knowledge is necessary: no support from supplier
- 50W cost: \$471
- A loan is usually needed for a 50W
  - Final cost: \$600
  - Usually, the entrepreneur pays back the MFI **\$23** every 2weeks during 1 year

### Purpose built systems with PAYG

- More sophisticated than traditional system: not possible to tamper with
- Good quality and aftersales support from the seller
- Suppliers who offer those products are **BBOXX, Mobisol, Solaris** and **Barefoot**
- 60W cost: \$390
- PAYG:
  - No need to borrow money for the entrepreneur
  - The supplier provides financing
  - It is the seller who must have the cash flow
  - The entrepreneur pays back the supplier around **\$13.5** every 2weeks during 1 year (cost varies depending on the product)

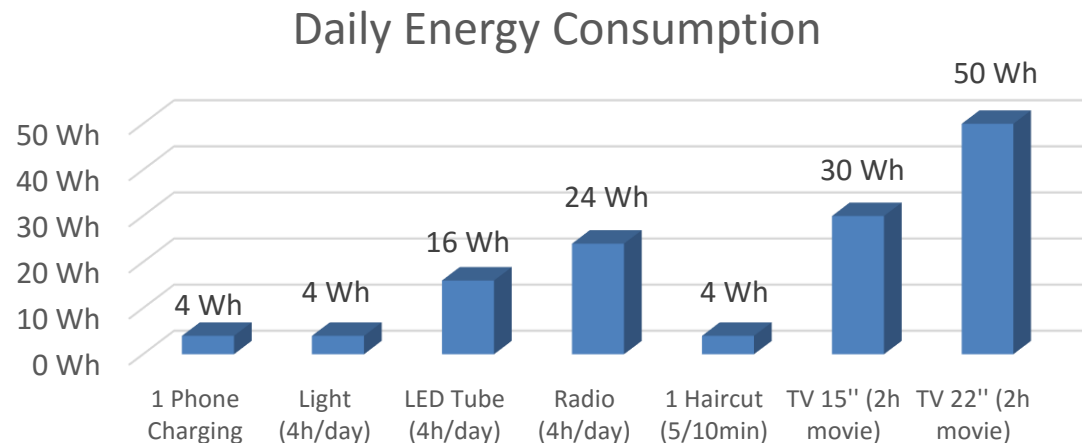
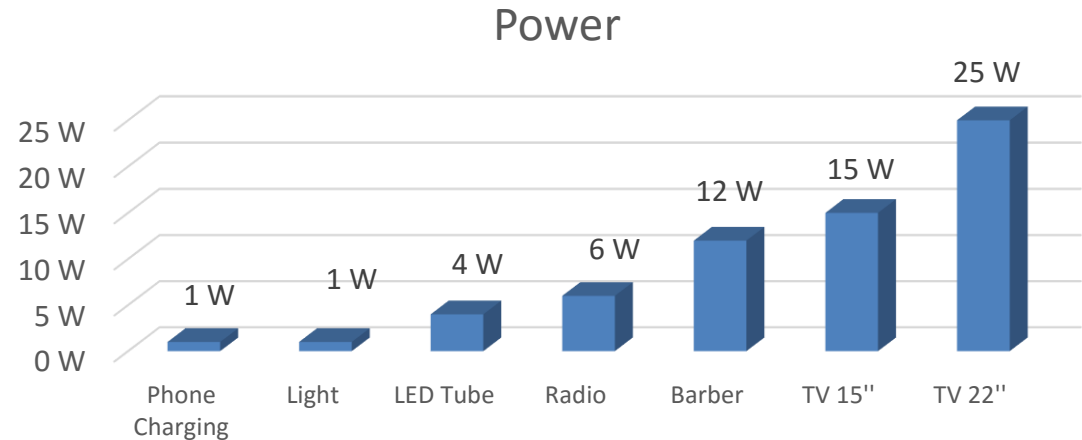


# Power consumption and Energy costs

## Phone Charging, Barber, Light, TV, Radio

To choose the better system to run the business, the entrepreneur must know:

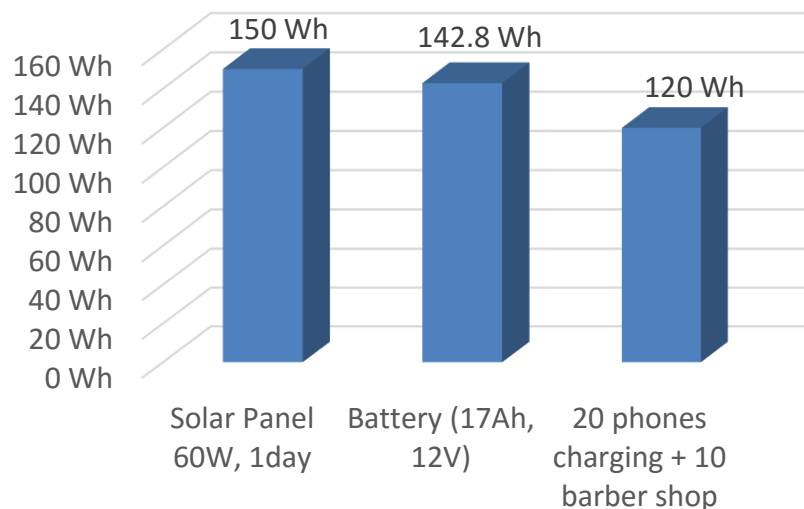
- The power needed by each electrical appliance used or serviced
  - Number of hours spent charging/using each product
- The entrepreneur gets the total energy needed



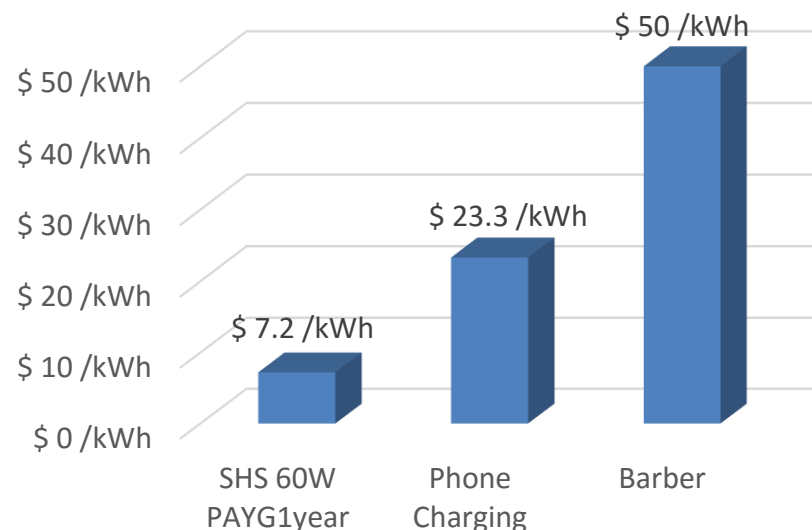
# Power consumption and Energy costs

Phone Charging, Barber, Light, TV, Radio

Energy supply and use



Energy cost to customer / kWh



- The entrepreneur pays for 1kWh **\$7.1\***
- The entrepreneur sells 1kWh for between **\$23** and **\$50**
- **Average Price of PV system** from 40W to 200W: **\$ 6.50 /W \***

Inverter DC/AC up to 600W: \$70

\*These prices are for integrated products (using PAYG). Example: price of a 60W system: \$390, 1year PAYG

→ 60 W / \$ 390 = \$ 6.50 / W

→ 60 W \* 2.5 (Sun Coefficient) = 150 Wh / day → 54.75 kWh/year → \$ 7.1 / kWh

# Details of calculations made in this document

## Market size, Solar PV System Cost

### Market Size

- The market size is quantified on the basis of the number of households (5 people per households on average)
- It is one of the base factors for all calculations
- Statistics from studies give the number of potential clients per 100 households.
- Reasoning: if the entrepreneur knows the number of households in his village, he will be able to determine the average number of customers per day. Knowing the sale price and the investment needed, he can estimate the profit per day
- **Minimum size of the market** (to breakeven): it indicates the minimum number of households the entrepreneur needs to have enough customers to breakeven within a year. It is calculated considering that the minimum Solar PV System size is 40W (\$260), even if the need is less
- To find the number of households in a village, it is possible to ask the person in charge of the district demography reporting

### Solar PV System Cost

- In this document, we use the cost per day. It is calculated assuming that the entrepreneur pays back the system every day during 1 year:  $\text{cost per day} = \text{total cost} / 365 \text{ days}$
- In practice, the entrepreneur pays back the system every week, every 2 weeks or every month, using his phone (mobile payment)



# Details of calculations made in this document

## Time to breakeven, Profit

### Time to breakeven

- It is calculated assuming the entrepreneur uses all his revenue to pay back the investment
- It depends on the size of the market: if there are more households, the entrepreneur will make more profit and will pay back the system faster

### Profit during the 1<sup>st</sup> year

- It is calculated assuming the entrepreneur recover the investment in one year. The profit is equal to the daily revenue minus the daily reimbursement.

### Profit after 1 year

- It is calculated assuming the entrepreneur has already recovered the investment. It is equal to the daily revenue minus the daily cost (cable TV connection for example)

# Contents

Background

**Phone Charging Business**

Phone Charging + Other businesses

Businesses Synthesis

Field Study: Verification and Correction

Other Alternatives for Phone Charging

Trend

Final Recommendations

References

# Phone Charging Business

## Description

### How does it work?

- The entrepreneur uses, usually, a solar PV system to charge batteries and phones
- The entrepreneur attends clients from 9am to 9pm (ENEA 2013)
- People come to charge their phone
- Price: \$0.093 (200 TZS) to charge one phone

### Entrepreneurs are:

- Using an integrated solar PV kit
- Using a kit they assemble from components themselves
- Not using solar energy → they use car batteries for example



Phone battery charging, Magu, Tanzania

# Phone Charging Business

## Energy aspects

### Energy available

- Sunshine Coefficient is between 2.5 (rainy season) and 6 (dry season)
- A system using an MPP (Maximum Power Point) Tracker has a 3.5 average sunshine coefficient (the panels track the sun)
- In this document, we will assume that the energy provided by the system is **Power x 2.5**
  - Example: 60W system generates 150Wh per day

### Energy needed

- Basic phones (Nokia) need 2Wh. Smartphones (Techno) need more than 4Wh. In this document, we will assume that one phone needs **4Wh** to be charged
- To be sure that the entrepreneur has enough energy to run his business, we **oversize 2 times the system**.
  - Example: if the entrepreneur needs 50Wh per day, he should buy a system that provide theoretically 100Wh → 40W panel and appropriately sized battery

### Energy cost

- Average price for solar PV systems from 40W to 200W: **\$ 6.50 /W \***
- If the system is paid back during 1 year:
  - **\$ 7.12 /kWh** theoretically \*
  - **\$ 14.25 /kWh** for the entrepreneur (system oversized 2 times)
  - Solar PV is expensive in Africa. In France, electricity production using a small PV system costs \$ 0.33 /kWh

\*These prices are for integrated products (using PAYG). Example: price of a 60W system: \$390, 1year PAYG

→ 60 W / \$ 390 = \$ 6.50 / W

→ 60 W \* 2.5 (Sun Coefficient) = 150 Wh / day → 54.75 kWh/year → \$ 7.1 / kWh

# Phone Charging Business

## Financing options

### Pay cash

- The entrepreneur has enough money to buy the entire system
- Very rare in rural areas, entrepreneurs have no business or a small business

### Take a loan

- The entrepreneur has to convince an MFI to lend to them
- The interest rate is high (on average 18% where partially guaranteed by GVEP, 23% without), the entrepreneur pays back every two weeks
- Collateral (field, house, ...) is needed but the entrepreneur cannot or doesn't want to take the risk
- Significant administrative burden
- MFIs want short term loans but entrepreneurs doing phone charging need time to pay back

### Pay As You Go

- The Pay As You Go model takes care of the above challenges
- The entrepreneur pays a small amount every week
- The system does not work if the entrepreneur does not pay
- The PAYG model creates links between the supplier and the customer → the customer may buy other products from the supplier
- However the supplier must have the cash to finance the PAYG model

# Phone Charging Business

## Economic aspects

### Mobile Penetration

- Rural areas: 47% of household have an active sim card(GSMA, 2012-2013)

### For 100 households

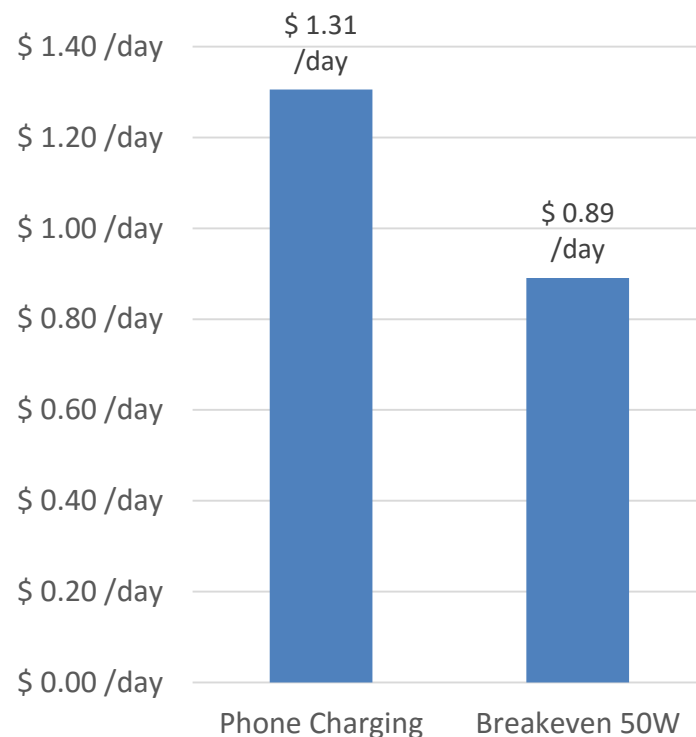
- 47 mobile phones
- Phone charged 2 times per week
- 14 phones charged per day → 22.4 W system needed
- TZS 200 = \$0.093 each charge

**NB:** 22.4 W is enough to charge 14 phones but usually the entrepreneurs use some of the power for home-use. The system can also be less efficient than anticipated. The next calculations will be based on a system more than 2 times oversized: 50W

### Economics

- Profit during the 1<sup>st</sup> year: **\$15.7/month**
- Profit after 1 year (system fully paid back): **\$40.5/month**
- Time to breakeven within a year: 32 weeks
- Minimum size of the market to breakeven within year:  
**55 households** (26 customers)

Market of 100 households,  
47 customers





# Phone Charging Business

## SWOT analysis

<p style="text-align: center;"><b>Strength</b></p> <ul style="list-style-type: none"> <li>• Technology is well-functioning today and quite affordable: it is possible to run a profitable business</li> <li>• <b>Demand</b> is high (more and more phones)</li> <li>• <b>PAYG</b>: no more financing issue for the entrepreneur, customer credit provided by suppliers</li> </ul>	<p style="text-align: center;"><b>Opportunities</b></p> <ul style="list-style-type: none"> <li>• Smartphones</li> <li>• Internet</li> <li>• Entrepreneurs can create their own brand</li> <li>• <b>Other businesses:</b> <ul style="list-style-type: none"> <li>○ Barber shop</li> <li>○ Solar Lantern Leasing</li> <li>○ Mobile Money agent</li> <li>○ Airtime</li> <li>○ Fridge (cold drinks, ice)</li> <li>○ Entertainment (TV, Music, Radio, Cinema)</li> <li>○ Repair phones</li> <li>○ Sell/Rent phone accessories (phone hull, headset ...)</li> <li>○ Rent batteries (like an energy kiosk)</li> </ul> </li> <li>• <b>Extend the business</b> buying <b>more panels</b> and batteries</li> </ul>
<p style="text-align: center;"><b>Weakness</b></p> <ul style="list-style-type: none"> <li>• Phone charging only, no other revenue source</li> <li>• The entrepreneur uses the system for himself: <b>first objective is to have electricity at home</b></li> <li>• Entrepreneur is <b>not aware</b> of elementary information : functioning of system, procedure of basic maintenance (ENEA 2013)</li> <li>• <b>Incorrect use</b> of system: dust on panels, panels exposed to trees' shadows or not well directed to the sun, system does not have the proper capacity, improper electrical connections (ENEA 2013)</li> <li>• Marketing</li> </ul>	<p style="text-align: center;"><b>Threat</b></p> <ul style="list-style-type: none"> <li>• <b>Competition with domestic solar PV systems</b></li> <li>• Competition with <b>Grid extension</b></li> <li>• Competition with Minigrid</li> <li>• Competition with other phone charging businesses</li> <li>• Energy needed to charge a smartphone is higher than for a basic phone.</li> </ul>

# Phone Charging Business

## Recommendations

### **Ensure the security of the business** (Weaknesses, Threats)

- **Distinguish home-use and business-use** → measure how much s/he is using for home use.
- Be **trained** to make the very best use of the system
- Conduct a **market study** regularly to be aware of demand and competition → the entrepreneur will be able to adapt his/her business.
- Improve revenues developing **another business in parallel** with phone charging

### **Solidify the strength of the business** (Strength)

- Buy a complete solar PV kit with PAYG service → periodic payment affordable, technical support from the supplier, good quality
- **Become the standard** in the village for phone charging

### **Develop the business** (Opportunities)

- Have information about the demand (phone charging, barber, internet, mobile money, solar lantern, movies ...) to provide the most requested service
- Draft an action plan in accordance with the market study

# Contents

Background

Phone Charging Business

Phone Charging + Other businesses

Businesses Synthesis

Field Study: Verification and Correction

Other Alternatives for Phone Charging

Trend

Final Recommendations

References

# Objectives

## What are the alternatives

### Recommendation of Phone Charging Analysis

- Diversify the business to limit the risks (bankruptcy)
- Develop a business in the same area of activity as phone charging (electricity and tech services)  
→ people visit the business and take the opportunity to charge their phone

### Businesses in the same domain of activity as phone charging

- Airtime
- Mobile Money
- Barber Shop
- Entertainment
- Solar Lantern Leasing



Solar Lantern



Mobile Money & Airtime Agent



Barber Shop



Entertainment

# Mobile Money agent

## Description

### How does it work?

- Mobile Money Deposit: customers come to put in cash into their accounts
- Mobile Money Withdrawal: customers come to withdraw
- Transactions are done by mobile payment
- The entrepreneur makes profit taking a percentage of the transaction
- Usually, the entrepreneur is a “sub-agent”: he works for a Mobile Money Agent. This Agent meets strict requirements set by the mobile operator (have a business for over 6 months, avail a minimum of \$1,000, have at least 3 outlets)
- The entrepreneur is paid by the mobile operator **every month** (monthly revenue)
- The entrepreneur **must have the cash flow** to start the business (>\$200).
- In rural areas, people tend to withdraw money much more than deposit money (because relatives in the cities or abroad are sending them money)
  - The agent has to make frequent trips to the bank to get cash
    - It is a big challenge for the entrepreneur and can add a lot of costs to the business if the nearest bank branch is some way off.



Mobile Money & Airtime Agent

# Mobile Money agent

## Economic aspects (Calculation M-Pesa)

### Transactions (rural areas in Tanzania, GSMA 2013)

- M-PESA: 53% of the M-Money market
- 25% of rural households are M-Money user
- **TZS 226,200** value of mobile money withdrawal/deposit every day by **100 households** in rural areas

### Revenue (0.77% commission)

- \$0.82/day/100 households

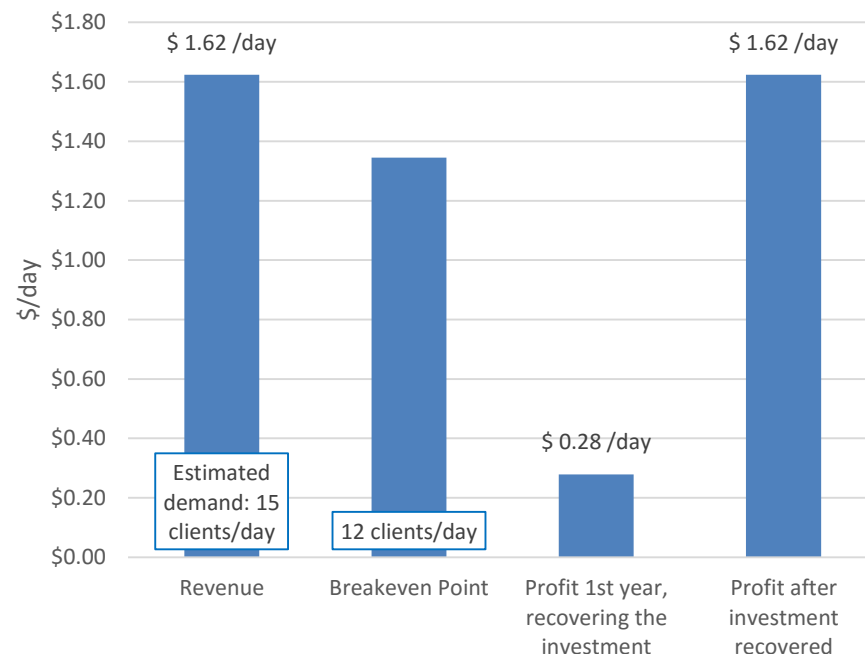
### Investment needed (loan 1year 18%)

- \$200 for the cash flow
- \$100 for branding and building the room
- \$100 for license
- \$15 for a basic phone
- No additional solar cost

### Total profit (200 households)

- Profit during the 1st year: **\$8.64/month**
- Profit after investment recovered: **\$50.34/month**

Mobile Money Business, 200 households, Key figures



Minimum size of the market:	166 households
Market oversized of:	20%
Profit/Investment:	21%
Power needed:	0 W



# Phone Charging + Mobile Money Business

## How does it work?

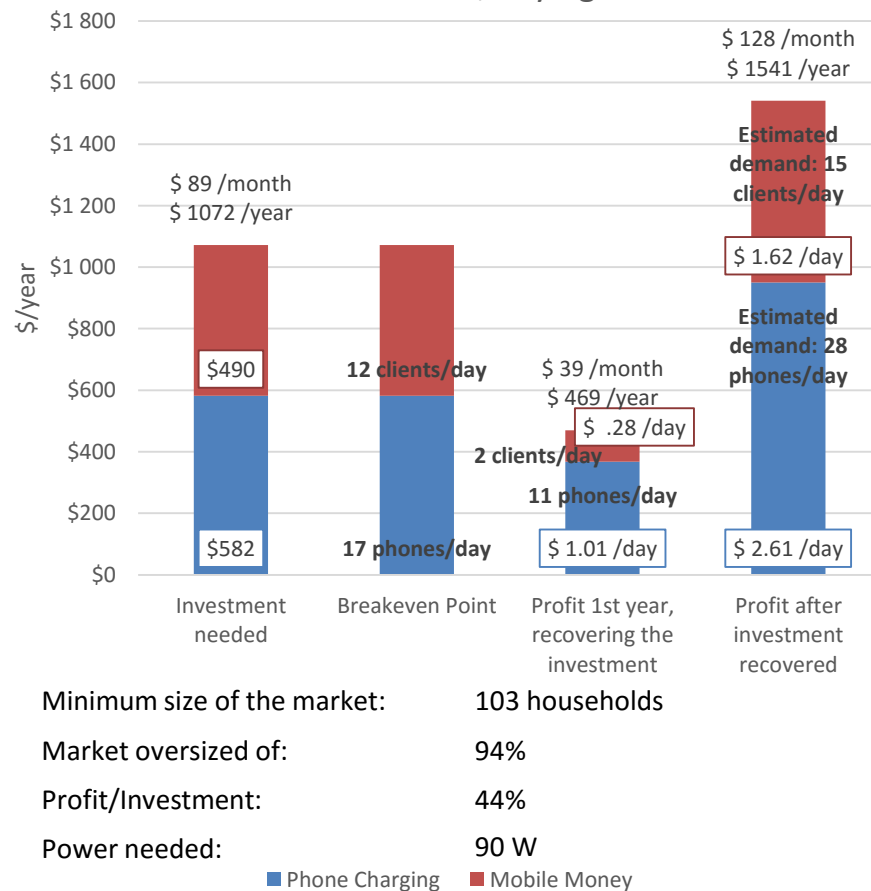
- The entrepreneur has a secured store
- The entrepreneur provides phone charging and mobile money services
- The entrepreneur must be trained to be an M-Pesa agent and in the use of the solar PV system
- The entrepreneur receives money every month from the mobile operator

## Economics (200 households)

- Global Profit, 1<sup>st</sup> year: **\$40/month**
- Global Profit after investment recovered: **\$131.3/month**
- Time to breakeven: **36 weeks**

***This study focus on M-Pesa but the entrepreneur can be an Airtel or Tigo agent if it looks more promising***

Phone Charging + Mobile Money Business, 200 households, Key figures



Minimum size of the market: 103 households  
 Market oversized of: 94%  
 Profit/Investment: 44%  
 Power needed: 90 W

# Airtime

## Description and Economic aspects

### How does it work?

- The entrepreneur sells airtime and takes a commission: 5%
- **No investment needed**

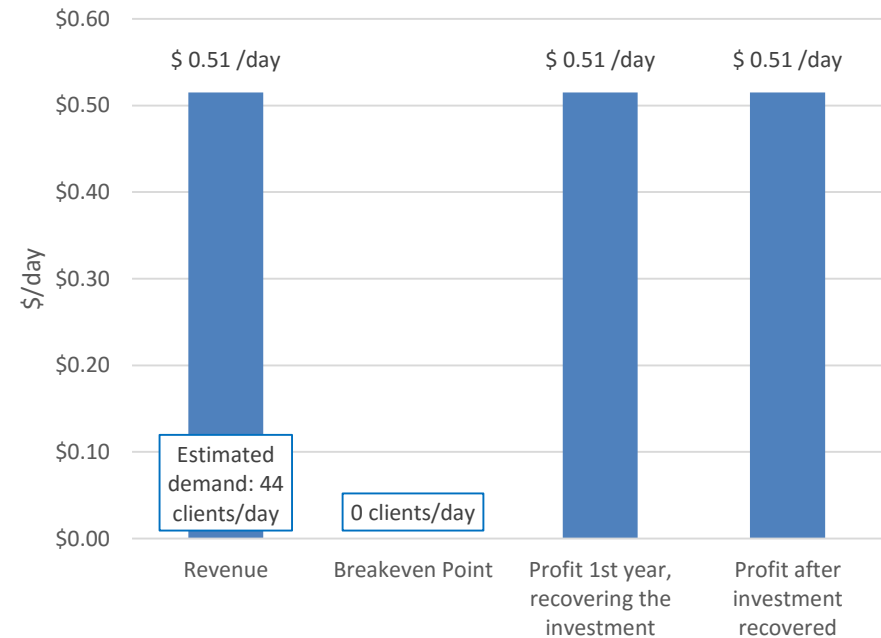
### Sim card

- Cost: \$1.5
- No profit on this for the entrepreneur

### Economics

- Mobile penetration in rural areas: 47% of household have an active sim card
- Airtime spent by a household in rural area per day: \$0.22, (GVEP, 2014, Rwanda)
- **Revenue** (/100 households)
  - \$10.34 airtime/day
  - Profit for the entrepreneur: **\$0.51/day**
  - Profit: **\$16/month**

Airtime Business, 100 households, Key figures



Minimum size of the market:	1 households
Market oversized of:	/
Profit/Investment:	/
Power needed:	0 Wh

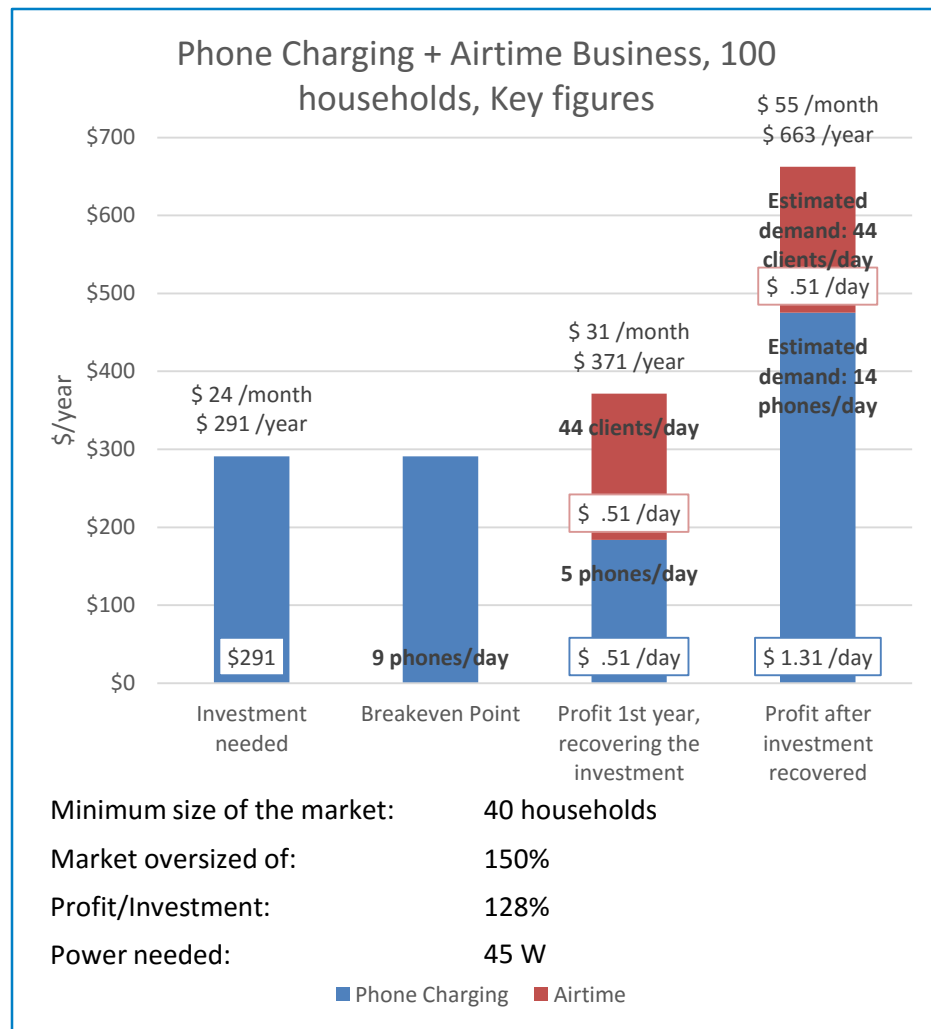
# Phone Charging + Airtime Business

## How does it work?

- The entrepreneur provides phone charging and Airtime service

## Economics (100 households)

- Global Profit, 1<sup>st</sup> year: **\$31.6/month**
- Global Profit after investment recovered: **\$56.43/month**
- Time to breakeven: **23 weeks**



# Barber shop

## Description

### How does it work?

- The entrepreneur uses a solar PV system to charge a battery to supply current to the hair clippers
- The hair clippers can operate from DC or AC (it depends on the type of products available on the market). If it operates from AC, an inverter is needed
- The entrepreneur attends clients from 9am to 9pm
- The entrepreneur does only men haircuts
- The hair clipper should be good quality
- Price: TZS 450 = \$0,21 for one haircut (TZS 400 for children, TZS 500 for adults)
- It is a safety insurance against grid: people will still need to cut their hair even if they have electricity at home



Barber Shop

# Barber Shop

## Economic aspects

### Frequency

- Man: once every month
- 250 men / 100 households
- 250 haircuts/month, 8 haircut/day
- Price: \$0.21/haircut

### Revenue

- \$1.68/day

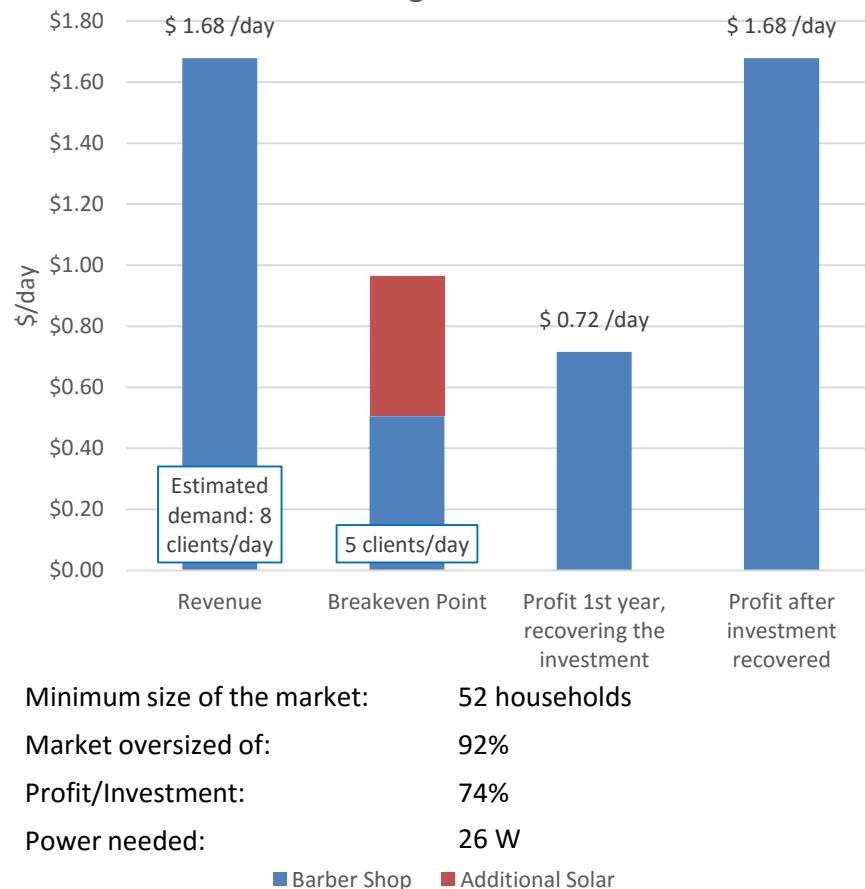
### Investment needed (loan 1year 18%)

- \$0.7/week for the clipper(PAYG 1 year)
- \$60 for the inverter (if needed)
- \$50 for accessories
- Additional Solar cost: \$166

### Total profit (100 households)

- Profit during the 1<sup>st</sup> year: **\$22.2/month**
- Profit after investment recovered:  
**\$52/month**

Barber Shop Business, 100 households, Key figures



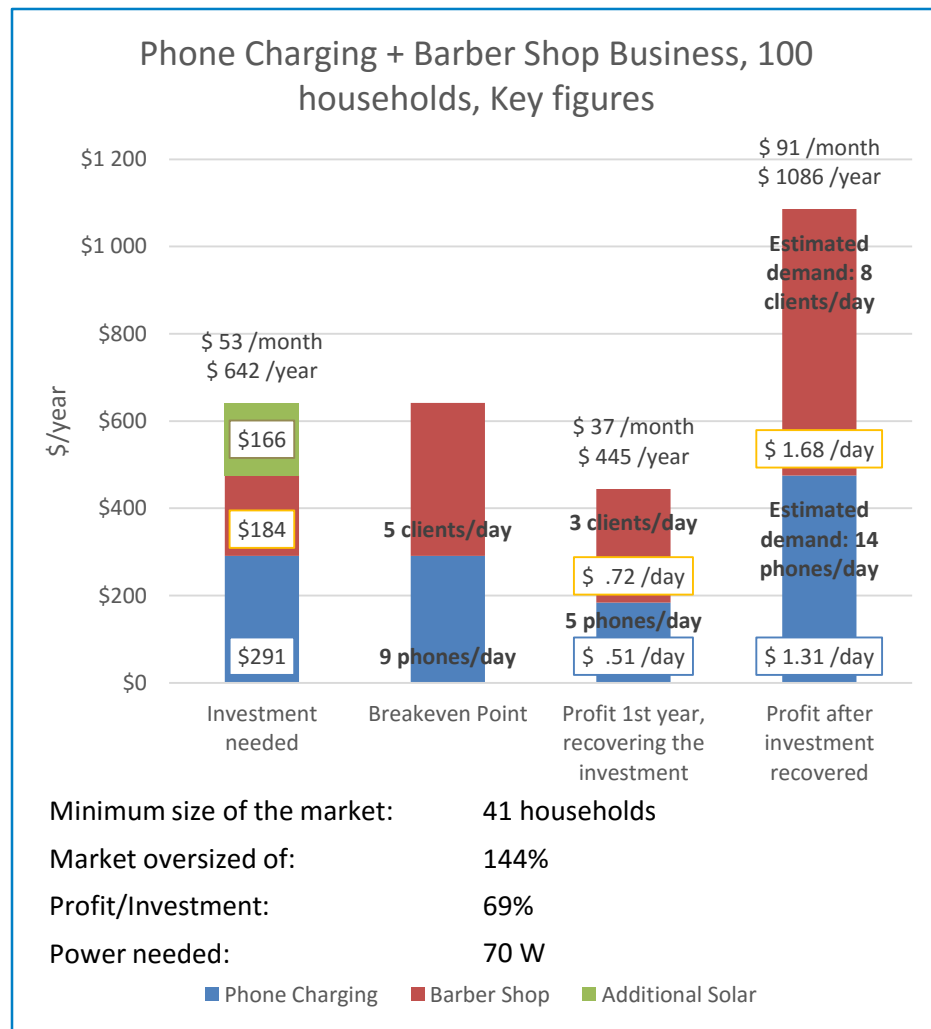
# Phone Charging + Barbershop Business

## How does it work?

- The barber shop could be the highlighted activity: the entrepreneur is recognized as a barber, who also provides phone charging.
- The entrepreneur must be trained as a barber

## Economics (100 households)

- Global Profit, 1<sup>st</sup> year: **\$37.9/month**
- Global Profit after investment recovered: **\$92.5/month**
- Time to breakeven: **31 weeks**





# Entertainment

## Description

### How does it work?

- The entrepreneur needs at least a 40W system, an inverter if using AC, a TV 22", a place adapted for such purposes
- The entrepreneur needs to subscribe to DSTV, StarTimes or AzamTV
- The village must be reached by TV coverage (StartTimes is accessible in Dar es Salaam , Dodoma ,Arusha and Mwanza)
- **2 periods:**
  - From August to May (Premier League season)
  - International Competition (World Cup, Euro, Africa Cup), during 1 month
- Customers pay \$0.1 for a movie and \$0.25 for an important football match
- Energy needed: max 120Wh per evening (2 viewing) → 60W system is enough but a 100W system is better to run in addition a phone charging business



Entertainment

# Entertainment

## Description

### How does it work?

- Period from August to May (Premier League season)
  - 2 important matches every week-end → DSTV subscription needed (\$70/month, Super Sport Channel)
  - 2 matches of Tanzania Premier League every week-end
  - 2 movies night/week
- International Competition (World Cup, Euro, Africa Cup), during 1 month
  - 1 match every day → StartTimes, azamTV or DSTV subscription needed (\$30/month, StartTimes)
  - Africa Cup: mid-January, mid-February, 2015, 2017, 2019 ...
  - Euro: June, 2016, 2020 ...
  - World Cup: mid-June, mid-July, 2014, 2018, 2022 ...
  - 2 movies night/week



Entertainment

# Entertainment

## Economic aspects, August to May

### TV revenue (200 households)

- Football match : 80 ppl x \$0.25 x 2/week
- Movie Night : 30 ppl x \$0.1 x 2/week

### Investment needed (loan 18% 9month)

- TV 22" → \$250
- Inverter → \$60
- Decoder → \$30
- Antenna → \$8
- Other (Chairs ...) → \$100
- Additional Solar cost: \$260

### Cable connection: \$70/month

### Total profit (200 households)

- Profit during the 9 first month: **\$9/month**
- Profit after investment recovered: **\$114/month**



Entertainment

# Entertainment

## Economic aspects, July

### TV revenue (300 households)

- Football match :  $120 \text{ ppl} \times \$0.25 \times 30$
- Movie Night :  $45 \text{ ppl} \times \$0.1 \times 8$

### Investment needed (loan 18% 1month)

- TV 22"  $\rightarrow \$250$
- Inverter  $\rightarrow \$60$
- Decoder  $\rightarrow \$30$
- Antenna  $\rightarrow \$8$
- Other (Chairs ...)  $\rightarrow \$100$
- Additional solar cost:  $\$260$

### Cable connection: \$30

### Total profit (1 month, 300 households)

- Profit if investment needed: **\$65**
- Profit if investment recovered: **\$906**



Entertainment

# Entertainment

## Economic aspects, Average

### TV revenue (200 households)

- Football match : \$168/month
- Movie Night : \$24.7/month

### Investment needed (loan 18% 1month)

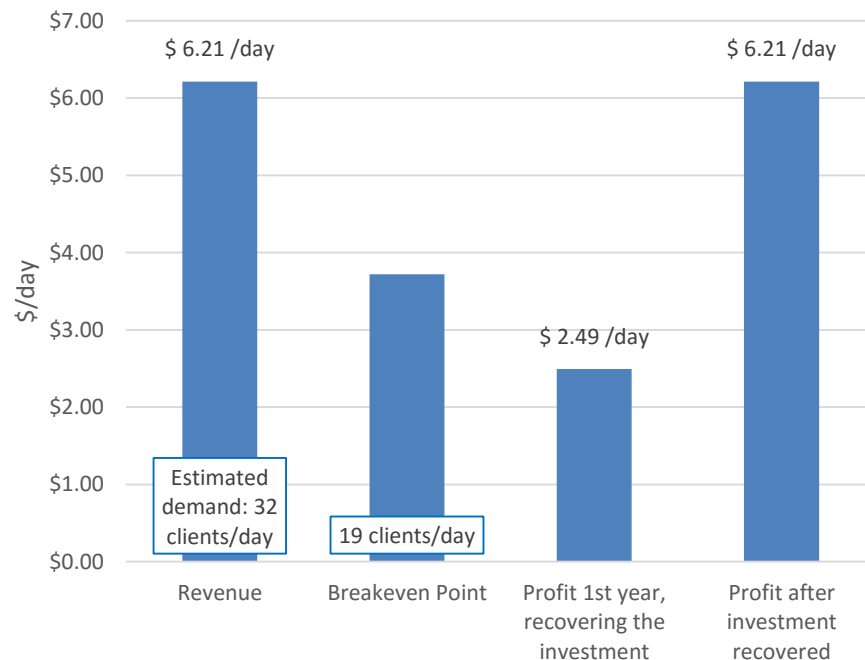
- TV 22" → \$250
- Inverter → \$60
- Decoder → \$30
- Antenna → \$8
- Other (Chairs ...) → \$100
- Additional solar cost: \$260

**Cable connection:** \$660/year

### Total profit (200 households)

- Profit if investment needed: **\$77.3/month**
- Profit if investment recovered: **\$192.6/month**

Phone Charging + Entertainment, 200 households, Key figures



Minimum size of the market:	120 households
Market oversized of:	67%
Profit/Investment:	66%
Power needed:	40 W

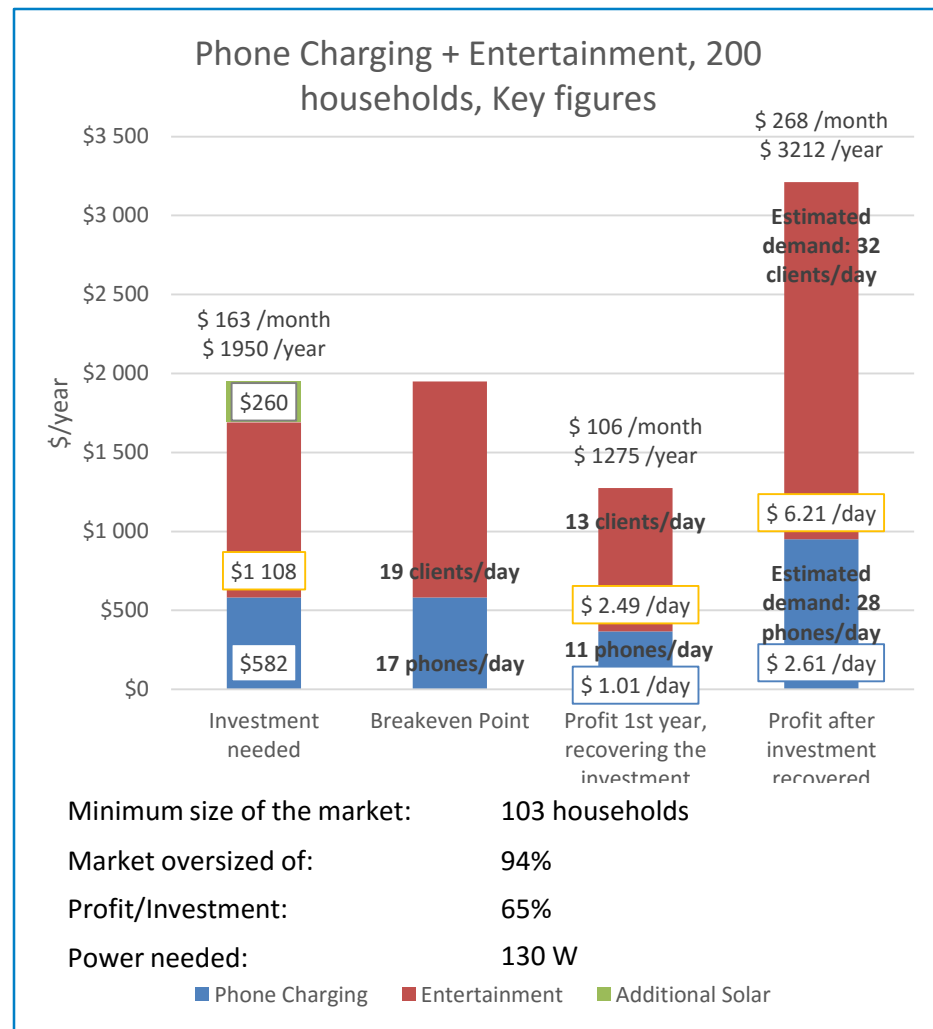
# Phone Charging + Entertainment Business

## How does it work?

- The entrepreneur runs a classic phone charging business. The days where he/she organizes a projection, he has to be sure there is enough energy in the battery: maximum 30 phones charged

## Economics (200 households)

- Global Profit, 1<sup>st</sup> year: **\$108.6/month**
- Global Profit after investment recovered: **\$273.5/month**
- Time to breakeven: **32 weeks**





# Solar Lantern Leasing

## Description

### How does it work?

The entrepreneur:

- buys solar lamp kits (lamp + small solar panel)
- charges the lamps using the small panel
- rents the lamp to customers
- customers bring back the lamp when it is discharged

The entrepreneur can also sell directly the entire solar lamp kit

### Requirements:

- The entrepreneur mustn't rent lamps which include a mobile phone USB charge → it is not good for the phone charging business...
- Key factors of success:
  - frequency of visit to the entrepreneur's shop
  - confidence in the product
- The entrepreneur should run the business using small lamps:
  - the entrepreneur can buy more lamps and reach more customers
- It must be cheaper and more efficient than a kerosene lamp



Sun King Solo

# Solar Lantern Leasing

## Description

### Impact:

- 77% of households rely on kerosene to light their home (Solar-Aid, 2014)
- Rural Tanzanian households spend around 25% of their income on lighting (Solar-Aid, 2014)
- Average daily expense for kerosene: TZS800 = **\$0.38** (Tanzania Market Intelligence, GreenMax, dec 2013)
- Kerosene lamp: 12 lumens
- Sun King Solo (Green Light Planet):
  - Price: \$16
  - 24 hours of full light
  - Energy available: 2.24 Wh
  - 5 times brighter than kerosene
  - Life time: 5 years
- 100 households: 30 tons of CO2 saved \*



Sun King Solo

\*50 lamps used during 2 years

[www.goodenergy.co.uk](http://www.goodenergy.co.uk)

# Solar Lantern Leasing

## Economic aspects

### Frequency

- Recharge once per day
- 10 customers per 100 households
- Price: 400 TZS/charge (\$0.19)

### Revenue

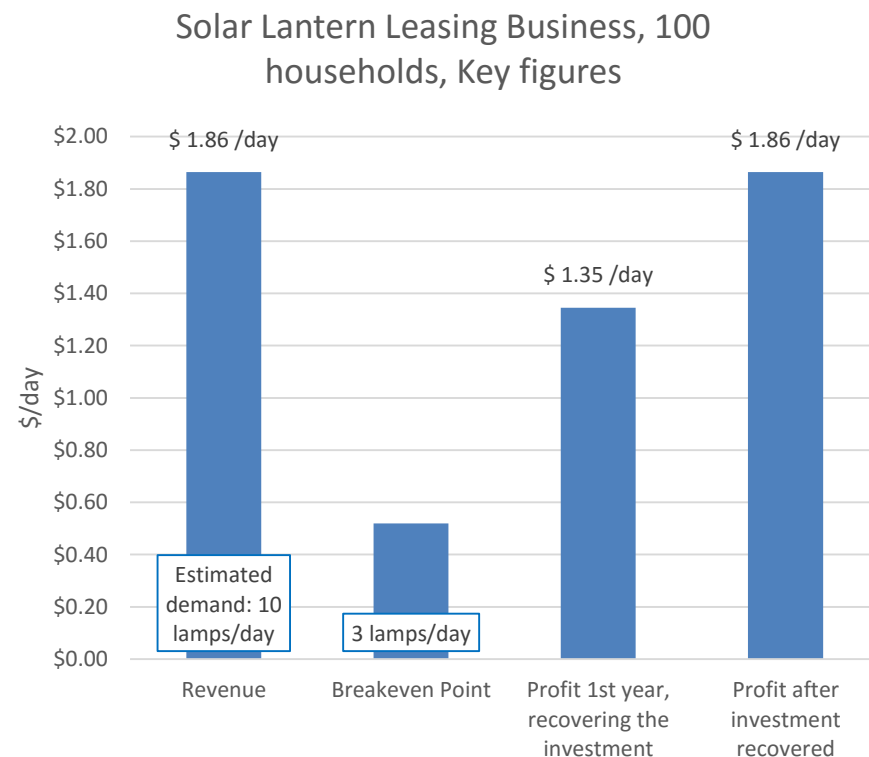
- \$1.86/day

### Investment needed (loan 1year 18%)

- \$189 for 10 lamps
- No additional solar cost

### Total profit (100 households)

- Profit if investment needed: **\$41.7/month**
- Profit if investment recovered: **\$57.8/month**



Minimum size of the market:	52 households
Market oversized of:	257%
Profit/Investment:	259%
Power needed:	0 W

# Phone Charging + Solar Lantern Leasing Business

## How does it work?

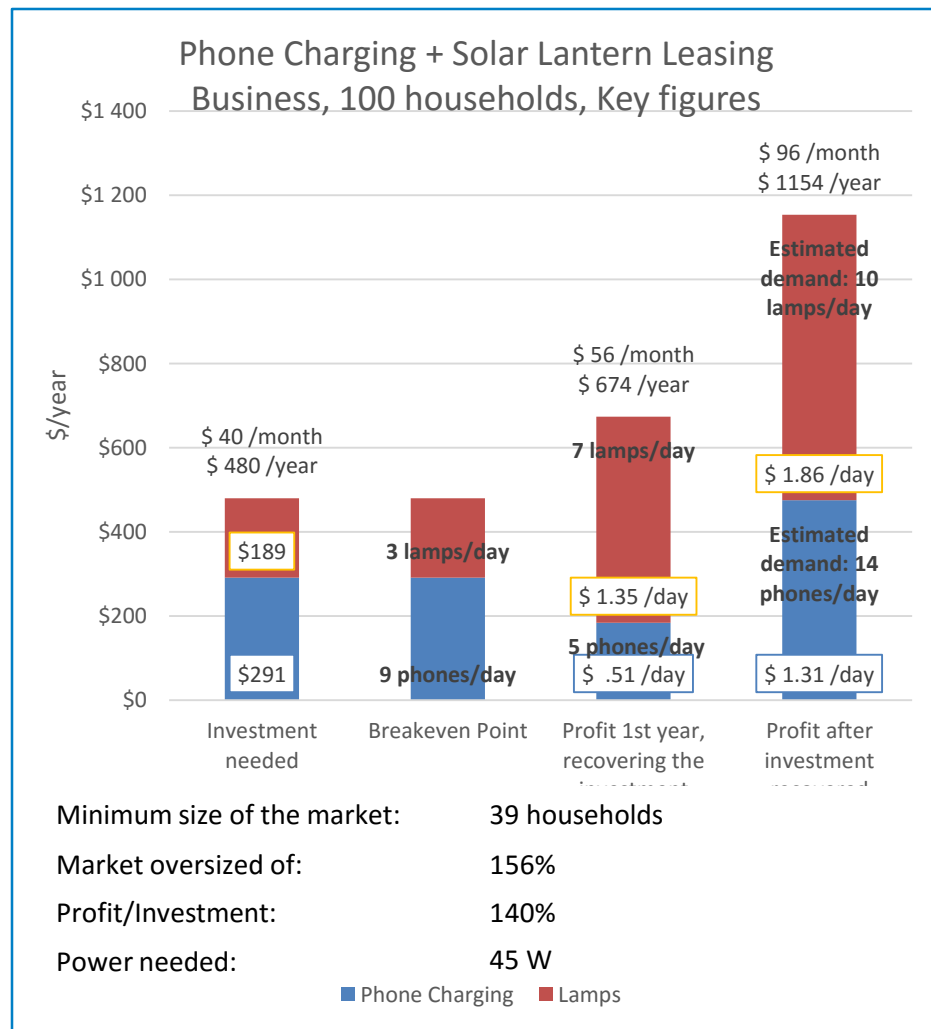
- Customers bring their solar lamp to the entrepreneur's shop, they can also charge their phone.
- The entrepreneur charges the lamps during the day

## Economics (100 households)

- Global Profit, 1<sup>st</sup> year: **\$57.4/month**
- Global Profit after investment recovered: **\$98.3/month**
- Time to breakeven: **22 weeks**

## Opportunities

- Offer the entire system to the customer after a certain amount of charges → motivation for the customer



# Contents

Background

Phone Charging Business

Phone Charging + Other businesses

**Businesses Synthesis**

Field Study: Verification and Correction

Other Alternatives for Phone Charging

Trend

Final Recommendations

References

# Businesses synthesis

## Phone Charging

### Recommendations

- Become the “tech” standard in the village
- Conduct a market study in the village to estimate the number of phones and choose the best system (size)
- **Diversify the business** because phone charging is not very profitable and threatened by the grid extension and SHS home use.

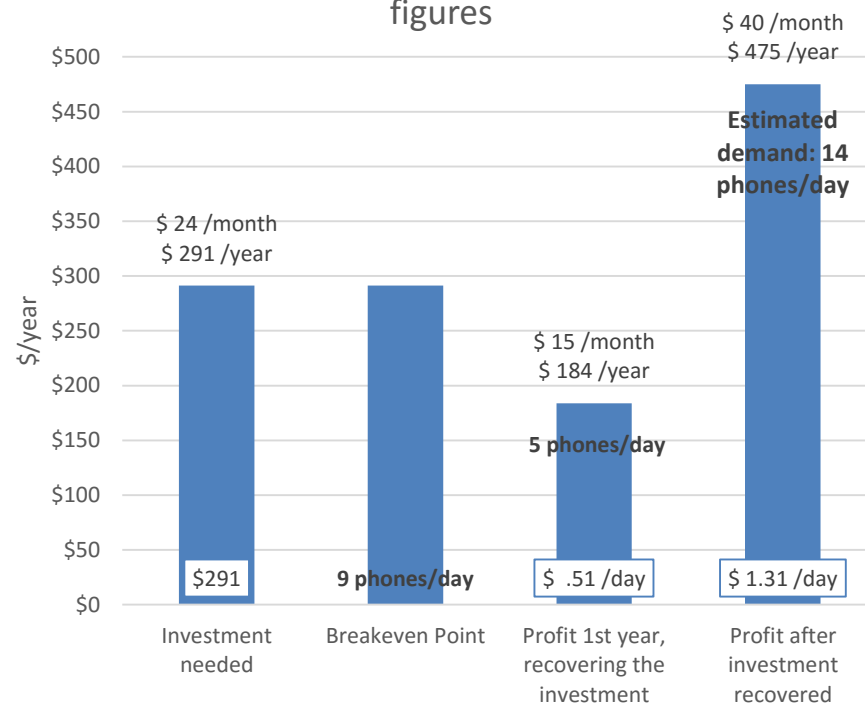
### Risks

- Grid extension
- SHS home use competition

### Opportunities

- Become the technical standard reference in the village
- Partnership with solar kiosks (ARED, Juabar) to limit the risk starting the business

Phone Charging Business, 100 households, Key figures



Minimum size of the market:	40 households
Market oversized of:	150%
Profit/Investment:	128%
Power needed:	45 W

# Businesses synthesis

## Phone Charging + Airtime

### Recommendations

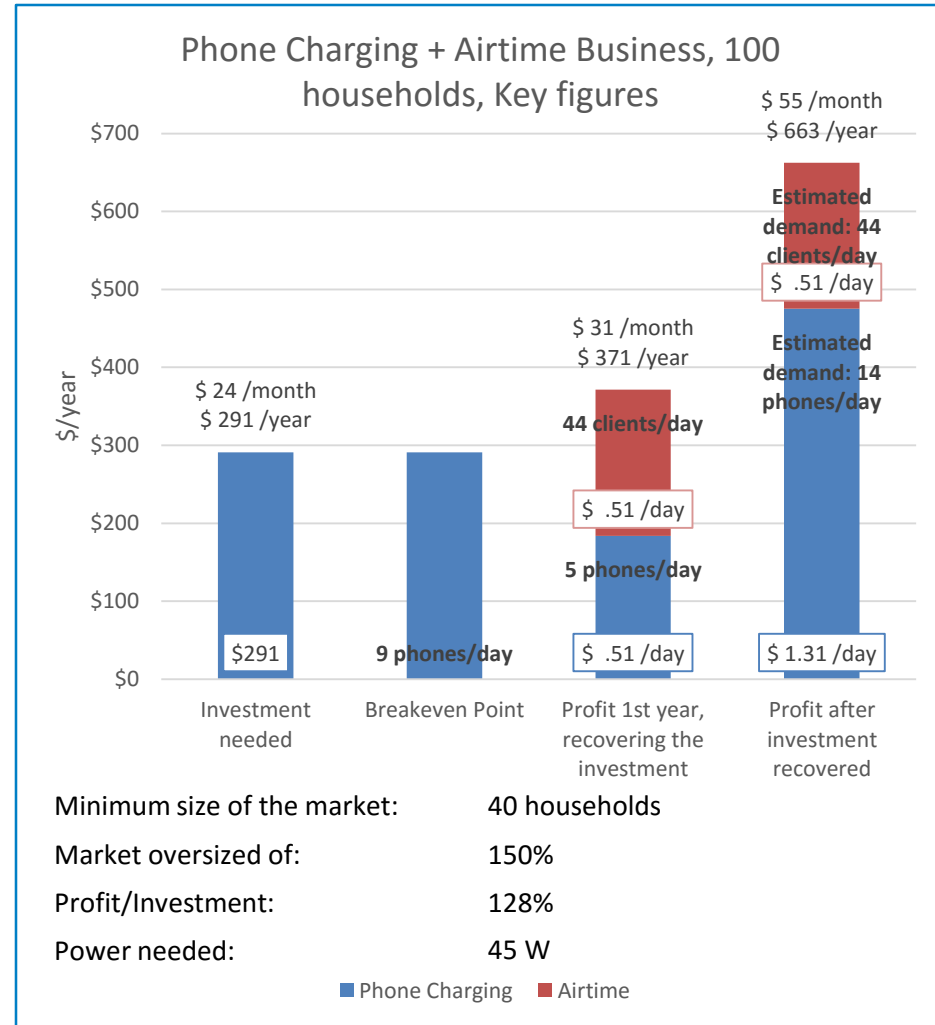
- Airtime should be developed in addition to every business (no investment needed),

### Risks

- Airtime does not generate enough revenue to limit phone charging business risks

### Opportunities

- Partnership with mobile operators (interested in increasing their market share)





# Businesses synthesis

## Phone Charging + Mobile Money

### Recommendations

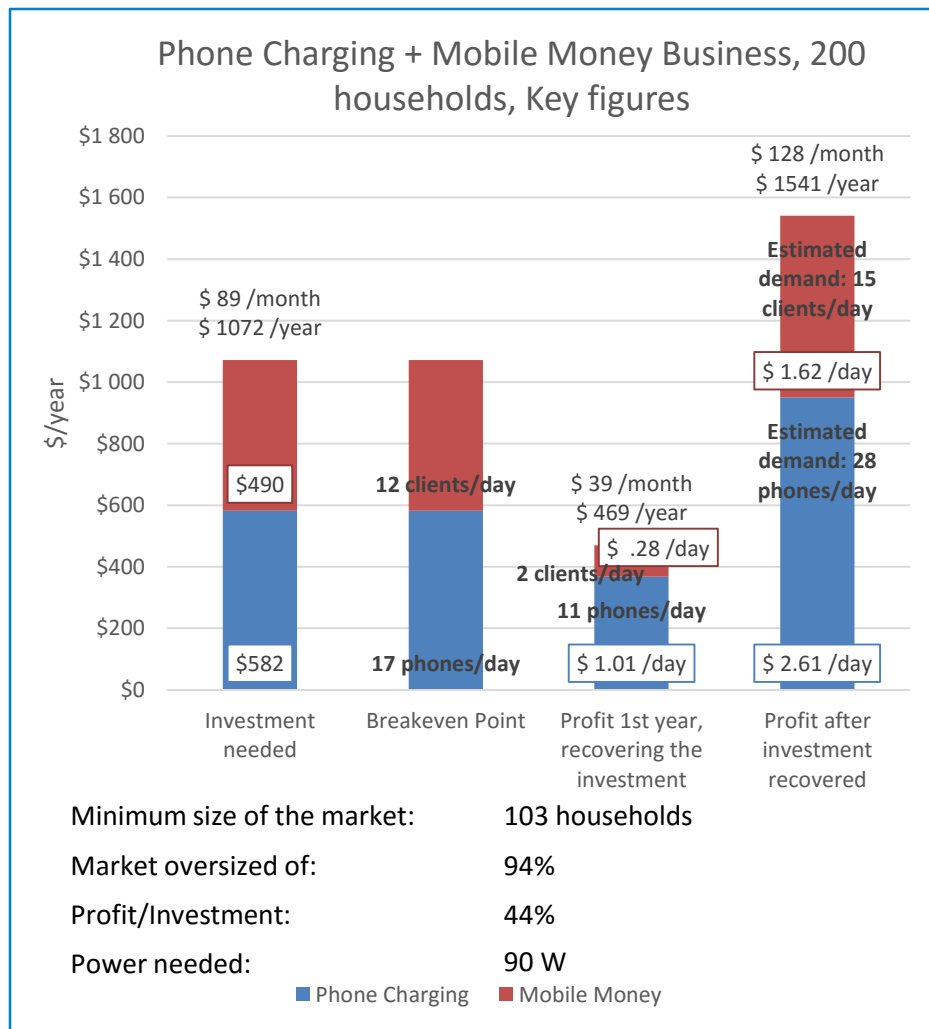
- Only start this business if there are at least 200 households customers
- M-Pesa is the most important mobile money operator

### Risks

- High Investment needed
- Competition can be high (issue of “the neighbor who wants to do the same business without knowing if it is sustainable”)

### Opportunities

- Partnership with mobile money operators (interested in increasing their market share) → this partnership could be led by the Solar PV System supplier who may have more influence with service operators



# Businesses synthesis

## Phone Charging + Barber Shop

### Recommendations

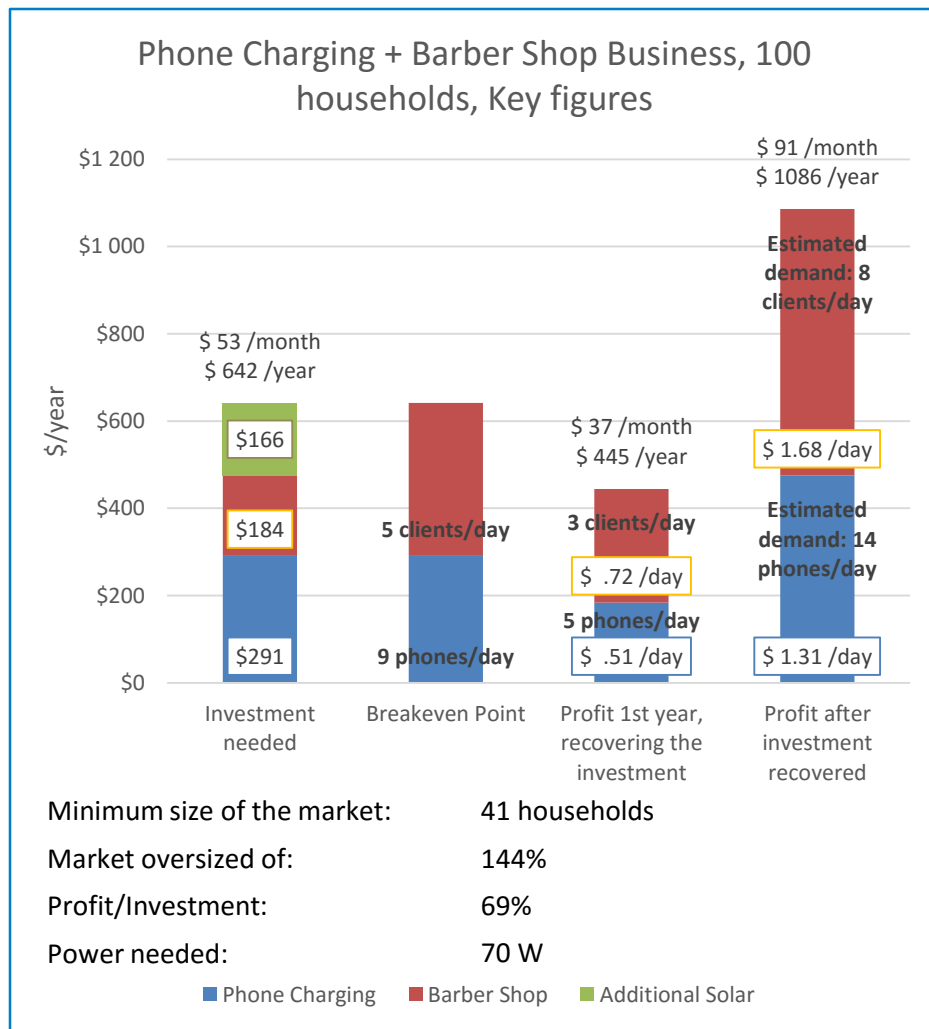
- Should be developed if the entrepreneur has few households customers

### Risks

- No major risk, investment is affordable
- Technical risk: the entrepreneur has to buy a good quality hair clipper (> \$30)

### Opportunities

- It is a safety insurance against grid/SHS: people will still need to cut their hair even if they have electricity at home
- The entrepreneur can have a “street” barber shop: he goes from house to house to reach more clients



# Businesses synthesis

## Phone Charging + Entertainment

### Recommendations

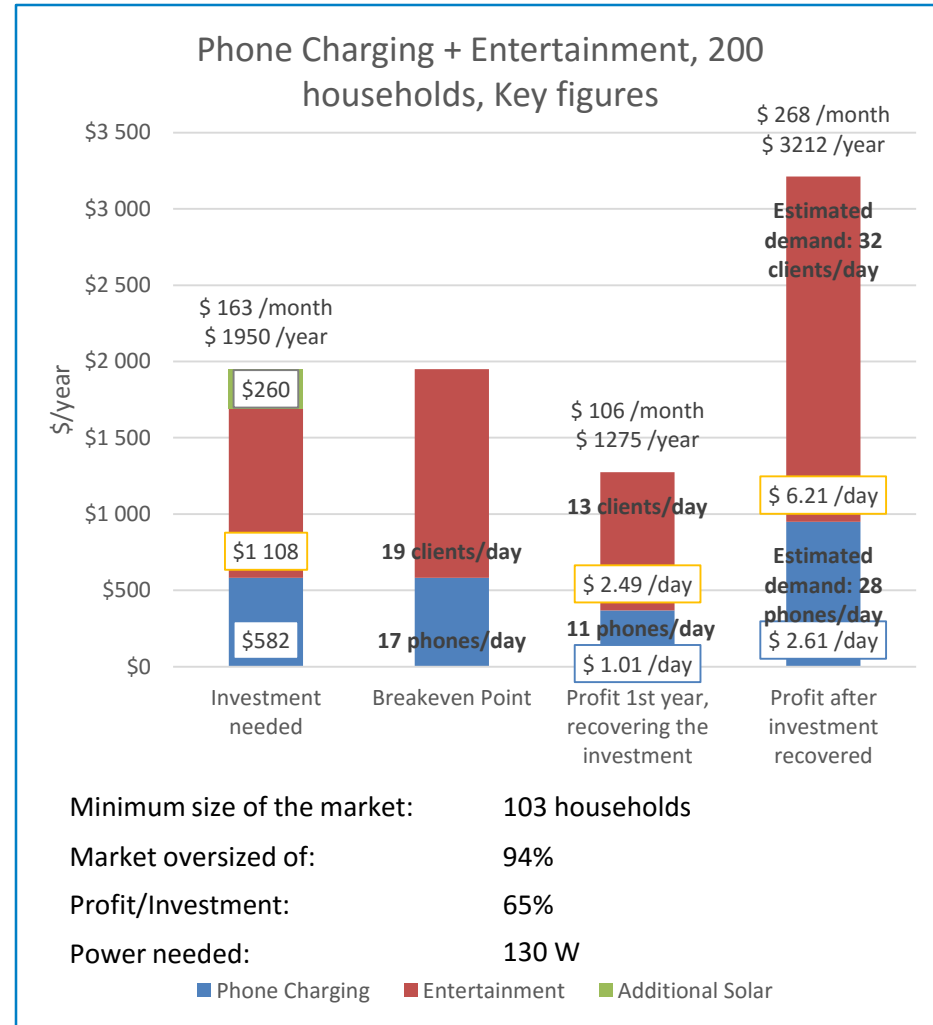
- It should be started during a big international cup (World Cup, Euro, Africa Cup) to recover the investment faster
- The best market size is more than 200 households (security to have enough customers)

### Risks

- High investment needed
- Cable connection very expensive

### Opportunities

- The entrepreneur can sell drinks and food during the match
- The entrepreneur's place can become the amusement place of the village where people come to listen music, watch videos ...



# Businesses synthesis

## Phone Charging + Solar Lantern Leasing

### Recommendations

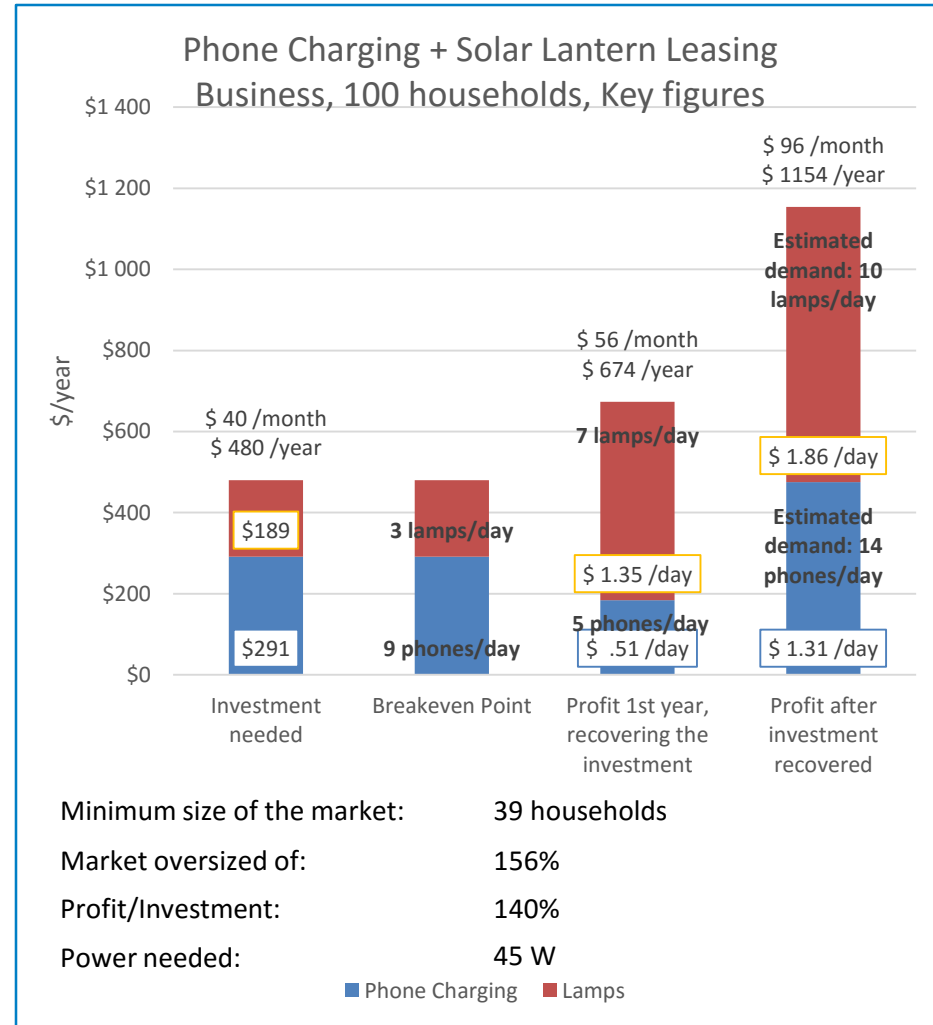
- Be sure that the demand is enough
- Make marketing to inform people that they can rent lanterns

### Risks

- Lamps broken
- Customer don't bring back the lantern

### Opportunities

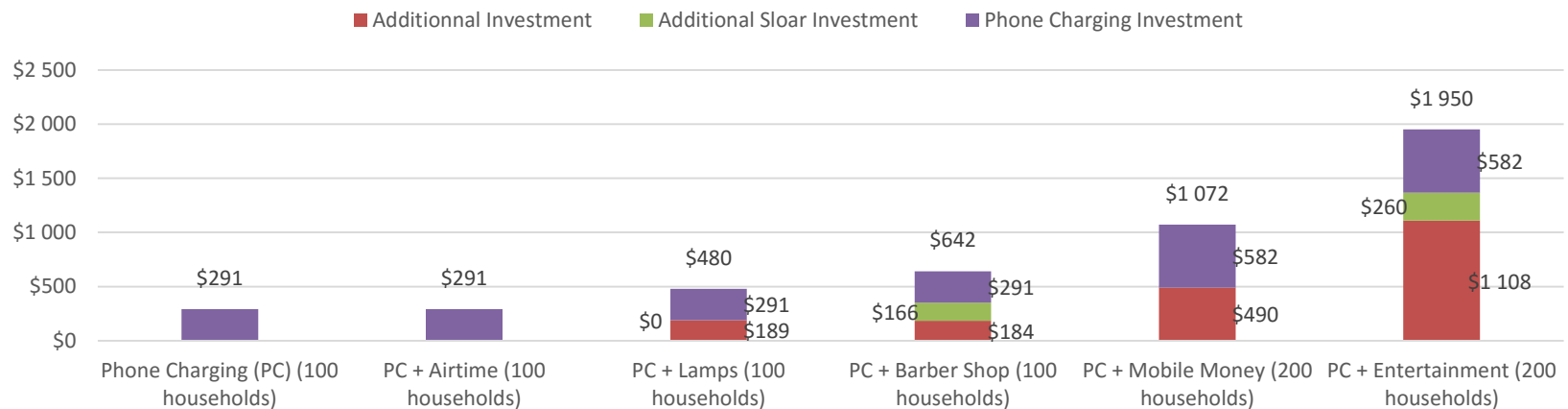
- Strong relationship with the customer who has to visit the entrepreneur shop every day  
→ the entrepreneur can provide other services
- Sell lamps: be a last mile distributor agent for solar supplier



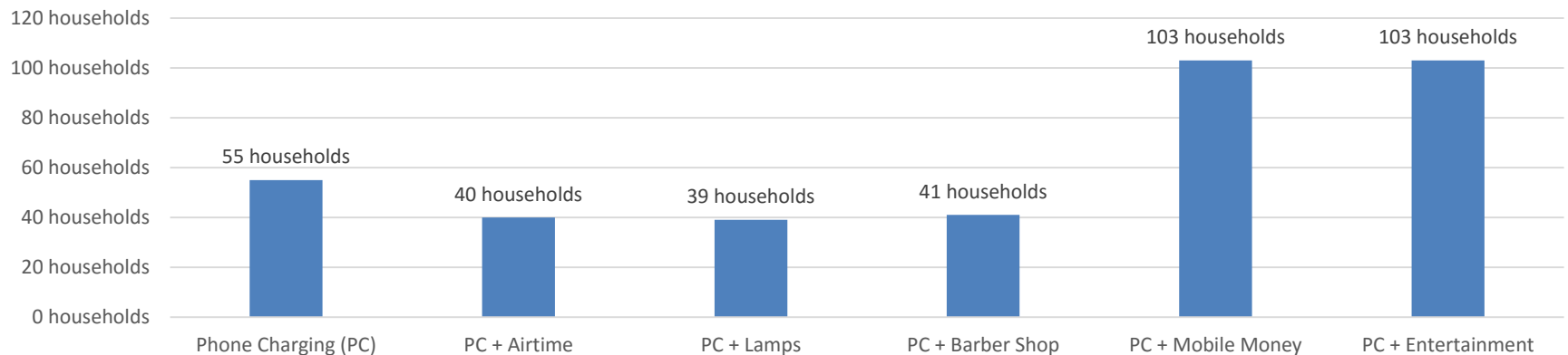
# Businesses synthesis

## Comparison

Investment needed



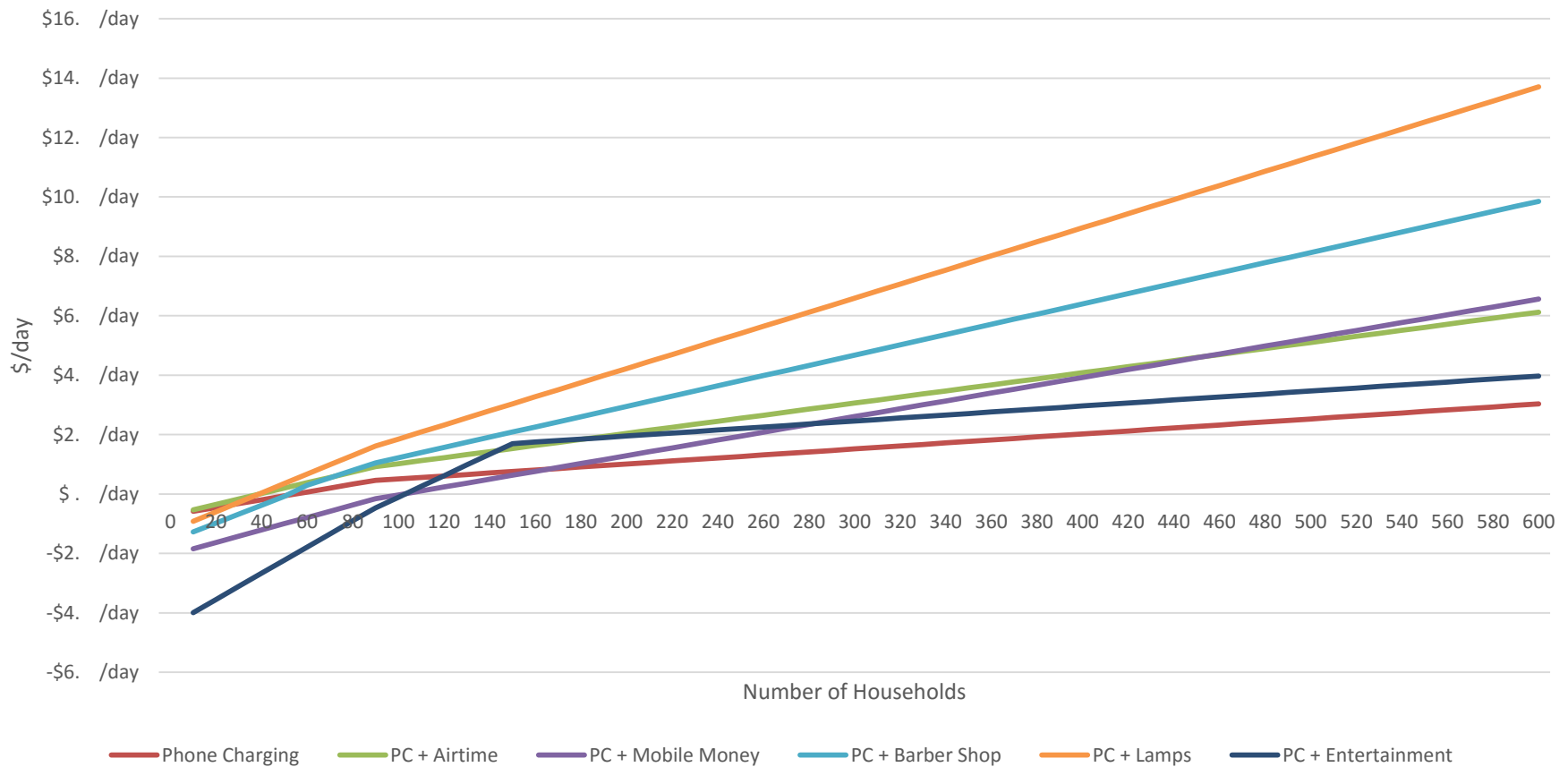
Minimum households needed



# Businesses synthesis

## Comparison, Profit 1<sup>st</sup> year

Profit per day the 1st year (paying back the investment)



# Businesses synthesis

Comparison, Profit 1<sup>st</sup> year

Investment

Low

Solar Lantern  
\$42  
100 households

Airtime  
\$16/month  
100 households

Barber Shop  
\$22  
100 households

Low

Ease of set up

High

Mobile Money  
Partnership  
\$9  
200 households

Mobile Money  
\$9  
200 households

Entertainment  
\$77  
200 households

\*Profit \$/month

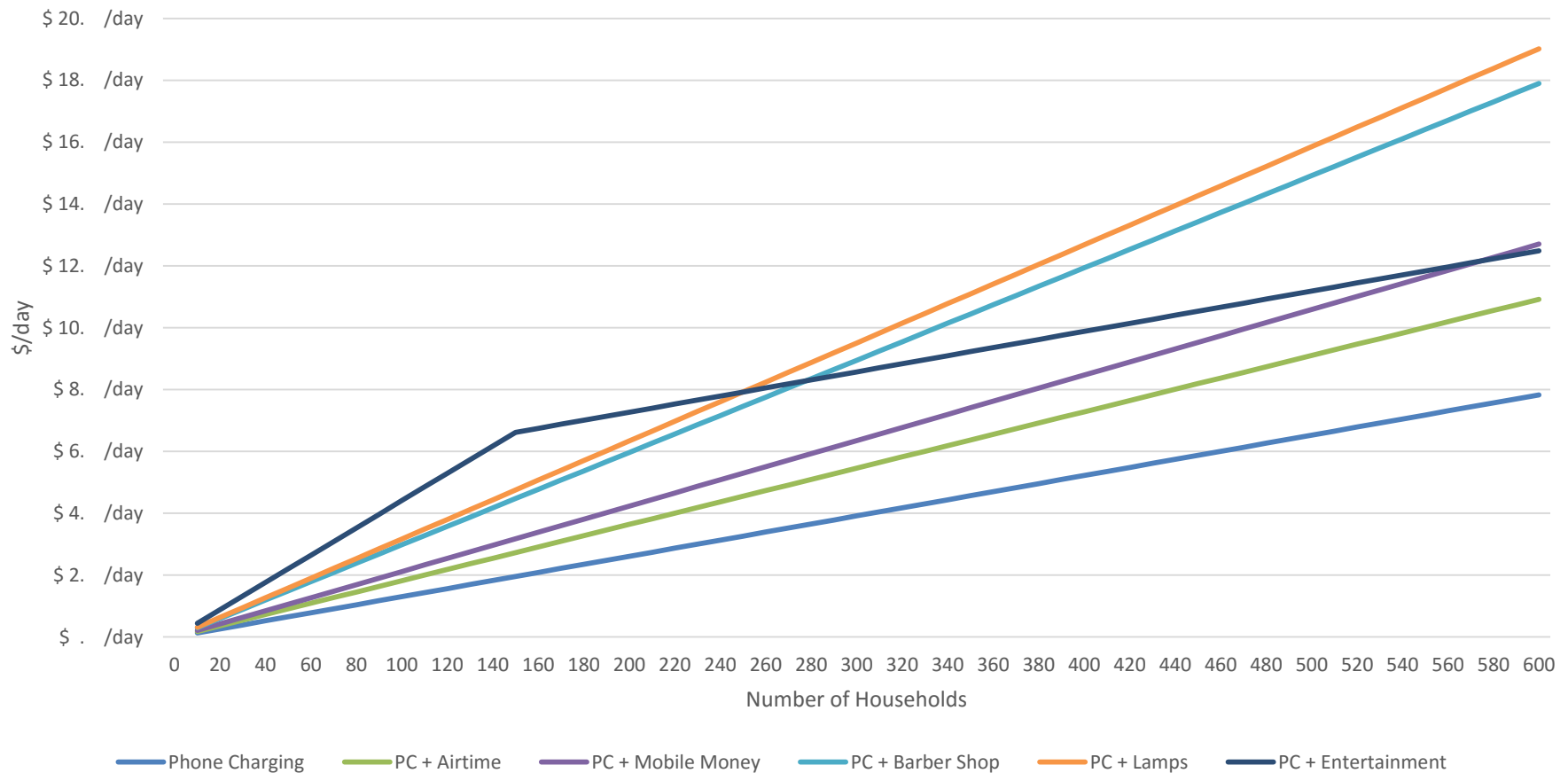
High



# Businesses synthesis

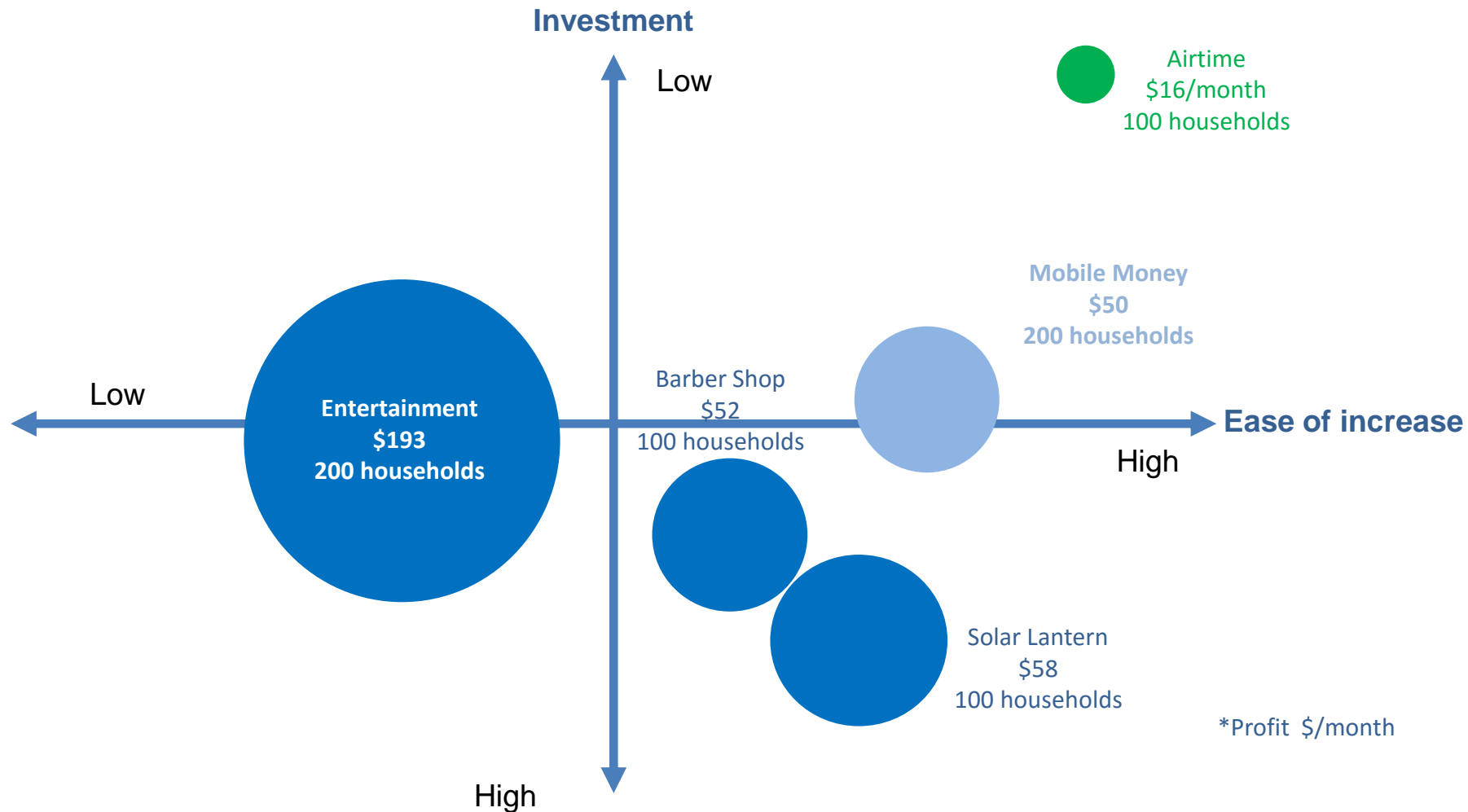
## Comparison, Profit after investment recovered

Profit per day after investment recovered



# Businesses synthesis

Comparison, Profit after investment recovered



# Businesses synthesis

## Analysis of businesses

### Airtime Business

- The Airtime business is a low risk business, no investment required. All phone charging entrepreneurs should sell airtime to increase profits of \$16/month/100 households and to attract more customers\*.

### Barber Shop Business

- The Barber Shop business is a low risk business with a low investment required. It can be developed either in small villages and bigger villages, but it is not a scalable business.
- The Barber Shop business is a good security for grid extension or SHS competition
- The Barber Shop business will increase profits from \$15.67/month to \$37.9/month/100 households recovering the investment (+142%), and from \$40.5/month to \$92.5/month after investment recovered (+128%).

### Solar Lamp Leasing Business

- Not the main business
- The Solar Lantern Leasing business is a small scale business with a low investment required and a quite big profit. It is a good business to attract customers.
- A partnership can be developed with lantern suppliers.
- The risk is high because of the grid extension/SHS/Pico Solar sales.
- The Solar Lantern Leasing business will increase profits from \$15.67/month to \$57.4/month/100 households recovering the investment (+266%), and from \$40.5/month to \$98.3/month after investment recovered(+143%).

\*See next page

# Businesses synthesis

## Analysis of businesses

### Entertainment Business

- The Entertainment business is a high risk business because of the investment. It needs many customers and is very profitable. The entrepreneur should develop it if there are more than 200 households in the village.
- The Entertainment business will increase profits from \$31.3/month to \$108.6/month/200 households recovering the investment (+247%), and from \$81/month to \$273.5/month after investment recovered (+238%).

### Mobile Money Business

- The Mobile Money business success depends on demand: people have to use mobile money in the village. It is a high risk business because of the high investment and easy competition. It is also a very promising business: widely scalable and very attractive for customers. It should be developed only in big villages (>400 households)
- The Mobile Money business will increase profits from \$31.3/month to \$40/month/200 households recovering the investment (+28%), and from \$81/month to \$131.3/month after investment recovered (+62%).

\*All these calculations have been made considering the entrepreneur is running only a phone charging business before developing another business

# Businesses synthesis

## Recommendation based on market size

Based on the analysis undertaken, the following recommendations are made depending on the number of households in the village:

- **Very small market (<50 households)**
  - The phone charging entrepreneur should sell Airtime and lease solar lanterns. Doing so, the profit will be \$20.8/month recovering the investment and \$36.9/month after investment recovered\*.
- **Small market (50-150 households)**
  - The phone charging entrepreneur should develop a Phone Charging, Barber Shop, sell Airtime and lease solar lanterns. Doing so, for 100 households, the profit will jump from \$15.7/month to \$95.5/month recovering the investment (+508%), and from \$40.5/month to \$166/month after investment recovered (+310%).
- **Medium market (150-300 households)**
  - The phone charging entrepreneur should start an entertainment business in addition to the previous businesses. Doing so, for 200 households, the profit will jump from \$31.3/month to \$300/month recovering the investment (+858%), and from \$81/month to \$525/month after investment recovered (+548%).
- **Large market (>300 households)**
  - The phone charging entrepreneur can become a Mobile Money Agent. The entrepreneur can sell airtime, do haircutting, start an entertainment business and lease solar lamps. Doing so, for 300 households, the profit will jump from \$47/month to \$557/month recovering the investment (+1085%), and from \$121.4/month to \$863/month after investment recovered (+611%).

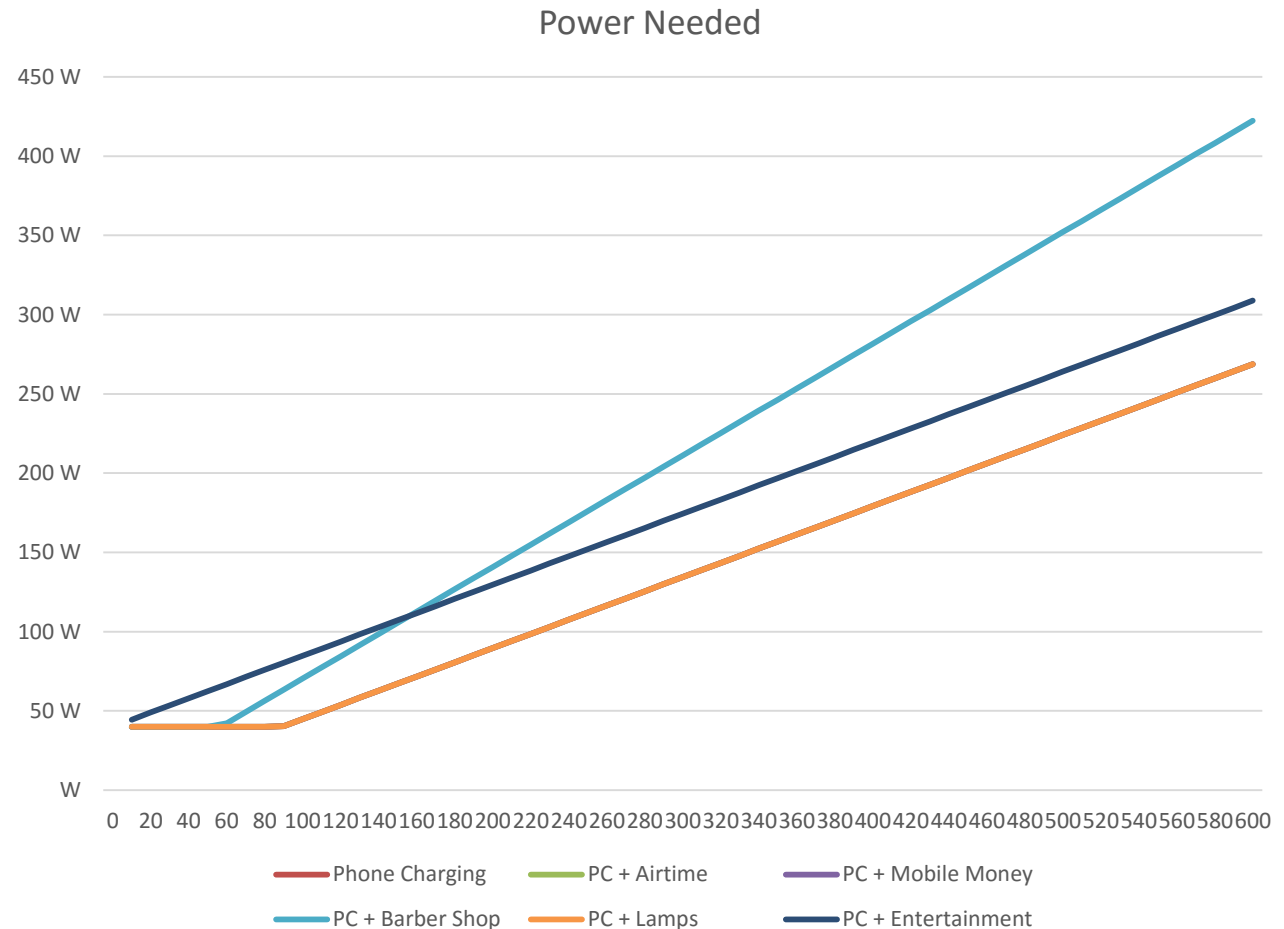
\*All these calculations have been made considering the entrepreneur is running only a phone charging business before developing another business

# Businesses synthesis

## Comparison

On average, for a village with 100 households, a 60W or 80W solar system is enough → Solaris product

On average, for a village with 300 households, a 200W solar system is enough → Mobisol product



# Contents

Background

Phone Charging Business

Phone Charging + Other businesses

Businesses Synthesis

Field Study: Verification and Correction

Other Alternatives for Phone Charging

Trend

Final Recommendations

References



# Field Study: Verification and Correction Objectives

## Verification of the current findings:

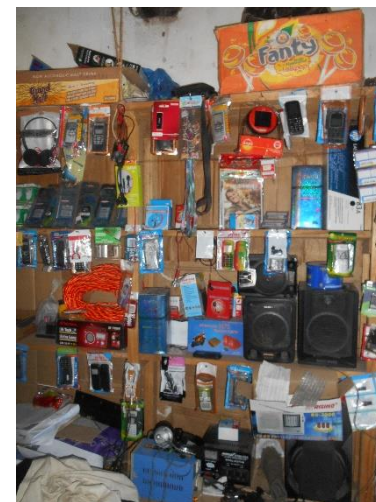
- Interview with entrepreneurs running:
  - Phone charging business
  - PC + Airtime business
  - PC + Mobile Money business
  - PC + Barber Shop business
  - PC + Lamp business

## Presentation of this work to Tanzania GVEP team

- How can they use it?
- Which changes are needed to make it useful for field work?

## Entrepreneurs interviewed

- Misungwi area: two entrepreneurs running a phone charging + barber shop + airtel business
- Magu area:
  - One entrepreneur running a phone charging + barber shop + mobile money + accessories + printing business
  - One entrepreneur running a phone charging + barber shop business and planning to run an entertainment business
- These entrepreneurs are successful entrepreneurs



Tech accessories sold by an entrepreneur in Magu



Barber Shop, Magu

# Field Study: Verification

## Data to verify

### Technical information about solar technology

- What is the real power available?
- What is the price of this system?
- What is the service provided by the supplier?

### Investment data

- What is the initial investment?
- What is the recurring investment?
- Which investment depends on the number of households?

### Business data

- How does this business really work?
- How many customer households?
- How many clients per day?
- How much is the unit cost?
- What is the profit (per day, per week, ...)
- Does the entrepreneur plan to expand his business? What does he need to expand this business?



M-PESA Agent + Phone Charging +  
Accessories, Magu

# Field Study: Correction

## Conclusions of this market study

### Main information from the field

- 1 phone charging is 200TZS → this business is not very profitable
- All the entrepreneurs would like to increase their business
- The 4 entrepreneurs interviewed were using solar PV system components from Zara Solar (a local retailer): they were helped by GVEP to take a loan (18% interest on average)



Printing and Photocopy,  
Magu



Field study: interview of an  
entrepreneur running a barber  
shop business in Misungwi

# Field Study: Correction

## Conclusions of this market study

### Main conclusions of the field study

- The entrepreneur doesn't have a global vision of his market: the number of households is approximately known and competition doesn't seem to be worrying the entrepreneur
- The way the entrepreneur runs his business looks more passive than active: he/she starts with a small system and if there is a higher demand, he/she will upgrade the system. There is no optimization strategy
- There is no preliminary study before starting a business. The decision to start a new business is based on the experience of the mentor and some observations made in the village. The entrepreneur doesn't have an estimation of the breakeven before starting, he has it a few months after having started the business when he/she sees what the sales are  
→ it is an intuitive way to run the business



Printing and Photocopy,  
Magu

### Recommendations

- Encourage the entrepreneur to conduct a market study to size his system and choose the best business
- Develop a methodology for the entrepreneur to conduct this market study

# Contents

Background

Phone Charging Business

Phone Charging + Other businesses

Businesses Synthesis

Field Study: Verification and Correction

Other Alternatives for Phone Charging

Trend

Final Recommendations

References



# Other Alternatives for Phone Charging

## Solar Kiosk

### Suppliers: ARED, Juabar and Buffalo Grid

- ARED is located in Rwanda
- Juabar is located in Tanzania
- Buffalo Grid is located in India (pilot in Uganda)
- They provide a phone charging kiosk and some have Wi-Fi
- The main business of the customer is phone charging
- Rental model: the entrepreneur doesn't own the system  
→ A part of his revenue is for the company

### Positive aspects

- No need for the entrepreneur to make investment (no loan, no risk)
- It is the responsibility and the objective of the company that owns the kiosk to make the entrepreneur's business sustainable
- Renting model: if the entrepreneur doesn't succeed, he just gives back the kiosk

### Negative aspects

- The global cost of the system should be higher than a classic system → less profit
- The entrepreneur has to share the profit with the company that owns the kiosk
- The main business is phone charging, but it is not a profitable business (only 200TZS per charge). Maybe the entrepreneur can be a street barber, going from house to house? But systems limited in capacity



ARED kiosk, 80W



Juabar kiosk, 50W



Buffalo Grid, 50W-80W

# Other Alternatives for Phone Charging

## Recommendations for Solar Kiosks

### For the entrepreneur

- **Start the business:** the entrepreneur should start his business doing phone charging using a kiosk:
  - No risk, no investment
  - Trained by the kiosk company
- **Understand the market:** the entrepreneur will improve his understanding of the market (number of active customers, current demand and potential demand)
- **Solidify his business:** the next step for the entrepreneur should be to diversify his activity using his previous experience

### For the Kiosk Company

- **Strong relationship:** the kiosk company should mentor and support the entrepreneur
- **Expand the business using the network of entrepreneurs:** the entrepreneurs are for the kiosk company last mile agents, the kiosk company has the opportunity to build a supply chain:
  - Sales agents: they can sell many types of products
  - Service agent: barber shop, entertainment, WiFi ...
  - **It is the kiosk company who should develop these new activities** because it must be developed in a large scale to interest potential partners
  - Product must be capable of scaling to provide more power



# Contents

Background

Phone Charging Business

Phone Charging + Other businesses

Businesses Synthesis

Field Study: Verification and Correction

Other Alternatives for Phone Charging

**Trend**

Final Recommendations

References

# Objectives

How will phone charging businesses be influenced?

## **This part focus on the evolution of:**

- The use of mobile phones
- The type of mobile phones used
- The mobile penetration
- The network coverage
- Access to internet

## **Goals**

- Provide an overview on the different trends
- Identify which impact it will have on phone charging business
- Propose recommendations: which points need to be fleshed out more?

# Mobile and Internet Trend

## Trend

### Mobile Trend

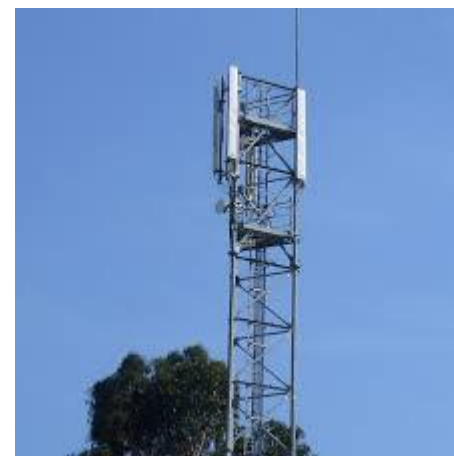
- 25% of households in Tanzania use mobile money
- 47% of household in Tanzania have an active sim card(GSMA, 2012-2013)
- Smartphones in SSA: 160m in 2015 → 540m by 2020
- Major stakeholders (Safaricom ...) foster this trend (smartphone sales promotion, low cost smartphones ...)
- The low-cost smartphone device market is dominated by Asian vendors (Gionee, Huawei, ZTE, Tecno)
- March 2015, Orange announced plans to launch a sub-\$40 smartphone in Africa
- A basic phone costs \$15

### Internet Trend

- Mobile internet penetration in SSA: 23% in 2015 → 37% by 2020



*Tecno H3, 120,000 TZS  
(\$60)*



UMTS Antenna, 3G

# Influence on Phone Charging Business Trend

## Mobile influence

- **More energy required:** Entrepreneurs will be able to charge less phones with their current system as smartphones need more energy
- **More frequent charging:** The phone charging demand will increase:
  - More phones in the market
  - People will need to charge their phone more often (more powerful phones, internet use ...)

## Internet influence

- **More frequent charging:** Mobile phone use will increase with internet → need to be charged more often
- **More energy required:** People will buy smartphones to be able to go on internet → need more energy to be charged
- **Increased demand** for Wi-Fi access to internet?

## Recommendations for the entrepreneur

- **Adapt the business:** The entrepreneur can adjust the phone charging price in line with the type of phone (it should be more expensive to charge a smartphone than a basic phone)
- **Knowledge of the market:** The entrepreneur has to take into account if people have access to internet or not when he estimates the market

# Contents

Background

Phone Charging Business

Phone Charging + Other businesses

Businesses Synthesis

Field Study: Verification and Correction

Other Alternatives for Phone Charging

Trend

**Final Recommendations**

References

# Final Recommendations

## Opportunities and development paths

### **Diversify the phone charging business**

- To develop his business and make it sustainable and profitable, the entrepreneur can diversify his/her activity developing other businesses presented above (see the recommendations at the section “Businesses Synthesis”)

### **Solar development in villages**

- For successful entrepreneurs, the potential of solar energy growth in the village is high:
  - The entrepreneur can increase his/her business and provide new services (mobile money, solar lantern leasing, photocopies, ...)
  - The entrepreneur can be a solar home system distributor in the village
    - No risk for his business because it will generate a new source of revenue and just reduce the phone charging business (people will still need to cut their hair, to buy airtime, to watch premier league ...). Moreover, phone charging business is not very profitable
  - The network of GVEP entrepreneurs would allow suppliers to reach the rural market. The entrepreneur knows the technology (he/she can be trained if necessary), and people trust him/her  
→ he/she can become the solar ambassador of the village: sales and after sales agent.

# Contents

**Background**

**Phone Charging Business**

**Phone Charging + Other businesses**

**Businesses Synthesis**

**Field Study: Verification and Correction**

**Other Alternatives for Phone Charging**

**Trend**

**Final Recommendations**

**References**

# References

1. **GVEP International.** *TPB - Businesses and Loan Performance.* 2015.
2. **BBOX.** *Product Brochure.* 2015.
3. **ENEA Consulting & GVEP international.** *At the bottom of the phone charging value chain.* 2013.
4. **GVEP International.** *Capital Access Fund and Loan Guarantee Facilities.* 2015.
5. **GSMA.** *Tanzania Enabling Mobile Money Policies.* 2014.
6. **BusinessInventor.** The Mathematics of M-PESA. *Business Inventor.* [Online] June 2012.  
<http://businessinventor.blogspot.co.ke/2012/06/mathematics-of-m-pesa-101.html>.
7. **GVEP International.** *Baseline Assessment for the Indigo Solar Lighting Project in Rwanda.* 2014.
8. **GSMA.** *The Mobile Economy - Sub-Saharan Africa.* 2015.
9. **SunnyMoney.** *Tanzania Country Report 2014.* 2014.
10. **GreenMax Capital Advisors.** *Tanzania Market Intelligence.* December 2013.