

Full Length Research Paper

User perception towards a motorized thresher ('Kungula') in Uganda: A need finding survey

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Maize which remains the most important food crops in the sub-Saharan Africa is expected to register about a 10% drop in net production globally by 2055. Poor farming techniques, economic diversification in the developing countries due to increased industrialization, could partly explain this trend but addressing food security problem reflected in the world malnourished figures remains a core component of the sustainable development goals. Initiatives such as mechanization intended to boost which are geared towards boosting agricultural production have not registered much success especially in the sub-Saharan African region, largely due to diversities in climates, soils, poverty, culture which often influence the choice of farming techniques. This survey was formulated on the hypothesis that technologies that have worked elsewhere might not necessarily be applicable to other areas without any necessary modifications and/or end-user involvement at the design stage. A human centred design (HCD) approach was adopted; an extended survey using semi-structured interviews and focus group discussions conducted among smallholder maize farmers (randomly sampled) in Nakasongola district (first phase of the bigger sample space) to explore their views and perceptions that would likely influence the uptake of the proposed maize thresher ('Kungula'). Findings show a significant diversity on the crops grown and the amount of land tilled by the smallholder farmers largely due to food insecurity and land tenure system. Post-harvest handling of maize still remains a challenge and rudimentary tools are still popular amongst farmers. There is also a general negativity around the costs of agricultural mechanization but respondents expressed willingness to adopt any technology that would ease their work provided incentives and in a few cases trainings are provided. However, lack of a proper distribution model is one of the hindrances to access of farm inputs which should substantially be addressed. The role of government and other key stakeholder towards economic empowerment of indigenous farmers is still very vital as the success of this user-centred approach hinges largely on the level of economic capability of the final users.

Key words: Maize, farmers, perception, Kungula, thresher.

INTRODUCTION

Maize continues to be one of the major food crops in the sub-Saharan African region covering 25 M ha of

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cultivated land between 2005-2008 representing almost one third of cereal area (about 27%) and 34% of total cereal production (Smale et al., 2011) with huge potential for expansion. Conversely though, according to Jones and Thornton's (2003) seminal paper and other projections including Knox et al. (2012), Lobell (2008), Heisey (1998), a decline of about 10% in maize production will most likely be registered mainly in Africa and North America by 2055, and yet substantial agricultural research (especially in Africa) has been directed towards increasing overall crop yield e.g. through improved crop species, development of safe-efficient fertilizers and other artificial nutrients, improved farming techniques, etc. It is worth noting that any projected drop in maize and cereal production is in essence attributable to the overall drop envisaged in agricultural production. These declines however could be annotated by changes in climate, reduction in farmland (as a result of population increase and urbanization), poor farming techniques especially in sub-Saharan Africa which also compromise quality of agricultural outputs and increased reduced dependence on agriculture by both developing and underdeveloped economies (due to rapid industrialization). Whereas these factors explain declines in food production, addressing the food security problem reflected in the world's malnourished figures which stands at about 795 million people (mostly in Sub-Saharan Africa and south Asia whose smallholder farmers largely depend on rainfed agriculture) implies a dire need for increasing food production to near double by 2050 (Jones & Thornton, 2003; Knox et al., 2012 and WFP, 2016).

Increasing food production would also mean massive investments in a number of initiatives amongst the agricultural population e.g. increased use of inputs (e.g. fertilizers, pesticides, improved seeds, etc.), diversification and agricultural mechanization. It should also be noted that the basic challenges affecting the agricultural industry are more prominent in the sub-Saharan African countries. Particularly agricultural mechanization (using advanced technologies) through technological advancements which is one of the ways to increase agricultural outputs has not registered much success in sub-Saharan Africa. The reasons for persistent failure of mechanization to register substantial success in the Sub-Saharan Africa resonates with Binswanger and Pingali (1988) major findings that is, diversity in the climates, soils, poverty, cultures and traditions, etc. which have often translated into varying choices of farming techniques. In other words, most technologies do not seem to substantially address these diversities at their conceptual stages, thus the traditional and often inefficient rudimentary tools tend to be preferred by farmers.

In Uganda, maize remains one of the main food crops and the major cereal crop grown covering almost one third of total cultivated land. However, the majority of

maize farmers (as with the case of many farmers in sub-Saharan countries) still use rudimentary tools at all stages of production (that is, from ploughing to post harvest handling). These have not only affected quantity produced but also greatly compromised quality. Quantitatively, official estimates showed about 3,000 metric tonnes total weight loss resulting from poor post-harvest handling which translated to more about 3.7 million USD by 2014. In principle, poor-harvest handling could primarily increase the risks of incomplete threshing, grain spillage, physical breaking (making grains susceptible to pests) and grain contamination (by soil and stones). Maize post-harvest handling challenges have been exacerbated by the introduction of the draught resistant maize varieties (e.g. WE2101, WE2103, WE2104 and WE2106) in sub-Saharan Africa which have amplified demands for better post-harvest handling technologies due to the alteration of harvest patterns (AATF, 2012).

This survey rather focused on Uganda as a typical country in the sub-Saharan country where food production particularly maize has been seen to fall over the years. The paper presents the findings of an extended survey from semi-structured interviews among smallholder farmers in Nakasongola district on to explore their views regarding a proposed maize thresher 'Kungula'. 'Kungula' is a proposed innovative research with primary intent to improve post-harvest handling practices amongst farming communities in Uganda through increased output efficiency, reduced wastage/losses and better grain quality at affordable costs. The name 'Kungula' is adopted from one of the widely spoken dialects in Uganda which literally means 'to harvest'. The project aims to design and construct a set of maize threshing machines that is, a motorised thresher for large scale growers and a low-cost manual thresher for the smallholder maize farmers.

In Uganda and a sizeable section of sub-Saharan Africa, machine design, fabrication and to a certain extent technological innovation have been largely dominated by the informal sector mainly manned by local artisans (e.g. 'Jua Kali' as they are referred in Uganda) who train on the job that is, through informal apprenticeship(s). The case for this phenomenon is arguably that agricultural technological improvement (in sub-Saharan Africa) has been largely side-lined by the inevitable investments in agricultural research focused on increasing yield through improved crop species. What cannot go unmentioned though is the role played by this informal sector towards supporting not only agricultural mechanization but also major projects and industries in sub-Saharan Africa such as construction and manufacturing industries. This is largely because locally fabricated equipment and machinery tend to be more readily available and affordable in terms of purchase cost; a case in point is the motorized maize thresher (locally fabricated and assembled) with threshing capacity; 1 tonne/hour/litre of

petrol which costs about \$1000 (USD) in the open market as opposed to \$1500 (USD) for imported thresher of similar capacity.

This prevailing supply chain model coupled with the informal nature of local design and fabrication industry implies that there is minimal end-user involvement at the development stage(s) of these equipment, a gap which the Kungula project seeks to address.

The survey has been formulated based on the hypothesis that diversities in cultures, climatic and topographical variations, nature of labour requirements, size of any given economy, etc. are key in determining the extent to which agricultural mechanization is adopted; As such technologies used elsewhere might not necessarily work if directly employed in other areas. Therefore, either new technologies need to be modified (especially through research and development) to suit local requirements or local conditions can be changed (e.g. investing in infrastructure to allow for ease of implementation, mind set and perception change through massive sensitisation). This paper argues that altering local conditions could be far-fetched often requiring policy formulations, appropriation and monitoring which place huge financial burdens on the institutions of government. On the other hand, a number of benefits such as reduction in equipment development times and end-user trainings, re-doing new versions etc. that come with tailor-made designs compare favourably against challenges that arise from trying to alter local conditions (Bevan, 2001). This hypothesis therefore is a strong rationale for attempting to obtain views of targeted end users of a particular technology before actual design commences. This phenomenon could be explained by the Human Centred Design (HCD) approach which tends to ensure product usability and guarantees validity of usability claims by product designers (Earthy et al., 2001). In other words, HCD strives to incorporate end user perspective into the product development process with the aim of achieving high level of product acceptability and user-friendliness. The HCD approach is not exclusive to the product development stage but also encompasses user-feedback based on their use of first phase of products developed. Typical of this is the software development cycle but it can be conceivable that tangible products essentially do go through similar cycles during their development stages. Detailed description of the working and functionality of Human Centred Design however, are not within the scope of this paper though interesting literature could be found in Rouse (1991), Cooley (2000), Norman (2005), and Oviatt (2006).

The findings of this study were used to inform design decision(s) in terms of end-user perceptions and expectations of the proposed innovation. Findings were restricted to the post-harvest handling scenarios (as highlighted below) presented to the respondents but this is not to rule out design modifications as this survey sets out to identify and innovatively address technological

gaps regarding post-harvest handling. Preliminary (proposed) information such as feed rates, spiral angle of bar tooth such as feed rates, roller rotation and fan speeds, that is, rotation per minute (rpm), spiral angle of bar tooth, etc. (Wuyun and Kangquan, 2012), which were regarded to be highly technical were deliberately omitted from the different scenarios presented primarily because of the non-expert nature of the targeted respondents.

Traditional manual threshing

This operation is arguably the most commonly used among rural farmers (in Uganda) and it involves the confinement of dried maize cobs in nylon bags and thumping them repeatedly with sticks. In addition to the low grain recovery rates, there is also a high risk of physical damage to the grains making them susceptible to moulds and pest attacks.

Manual threshing

Almost identical to the traditional manual threshing except that it involves using manual energy to operate a mechanical equipment that extracts dried maize seeds from the cobs. Two people are required during threshing using a manual thresher with one person continually feeding the maize cobs to the machine and the other operating the equipment to control rotational speed. Just like manual threshing, grain recovery rates depend on how much (in terms of physical input) the machine operator can do. These threshers however come in handy in areas where access to energy is a major problem, typical of most rural settlements in sub-Saharan Africa.

Motorized (immovable) thresher

This uses the same principle as a manually operated thresher except the machine is driven by a motor using a petrol engine. The equipment is usually kept in a central location within the reach of harvests, hence the name place immovable. Because of the high costs involved in procuring mechanized farm equipment, motorized threshers tend to be owned by clusters of farmers as opposed to individual ownership and in some instances individual farmers buy them to do threshing on a commercial basis. The problems with this model are the associated costs incurred by farmers (e.g. transportation of maize to and from the threshing location, paying for the threshing, drying and cleaning, etc.) and the inconvenience caused by having to travel back and forth.

Motorized portable

Motorized threshers can be modified so as to be as

portable as it possibly can be. This not only reduces the capital investment cost thereby making it more affordable than the immovable type but it also addresses the convenience problem which is one of the major challenges with the immovable threshers.

METHODOLOGY (SURVEY APPROACH ADOPTED)

Research approach is defined in Creswell (2013, p. 3) as “plans and the procedures for the enquiry that span the steps from assumptions to detailed methods of data collection, analysis and interpretation”. These aforementioned plans and procedures often entail having to make numerous decisions at various level, therefore in addressing any given research problem, three non-discrete approaches could be employed, that is, quantitative, qualitative and mixed methods approach. Details of these research approaches is not within the scope of this paper but important information could be found Golafshani (2003), Rajasekar et al. (2006) and Creswell (2013), etc. Whereas each of these methods could present a number of advantages such as comprehensiveness in understanding the research problem as in mixed methods, delivering precise and conclusive results, that is, quantitative; the nature of this study which is based largely on perception of the respondents using results from semi-structured interviews, implies that a qualitative approach was best suited for this kind of study. The approach encompasses “exploring and understanding the meaning of individuals or groups ascribed to a social or human problem” (Creswell, 2013, p. 3). In other words, no particular attempts were made to have the phenomenon manipulated, instead the situation was analysed from a real life viewpoint. The form of data obtained from qualitative approach comprise mainly information often gathered from questionnaires and interviews (that is, open ended, structured or semi-structured) and focus group discussions, as with the case of this study. This study aims to largely employ an empirical evidence based type approach, usually adopted by various agricultural researchers, policy think tanks, government institutions and international organizations to inform policy formulations. Qualitative primary data obtained during the survey was thus used to inform judgement during the proposed technology design processes.

We conducted semi structured interviews and two focus groups with farmers from two sub-counties (Kakooge and Kalongo) in Nakasongola District between June and July 2015. The respondents were recruited by the Nakasongola District agricultural officials, and these comprised mainly smallholder farmers who had previously participated in a couple of previous government surveys and projects. The decision to delegate the respondents’ recruitment was largely resources and logistics based and not scientific as having interviewers recruit the respondents would not only require more time but also more financial resources to facilitate the process (Tables 1 and 2). The overall aim was to assess the farmers’ perception that would likely affect the uptake of the proposed maize thresher ‘Kungula’, thus the interview themes were designed to address the following key aspects:

- i) Identifying existing practices related to handling of maize among subsistence and commercial farmers in Nakasongola district.
- ii) Investigating existing challenges related to threshing of maize among subsistence and commercial farmers in Nakasongola district.
- iii) Assessing existing management practices related to threshing of maize among subsistence and commercial farmers in Nakasongola district.
- iv) Exploring distribution models affecting access to agricultural inputs among subsistence and commercial farmers in Nakasongola

district.

- v) Establishing attitudes, perceptions and other factors that would affect adopt the proposed maize thresher among subsistence and commercial farmers in Nakasongola district.

FINDINGS AND DISCUSSION

The questions in the questionnaire/focus group were generally designed to establish the baseline scenario(s) regarding general maize handling practices (that is, from ploughing to post harvest handling) in the study area, as a means of identifying technological gaps and thus use the said gaps to gauge end-user expectations.

Respondents were asked to elaborate on the existing management practices employed in maize handling from planting to harvesting. All respondents who responded to this question confirmed the fact that re-known traditional farming techniques and procedures (that is, clearing the land using hand hoes, planting and weeding after the shoots sprout) are still popular amongst the farming community. This has been largely attributed to inadequate resources as most farmers do not have the necessary resources to invest in irrigation, herbicides and other machineries. Additionally, it is worth noting that the financial resource constraint is not exclusive to maize farmers but rather the entire agricultural community. This is not to suggest that availing rural based farmers the financial resources would immediately translate to mechanised farming practices since promoting mechanised agriculture requires a rather broad based approach which could encompass both physical infrastructure and government policy. This narrative can be confirmed by a quick assessment of farming communities in urban areas who have easy access to infrastructure. These tend to use more efficient farm equipment (however simple) compared to their rural-based counterparts, not because of the intensity of their farming but simply due to the accessibility of these equipment. This sentiment was also echoed by a number of respondents claiming the problem is ‘everything is in town and Kampala areas’ (that is, urban areas and the capital city)

Likewise, a number of challenges specifically related to post-harvest handling of maize/maize threshing were identified and admittedly, all respondents cited labour intensiveness and inefficiency of the traditional maize threshing techniques (e.g. thumping using sticks) as a major threshing challenge. However, as intimated in the previous texts traditional techniques are still very popular amongst maize growers and this has also been majorly due to inadequacy of financial capacity to invest in improved techniques and partly due to ignorance. This cost factor was emphasised by Pingali and Binswanger (1988) as the major impediment to transitioning from traditional tools to highly mechanized tools such as tractors. In other words, if the cost of mechanization

outweighs the savings in the cost of manual labour (a very likely scenario in sub-Saharan Africa), farmers are inclined to stick to the traditional approaches. In some instances, especially where topography permits, animals such as oxen and donkeys have remained intermediaries between rudimentary and highly mechanized techniques. Animal power however, is mostly suited for cultivation and perhaps certain aspects of harvesting which implies that improvisations and intermediaries are not plausible options for harvesting and post-harvest handling.

Other more specific threshing challenges identified included weight loss resulting from improper drying, low quality grains due to poor winnowing thereby leaving chaff and other unwanted additions/residues in the threshed maize. One respondent elaborated that up to 3kg of maize is lost to the buyer for every 100 kg to cater for chaff and other unwanted additions. It could be conceivable that these estimates could have no basis or perhaps unrealistic and as such there was no consensus on the actual amount of loss incurred as this seemed to vary from buyer to buyer, however all respondents (including buyers) concurred on the monetary implication attributed to losses due to chaff and 'impurities' which obviously cost farmers a considerable amount of income. From a mechanized threshing view point, the locally available threshing machines apart from their scarcity, operability and maintenance costs, and portability, they also lack some of the end-user desired technical abilities such as winnowing, drying and cleaning alongside threshing. In fact, farmers are more interested in having a robust, potable and diverse threshing equipment that can enable them perform multiple processes concurrently. This was the basis of this research that is, to gauge targeted end-user expectations and use it to inform design decisions of the proposed thresher. A total deviation from the existing thresher designs to meet all farmer expectations might not be realistically practicable but removal of chaff and other impurities from the harvest (to improve quality) is undoubtedly a worthwhile problem that could be addressed at the technical design phase. Additionally, there were mixed responses towards farmers' expectations of the proposed thresher especially regarding its mode of operation (that is, manual or motorized). However most (that is, 25 out of 29 who gave clear answer(s) to the question) respondents specifically suggested that any new technology should at least be incorporated with a winnowing component like fan to be able to clean their products to improve value. Both these technical and logistical challenges were taken into consideration during design. A summary description of the baseline scenario regarding maize handling practices can be found in Table 3.

Summary

Like most farming communities in the sub-Saharan Africa

region, more than 70% of the farmers surveyed practice mostly subsistence farming mainly attributed to the land tenure system which makes it hard to practice large scale farming due to the fragmentation. Likewise, land tenure system and food insecurity have also been responsible for the diversification in crop production among the indigenous farming communities not only in the area surveyed but through most parts of Uganda. Rudimentary tools still remain popular amongst the smallholder farming communities mainly due to affordability and accessibility (in terms of distribution models) of modernised equipment, lack of awareness about agricultural mechanisation.

Furthermore, locally available maize threshing equipment lack the end-user desired technical features/abilities e.g. winnowing, cleaning, drying and above all user friendliness and portability. These were incorporated in the design process of the proposed technology with the aim of producing a user-desired product.

Limitations of the study

Very often, qualitative data are seen to be too subjective, inconclusive and over reliant on respondents. Therefore, interpersonal skills that combine empathy and analytical abilities are very vital for qualitative researchers. Other than the 'common' challenges of qualitative research, the findings of this study were also subject to certain specific limitations which have been discussed next.

Bias and misrepresentation

Because of limited resources and time, respondents were not directly recruited by the researchers and as such there was no direct contact with the respondents prior to the study. This meant that the district agricultural officers delegated to identify and recruit participants had the sole responsibility of determining who took part in the survey. There is a reasonable possibility that this could have compromised the responses especially if the recruiters had personal biases or if the process itself created a bias amongst the respondents. It is also worth noting that the district officials interact regularly with the local farmers therefore the nature of their relationship can be critical while conducting studies of this nature.

Some level of mistrust and discomfort

The interviews were conducted by total strangers as there were no prior correspondences with the respondents. Naturally, there could have been some concerns on the part of the interviewees as to how much information they could disclose to the interviewers. This implies that some respondents could have chosen not to

Table 1. Summary extract of questionnaire.

Baseline scenario	Existing practices relating to maize handling from ploughing to harvesting	Describe the practices involved in maize growing from planting to harvesting
	Challenges relating to maize threshing	Describe the challenges you face related to post harvest handling of maize (e.g. threshing methods, their challenges, etc.)
	Management practices related to threshing of maize	Describe existing management practices related to post harvest handling (Probe for threshing management strategies)
		In your opinion, do you think post-harvest practices affect quality and quantity of the maize produced?
		Have you done anything to try to improve post-harvest handling practices
		Do you use any form of machinery for post-harvest handling? If yes which ones?
	Distribution models affecting access to agricultural inputs among subsistence and commercial farmers in Nakasongola district	Do you have any preference, in terms of any innovations you use for maize threshing? If yes, what are some of these innovations (methods)
		How would you rate your satisfaction with the current means of threshing
		How do you get to know about agricultural supplies e.g. fertilizers, seedlings, machinery, etc.
		What do you consider when buying agricultural inputs? Are you helped in anyway while deciding what to buy?
End User- Perception	Attitudes and perceptions that would affect adoption of proposed maize thresher	How and where do you buy your supplies? What are the difficulties you find with financing your agricultural activities and how can it be improved?
		How do you pay (that is, finance) for agricultural supplies? Individually or groups?
		What are the difficulties you find with financing your agricultural activities and how can it be improved?
		From the explanation provided; what do you think about the proposed maize thresher
		Would you be willing to take up a maize thresher designed to thresh other crops? If so, which ones?
		How big (in terms of volume of maize threshed) would you want this thresher (Kungula) to be
Do you have any preference in terms of source of power for the thresher?		
What about cost of the machine, how much would you be willing to pay for the thresher?		
Would you love any special trainings on how to use the thresher		

Format: Author.

Table 2. Respondents' Information.

Education Level	Number of respondents	Acres of Maize cultivated	Number of respondents
Above A level	3	0-5	20
High School (A Levels)	1	5-10	3
O Level	1	10-15	0
Below O Level	12	Above 15	1
Not provided	14	Not provided	7
∑ sum	31	∑ sum	31

Format adapted from: Jenkinson et al., 1993, p.2.

disclose certain information they consider sensitive, thereby impacting negatively on the data collected

especially if the information could have been valuable for the study.

Table 3. Baseline scenario of existing maize handling practices (Format adapted from: Bacenetti et al., 2016).

Operation	Description
Ploughing	Farmers use mainly hand hoes, ox-ploughs and in very rare cases tractors for primary ploughing. In some cases, (rough areas) secondary tillage is necessary which further prepares the land for planting
Planting	No special equipment other than hand tools employed during planting. Planting is done mainly at the beginning of rainy season(s)
Mechanical weed control	Usually done within the first three weeks of planting (first weeding), then one month after first weeding
Harvesting	Starts after 3-5 months of planting (depending on the breed). Done manually (with hands) and no specialized tools
Drying/Transportation	Harvested maize transported to the drying yard, sunshine is the main mode of drying
Threshing	Manual threshing (that is, thumping with sticks) and mechanical threshing using motorized equipment
Cleaning/winnowing	Also done manually with no specialised tools
Bagging and storage	Maize seeds stored in bags and silos

Exaggeration of responses

Naturally, there is a tendency of interview respondents speculating the intention and objective(s) of interviews and this often tend to influence how participants respond to certain questions. It was noticeable that a sizeable number of individuals (about 6), and mostly those who had attained at least high school qualifications attempted to provide exaggerated figures (that is, over estimating) especially relating to volumes of output and size of land. It is worth mentioning that the government of Uganda has over the years tried to put in place initiatives e.g. agricultural grants, advisory services, subsidies to farm inputs, etc. to boost agricultural outputs. Benefiting from such initiatives however, are always through a prescribed criteria developed by government experts often targeting medium and large scale subsistence farmers. This survey could have easily been mistaken for a way of identifying beneficiaries of one of those government programs, and the fact that more calculated, rehearsed and premeditated answers came from respondents who had slightly better education qualifications confirms this argument. As a mitigation measure, the survey questions were designed and customised to suit almost every respondent and the team tried as much as they possibly could to clearly explain the objectives of the study. It is likely though that this could have not been sufficient to counter all well thought answers.

RECOMMENDATIONS

This was an empirical need finding study primarily

intended to inform design decisions of the proposed maize thresher. Major findings of the study were adopted and eventually incorporated in the final product design. We recommend the following for future research as well as improve farming practices:

- i) A robust equipment that performs multiple operations (that is, threshing, cleaning, drying, etc.) concurrently and threshes different crops is plausible for future research. Likewise, handling of agricultural wastes was not factored in at conception stage of the proposed technology. The question of what happens to the residue (maize cobs, chaff, dust, etc.) after the threshing activity
- ii) The lack of a clear distribution model for farm inputs and equipment still remains one of the major inhibitions to mechanised and large scale farming. We recommend and emphasise a model where farmers work in clusters and local groups so they can collectively afford mechanized equipment and also easily voice their needs. Farmer groups and clusters have proven to work in low income countries and all respondents agreed that farmers who mobilised themselves in groups often have better access to aid initiatives, government programs, mechanised equipment and a higher bargaining power in the market. This can only be achieved through massive and continuous sensitization on the benefits of 'coming together', mechanisation and large scale farming.

Conclusion

Rudimentary and traditional practices will most likely remain popular amongst rural smallholder farming

communities in Uganda and sub-Saharan Africa. It is evident that economic levels, attitudes and perception do play an impeccable role in determining the farming practices amongst indigenous and smallholder farmers. Agricultural mechanisation through innovation and technological advancement is one of the practical ways to minimise and/or mitigate losses attributed to post harvest handling and to boost not only agricultural productivity but also improve quality of agricultural output. User-centred design approach adopted by the 'Kungula' design team is a realistic way to develop tailored local solutions to agricultural mechanization challenges, and above all achieving maximum adoption of any new innovations amongst smallholder farmers. However, the success of this strategy will largely hinge on the level of economic empowerment within the farming communities thus the role of government and other stakeholders cannot be trivialised.

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CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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