



Up-scaling Social Innovations: The Eku and Implications for Enhancing Small-scale Palm Oil Production in Nigeria

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Abstract

The dearth of adoption of processing technologies by small-scale palm oil processors in Nigeria has resulted in poor quality of output and low extraction rates. This chapter proposes that improved versions of the Eku, a community-based social innovation which enables the sharing of palm oil processing facilities can be up-scaled and diffused in the sector to improve the technological base of small-scale palm oil production in Nigeria. A framework, which emphasises removing constraints to the practicality and efficiency of social innovations with institutional and funding measures to create a prototype that will be up-scaled and diffused, is developed. The study reveals that only one of five unit operations of small-scale palm oil production is totally mechanised in the Eku and constraints affecting full mechanisation of all unit operations in the Eku include lack of awareness and funds to adopt processing technologies. The chapter recommends equipping prototype Ekus with innovations for all the un-mechanised stages of palm oil production and suggests its up-scaling and diffusion in the sector through small-scale entrepreneurs. The study concludes that the diffusion of the prototype versions of the Eku can enhance the diffusion of technological innovations in the sector.

Keywords: *Social innovations; Eku; Technology Adoption; Small-scale agriculture; Palm oil production; Processing technologies*



1.0. Introduction

The small-scale processor has an important role to play in the development of the oil palm sector in Nigeria (Carrere, 2010; Adejuwon *et al.*, 2014). First, the group remains the highest contributor to the sector's total output, accounting for over 80% of total production in Nigeria. Secondly, majority of oil palm trees belong to dispersed smallholders spread over an estimated area of about 3 million hectares who harvest the wild and semi-wild plants using traditional processing techniques (Carrere, 2010). Omoti (2009) estimated that about 70% of Nigeria's oil palm trees are in wild grooves.

Traditional methods of palm oil production however have adverse effects on the quality of the output and limit the quantity of extractable oil (FAO, 2002). The resulting oil is usually high in free fatty acid (FFA), moisture and dirt contents. Lack of adoption of processing technologies in the threshing stage has led to the practice of *heaping* which allows fermentation of the fruits for easy removal by hand. This practice is the major cause of high FFA content and high crude palm oil refining losses (NIFOR, 2009). The presence of impurities and high moisture content in the final output is caused by lack of adoption of proper clarification technologies while about 75% of the available oil in the fruit is lost due to the dearth of adoption of mechanized extraction methods (PIND, 2011).

Women constitute about 80% of oil palm fruit processors in Nigeria (Carrere, 2010; FAO, 2002; PIND, 2011) and they have traditionally processed oil palm fruits in communally owned processing centers called *Ekus*. This social innovation has enabled women to share resources in the production of palm oil. Social innovations present effective and relevant mechanisms for people to pool resources and work together to attend to pressing social needs and societal problems that have been inadequately addressed or not at all by either the Market or the State (EU, 2014). They have also been described as innovative activities and services that are motivated by the goal of meeting a social need (Mulgan, 2006).

Mulgan (2006) argued that as a matter for policy, social innovations may be improved upon, replicated and diffused by the government or private sector to meet certain pressing social needs. Nuemeier (2017) argues that an understanding of the mechanisms underlying the formation of social innovations can bring about policy initiatives that may support the scaling up and diffusion of improved versions of these innovations which may make them more effective in tackling targeted social needs. Can the *Ekus* be used as a tool to enhance productivity in small-scale palm oil production in Nigeria? The aim of this chapter therefore is to examine ways in which the *Ekus* can be used to improve productivity in small scale palm oil production in Nigeria by providing up-scaled versions of *Ekus* which are equipped with processing technologies for all unit operations of small-scale palm oil production. This will be done by exploring avenues through which *Ekus* can be equipped with these processing technologies and how versions of this modernised *Ekus* can be scaled up and diffused in the small-scale palm oil processing sector in Nigeria.

This section is followed by a review of the literature on the factors that enhance the development, promotion and diffusion of social innovations. This is to aid the policy discussion part of the study. This is followed by the methodology where a policy framework is developed, the findings, discussion and conclusion.

2.0. Scaling-up and Promoting the Diffusion of Social Innovations

The rise of social innovations has been due to the increase in intractable social problems, the cost of dealing with these issues and the divide between social needs and existing structures and institutions (Murray *et al.*, 2010). The main aim of social innovations is to achieve development and growth objectives by leveraging on actors and institutions that are willing to work together to take up the challenge of finding novel solutions to social needs (Neumeierm 2017; Murray *et al.*, 2010). Mulgan (2006) argues that the motivation to solve personal problems or problems of close friends

and family may be the starting point of the emergence of social innovations. The author suggests that the best way to know how to solve a social problem is to find people who are already solving similar problems against all odds. In addition, social innovations may emerge from a myriad of ideas. Mulgan (2006) claims that ideas for social innovations rarely emerge fully formed. This leaves room for public intervention. Deliberate public action focused on copying and disseminating successful social innovations is an effective way of finding solutions to address social ills (EU, 2014). Nuemeier (2017) argues that policy initiatives may be targeted at alleviating the constraints limiting the diffusion of social innovations. The author argues that these initiatives may determine the success of those innovations as these constraints are usually beyond the capabilities and responsibilities of the initiators of the social innovation. These constraints may be financial, judicial or the lack of support (funding and policy) for social initiatives by public institutions. Nuemeier (2017) also mentions that the participation of a diverse set of key actors from different backgrounds in the process is also a factor of success of the diffusion of social innovations. Not only will multi-stakeholder participation bring a breadth of perspectives to the process, but also a breadth of connectedness across different social networks (Burt, 1980). Nuemeier (2017) mentions the work of Pollermann (2004) and F€urst *et al.* (2006) where key factors important for the successful development, up-scaling and diffusion of social innovations were elucidated. Among these factors are commitment and abilities of participating actors, effective coordination and communication, quality of the concept, cooperation among actors and access to financial resources among others.

According to the European Union report, social innovations may thrive with supportive policies, adequate governance and innovative finance, capacity building and recognition tools, benchmarking and impact measurement (EU, 2014). The report also corroborates findings and arguments by the aforementioned that social innovations are created by a myriad of creative actors working in an enabling administrative, legal and economic environment. According to the report, supportive governance includes removing administrative bottlenecks that may prevent actors from interacting, creating an enabling environment for learning and promoting a culture of trust. The report also points out that it is important that the impact of social innovations be measurable to show whether the social innovation is effective and sustainable in addressing social needs and to justify public expenditure. In addition, indices of measurement may also be used to show potential investors or financiers (or whoever is willing to take up the responsibility of up-scaling and diffusing the innovation) the viability of the social project. Measures may also show if policy is having the desired effect.

Mulgan *et al.* (2007) argue that social innovations may be taken up and promoted by social organisations, the government, commercial markets, academia, philanthropists and social software and open source methods. Mulgan *et al.* (2007) also mention factors important for the success of social innovations pertaining to the different institutions that may promote innovation. Chief among these is global links which cuts across institutions or mechanisms that may promote social innovations. Among non-profits, legal backing, funds and active links with civic organisations, think-tanks, politicians, foundations and philanthropists may provide the impetus for the diffusion of social innovations while with for-profits, competition, open cultures and accessible capital may present the right conditions. Public agencies are however poor at recognising social innovations that may replicate failing programs and public services. This may be exacerbated by a lack of motivation for officials to take up new ideas. In addition, the promotion of new ideas may upset vested interests and powerful forces (Mulgan *et al.*, 2007; Murray *et al.*, 2010).

3.0. Methodology

3.1. Analytical Framework

Figure 1 below shows the steps which may be taken towards scaling up and promoting social innovations. These mechanisms are important to develop a prototype or an improved version of the social innovation.

The prototype will be a working model of the innovation that will be scaled up and diffused. First, the social innovations or working solutions to solving social problems are identified. Secondly, the inner workings of the innovation are examined. This will reveal the history and merits of the innovation in addition to the constraints currently limiting the proper functioning and efficiency of the innovation and barriers to adopting the social innovation. Thirdly, a suite of mechanisms to overcome the constraints may be proposed. This may require legislative measures, supportive policies and innovative funding among others. The prototype will be developed at this stage. Fourthly, institutions which are best qualified to scale up and enhance the diffusion of an improved model of the social innovation may be identified. Scaling-up, a figure of speech used in manufacturing (Murray *et al.*, 2010) refers to replicating the social innovation (Mulgan, 2006). These institutions may serve as the implementers and/or coordinators for the scaling up and diffusion of the social innovation.

Mechanisms which may encourage interaction among actors that will be involved in the process may also be developed and implemented. The social innovation may then be re-evaluated from time to time to examine fresh challenges and constraints to the diffusion of the innovation. Similar to technological innovations, social innovations may need to be continually reviewed to improve its ability to solve social problems. These improvements, akin to incremental innovations, may be brought about by revisiting the assessment stage to investigate new challenges that may occur in the course of the diffusion of the social innovation. Evaluation will also involve methods of measuring the impact of the social innovation.

3.2. Study Area, Sample and Methods of Data Collection

The study was limited to Ondo and Ekiti States in Southwestern Nigeria, specifically in the towns of Igbara odo-Ekiti and Ogotun-Ekiti in Ekiti State and Ijuji in Ondo State. The area was selected for three reasons. First, there is a large cultivation of oil palm in these States. (about 3.4% of oil palm cultivation in Nigeria; Faborode, 2003) Second, there is a preponderance of processing centres in these towns and third, firsthand knowledge of the area and where processors could be located. Information was collected using focus group discussions. A total of two processing centers were visited. Twenty-five processors each participated in two group discussions. A discussion guide was developed around the objectives of the study. The guide was centred on general demographics, processing techniques employed, technological innovations adopted in processing, mode of adoption, source of finance of adoption of processing technologies and challenges of access to finance in running the processing venture.

The group discussions were conducted on site in the processing centers and were electronically recorded and transcribed. Notes were also taken. The questions and response were a mixture of Yoruba and Pidgin English. The interviews and discussions were translated to English after the first transcription. The interviews, transcriptions and translations were done by the author who is a native Yoruba speaker and well versed in Pidgin English. The manuscripts were searched for responses surrounding the objectives and the notes were written as answers to the questions.

4.0. Results

All the respondents in the shared processing centres were women. A majority of them were itinerants from other Yoruba speaking parts of Southwestern Nigeria. The women usually buy oil palm fruits from indigenes. Others have informal contracts with families or individuals who have oil palm trees on their farm land to deliver a certain amount of money or palm oil in a specified period of time for access to the oil palm trees. All of them also traded in agricultural produce. They buy farm produce from farmers in the area and take same to major markets for sale. All of the respondents from the shared processing centers used the aqueous method of extracting palm oil from the digested mash.

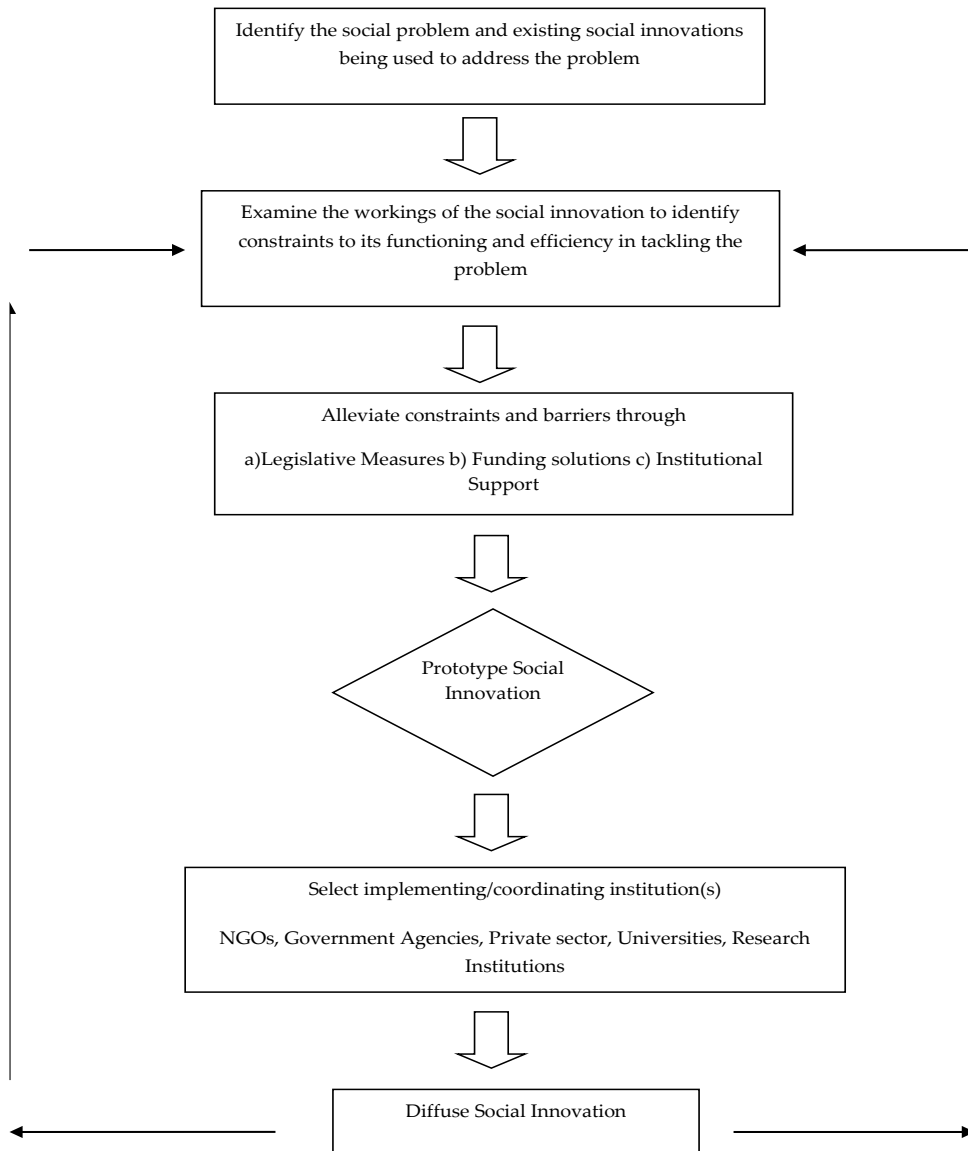


Fig. 1: Framework for Scaling up and Diffusing Social Innovations. Developed from Mulgan et al, (2007), European Union (2014) and Neumeier (2016)

According to the discussants, the *Ekus* is a community based shared palm oil processing center. It is a place where women gather to process oil palm fruits. *Ekus* is also the name of the pit used in the aqueous extraction process. This is also used to describe the location of a particular processing center as well, for example *Ekus* of so and so road or town.

One of the *Ekus* was located in Ibuji in Ondo State while the other was located in Ogotun-Ekiti in Ekiti State. Both *ekus* had mechanised digesters and kernel nut crackers powered by diesel engines for the digestion and kernel nut cracking stages.

The *Ekus* is usually located near a source of water because of the the sterilisation unit operation and aqueous extraction phase of palm oil production. However over the years, rudimentary methods have been replaced with processing technologies. According to the discussants of the *Ekus* based in Ibuji, the processing center used to be located inside a cocoa plantation about 15 minutes walk from the main

town. At the former *Ekus*, the digestion stage used to be carried out in a log of timber hollowed out like a boat where processors would pour the fruits and tread on them with their feet to rupture the oil bearing cells. The processors however had to move their processing activities to the present *Ekus* where a local entrepreneur provided a mechanised digester and a kernel nut cracker for the processors to use. The discussants claimed that the nuts used to be cracked manually using large stones. The kernel nuts are obtained after the extraction process and the processed kernels are usually sold to palm kernel oil producing mills. The owners of the *Ekus* also provided the pits and water pumps used in the aqueous process and the drums used to sterilise the oil palm fruits. The owners of both *Ekus* were men. The two *Ekus* visited have different methods of payment. In the first payment with palm oil is allowed. The owner charges two gallons of palm oil for three drums (about 700 Kg) of oil palm fruits processed. In the second *Ekus*, the processors pay ₦2,500 (Two Thousand Naira or USD \$6.02 at ₦415.33 to USD \$1) to process a drum of oil palm fruits. Only in the digestion stage are the women not involved. The sterilization and extraction stages are all performed by the women using the processing facilities in the *ekus*, while the threshing stage is performed at the point of harvest of the fruits. Threshing make it easier to transport the fruits from the farm to the *Ekus*.

The oil palm fruit processing operations of most of the processors in the *ekus* were financed by the wholesalers of palm oil who buy palm oil from them. These loans were paid back with palm oil at the prevailing market price at the time of repayment. Though the processors also obtained loans from cooperative societies and micro-finance institutions, they only used these loans for trading in agricultural produce. They claimed that oil palm processing was seasonal and too risky as yield was dependent on climatic conditions. Some of the discussants claimed that the reason they used the *Ekus* was that they lacked the wherewithal to purchase the processing technologies. Some however claimed that the operation of the machines was better left to men who are more able to cope with the complexities of maintaining and working the machines. One of the discussants particularly declared that she did not think that she was able to start-up the diesel engine (the prime mover of the digester) which required some energy and dexterity.

5.0. Policy Implications for Scaling-Up and Promoting the diffusion of the *Ekus*

Drawing on the foregoing, this section applies the framework to develop strategies to scale up and promote the *Ekus*.

5.1. Identify the Constraints

Only the digestion and the nut cracking stages were mechanised in the *ekus* visited. The threshing, sterilising, extracting and clarifying unit operations were done manually. The use of rudimentary methods in the processing of oil palm fruits contributes to low extraction rates and poor quality of palm oil. Not only is threading on the fruits with bare feet tedious and time consuming, it contributes to low extraction rates as not all of the fruits may not be ruptured properly if at all. Inappropriate clarifying methods reduce the quality of the palm oil as the product is not properly cleansed of water and entrained impurities. The technological upgrading of production activities in the *ekus* may therefore contribute to increases in productivity. Adejuwon (2014) reported that those that adopted the digester earned about ₦35,409.70 (USD \$85) and produced 6.4 thirty litre kegs (192 litres) more annually than those that did not. Adopters also saved approximately ₦149.14 (USD \$0.36) on each keg of palm oil produced. In addition, Adejuwon (2014) reported that digesting a drum of fruits by threading under foot takes about 4 hours, while it takes about 25 minutes using a mechanised digester. However, according to the discussions it was unanimous that adoption is limited by awareness and dearth of funds to adopt processing technologies.

5.2. The Prototype *Ekus*

The prototype *Ekus* will have processing technologies for each unit operation of small-scale oil palm fruit processing. This social innovation can be used as a veritable tool to provide access to

processing technologies and upgrade the production techniques of small-scale palm oil processors. The traditional *Ekus* has enabled processors, especially women to share processing facilities and thereby save costs of establishing mills of their own. These traditional mills have been a source of interaction for local women. It has also enabled women to pool resources (labour, capital etc.) together in processing oil palm fruits. The level of technological sophistication of the *Ekus* may therefore have an impact on the production activities of small-scale processors. The introduction of community based technologies into palm fruit processing sector is not new. The *Pioneer Mill* was introduced to the sector in the 1940s (Nweze, 1961; Hartley, 1988). The *modus operandi* of this technology however differed from the *ekus* in that it required the farmers sell off their palm fruits to the mill. According to Nweze (1961) this innovation failed because of several factors. First, the innovation suffered from under-capacity utilisation when the availability of oil palm fruits fell off because roads which were used to transport the fruits to the mill became un-motorable during the rainy season. Second and most importantly, women had to give up their cultural rights to oil palm fruit processing and palm kernels which was obtained after the extraction stage. This was one of the main causes of the Ngwa and Ibibio's Women's riot in Southern Nigeria in 1948 and 1950 respectively. Women perceived the new technology as a *sheer ploy to take the bread from their mouths and hinder their means of livelihood* (Hartley, 1988). Small-scale oil palm fruit processing is a socio-cultural activity mainly carried out by women. It therefore requires appropriate gender-friendly innovations to thrive.

Therefore, the simple introduction of available technologies in the prototype *Ekus* may not be appropriate. The screw press used for the extraction stage was reported by Adejuwon et al. (2016) to be operated by adolescent males as women found it too energy demanding to use. It is however important that at least some if not all of the processing technologies be gender friendly to give women the opportunity to use the processing technologies themselves. The use of innovation brokers and platforms may be necessary for proper needs articulation and awareness of processing technologies to be introduced to the *Ekus* (Oguntunde et al., 2019). To overcome the constraints of the unavailability of appropriate processing technologies, institutional support and funding for R&D and tertiary institutions may be needed. In addition, mechanisms may be required to guide the production of appropriate processing technologies which are gender friendly, aligned with the processing needs of users, affordable and capable of the scale requirements of the *Ekus*. Innovation brokers and platforms may also be used to create awareness of new processing technologies and co-develop funding solutions for owners of the *ekus* to adopt technologies (Oguntunde et al., 2019).

5.3. Selecting the Institutions to Up-Scale and Promote the Diffusion of the Prototype *Ekus*

The role of up-scaling and promoting the *Ekus* may be taken up by different categories of institutions including NGOs, Government agencies and the present cadre of small-scale entrepreneurs currently running the *Ekus*. While NGOs and government agencies may have more access to funds to set up the *Ekus*, entrepreneurs may provide a competitive environment that may encourage the development of productive capability in the *Ekus*. The location of the *Ekus* is also important for far reaching effects. According to Adejuwon (2014), many of the processors that use traditional methods for all unit operations of oil palm fruit processing do so because of lack of access to *Ekus* equipped with digesters and other processing facilities. Promoters must therefore ensure a wide geographical spread of the prototype *Ekus*.

An important factor in the promotion of the *Ekus* is the continued linkages with innovating unit(s) that provide the processing technologies. This is to facilitate feedback on the use of the innovation and enable further alignment to user needs and improvements on the innovation provided. These interactions can also serve as platforms for capacity building for both users and innovating units.

These innovating units may be supported with funding. In addition, access to global and local R&D institutions may also be facilitated to avail the innovating units a wide range of technical opportunities that may be used to solve problems which may occur when using the innovations.

Measures of the impact of the diffused version of the *eku* may include measures of productivity such as physicochemical properties of the palm oil produced or extraction rates. Measures for feasibility studies for institutions that may be willing to take up the up-scaling and promotion of the *Ekus* may include average number of processors that use *Ekus* and the average weight of oil palm fruits processed.

6.0. Conclusion

The scaling up and diffusion of the prototypes of the *Ekus*, a social innovation that has provided access to processing technologies may go a long way in improving the technological base of small-scale palm oil production. Many of such social innovations may exist along the value chain of small-scale agricultural activities in sub-Saharan Africa. These innovations may have sustained agricultural activities over time in the region albeit on a subsistence level. Up-Scaling and diffusing enhanced versions of these innovations may go a long way in improving production activities in the sector. Future studies may identify these social innovations to promote policy discussions. Depending on the social problem, existing working solutions may be a point of departure for development practitioners to begin to develop solutions to solve these problems. The inclusion of social innovations in mechanisms to improve the technological base of smallholder agricultural activities may be a necessary input for policy initiatives for the sector.

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