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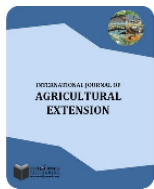
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CHALLENGES FACED BY SMALL LAND HOLDER FARMER REGARDING DECISION MAKING IN INNOVATIVE AGRICULTURAL DEVELOPMENT: AN EMPIRICAL ANALYSIS FROM KENYA

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ABSTRACT

Declining agricultural productivity among smallholder farmers in Sub-Saharan Africa remains a major bottleneck to the continent's agricultural sector development. In Kenya's semi-arid lower Eastern region, efforts have been made through public-private partnership (PPP) initiatives to address food insecurity in particular. Inadequate understanding and poor documentation of factors related to challenges facing smallholder farmers in decision-making to improve farm productivity and food security exists. A study was carried out to determine the factors related to decision-making among smallholder farmers to increase farm productivity for improved food security. It involved 34 Key Informants (KI) and five Focus Group Discussions. Data were collected using a check-list, a semi-structured questionnaire and a self-administered questionnaire and analysed using Statistical Package for Social Sciences (SPSS). Results showed that: farmers faced challenges in deciding how to improve their farm productivity. About 76% of KI respondents observed that some of the promoted technologies did not address farmer's immediate needs; 65% argued that technologies were promoted without considering prevailing farmers' circumstances. The study concluded that farmers needed accurate information to make informed farming decisions; their immediate needs required technologies with diversified utilization options; analysis of farmers' operating circumstances was crucial. Consequently, development partners should: provide adequate information on available technologies and innovations; exploit the existing PPP meetings to promote technologies and innovations with wide utilization options; put strategies in place to analyse farmers' circumstances and promote improved technologies and innovations to increase farm productivity for improved food security.

Keywords: Declining agricultural productivity, decision-making, farmer circumstances, food insecurity, improved technologies and innovations, limited utilization options

INTRODUCTION

Augustine *et al.* (2013) and Klerkx and Leeuwis (2008) noted that in many developing countries, the agricultural sector is organised along demand-driven production chains in both local and global competitive markets. They further observe that poorly functioning agricultural value chains in Sub-Saharan Africa can be effectively improved through public-private-based partnership (PPP) linkages. Such linkages should be used to strengthen stakeholders' individual and collective capacities to innovate and improve

organizational cultures and behaviours. Additionally, innovation platforms and intermediaries can help entrepreneurs cope with emerging agricultural challenges such as the articulation of the multi-stakeholders' innovation needs. Such innovation platforms therefore need a flexible attitude and process skills in the navigation of their dynamics (Buchanan *et al.*, 2013). Furthermore, improved technologies and economic innovations create a win-win situation while maintaining and improving economic competitiveness and securing environmental sustainability (Coenen & López, 2010). They also need a broad range of tasks that relate to problem solving, learning and group development processes (Paassen *et al.*, 2013).

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Despite considerable advances in technology, declining agricultural productivity among smallholder farmers in Africa remains a major bottleneck to the continent's agricultural sector development (Adejobi & Kassali, 2013). The agricultural sector's growth and development as noted by Faria *et al.* (2010) is influenced by complex interactions among the PPP actors. This is coupled with rapidly changing market and policy regimes that affect knowledge and information flows, technological opportunities and innovation processes. Agricultural research can contribute substantially to enhancing agricultural production, growth and poverty alleviation (Augustine *et al.*, 2013). However, such contribution seems to fall short of meeting the expectations of PPP joint development initiatives geared towards increased agricultural production in the semi-arid areas of lower Eastern Kenya. Leys and Vanclay (2011) noted that earlier technology transfer approaches and methods were unsuitable for resource-poor farmers in the third world countries' complex, diverse and risk-prone agriculture. Little focus, they say, has been given to the development of institutional frameworks for implementation and evaluation of emerging technology dissemination approaches and methods. Thus, there is need for more innovative and less linear approaches to exploit new opportunities and overcoming production constraints (Augustine *et al.*, 2013).

The semi-arid areas of lower Eastern Kenya which cover the three semi-arid Counties of Kitui, Machakos and Makueni are characterised by poor infrastructure, low, erratic and poorly distributed rainfall (Kavoi *et al.*, 2013). In this region increasing population and scarcity of available resources have aggravated the situation (Ministry of Agriculture, 2012). Resource-poor smallholder farmers in the three Counties of Kitui, Machakos and Makueni rely on subsistence farming where both crop production and livestock keeping are practised. Over the years, research for development has been made through PPP joint initiatives to address food insecurity in the semi-arid lower Eastern Kenya region (Maeda *et al.*, 2011). However, the inability of smallholder farmers to access adequate and affordable food in the region resulting from reduced farm productivity as well as unreliable, distorted and disorganised markets have compounded past PPP joint development initiatives (Karanja *et al.*, 2011).

Ouma *et al.* (2011) noted that, development agencies in the region have been engaged in promoting improved technologies and innovations to help improve farm productivity and household income of the resource-poor smallholder farmers. However, the complexity of knowledge and information processes on the promotion and adoption of improved technologies and innovations calls for development partners to seek for valuable knowledge beyond individual partner's own institutional boundaries. But since technology adoption is influenced by the clarity at which the new knowledge and information is communicated in a recipient population, both knowledge and information can contribute significantly to increased agricultural development (Ali & Kumar, 2011; Gido *et al.*, 2013). Gido *et al.* (2013) further noted that adoption of technologies and innovations for improved agricultural productivity is influenced by the profit associated with adopted technologies and innovations. Although adoption of improved technologies and innovations could be related to the access and suitability of the technologies with the available production resources, the experience and the needs of the targeted population of such technologies play an important role (Gal *et al.*, 2011).

Over the last three decades, development partners involved in PPP joint development initiatives in the semi-arid lower Eastern Kenya region have used different approaches to promote improved technologies and innovations with a view to improving farm productivity in the region (Kavoi *et al.*, 2011). Their efforts have, however, been done with limited documented information as to why promoted improved technologies and innovations have not helped the resource-poor smallholders farmers to move out of poverty as observed in other part of Kenya by Wang'ombe and van Dijk (2013). The focus of the study was to determine and analyse factors related to challenges in decision-making among smallholder farmers in semi-arid lower Eastern Kenya face in the uptake of promoted improved technologies and innovations to improve farm productivity for improved food security.

STATEMENT OF THE PROBLEM

Technologies and innovations developed through Multi-stakeholders processes generally drive the agricultural sector's profitability, productivity and sustainability. Meaningful innovative agricultural development particularly in the semi-arid areas requires effective

stakeholders' joint efforts to develop and promote improved technologies for wider adoption. Resource-poor smallholder farmers in the semi-arid areas of lower Eastern Kenya operate in an environment with poor infrastructure, low, erratic and poorly distributed rainfall. These challenges make it necessary to involve farmers in sustainable development activities through public-private-partnership (PPP) development initiatives. Evidence of increased adoption of improved technologies in the region remains substantially inadequate. There has been inadequate understanding and poor documentation of factors related to choices that resource-poor smallholder farmers face in decision-making to improve their farm productivity.

PURPOSE AND OBJECTIVES OF THE STUDY

This study sought to determine the factors related to challenges in decision-making among smallholder farmers in semi-arid lower Eastern Kenya in the promotion and uptake of improved technologies and innovations to improve farm productivity for improved food security. Specific objectives of the study were to: -

- a) Identify and describe improved technologies that have been promoted for diffusion and wider adoption to improve farm productivity and food security in the semi-arid areas of lower Eastern Kenya.
- b) Identify and describe challenges related to choices resource poor smallholder farmers make in technology and innovation adoption to improve farm productivity in the semi-arid areas of lower Eastern Kenya.
- c) Develop recommendations for enhancing smallholder farmer's choices for increased technology and innovations adoption to improve farm productivity and food security in the semi-arid areas of lower Eastern Kenya.

METHODOLOGY

The researchers used structured Key Informant interviews and Focus Group Discussions (FGDs) to carry out the study in six Sub-Counties, namely, Kyuso, Migwani, Machakos, Mwala, Kathonzweni and Makueni in semi-arid lower Eastern Kenya. Inhabitants in these Sub-Counties rely on subsistence farming where both crop production and livestock keeping are practised. Using a structured check-list and a semi-structured questionnaire, the researchers collected both qualitative and quantitative data from 34 Key Informants (KIs) and five Focus Group Discussions (FGDs) with a total of 55 participants. To triangulate the qualitative data collected during the KI structured interviews, each KI respondent was given a structured self-administered questionnaire

with statements containing a five-point Likert scale. The researchers combined observations made during data collection; researchers' professional experiences gained during their work in the target area, interactive consultations with extension agents, researchers and experts in agricultural extension to complement the collected data. Collected data were synthesized and analysed using the statistical package for social sciences (SPSS) version 17.0. Where responses were ranked, the researchers transformed the ranked data into scores for ease of determining the highest and lowest ranked responses. This was achieved by adopting the following scores in descending order of importance of the corresponding ranks: Rank 1, score 5; Rank 2, score 4; Rank 3, score 3; Rank 4, score 2; Rank 5, score 1 as recommended by Abeyasekera (2001) and Gido *et al.* (2013). To avoid generating incorrect means of the summated scores, system missing values were given a score of zero. Descriptive statistics (sums and means) were derived by generating summated scores and means of the transformed data. Since "n" was constant in any of the variables ranked, using either the summated score or the mean of the summated score would give the same ranking order (Khayri *et al.*, 2011). The resultant ranks obtained from the summated scores were put in a descending order of importance where the highest summated score was ranked number 1 and the least summated score was ranked lowest. Expressed opinions from KIs on Likert scale rated responses were summated and descriptive statistics used to present the results. Similarly, summated scores of Likert scale data were used to rank perceived causes of poor performance of past joint PPP developments and suggestions for improving PPP performance mentioned by the respondents (Abeyasekera, 2001; Gido *et al.*, 2013).

RESULTS AND DISCUSSIONS

The first objective sought to identify and describe the improved technologies that have been promoted through PPP joint development initiatives for adoption for improved food security in the semi-arid areas of lower Eastern Kenya. Literature review showed that the inhabitants of semi-arid areas of Kitui, Machakos and Makueni Counties often dispose off their farm produce soon after harvest to avert huge yield losses due to storage pests (Bett *et al.*, 2010; Karanja *et al.*, 2011). It also showed that, over the years, the stakeholders have implemented several Public-Private-Partnership (PPP) initiatives aimed at

commercializing cotton (*Gossypium hirsutum*) and sunflower (*Helianthus annus L*) in 1980s, castor (*Ricinus communis L*) and dairy goat production in 1990s and Gadam sorghum and cassava in mid 2000s. Due to erratic and poorly distributed rainfall, crop failure is frequent in the region, thus creating the need for famine relief. The overall objective of the Gadam sorghum PPP initiative was to promote production and commercialisation of Gadam sorghum among smallholder farmers in the semi-arid areas of lower Eastern Kenya, which cover Kitui, Machakos and Makueni Counties. A cereal grain consumption analysis conducted in 2008 showed that East African Breweries Limited (EABL) at the time used 100 million Kg of barley annually. Barley production had decreased because more barley farmers had turned to wheat production following an increase in international wheat prices. To meet its annual grain consumption, EABL imported barley, thus consuming

part of the country's foreign exchange earnings. To address this challenge, barley consumption by the brewing industry needed to be reduced by 60% through use of the fermentable Gadam sorghum grain. It was also envisaged that through commercialization of Gadam, farmers in the target region would acquire a new source of household income (Karanja *et al.*, 2011). With a guaranteed market and better farm-gate price, it was hoped that the Gadam sorghum PPP development initiative would increase production and marketing of the sorghum grain from the region. However, just like other past PPP initiatives, production and tonnage from the region picked up during the first two years of its inception. During the third year (2012) of production, tonnage from the region reduced, with some of the production cells (organised farmer groups of 15-20 or 25 farmers in a village) opting to stop production of Gadam sorghum altogether (see Figure 1).

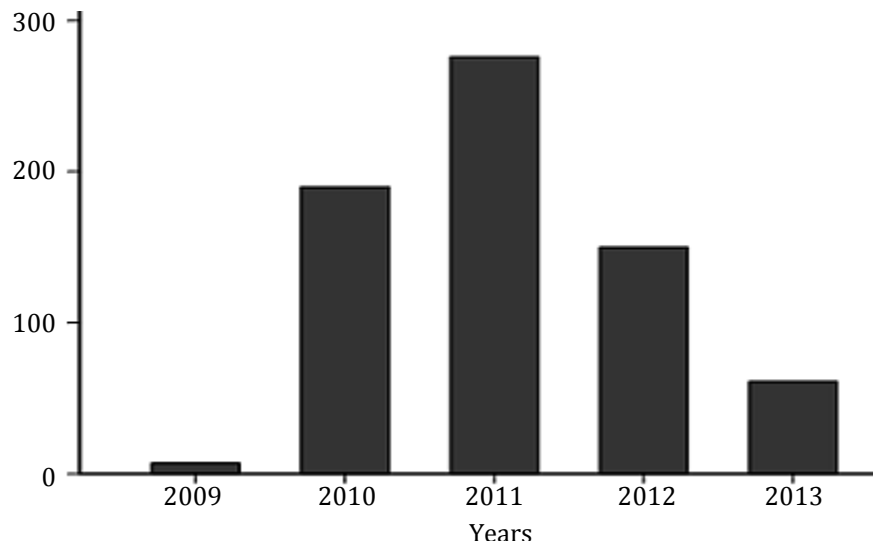


Figure 1. Gadam sorghum production in the six Sub-Counties (Metric Tones).

The Gadam sorghum promotion and commercialization venture fitted very well in a PPP joint initiative setup. To further identify and describe the improved technologies that have been promoted through PPP joint initiatives for adoption in the semi-arid areas of lower Eastern Kenya, the researchers used the Gadam sorghum PPP joint initiative as a case study, linking and relating their questions to other past PPP joint development initiatives. Discussions with KIs and FGDs respondents showed that, cotton, Sunflower and castor have been promoted for wider adoption the region.

In summary, study findings under **objective one** showed that several improved technologies have been introduced and promoted in the study area. These included Cotton, sunflower, castor, dairy goats, cassava and Gadam sorghum. They also showed that efforts made to promote improved technologies for wider diffusion and increased adoption did not result in increased uptake of technologies. However, the inhabitants of the region still remain food insecure. The second objective sought to identify and describe factors related to choices resource poor smallholder farmers make in technology and innovation adoption in

the semi-arid areas of lower Eastern Kenya. Both KIs and FGDs participants observed that the technologies that have been promoted in the region had their own challenges. For instance, cotton, sunflower and castor had limited utilization options at farm level. This combined with low farm-gate and market prices as well as unreliable/ distorted markets seemed to have

contributed to low uptake of the technologies in the region. Moreover, the same technologies were out-competed by other food crops such as green-grams (*Vigna radiata*) for the available cropping land. Table 1 presents findings from KIs on factors related to poor performance of past PPP joint initiatives in the promotion and adoption of improved technologies.

Table 1: Key Informants' Perceived Causes for Poor Performance of Past Joint Public-Private-Partnership initiatives in the Semi-Arid Areas of Kitui, Machakos and Makueni Counties (n=34).

| Cause | Summated Score | Mean | Std. Dev | Rank |
|---|----------------|------|----------|------|
| Promoting technologies that do not address farmers' immediate needs and also with limited utilization options | 113 | 3.32 | 1.628 | 1 |
| Low farm-gate prices coupled with distorted and unreliable markets | 112 | 3.29 | 1.835 | 2 |
| Lack of joint planning and implementation of the planned activities | 84 | 2.47 | 2.178 | 3 |
| Uncoordinated PM&E farm visits coupled with conflict of interests | 68 | 2.00 | 1.688 | 4 |
| Lack of openness among stakeholders coupled with broken promises and group dynamics | 62 | 1.82 | 1.696 | 5 |

Findings from Key Informants indicated their dissatisfaction with development partners who rushed to promote new technologies and innovations without first of all making efforts to analyse the immediate farmers' operating circumstances and matching the same with available technologies and innovations. Lack of joint planning and implementation of planned activities was ranked third highest. Low farm-gate prices

coupled with unreliable markets have largely contributed to poor performance of past joint PPP initiatives in the target area. Uncoordinated participatory monitoring and evaluation (PM&E), farm visits as well as conflict of interests among development partners though ranked fourth had partly contributed to the less than optimal performance of past PPP joint initiatives. Table 2 presents the findings from the FGDs.

Table 2: FGDs Respondents' Perceived Causes for Less than Optimal Performance of Past Joint Public-Private-Partnership initiatives in the Semi-Arid Areas of Kitui, Machakos and Makueni Counties (n=5).

| Cause | Summated Score | Mean | Std. Dev | Rank |
|--|----------------|------|----------|------|
| Need for quick money to meet urgent/ pressing family needs for cash | 17 | 3.40 | 2.302 | 1 |
| Weak linkages coupled with lack of transparency among development partners | 13 | 2.60 | 1.517 | 2 |
| Low farm-gate prices coupled with broken promises | 12 | 2.40 | 1.817 | 3 |
| Unreliable or distorted markets | 10 | 2.00 | 1.581 | 4 |
| Lack of clearly defined roles of different development partners | 8 | 1.60 | 2.191 | 5 |

Findings from the five FGDs agreed to a great extent with those from the KI interviews on perceived causes of poor performance of past PPP joint initiatives in the target area. Both KIs and FGDs respondents ranked issues related to the technologies that have been promoted in the target area as number one. Low farm-gate prices and distorted or unreliable markets together with weak linkages that were associated with lack of effective joint planning and implementation of activities were ranked either second or third highest. Citing past PPP joint initiatives that have been promoted in the target area such as cotton, sunflower and castor production for a ready market, the FGDs respondents were quick to point

out that past PPP joint initiatives promoted technologies with limited utilization options. The FGDs respondents added that, limited utilization options coupled with unreliable markets and low farm gate prices could not address the farmer's family immediate cash needs. Instead, farmers needed quick money to settle pressing family needs. Development partners involved in past PPP joint initiatives were blamed for promoting technologies without analysing what farmers really needed to meet their household pressing needs such as school fees and health related issues.

The overall impression therefore seemed to indicate that development partners needed to analyse the

circumstances resource-poor smallholder farmers operated under and match the same with available improved technologies and innovations. In addressing the market issues, development partners needed to promote technologies and innovations with wide range of utilization options; and promote joint planning, implementation as well as coordinated PM&E activities. Thus, study findings agreed with earlier study by Ouma *et al.* (2011) which showed that although several PPP joint development initiatives have been carried out in the target area, technology uptake remained low. In summary, study findings under objective two showed that past PPP joint initiatives promoted technologies with limited utilization options. Low farm-gate and market prices coupled with unreliable markets for such technologies contributed to low uptake of the same. Additionally, farmers faced challenges in decision-making when choosing between technologies with limited utilization options and their current practices. Moreover, technologies with limited utilization options were out-competed by other food crops for the available cropping land.

The third objective sought to develop recommendations for enhancing smallholder farmer's choices for increased adoption of technologies and innovations in the target area. Discussions during KI interviews showed that 21% of the respondents were

aware of past recommendation, which showed that value addition at farm level was crucial in contributing to increased adoption of improved technologies and innovations. The researchers sought to establish how resource-poor smallholder farmers could effectively make informed choices on the uptake of available improved technologies and innovations in the target area. Study findings are presented in a multi-response Table 3. Study findings agreed with earlier studies by Narrod *et al.* (2009) and Okoko *et al.* (2008) that development partners need to embrace value addition especially at farm level to increase utilization of improved technologies. Of the total KIs, 66% said that development partners should promote technologies that address farmers' family immediate needs such as school fees, health and food. They should also promote technologies with many utilization options so that in the event that farmers are unable to market their farm produce, they can have other options of utilizing them. Additionally, 65% of the KIs said that development partners need to jointly analyse the circumstances under which farmers operate before promoting improved technologies. The respondents further said that issues of farm-gate and market prices, middlemen and openness among development partners should be addressed to increase the uptake of technologies and innovations in the target area.

Table 3: Key Informants' Suggestions on how to Improve the Uptake of Improved technologies and Innovations in the Target Area (n=34).

| Suggestion | Frequency | Percent | Rank |
|---|-----------|---------|------|
| Promoting technologies that address farmers' immediate needs/ with many utilization options | 26 | 76 | 1 |
| Analyse the circumstances under which farmers are operating before introducing and technologies | 22 | 65 | 2 |
| Improve farm-gate and market prices coupled with reliable markets | 21 | 62 | 3 |
| Address the issue of middle men who exploit the farmers | 20 | 59 | 4 |
| Promote openness among stakeholders | 18 | 53 | 5 |

In summary, study findings under objective three showed that past improved technologies fell short of addressing farmers' immediate pressing needs. They also showed that development partners promoted technologies without analysing the circumstances farmers were operating under. Furthermore, a combination of low farm-gate and market prices, middlemen exploitation and lack of openness among development partners contributed to low farmers' uptake of improved technologies in the target area.

CONCLUSION

The researchers concluded that past PPP joint initiatives have been carried to promote improved technologies in the target area. Although several improved technologies have been promoted in the target area, uptake of the same has been low. Food insecurity in the semi-arid lower Eastern Kenya still persists among the inhabitants in the region. Additionally, promotion of technologies with limited utilization options seemed to have greatly contributed to low adoption of the same among resource-poor farmers in the region. As a result, resource-poor farmers opted to grow food crops with

wider range of utilization options. Thus, technologies and innovations with a wider range of utilization options stood a better chance of adoption among the resource-poor farmers in the target area. Furthermore, resource-poor farmers prefer improved technologies and innovations that address their immediate pressing family needs. As such, analysis of farmers' operating circumstances by development partners before introduction and promotion of improved technologies and innovations is crucial. Improved farm-gate and market prices, minimal farmer exploitation by middlemen as well as trust among development partners can greatly contribute to increased adoption of improved technologies and innovations among resource-poor farmers in the semi-arid lower Eastern Kenya.

RECOMMENDATIONS

Based on the conclusions made from the study, the researchers recommend that leaders in the target area should use the existing partnership to promote improved technologies and innovations for wider adoption. They also recommend that stakeholder should put strategies in place to help accelerate wider adoption of available improved technologies and innovations in the semi-arid lower Eastern Kenya. In addition, stakeholders should in jointly explore available opportunities that have the potential to alleviate food insecurity in the region. Development partners should promote technologies with a wide range of utilization options to enhance increased uptake of the same among resource-poor farmers in semi-arid lower Eastern Kenya. Since resource-poor farmers opted to grow food crops with wider range of utilization options, development partners should promote technologies and innovations that address farmers' immediate family needs to reduce competition between what the farmers are already growing and what is being promoted. Since technologies and innovations with a wider range of utilization options had better change of adoption in the target area, development partners should promote the concept of agricultural product value chain to achieve increased uptake of technologies and innovations that are promoted. To effectively address food insecurity in the target area, development partners should endeavour to promote technologies and innovations that address family pressing needs such as school fees, health and family food. Stakeholders should analyse farmers' operating circumstances and match them with the

available improved technologies and innovations that are being promoted in the area. Additionally, to address issues of low farm-gate, market prices and farmer exploitation by middlemen, all stakeholders should jointly put strategies in place to address the same. Stakeholders should also put structures in place that could facilitate establishment of sustainable linkages with key service providers.

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