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Full Length Research Paper

Economic Evaluation of Factors Affecting Farmers Participation in Development Groups: A Case of Trans-Nzoia County, Kenya

Dennis Opiyo Olila

Msc. Agricultural and Applied Economics, Department of Agricultural Economics, University of Nairobi, P.O.BOX 29053-00625, Nairobi, Kenya

E-mail: oliladennis@gmail.com

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Kenya is a middle income economy where agriculture plays a fundamental role in economic growth and development. Over 70 percent of population depends on agriculture as the main source of livelihood, a majority of who live below the poverty line. Besides, problems of inherent climate change and market price fluctuations continue to worsen their welfare. In the phase of these inevitable challenges, financing farmers has been one of the major concerns of agricultural development efforts in the country. In an effort to cushion against these challenges, farmer groups have evolved over the years with the sole objective of enhancing farmers' welfare. However, despite the availability of various development groups, limited empirical information exists on the factors affecting participation in such groups. Primary data was collected using a semi-structured questionnaire among 300 respondents. The study employed a binary probit model in the analysis. The core findings of the study were that accessibility to credit; household incomes as well as gender of the household were the main factors affecting farmer participation. The study gives policy insights on the key areas of intervention in ensuring that farmer development groups are given capacity to serve the needs and constraints facing farmers on the ground.

Keywords: Farmers, participation, development groups, probit model, Kenya

INTRODUCTION

Background of the study

Agriculture is the major economic activity in Kenya contributing up to 24 percent of the Gross Domestic Product (GDP) (GoK, 2014). According to Odhiambo et al. (2004), agriculture is the most important sector in the Kenyan economy. This is because it provides employment opportunities, source of foreign exchange earner, and food provision besides offering linkages with the other sectors of the economy. Moreover, agriculture is among the six key sectors identified to deliver a 10 percent economic growth per annum as envisaged under the economic pillar of the Kenya Vision 2030. The country aims at promoting an innovative, commercially oriented, and modern agricultural sector (Kenya Vision 2030).

However, despite the significance role played by agriculture in the economy, the sector faces a myriad of challenges ranging from climate change, production spikes, as well as financial constraints among farmers. With a majority of the population living in rural areas, (most of whom live below the poverty line), under performance of agricultural sector possess a serious impediment on poverty alleviation among the rural households who depend on agriculture as their main source of livelihood. The high poverty level among most farmers results in a demographic dependency burden to the few people who work in urban centers. Amidst these challenges, an opportunity exists for poverty alleviation through use of improved inputs and creation of market access among farmers (Kirui and Njiraini, 2013).

For a country to transform its economy from primary to secondary and finally tertiary sector, the factor inputs such as labour, land, and capital are important drivers.

One of the major constraints facing farmers is financial i.e., inadequate capital for investments in agriculture. According to Centre for Alleviation of Poverty through Sustainable Agriculture (CAPSA, 2012), investing in agriculture has long been a key to economic expansion and development. In the face of this crisis, most farmers tend to join farmer groups (development groups) such as Merry-go-round, farmers Savings and Credit Cooperative Organization (SACCO, s), table-banking among others with the sole aim of pulling their resources together. According to the Association for Strengthening Agricultural Research in Africa (ASARECA), a farmer group is a collection of farmers with a common objective or problem solving, which often associated with agricultural production and marketing.

Empirical evidence show that farmer participation in a development group is advantageous in several ways for example the group can act as a security for loans, the disadvantaged farmers able to get access to credit besides getting members voices heard to enhance a given policy (Delgado, 1999). Moreover, a farmer group enhances collective action i.e., voluntary action taken by a specific group of people who are bound by common interest (Olson, 1965) besides having the merit reducing transaction costs (Markelova et al. 2009). Adong et al. (2013) posits that farmer groups form a means of reaching small holder farmers by government, private sector, and the development partners with an objective of enhancing agricultural productivity and food security. Further, according to Fafchamps (2004), farmer groups initiating collective action results in better market power among farmers.

Research problem statement

In Kenya, the use of farmer groups plays an important role in enhancing agricultural production specifically through credit access among farmers. Having realized the declining agricultural performance, the government introduced the Strategy for Revitalizing Agriculture (SRA) in the year 2004. Through SRA, farmers' organizations played an important role in pooling scarce resources together with an aim of enjoying economies of scale as far as marketing of produce is concerned. However, despite the various attempts made both by government and NGOs towards the strengthening of various farmer groups in Kenya, there exists an empirical gap in knowledge on determinants of participation in development groups such as farmers SACCOs, table banking, and Merry-go-round among others. Since limited emphasis is on factors affecting farmer participation in development groups, the current study aims to fill the aforementioned knowledge gap. In regard to this, the study envisages that empirical information will offer relevant policy insights to stakeholders such as Non-Governmental Organizations, government and the private banking sector who value working with organized farmer groups. Moreover, understanding such factors will provide impetus to promoting such initiatives within the newly devolved system of government.

Purpose of the study

The main purpose of this study was to evaluate factors affecting farmer participation in in development groups. The specific objective was to determine factors influencing farmers' participation in development group.

Hypotheses

The study hypothesized that there are no factors affecting farmers' participation in development groups. The hypothesis postulated will either be accepted or rejected based on the findings of the study.

Literature review

A myriad of literature exists on factors influencing farmer participation in development groups. For example, Adong et al. (2013) investigated factors affecting membership to farmer groups in Uganda using the 2008/2009 census data. A linear Probability Model (LPM), a logit, and probit models employed in data analysis. The study findings revealed low levels of membership to development groups both at individual and household level. However, there were marked differences in regional participation. Further, Mabuza et al. (2012) studied the role of social capital in the management of informal farmer groups in Swaziland. The key factors found to create cohesion within mushroom farmer groups were trust, cooperation, and communication. On the other hand, Kumba (2003) analysed farmer participation in agricultural research and extension service in Namibia. Findings revealed that two-thirds of the published material was derived from work in which farmers had apparently played no role. Moreover, participation among the communal farmers was lower as compared to that of commercial farmers.

Wollni (2006) assessed whether farmers benefit from participating in specialty markets and cooperatives in Costa Rica. A two-stage model was used to analyze farmers marketing decisions and their effect on the prices received. The results indicated that farmers participating in coffee specialty do receive higher prices as opposed to those in conventional channels. Furthermore, participation in cooperatives has a positive impact on the probability that a farmer chooses to grow specialty coffee.

In Kenya, Karaya (2013) investigated women farmers' participation in women groups in Mwala division. Primary data collected on a sample of 156 respondents while

data analysis done in statistical package for social scientists (SPSS) software using percentages, frequencies, multiple regressions and Spearman's Rank Correlation Coefficient. Findings revealed that household food security is significantly and positively influenced women participation in development groups. In a separate study, Saweda and Liverpool-Tasie (2012) investigated the relationship between farmer group and input access using a double hurdle model to explore whether different methods of distributing fertilizer through groups in a targeted input subsidy program affects an interventions ability to increase accessibility of inputs among farmers. Study results showed that while farmer groups may facilitate the process of farmer identification and coordination, the intra-group dynamics affect their efficacy of providing inputs to members equitably.

Besides the above studies, Kirui and Njiraini (2013) assessed the impact of collective action on small holder agricultural commercialization and incomes in Kenya. A propensity score matching technique to assess the effect of collective action initiative on household agricultural commercialization and household agricultural income. The study findings were that participation in collective action by farmers was mainly due to enhanced market access and better household welfare resulting from an increment of income. Despite the above empirical studies offering good insights on farmer participation in development groups, limited literature exists particularly on factors affecting farmer participation in various farmer groups. The current study endeavors to fill the aforementioned empirical gap in knowledge.

METHODOLOGY

Sampling method

Primary data were collected in three districts of Trans-Nzoia County namely Trans-Nzoia West, Trans-Nzoia East, and Kwanza. The county was purposively selected because it is Kenya's main maize producing region. The study employed a multistage sampling procedure. This sampling procedure has the advantage in that it facilitates sampling to be done sequentially across two or more hierarchical levels (Cochran, 1977). The initial step began by listing all the divisions within the three districts followed by a random selection of four divisions considering major maize growing areas. This same procedure was repeated by narrowing down to smaller administrative units (sub-locations). Fifteen sub-locations finally gave the primary sampling units. A Systematic random sampling approach was used to narrow down to the respondents for a face-to-face interview.

Data Collection

The rural household survey was carried out in the months of April and May 2013. A pre-tested questionnaire was administered through face-to-face interview with farmers. The face to face interviews were given priority to other survey modes such as mail and telephone interviews among others because of inconsistent and unpredictable use of mobile phones and internet among farmers in the region. Moreover, face-to-face interview has the merit of enabling further clarification of the questions by the interviewers besides facilitating collection of more data (Bateman *et al*., 2002).

The survey targeted maize farmers only irrespective of their scale of operation. A total of six enumerators who were trained by the researcher and the supervisory team collected primary data. The survey employed a random route procedure where enumerators first interviewed farmers on one side of the road (left) before moving to the other side (right). This was used to get to select the third or sixth farmer in the various 15 sub-locations. The final sample size was 300 maize farmers. Only household heads who are the key decision makers were interviewed. This was important in obtaining reliable information. The household survey questionnaire had an introductory part of which enumerators were well acquainted with. Such was important in gauging the ability of the respondent to answer the questions.

This was followed by requesting permission to commence the survey given the estimated time to complete the interview was about 30 minutes per respondent. The researcher checked the filled questionnaires by the end of every day to confirm that all the questions were attempted.

Description of the variables

The study used six variables namely loan application by farmers (LAONAPP), farm size (FARMSIZE), income (INCOME), gender (GENDER), education (EDUC) and marital status (MARITAL) of the household. Farm size refers to the total acreage of land (owned or rented) by a farmer for farming enterprise. It was hypothesized that farmers with large tracks of land are likely to be involved in development groups where they can share information and bulk their produce for marketing. The variable on loan application refers to farmer's ability to access loan for the last twelve months. It is postulated that farmers who access loans are likely to be members of a development group. Since most financial institutions such as banks and deposit taking microfinance (DTMs) prefer to lend farmers who are organized in a group, membership to a group offers a guarantee for the borrowed money.

Gender of the household denotes socially and culturally defined meanings associated with being a man or woman. Gender is believed to affect membership to a development group. Household income means the average monthly household income of the farmer. It is expected that farmers with income above average are

Table 1: Variables, description and expected signs

Variable	Description	Expected sign
LOANAPP	Accessibility to credit for the last 12 months [1 = Yes, 0 = No]	+
FARMSIZE	Size of land in acres [1 = large scale farmer, 0 = small scale farmer]	+
INCOME	Average monthly income [1 = high income, 0 = low income]	+
GENDER	Household gender [1 = male, 0 = female]	±
EDUC	Level of education [1 = high, 0 = low]	+
MARITAL	Marital status of the household [1 = married, 0 = Otherwise]	±

Table 2: VIF values

Variable	VIF	1/VIF
FARMSIZE	1.42	0.702
INCOME	1.39	0.721
EDUC	1.10	0.911
LOANAPP	1.09	0.914
GENDER	1.05	0.951
MARITAL	1.03	0.972
Mean VIF	1.18	

likely to be associated with membership to development groups. Finally, marital status simply refers to whether a farmer is married or not. It is expected that income, access to loan, education, and farm size will have a positive effect on farmer participation to a development group. Last but not least, gender and marital status are expected to have either positive or negative effect on farmer engagement in a development group. The variables included in the current study are thought to have the greatest impact on farmer participation in development group (table 1).

Further, the current study carried out a Variance Inflation Factor (VIF) test. The aim was to ensure that the explanatory variables included in the model had no correlation with each other i.e., a test for multicollinearity in the data. As such, a simple Ordinary Least regression (OLS) model with membership to development group as the dependent variable was estimated. According to Long (1997), empirical estimation of VIF is as:

$$VIF = \frac{1}{1 - Ri^2} \quad \text{..... (1)}$$

Where R_i^2 is the R^2 of the artificial regression with the i^{th} independent variable as a dependent variable. Table 2 below presents the results of the VIF:

The mean VIF is 1.18 while the explanatory variables have VIF's ranging from 1.03 to 1.42. Since the mean VIF's for the independent variables are less than five (<5), the inclusion of the variables in the probit model is justified (Maddala, 2000).

Model specification

Modelling of factors affecting farmers participation in development groups is characterised by duality i.e., a farmer either participates in a development group of not. Therefore the dependent variable is participation in a development group is binary in nature and takes the value of 1 if positive and 0 otherwise. Greene (2003) specifies the probit model as:

$$P(\alpha_1 = 0) = \phi\left(\frac{-\beta_\alpha^1 X_1}{\sigma}\right) \quad \text{..... (2)}$$

Table 3: Descriptive statistics results

Characteristic		(N = 300)
Education (mean years)		10.73
Membership to development group (%)		48.70
Average monthly income (KSHs)		40,040
Credit access (%)		30.30
Age years (mean)		44.98
Farm size in acres (average)		9.67
Maize yield (average 90 bags/acre)		22.60
Gender (%):	Male	43.30
	Female	56.70
Education (%):	None	3.30
	Primary	37.70
	Secondary	33.70
	College	20.30
	University	3.30
	Masters	1.70

Where α_1 is the dependent variable i.e., farmer participation in development groups; *P* is a vector of individuals socio-demographic characteristics; β's, a vector of coefficients to be estimated and ϕ is the cumulative probability distribution. Therefore, the probability that farmer *i* participate in a development group is empirically estimated as estimated as follows:

$$\Pr[Y_i = 1] = X_i \beta_i + \varepsilon_i \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

X is a vector of socio-demographic factors that are thought to affect participation in development group; β_i is a vector of parameters to be estimated, while εi is the stochastic random term specific to individual farmer. Even though the data used in the current study can be analysed using either binary logit model, the choice of a binary probit model was based on the appealing results gotten from the probit model. Further, in order to measure instantaneous effects on changes on any explanatory variable *ceteris paribus,* marginal effects were estimated. Descriptive statistics was done in SPSS version 16 while the binary probit model was estimated in a statistical package STATA version 10.

RESULTS AND DISCUSSIONS

Descriptive results

The descriptive results (table 3 next page) indicate that the households had mean years of schooling of 10.73 with only 3 percent having not attended any formal school. In terms of membership to a farmer development group, only 48.7 percent belonged to a development group such as farmers' merry-go-round, table-banking among others. The low membership to development groups could be alluded to lack of information on the merits of a development group. Heinrich (1993) opines that working in groups expands the number of technology choices entering the extension process. This calls for creation of farmer awareness about the significance of participating in a development group. A study by Katinka and Johanness (2001) external support both by the government and NGOs plays an important role in motivating group activities. With regard to income, the results reveal that a majority of farmers had incomes that could trigger investments in farming. This is owed to the fact that they could afford farm inputs from their average monthly income.

Accessibility to credit among farmers was found to be low, only 30.3 percent of the sampled population had accessed credit over the last one year. The low accessibility of formal credit among farmers is attributed to the fact that agriculture is a risky venture thus most financial institutions fail to offer agricultural credit to financially constrained farmers. Respondents mean age was approximately 44 years implying that a majority of the farmers were elderly, as they had surpassed the youthful age requirement of 35 years in the Kenyan context. Further, most farmers were small scale farmers with an average land size of 9.67 acres. Their main constraint capital accumulation and thus are unable to produce large volumes of products demanded by the

Table 4: Probit model results

Variable	Coefficient	p-value	Marginal effect	p-value
LOANAPP	0.858 (0.174)	0.000***	0.329	0.000
FARMSIZE	-0.169 (0.191)	0.378	-0.067	0.376
INCOME	0.37 (0.212)	0.080*	0.146	0.075
GENDER	0.348 (0.156)	0.026**	0.138	0.024
EDUC	0.203 (0.159)	0.202	0.081	0.200
MARITAL	0.188 (0.186)	0.315	0.074	0.311

Notes: Standard errors shown in parentheses; Statistical significance levels: ***1%, **5% and *10%.

market (Poulton et al., 2006). The average yield was 22 bags per acre. This means poor farm productivity given the potential of over 40 bags per acre with appropriate farm management. The finding corroborates that of Karaya et al. (2013) that household food security is positively related to participation in farmer groups.

Finally, more women (approximately 58 percent) formed the larger part of the sampled population. The implication of this is that women usually play a vital role in household agricultural production thus tends to spend more time on farms. These findings is consistent with that of Keraya et al. (2013) that women play a crucial role as primary food producers and are thus act as the custodians of food security in the country. Technical Centre for Agriculture and Rural Cooperation (CTA, 1993) reported that women in Africa make up more than one-third of the workforce particularly accounting for 70 percent of agricultural workers.

Factors affecting participation in development groups

The results for the binary probit model are presented in table 4 below.

The results of the probit model show that farmer formal loan application, income, and gender were the factors affecting farmer participation in development groups. The coefficient on loan application was statistically significant at one percent. Further, the coefficient was found to be positively related to participation implying that as the ability to access loans increases, so is the probability of belonging to a development groups. This finding is consistent with that of Adong et al. (2013) that farmers who were members of development groups had better access to credit. Past studies show that within a development group, farmers are able to enhance chances of accessing financial services, extension services as well as having the capacity to push for policy advocacy (de Haan, 2001). Further, the study reveals that if a farmer accesses the loan, the probability of participating in a development group would instantly increase by 32 percent.

With regards to income, it was revealed that farmers with higher income were likely to participate in development groups. The coefficient on the variable is positive and statistically significant at 10 percent implying that as income level increases, the probability of a farmer belonging to a development group increases. This could be explained by fact that farmers with high income could be accessing finances from the group.

This is attributed to the fact that banks and other financial institutions usually allow loan application only among farmers organized in a group. Such development groups thus act as a guarantee that the loan is serviced as required. The results of the marginal effects show that an increase in farmer income to above average would instantly shift the probability of participating in farmer development group by 15 percent. Likewise, gender of the household was found to statistically influence participation in a development group. The implication of this is that male headed households are likely to participate in a development group as compared female farmers. Generally, men have better access to capital and land ownership than female farmers do. Empirical evidence show that women are usually faced with constraints such as limited access to finances, land and social assets and have fewer opportunities (Saito and Spurling, 1992). As such, they have the requisite resources that are required as far as participation in development groups is concerned. In terms of marginal effects, bringing a male in the sampled population would instantly increase the probability of participating in a development group by approximately 14 percent.

Despite the variables on farmers' education and marital status not being statistically significant, they influence participation in development group positively. The findings contrast that of Adong et al. (2013) where farmers' education level and marital status statistically influenced farmers' decision to enroll in farmer groups.

CONCLUSIONS AND POLICY RECOMMENDATIONS

The study employed a binary probit model to determine factors influencing farmer participation in development groups. Accessibility to formal loans, household income, as well as gender were the main determinants of farmer participation in a development groups. An interesting finding that accessibility to loan was a major determinant of farmer participation in development group implies that farmers involvement in development groups offers opportunities to access loans. Since most co-operating partners and government agencies have high preference to work with groups, the study recommends policies that enhance farmers' capacity as far as forming organized groups should take center stage. The low participation in development groups among farmers gives empirical indicator that there is need to build capacity of farmers to form organized farmer groups where they can voice the needs of the members in forums on policy making and service provision.

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