AFRICA FOR RESULTS INITIATIVE

EVANS WADONGO: A SUCCESSFUL KENYAN YOUNG ENTREPRENEUR IN ENERGY INNOVATIONS

From the African Community of Practice on Managing for Development Results at the African Capacity Building Foundation

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SYNOPSIS

Access to energy enables people to earn a living, widens their livelihood options and strengthens resilience in the face of economic, social and environmental changes. Unfortunately, access to energy especially electricity is very low in African countries, impacting all development sectors. This case study featured Evans Wadongo who designed a low cost solar lamp named *Mwangabora* (good light in Swahili), set up a company, and elaborated a business model which succeeded though his main clients are low income households.

Key findings: Young people across Africa are showing they are capable of driving Africa's transformation through innovation. The story of Evans Wadongo is a good example of how well African people and its youthful population are innovating to fix African problems with local resources in critical sectors like energy. The case study shows that achievement of the Sustainable Energy Goal is possible but requires overcoming barriers including financing, affordability and enabling policies.

Main lessons: Tax reduction policies are necessary to promote innovative social business models that target populations with low purchase power. Also, an integrated innovation stands a good chance to succeed in African contexts, hence the necessity to support local entrepreneurs through appropriate public policies. Finally, an integrated business model in a single sector (energy) can have positive impact on other sectors and issues like education, health and employment. It also has the potential to build the capacities of poor Africans by creating new economic opportunities to them.

Key recommendations: Support to local innovators in Africa cannot be overemphasized. This requires appropriate investments, design and implementation of science, technology and innovation policies to train and equip young innovators. It is important that African governments and regional institutions establish the appropriate mechanisms and frameworks to leverage and scale up innovations that could drive Africa's transformation.

Introduction

The use of energy is a critical factor in poverty reduction (Doczi et al., 2013). Access to energy allows people to cook, heat their homes, use information and communications technologies, and benefit from better health and education services (UNDP, 2005a). It enables people to earn a living; it widens their livelihood options and strengthens resilience in the face of economic, social and environmental changes (Doczi et al., 2013).

The challenges in the energy sector include barriers to scaling up access and the use of renewables. Watson et al. (2012) characterized the barriers to accessing energy as economic, technical, political/institutional and socio-cultural, but argued that these barriers need to be viewed in an integrated way as they are inter-related. For the poorest households in developing countries, the affordability of modern energy is a barrier. At the micro level, the costs for new electricity connections

or for equipment and the recurring costs of energy services such as monthly charges, prevent them from using modern energy (Doczi et al, 2013). At the macro level, finance had been identified as a barrier to investments in energy sector because the initial costs are high, though such investments often generate good financial returns. Therefore, the achievement of the Sustainable Energy Goal will require overcoming the finance barrier for the full range of different users and providers of energy services, with diverse energy needs in widely varying contexts.

According to the International Energy Agency – IEA – (2011), between 1990 and 2008, around 2 billion people gained access to electricity around the world. Total electricity consumption increased by more than 50% during the same period. Per capita energy consumption increased in most countries, and at a faster rate in developing countries than in industrialized countries. Nevertheless, 1.3 billion people still have no access to electricity and a similar number have only intermittent access. Unless policies change and additional actions are taken, there will still be 1 billion people without electricity in 2030 (IEA, 2012).

According to the IEA (2015), Kenya, with a population of 43,692,881 in 2013 has its national electrification rate at around 20%. The urban electrification rate and rural electrification rate in the country are respectively 60% and 07%. These figures showed how deep the electrification problem in the country is with its consequences on all development sectors including education.

Face to this situation, Evans Wadongo created a low cost solar lamp which lightens up homes in the countryside and empowered the poor in Kenya. In order to sustain this innovation, he set up a business which succeeded, earning him numerous international awards. Evans Wadongo has received numerous awards and publicity from the international community over the past few years. Recently, he has been featured on CNN and in Forbes magazine as one of Africa's Best Young Entrepreneurs.

This case study aims to publicize the story of the successful venture that propelled Evans Wadongo from a simple innovator to one of Africa's Best Young Entrepreneurs. It is also worth sharing with young African people to inspire and engage them in entrepreneurship for the structural transformation of Africa.

Evans Wadongo's specific context

Like most children in rural areas of Kenya, Evans Wadongo needed to work during the day, leaving only the night time for studying. Generally, poor households without electricity spend most of their incomes on kerosene which affects their health. The kerosene lamp emitted light which was too weak for use by all members of his household. As a result, fights often erupted over who could use the lamp. Often, Evans Wadongo had to go to sleep in frustration, unable to complete his homework or study as much as he wished. He saw many children dropping out of school as a result of punishment for not completing their homework. To date, many children with limited access to lamps drop out of school in rural Kenya because they feel incapable of learning new material and keeping up with other children.

Wadongo also saw many experience burns in their houses caused by kerosene. Moreover, the use of kerosene lamps has negative health consequences since children must sit directly over the kerosene lantern to use the light to read. For Evans, the fumes from the kerosene damaged his eyes, and his vision has been permanently impaired. Blindness, as well as respiratory diseases, lung and throat cancers are common consequences of exposure to kerosene fumes.

Thus, born out of a strong desire to help his fellow Kenyans, Evans, at just 19 years old, developed the idea of replacing kerosene lamps with solar-powered LED[1] lanterns. He was studying at the Jomo Kenyatta

[1] Light-emitting diode

University of Agriculture and Technology and was performing an experiment in his dorm room with LED Christmas lights when he was struck by a simple idea: *Simple, locally made LED lights powered by solar energy should be used to light up the villages of rural Kenya*.

The solar lamp innovation

As a student at the Jomo Kenyatta University of Agriculture and Technology, Wadongo saw holiday lights made from LEDs and developed the idea to use LEDs in small villages for general lighting. After taking a leadership training course from a nonprofit group, he designed a manufacturing system for portable LED lamps that could be recharged by sunlight. While many such lamps are already on sale and are increasingly making their way into villages in poor countries, Evans Wadongo decided that his lanterns would be manufactured in local workshops with scrap metal and off-the-shelf photovoltaic panels, batteries, and LEDs.

Thus, determined to make a difference, Evans Wadongo designed an alternative – a simple, sun-powered lantern which is named *Mwangabora*, which means "good light" in Swahili. The lamps are made from locally sourced scrap metal and fragments of solar panels that charge a battery-powered LED light, while a USB port can be built into the base, enabling people to charge phones and radios. The solar lamps are made from at least 50% recycled materials. Solar lanterns are easy to assemble and provide free, individualized light in remote areas. 'Mwangabora' lanterns are the first African designed and produced solar powered lanterns customized to suit the conditions in rural African villages. The lamps are clean, green and also low in cost.

From innovator to entrepreneur

Evans Wadongo discovered that solar lamps were addressing only a small part of the biggest poverty problem. He realized that using his solar lamps help communities to save enough money to create small businesses: "*For a family that earns two dollars a day, kerosene takes about 30-40% of their daily income. If they're able to save that, it really makes a big difference*" said Evans Wadongo. He then developed the 'Use Solar, Save Lives' program to enable families secure a regular source of income, after purchasing solar lamps. After engaging communities to embrace the concept, he set up a company named GreenWize Energy which built upon the successful venture of the program to generate profit and help communities improve their livelihoods.

GreenWize Energy Limited is an innovative and fast growing, for profit energy social enterprise, operating in Sub Saharan Africa and incorporated in Kenya. GreenWize seeks to introduce innovative green energy products and solutions that out-perform competitors in the African market on originality, pricing, reliability in performance, ease of use, customization, and after sales support services. For that purpose, its mission is to create innovative

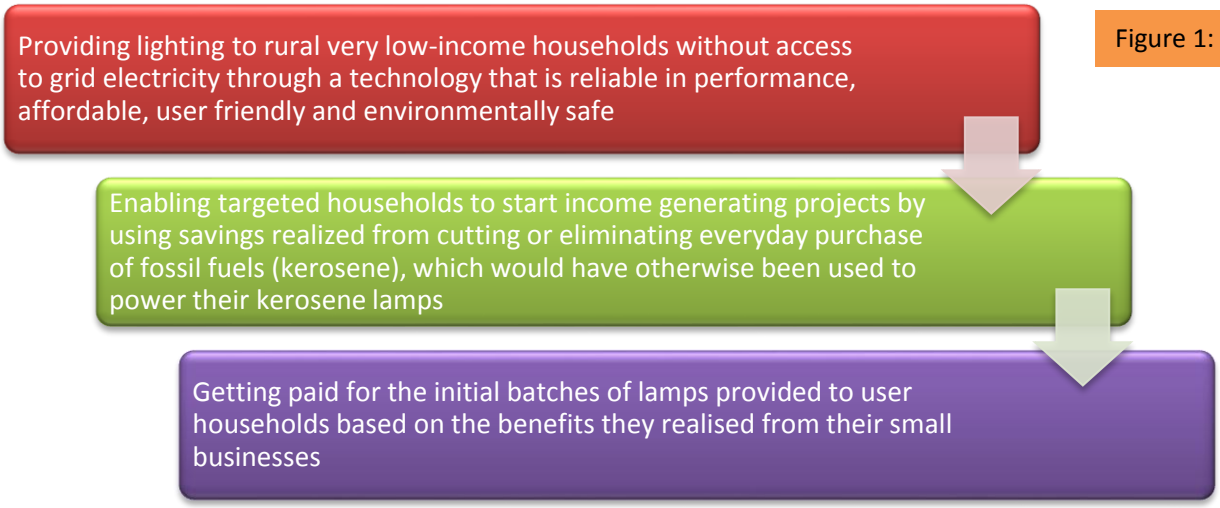

Figure 1: Sale process

African-designed renewable energy products and solutions that reduce pollution, improve energy efficiency, and reduce dependence on fossil fuels while yielding health, environmental and economic improvements. The distribution or sale process is summarized in three steps (Figure 1).

The company's turnover finally gets boosted when households realize profits from their small businesses and gradually buy new batches of lamps.

Outcomes and overall assessment

After running the enterprise for many years, the following results were realized:

Today, solar-powered LED lanterns *Mwangabora*, light up several villages in the rural areas of Kenya: Over 24,000 households in rural villages across Kenya had *Mwangabora* lanterns, with an average of five or more people per household using them.

The solar lanterns enabled the villagers to create small businesses and improve their livelihoods: When villagers acquire the solar lanterns, they start saving the money they would have spent on kerosene fuel to buy food or invest in projects that generate additional incomes for their household. With this income, local women launched a village microlending service and built businesses making bead crafts and handbags. "*We're now able to save 10 to 20 Kenya shillings (US$ 0,10 to US$ 0,20) a day, and in a month that amounts to something worthwhile*," says Irene Peter, a 43-year-old mother of two who grows maize and tomatoes. "*Personally, I saved and bought a sheep that has now given birth*." She also got started in a business making ornaments and curios.

The enterprise turnover is boosted when villagers' economic situation is improved: As profits rolled in from new microbusinesses such as those mentioned above, the villagers who acquired the initial lanterns paid for them later and gradually buy new batches of lamps. According to Evans Wadongo, "*Their economic situation is improving, and this is really what keeps the enterprise going*".

Evans Wadongo is also changing lives with the manufacturing jobs he is creating: The enterprise employs workers for the manufacturing of the solar lamps. Three men in a workshop can make 100 lamp housings a week. For this number, each man earns US$ 110 per week – far above the Kenyan monthly average minimum wage in urban areas excluding housing allowance (around US$ 170).

The solar lanterns help keep children in school by giving off a powerful light that can be shared by many, without threatening their health: Evans Wadongo has dedicated his life to giving villagers throughout Africa, not only light but hope for a better life "*Many of my childhood friends dropped out of school, and I always wanted to do something in a simple way to help out. So, the driving force was education – the desire to see more children from poor rural backgrounds competing effectively with their counterparts in towns and cities*" Evans Wadongo explained. Though, there were many other explanatory factors, in communities which experience the solar lanterns, secondary school drop-out rates decreased from 7% in 2007 to 5.3% in 2009, and absolute poverty decreased from 62% in 2006 to 57.47% in 2009.

The innovation contributes to the mitigation of climate change: Burning kerosene fuel produces large quantities of greenhouse gases which are the cause of global warning. "*Burning one liter of kerosene produces 2.6kg of CO_2, so with more than a billion people worldwide using it every day, you can imagine how much is emitted into the environment",* says Evans Wadongo. Therefore, by adopting the solar lanterns, this is an efficient way to reduce the pressure on the environment and to save the planet.

This entrepreneurship adventure brought to Evans Wadongo numerous international awards: The experience of Evans Wadongo impressed the international community for the valuable impact his innovation had on the poor households of rural Africa. Wadongo won numerous global awards including CNN's hero in 2010, recipient of the inaugural Mikhail Gorbachev Awards in 2011 for

"The Man Who Changed the World", recipient of the African International Achievers Award in 2012, Outstanding Social Entrepreneur in Africa at the Africa Awards for Entrepreneurship in 2013, listed among 35 innovators under 35 by MIT[2] Technology review, among others.

Conclusions, lessons learned and policy implications

This story of Evans Wadongo showed how well African people can fix African problems with local resources. Though there are still much to do in this area, his technology is contributing to solve rural electrification in Kenya, opening the road to other people to also invest in the sector. More, with public policies support, his business model could sustain and maintain the social and economic benefits for poor households. Finally, as modern energy encompasses electricity, clean-burning cooking, technologies, etc., this story could be an example for future Africans interventions in the energy sector.

The successful venture of Evans Wadongo provided us with key lessons and policy implications as follows:

Tax reduction policies are necessary to promote innovative business models that target populations with low purchase power: Evans Wadongo based his business model on poor households that could not afford the solar lanterns that he manufactured. Nevertheless, he knew that these people were already struggling to buy kerosene fuel for using dim light. Then, he set up a distribution model in three steps. First, he provided the initial solar lanterns to user households. Second, he advised them to save the money they would have spent on kerosene fuel to create small businesses. As profits rolled in, user households finally paid back the initial costs of the lanterns. User households also gradually buy new batches of solar lanterns when their economic situations improved. Such social enterprises should benefit from tax reduction policies for strengthening them in sustaining on the field. In this way, more poor households will be impacted, which powers the structural transformation of African countries.

An integrated innovation stands a good chance to success in African contexts, hence the necessity to support local entrepreneurs through public policies: Evans Wadongo considered and integrated different aspects of customers' needs before launching a product that had many competitors on the market. Indeed, the solar technology from mass producing countries already existed in Kenya but was not affordable to poor households. Thus, by designing a low-cost solar lantern and combining it with an innovative business model, he reached low-income people who consider him as an innovator. Therefore, such local business models should be supported through African public policies to facilitate the growth of local innovation in the face of foreign competition. This requires appropriate investments, design and implementation of science, technology and innovation policies to train and equip young innovators.

An integrated business model can have a positive impact in building the capacities of Africans, resulting in the structural transformation of Africa. By targeting low income households, thousands of children are encouraged to stay in school. Thus, the impact on the transformation of the continent is direct because there will be more African people attending schools, staying longer and attaining higher levels of education and acquiring more diverse capacities to deal with the continent's challenges.

[2] Massachussets Institute of Technology

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