

An Examine Into Farming Techniques Facilitation and Wellbeing of Small-Scale Maize Farmers in Kanduyi Sub County, Bungoma County

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Abstract- The purpose of the study was to establish the effect of One Acre Fund services on the wellbeing of Small-scale maize farmers in Kanduyi Sub-County, Bungoma County, Kenya. The specific objectives of the study were: to examine the extent to which technology facilitation influence the wellbeing of small scale maize farmers; to analyze how distribution of farm inputs facilitation influence the wellbeing of small scale maize farmers; to examine how credit facilitation influence the wellbeing of small scale maize farmers; to determine how market facilitation influence the wellbeing of small scale maize farmers and to establish the moderating effect of socio-economic characteristics on the wellbeing of small-scale farmers in Kanduyi sub-County, Bungoma County. The study was anchored on the Sustainable Livelihood Approach, diffusion of innovation theory, Microcredit theory and Capability approach. The study employed a descriptive research design for an in-depth study of the research objectives. The target population was 720 respondents who were households in Kanduyi Sub County from which a sample of 257 respondents was selected using the Yamane's formula. The study adopted a stratified random sampling technique in selecting the sample. Pilot study was carried out in Bumula Sub County for purposes of testing the reliability and validity of the data collection instrument. Data collection was carried out using questionnaires and analyzed using the Statistical Package for Social Sciences version 24. The study findings on the specific variables were statistically significant on the dependent variable which was predicted. The results of the study are expected to contribute to the management and improvement of the one acre fund activities in Kanduyi Sub County, Bungoma County and the entire country and beyond as well as contributing

towards the existing body of knowledge in Development studies field plus forming a basis for scholars who may elect to study on issues related to farming.

Indexed Terms- One Acre Fund services

I. INTRODUCTION

Largely, food delivery is led by small-scale benefactors. A projected seventy per cent of the worldwide populace, or almost 4.7 billion people, are nourished with food provided locally, ordinarily by small-scale farming, herding and fishing. Growing disintegration of land possessions, together with condensed savings and relegation of small farms in development and financial and policy, impeded this influence hence exposing many smallholders (IFAD, 2011). Kassie *et al.*, (2013) opines that agriculture sector progress is important in sustaining economic development for the poor, poverty alleviation and food security in relevant places.

In developing countries, a number of communities which are poor, live strangely in rural setups and relatively rely on subsistence and small-scale farming, that are partly assimilated into income, livelihoods, markets, and food, (Fischer and Qaim, 2012). Small scale farmers accomplish over 80 percent of the world's probable 500 million small farms and deliver over 80 per cent of the food used up in most parts of developing nations, significantly leading to food security and reduction in poverty.

Maize consumed ranges according to regions and is largely consumption of maize varies by region; maize is the most desired in Central America, South and Eastern Africa countries, and in Mexico. The most

prevalent processed foodstuffs are maize and flour. In regard to Food and Agriculture Organization data, the projection of 2012, indicated that the total production of maize in the world was 875,226,630 tons. Rice, Maize and wheat contribute to 94% consumption of cereal. Maize has more nutrients for provides people compared to any other foods with close to half the calorific requirement. Those demanding for maize have increased due to increased demand for food. Subsequently, the increased demand require increase in maize productivity in parcels of land (Paudyalet *al.*, 2001; Pingali, 2001). Though, in the previous years, the agricultural productivity as well as maize has also continued to stagnate or grow at a sluggish speed (Kaini, 2004).

The staple food in Africa is largely maize which is consumed at a range of 52 to 328 grams per person daily going by the 2009 World Health Organization (WHO) survey and FAOSTAT food report with small-scale farmers in sub-Saharan Africa, forming the majority in food production. Usually the yields for main food crops, per hectare in small-scale farming in the region. have substantial dissimilarities in harvest output amongst individual growers, (Yengoh, 2012). Bearing in mind that agriculture has been depending on rain output has remained low (Tittone and Gillet, 2013). Rural development and agricultural growth has resulted into poverty reduction (Minten and Barrett, 2008).

According to Olwande et al., (2009), age, education, credit, presence of a cash crop, distance to fertilizer market and agro ecological potential in Kenya considerably contributed to smallholder farmers' production of maize production. Similarly, extension officers' visits to farmers, land size, gender of household head, and training in agriculture pointedly led to adoption of new technologies by maize producers (Wanyama et al., 2009).

Established in 2006, One Acre Fund is a growing NGO in Kenya, Rwanda, Burundi, and Tanzania that is innovating a new way of helping farm families to achieve their full potential. The core program of One Acre Fund in Kenya is spread over the Western and Nyanza provinces and across different Agro-economic conditions. Farmers enrolled in the Kenya program usually plant their crops on 1.3 acres of

land, out of which 0.6 acres are allotted on average to program-specific inputs with an average of 30-40 bags of maize per acre. The Kenya program enrolls farmers during one season each year (World Bank, 2018). The primary focus of One Acre Fund's core program is to improve the productivity of smallholder staple crop agriculture. It primarily focusses on staples (e.g., maize, some beans) because such crops comprise the bulk of land cultivated by our target population and also pose the greatest potential for yield increases via improved inputs and training. In the first quarter of 2014, OAF exceeded its growth target by enrolling 80,400 farmers in Kenya. This 33% growth is attributed to our clients' satisfaction with the diversified crop bundle introduced in 2013 to mitigate the risk of Maize Lethal Necrosis Disease (MLND), as well as additional maize offered in the subsequent years' crop package (World Bank, 2018).

2.4.1 Farming Techniques Facilitation

Maize growing in high potential areas in Kenya use of certified maize seed account for Sixty-one (61%), while indigenous or retained maize seed account for about Thirty nine percent. Sometimes farmers use grain they have harvested and retained in previous seasons, including open pollinated varieties. (Ayieko, 2005) use of recycled grain by farmers lead to reduced out ranging from five percent for open pollinated varieties and thirty percent for hybrid maize (Pixley & Banziger, 2001). Adoption of improved technology in transforming agriculture and reducing poverty is an important factor as established in empirical study of Asia's Green revolution (Moser & Barrett, 2003; Minten and Barrett, 2008).

Muzari et al. (2012) avers that old-style techniques on sustenance output leads into a similar input and output association. Agriculturalists are unable to maintain reasonable lives in the wake of economic hardships. Small holder maize farmers expressively weaken production due to dependence on old methods of production (Muzari et al 2012). They point out that practicing old farming techniques has the connection between the input and output plays out in the hands of traditional practices of subsistence production. The farmers are unlikely to uphold socio-economic wellbeing due to poverty (Jain et al., 2009). A number of small-scale maize producers fall in this category as they depend on traditional production

practices which undermine productivity (Muzari et al., (2012).

According to Langyintuo et al. 2008, in a study undertaken to draw a parallel on sales of improved maize seeds between 1997 and 2007 in Angola, Zimbabwe and Kenya, revealed a study done to compare improved maize seeds sales volume showed a drop by 7%,2% and 1% respectively. Previous misfortunes have also farmers' use of **certified** maize seeds. Poor yields as a result of purchase of substandard maize seed from unscrupulous traders have been witnessed. Subsequently, use of uncertified seeds by small holder farmers has continued due to loss of faith in hybrid maize seed brands. Farmers who have adopted poor quality certified seeds have faced disappointments in terms of low germination and reduced yields of the seeds(Nyoro,2002).Decline between 1997 and 2007 in Eastern and Southern Africa Countries with Angola reducing by 7% Zimbabwe by 2% and Kenya by 1%Kenya. Farmers have also been discouraged from adopting certified maize seed due to past disappointments. Unscrupulous business people have infiltrated the maize seed market with substandard maize seed packaged in branded bags of know companies duping farmers to buy the products, as a result, germination has been poor and consequently poor yields. Consequently, small scale farmers have continued to lose faith in hybrid maize seed brands and resorted to uncertified seeds. As noted by Nyoro, (2002), farmers who adopt this poor quality although certified seeds have been disappointed as a result of poor germination and low yields of the certified maize seeds.

Wanjala (2014), points out that fertility of soil in some regions which with potential of high fertility have been lost due to issues related to crop residue burning, mono cropping, use of insufficient fertilizer and erosion of soil. Farmers have been urged to adopt the use of fertilizer in areas with high potential (Abdulai & tetteh, 2021). There have been low usage of organic fertilizer amongst smallholder farmers and programs have been launched by the government and other participants to enhance accessibility and promotion of use of fertilizer. The in National Accelerated Agricultural Inputs Access Program (NAAIAP) is one such program. Kenya.

The objective of the program is to improve production and make soil fertile. There has been loss of soil fertility in various areas with high potential due to factors ranging from burnt crop residue, mono cropping, insufficient use of fertilizers and soil being eroded. The challenges have been addressed by application of fertilizers more so in high potential areas (Sheahan, (2011).The government has come up with structures to enable farmers access and use fertilizers with Kenya having the National accelerated Agricultural Inputs Access Program commonly referred to as(NAAIAP) to promote the program. The major factor for the move being improvement of soil fertility and productivity. Nonetheless, the use of organic fertilizer has largely reduced amongst small scale maize farmers.

Jain et al. (2009) opines that agricultural technologies include all kinds of improved techniques and practices which affect the growth of agricultural output In addition, farmers need to embrace modern practices to manage soil acidity which is one of the leading hindrances to maize yields in high potential areas. Failures to manage soil acidity levels and plant nutrients have great impact on crop productivity. Due to low soil pH and poor availability of plant nutrients, such as phosphorus (P), calcium (Ca), magnesium (Mg) and potassium (K).soil biological activity hinders organic matter mineralization and therefore, nitrogen availability (Baligaret al., 2001; Kamprath, 1984). The inability to control the level of acidity in the soil and crop nutrients has impacted negatively on productivity. Farmers are therefore obliged to practice modern farming methods in controlling soil acidity to curb against challenges affecting maize productivity in high prospective areas. The improved techniques have promoted enhanced farm productivity (Jain et al,2009).

For widespread adoption of improved varieties and chemical fertilizer by farmers, extension educators need to understand the factors affecting technology adoption (Abebaw & Belay, 2001). Adoption of technology is influenced by physical, socio-economic, and mental factors including agro-ecological conditions, age of farmer, family size, education of farmer, how-to-knowledge, source of information, and farmer's attitudes towards the technology (Federetal., 1985; Byrlee& Polanco,

1986; Neupane *et al.*, 2002; Rogers, 2003). Young farmers are more likely to adopt a new technology because they have had more schooling and are more open to attitude change than older farmers (International Maize and Wheat Improvement Center [CIMMYT], 1993; Visser & Krosnick, 1998).

Such awareness on the institution of formal education exposes the farmers to the availability and technical-know-how of innovations and increases their desirability for acquiring them. The high and positive effect of off farm incomes on the adoption indices of the farmers is an indication that they need improved financial bases in order to adopt better farming technologies. Also, membership of farmers association brings about increased awareness on the part of the farmers regarding existing and new farming technologies. Chukwuji and Ogisi (2006). With increased awareness of the availability of improved farm inputs coupled with information on their applicability, the level of adoption and intensity of use of fertilizer would increase (Chukwuji&Ogisi, 2006).

In Kenya, acid and low-fertility soils particularly low available P and N are the major causes of low and declining maize yields (Kanyanjua *et al.*, 2002). Acid soils which cover 13% of the Kenyan land area (Kanyanjua *et al.*, 2002) are found in areas of high rainfall and are potentially suitable for maize production (Muhammad and Underwood, 2004). Maize crop needs different nutrients at different stages in its growth cycle. Soon after germination, sufficient nitrogen and phosphorous is needed to initiate the growth of stems, leaves and ear structures. Insufficient Nitrogen and phosphorous at two to six weeks after germination of maize can result into reduced yields (Jones, 1985). Significant amounts of N are transferred from leaf tissue to grain during the grain-fill process. Phosphorus uptake is more constant throughout the season as the dry weight increases. An efficient fertilization process needs adequate Nitrogen and potassium. Large quantities of Nitrogen are needed at tasseling and silking stage. Top dressing with Nitrogen fertilizer ensures losses resulting from leaching and minimized as high-water uptake and transpiration by the corn plant during this period of rapid growth (Wanjala, 2016).

II. RESEARCH METHODOLOGY

Kothari (2004) points out that research design is the conceptual structure within which research is conducted; it constitutes the blueprint for the collection, measurement and analysis of data. The study employed a descriptive research design. The target population for this study consists of small-scale maize farmers benefitting from OAF services in Musikoma ward, Township ward, Tuuti ward and Bukembe East ward of Kanduyi Sub-county, within Bungoma County. The estimated number of small-scale maize farmers was drawn from 720 farming households (OAF, 2015). The Small-scale maize farmers provided information on the effects of the OAF services on their wellbeing. According to Nachmias (1996), researchers use a relatively small number of cases or sample as the basis for making inferences about the entire population. The sample size of household consumers at 5% level of significance was obtained hence, the sample size therefore was established to 257 farming households. The primary data was collected using questionnaires administered by the researcher and assisted by a research assistant. A pre-test was done to access the clarity and effectiveness of the research instruments. The test-retest technique of assessing reliability of a research instrument was done by administering the same instrument to a small number of respondents in one week. Pilot testing was conducted to a small group of respondents to test the reliability of the research instruments. The same was done to provide groundwork and ensure the instruments are suitable for the study. The researcher's supervisor and colleagues assisted the researcher to assess whether the concept the instruments would be measuring are accurately represented. The researcher ensured that the item questions cover the extent of the study and are presented in a format suitable for those using the instruments.

The researcher first edited the collected data. This was done by collecting questionnaires per day, assigning those numbers and codes, and then cleaning them to ensure the data is clear and precise. The collected data was analyzed quantitatively. Quantitative data was analyzed by organizing it into categories on the basis of the concepts, themes, or similar features. Correlation was employed to

compute correlation coefficient in order to establish whether the content of the instruments is consistent in eliciting the right responses every time the instrument is administered. Quantitative data was analyzed using the Statistical Package for Social Science (SPSS v24) computer software.

III. RESULTS

Farm Techniques Facilitation on The Wellbeing of Small-Scale Maize Farmers

The first specific objective of this study was to determine the influence of Farm technology facilitation on the wellbeing of small-scale maize farmers in Kanduyi Sub-County. This variable was measured using three sub-variables which included; access to new methods, usability of new methods and affordability of new methods. Under this, several questions were asked and the statistical responses are summarized in the Table 1.

Table 1: Farm Techniques Facilitation on the Wellbeing of Small-Scale Maize Farmers

	Mean	Std. Deviation
I accessed improved seeds/fertilizers for farming	3.5396	1.09313
I used better procedures to enhance soil fertility for maize farming	3.6584	1.12288
I obtained better farming knowledge at the right time	3.6485	1.12865
I improved skills in maize farming	3.7030	1.11565
N = 202		
Key: 1.00-1.79 strongly disagree, 1.80-2.59 disagree, 2.60-3.39 neither disagree nor agree, 3.40-4.19 agree, 4.20-5.00 strongly agree		

For all the statements with regard to farm technology facilitation the respondents agreed they have access to improved seed and fertilizers among other facilitations. There is a strong evidence that when farmers have access to improved seeds and fertilizers then they are able to produce a lot which might improve their socio-economic status. Wanjala (2016) observes the best way to ensure farmers have access to basic needs is to ensure that the traditional forms/methods of farming are replaced by modern ones. As Jain et al., (2009) notes that failure to do so, such farmers can hardly maintain their marginal

livelihood with socio-economic stagnation leading to deprivation.

To establish Factor Analysis the extent to which the findings of the Table 4.10 above are related to the conceptual framework indicators of farm technology facilitation, factor analysis was carried out. In the conceptual framework farm technology facilitation was conceptualized as constituting access to new methods, usability of new methods and affordability.

Table 2: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.702	92.562	92.562	3.702	92.562	92.562
2	.237	5.932	98.494			
3	.049	1.230	99.724			
4	.011	.276	100.000			

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.702	92.562	92.562	3.702	92.562	92.562
2	.237	5.932	98.494			
3	.049	1.230	99.724			
Extraction Method: Principal Component Analysis.						

Table 2 shows the component extracted through the factor analysis with regard to farm technology facilitation. The results show that one component or factor was extracted (with Eigen values of above 1) instead of three as had been formulated in the conceptual framework. Table 3 show how the different statements related to farm technology facilitation were loaded in the respective component.

Table 3: Component Matrix^a

	Component
	Apply new farming methods
I accessed improved seeds/fertilizers for farming	.905
I used better procedures to enhance soil fertility for maize farming	.982
I obtained better farming knowledge at the right time	.980
I improved skills in maize farming	.980
Extraction Method: Principal Component Analysis.	
a. 1 components extracted.	

Table 3 above shows the statements that congregated on the component of farming technology facilitation as related to applying new farming methods. This confirms that one-acre fund does encourages farmers to adopt new farming methods. This also support the findings of Jain et al., (2009) who notes that applying new farming methods guarantees farmers better yields which improves their access to basic need (Jain et al., 2009). With regard to how they agreed or disagreed on the effects of the project towards contributing to adoption of new farming methods descriptive statistics was utilized. This is summarized in Table 4.

Table 4: Descriptive onFarm Technology Facilitation

	Mean	Std. Deviation	Cronbach's Alpha
Apply new farming methods	3.6374	1.07261	.973
N = 202			
Key: 1.00-1.79 strongly disagree, 1.80-2.59 disagree, 2.60-3.39 neither disagree nor agree, 3.40-4.19 agree, 4.20-5.00 strongly agree			

The descriptive statistics for the extracted component show that Apply new farming methods had a mean of 3.6374. This simply means that One Acre Fund has put the mechanism in place for farmers to apply new farming methods which the farmers agree that are very effective. These findings support the findings of Abebaw & Belay, (2001) who argues that applying new farming methods is a necessity for the farmers in sub-Saharan Africa to access basic needs.

• Regression Analysis

A regression analysis was used to determine the influence of farming technology facilitation on the wellbeing of small-scale maize farmers in KanduyiSub-County.

Table 5: Regression Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	.791	.208		3.796	.000

Apply new farming methods	.793	.055	.714	14.420	.000
Dependent Variable	Access to basic needs				
Anova (F) (Sig.)	207.945 .000 ^a				
Adjusted R Square	.507				
Std. Error of the Estimate	.83622				

With regard to the extent to which the wellbeing is influenced by farming technology facilitation this was summarized in Table 5. From the table it can be noted that apply new farming method significantly and positively contributes to wellbeing specifically with access to basic needs. This is shown by a positive coefficient of 7.93 and a significant value of 0.00. This therefore implies that an increase in apply of new farming methods will directly lead to increased access to the basic need. Kanyanjua et al., (2002) notes that application of new farming methods allows for farmers to get more yields which translates to better economic outcome hence improving their access to basic needs.

CONCLUSION

The study examined the influence of: techniques facilitation, distribution of farm inputs, Credit Facilitation and market facilitation the wellbeing of small-scale maize farmers in Kanduyi Sub County, Bungoma County. From the results, the study was able to draw the following conclusions based on the objectives.

RECOMMENDATIONS OF THE STUDY

From the results, the study makes several policy recommendations to all the stakeholders in Agriculture especially in Bungoma county. From the findings, it was recommended that since farmers who enrolled in the OAF programs had multiple benefits, OAF should expand the program to majority of the

farmers in the county in order for them to access improved seeds/fertilizers for farming, better use of procedures to enhance soil fertility for maize farming access to better farming knowledge at the right time and finally farmers' improvement in maize farming skills.

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