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Factors influencing solar water pump adoption by smallholders in Kenya | February 2017

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USAID-KAVES – Who we are and what we do

- Kenya Agriculture Value Chain Enterprises project 2013-17
- USAID's flagship Feed the Future agricultural development activity
- Goal of increasing productivity, incomes and nutrition of smallholder farmers
- Reducing poverty through value chain interventions
- Focus on maize, sorghum, dairy and selected horticultural crops
- 22 counties – offices in Nairobi, Kisumu, Eldoret and Kitui
- 500,000 small-scale farmers and increasing every day

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Our theory of change

Smallholders will increase whole farm incomes and nutrition by raising productivity of maize from a reduced area of land and investing in higher value enterprises, particularly horticultural crops and dairy.

Relevant background facts about smallholders

- Average area per Kenyan farmer is 1.6 hectares
- Less than 5% of farmers have permanent water
- Small-scale farming will continue to dominate agriculture
- Smallholders need to produce high value crops and products to meet income expectations
- Small-scale farming is not less efficient than large-scale
- Smallholder aggregation systems are inefficient
- Cost and scarcity of labor is a major factor in reducing productivity

Key facts about the Kenyan smallholder market

- More than 5 million smallholder customers in Kenya and 20 million in East Africa
- Have money for inputs and technologies that work
- They are interested primarily in cash income so the technology must be focused on specific markets
- Since areas are small, high value crops and products are essential (dairy, horticulture)
- They need to see a quick impact in terms of cost saving or higher sales
- Depend on village level traders and suppliers

Cross-cutting actors affecting technology adoption

- Absolute cost - TC banana
- Functionality – solar irrigation pump
- Labor-saving potential – maize sheller
- Cost-effectiveness – Bio-pesticides
- Availability - fertilizer
- Reliability – HST bag

Key factors for population level adoption

- Work, either instantaneously or within a few days
- Low cost or at least perceived as affordable
- Increase access to a specific market, preferable for a high value crop/product
- Reduce labor costs
- Have a short learning curve
- Be locally available for purchase or rent
- Increase yield, sales or price
- Be cost-effective
- Low maintenance/running costs
- Add value to a standing or mature crop

Factors affecting solar pump adoption

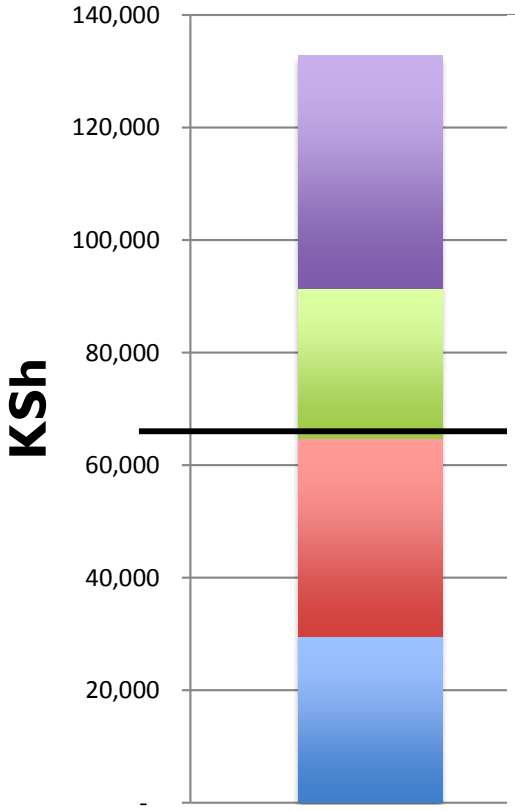
Positive

+ High functionality
+ Labor-saving
+ Low running cost
+ High ROI (c.w. rainfed)

Negative

- High capital cost
- Limited capacity
- Limited availability and choice

Marginal Increase in Gross Profit (KES)



- Rain fed farmer
- Convert ½ acre from maize to high value crops
- Plants 3 crop cycles per year
- SWP used on other crops offset ½ acre of maize forgone.

Marginal increase one year*

Gross Profit	132,775	100%
Cost of Pump	- 65,000	49%
Net to farmer	67,775	51%

*Assumes sufficient conditions for solar pump irrigation

Cabbage Potatoes Carrot Onions

Results and Conclusions so far:

- **232 KAVES farmers using SWPs**
- **ROI positive for farmers converting from rainfed production**
- **Latest Sunflower SWP can run 4 sprinklers per SWP**
- **Use of sprinkles reduces soil erosion**
- **Near zero break-down of SWPs installed in 2014-16**
- **Interest and demand high, commercialization taking place**
- **Market for at least 200,000 pumps**
- **Irrigation policies need revising to support SHFs**

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