

Determinants of Economic Gains from Crop Production in Africa: The Case of Smallholder Group Farmers in the Democratic Republic of Congo

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Introduction

Measures to alleviate poverty among smallholder farmers in Africa have focused on individual farmers all through the 21st century. However, these have not yielded much success, forcing research and development organizations to focus their efforts on technological innovations and other interventions through farmer groups.

The potential gain in productivity through group interventions is a major factor underlying the need for developing countries to promote groups. Group actions are analyzed within the concept of collective action.

Based on the new institutional economics approach, collective efforts solve societal problems, and focus on the conditions under which groups of people with common interests choose to act to achieve their respective interests (Clague, 1997). The farmer groups fill some of the gaps generated by this situation for example in input and output marketing.

Agricultural set up in the DRC

Annual decline in productivity in DR Congo has been estimated at 0.98% while low annual increment in agricultural production at 2% compared to the demographic rise of 3.3% (Vandamme, 2008 and Mastaki, 2006). Efforts to improve and sustain the sector's productivity therefore would be crucial to the nation's economic development and the welfare of the people.

Most farmers have limited access to improved crop varieties of major crops like maize, cassava, sweet potatoes, bananas and common beans. The decline in productivity has also been partly attributed to reduction in soil fertility and high levels of soil erosion such that an estimate of 80 kg/ha of nitrogen, Phosphorus and Potassium are lost annually (Kasereka, 2003). There is a shortage of animal manure due to reduction in livestock holdings (Lunze, 2000), that could be used as organic fertilizer. Family manpower has reduced following the emigration of active men and women to urban centers in search of alternative opportunities and internal displacement in conflict areas (Cirimwami and Mashika, 1999).

The research issue

Limited institutional support has been offered to farmers since independence in 1960 in terms of information, supply and credit regarding fertilizers. Currently, collective efforts are being made to link farmers to input and output markets by government, international research institutions such as CIAT and other partners. A plan to enhance productivity and economic gains among smallholder farmers in DRC has been followed by introduction of new improved production technologies such as new crop varieties, hybrid seeds and use of fertilizers (inorganic and organic). This has been encouraged through a participatory approach to technology and agricultural information dissemination that involves farmer groups, research institutions and development partners who initiate rural development projects in DRC.

Empirical evidence of the impacts of group efforts on productivity and economic welfare of smallholders of the South Kivu territories is limited. There is thus the need to bridge the information gap on whether there is need to upscale the efforts or not. The need to link with other institutions depends on the success of the existing group efforts and without impact assessment, it would be difficult to advocate for up scaling the group efforts. This study contributes to research on agricultural technology interventions aimed at improving productivity and economic gains among smallholder farmers in the DRC.

OLS regression model results

The model indicated a Durbin Wu value of 2.367 and F-value of 5.367 which was significant at 0.001%. The Durbin Wu test for serial autocorrelation validated the model as fit since the calculated value of 2.367 > 2 (Gujarati, 2003). The correlation coefficients were observed to have values less than 0.8 thereby proving that there was no multi-collinearity between the explanatory variables. Consequently, the variables selected explained the changes in the dependent variable (economic gain) thus used in the OLS regression that was fitted as:

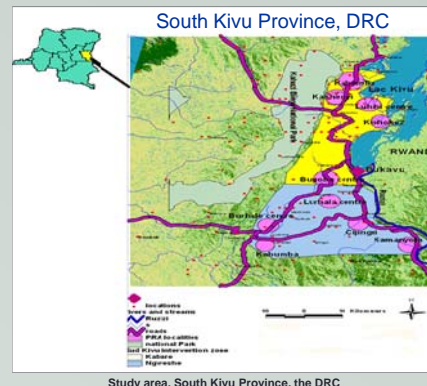
$$Econgain = \beta_0 + \beta_1 productionchange + \beta_2 groupmeetingschange + \beta_3 creditchange + \beta_4 timelistenedtoradiochange + \beta_5 Extchange + \beta_6 Remittancechange + \beta_7 offfarmincomechange + \beta_8 offfarmtimechange + \beta_9 Pricechange + \beta_{10} Groupmembershipchange + \epsilon \dots \dots \dots \text{equation 1}$$

Extchange represents changes in number of extension contacts in equation 1 while ϵ is the error term which is independently and normally distributed with zero mean and constant variance (Greene 2003). Table 1 indicates the regression results whereby the R² value of 55% meant that 55% changes in economic gain was explained by the changes in the explanatory variables at 1% significance level.

Table 1. Regression results for factors influencing economic welfare gain of farmers

Model	Beta	T
(Constant)	0.347	0.287
Production change	0.015	0.152
Change in number of group meetings	0.086	0.804
Total credit change	-0.42	-4.17***
Change in frequency of listening to radio programs	0.807	1.87**
Change in number of extension contacts	-0.03	-0.33
Change in number of trainings attended	0.006	0.055
Change in remittances	0.02	0.198
Change in off-farm income	0.561	5.593***
Change in time spent in off farm activity	-0.08	-0.81
Change in average prices	0.022	0.219
Change in membership	0.10	1.36*
R ²	0.545	
Adjusted R ²	0.449	
F change	5.637***	
Durbin Watson	2.367	

***, **, * significant at 1%, 5% and 10% levels, respectively.



Study area, South Kivu Province, the DRC

Discussions -1

Results show that there were differences in economic gains between group and non-group farmers.

Variable	Group members	Non-group members	P-value
Economic gains	50.2	14.02	0.001

The changes in farm credit amounts, group membership, frequency of listening to radio farmer programs and off-farm incomes significantly influenced the economic gains. Membership to farmer organizations is therefore important as a means of enhancing economic gains of smallholder farmers in the DR Congo

Regarding information access through farmer radio programs, there is need to allocate more radio air time to the programs so as to improve the adoption of new agricultural technologies. The promising information access strategy revolves around vigorous promotional activities via radio and should be carried out by interested NGOs, development partners and research institutions and other stakeholders to encourage the formation of farmers' radio listening groups across the territories to allow for timely flow of information on good agricultural practices that improve productivity and economic welfare of smallholder farmers.

Discussions-2

Time spent in off-farm activities influenced economic gain of the smallholder farmers as observed in off-farm income realized. Smallholder farmers spent more time in off-farm activities like running small business enterprises to supplement their income. These off-farm activities can be reinvested in agriculture to increase productivity and enhance economic gains. The positively significant influence of off-farm income on economic gain could only be substituted if future interventions incorporate more income generating activities along with the technology package to enable the resource poor farmers afford improved technologies whose adoption seemed low.

In line with the regression results, more credit needs to be availed to the farmers to increase economic gains. This could be done through innovative ways to enable the resource poor farmers access credit, for example credit in kind (input provision) given the risk averse nature of smallholder farmers. Financial institutions should however issue more credit in kind to reduce loss of the funds; the credit could be in form of material inputs necessary to increase agricultural productivity. The lending institutions instituted should be flexible on the repayment periods given the nature of agricultural production in Congo that is characterized by risks of crop failure, erratic rainfall and pest invasion.

Membership to farmers' organizations was also observed to have a positive influence on economic gain. It should be encouraged among smallholders in order to boost productivity and incomes as observed in the mean differences in these variables between group and non-group farmers.

Conclusions

- To achieve improved economic welfare, group efforts should be promoted
- The issue of credit access and provision needs a closer consideration
- Dissemination of technologies need to reach the highest possible number of farmers and radio appears to offer a better option

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