The Role of Extension and Farmer Groups in Adopting Agricultural Technologies

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Overture

Despite the inherent potential and merits of adopting modern agricultural technology, the present-day farmer in Sub Saharan Africa is yet to catch-up with the rest of the world in harnessing this potential.

The conceptual framework based on empirical studies is illustrated in figure 1 and the following hypotheses were derived:

- **Hypothesis 1:** Farmers group membership positively influence adoption of modern agricultural technologies (use of fertilizers, chemicals and appropriate plant density).
- **Hypothesis 2:** Agricultural extension support positively influence adoption of modern agricultural technologies (use of fertilizers, chemicals and appropriate plant density).
- **Hypothesis 3:** Adoption of modern agricultural technologies (use of fertilizers, chemicals and appropriate plant density) influence farmers' economic performance.

Objectives

Based on this background, this study examines the impact of agricultural extension support and farmer groups – among other empirically identified factors – on technical adoption and their consequent impact on cashew economic performance in the coastal regions of Kenya.

Specifically, it will:

⇒ Determine the effects of cashew farmers group membership and extension support on adoption of modern agricultural technologies (use of fertilizers, chemicals and appropriate plant density), and

⇒ Investigate the impact of adoption of modern agricultural technologies (use of fertilizers, chemicals and appropriate plant density) on cashew farmers' economic performance.

Methodology

- **Sampling method** ; Multistage stratified, quota and snowball
- **Respondents ;** 15 000 farmers; 375; **372** (no control group)
- **Data collection ;** Questionnaire
- **Data Analysis** ; Logit and multiple linear regression models were used to analyze a sample of 372 smallholder cashew farmers.

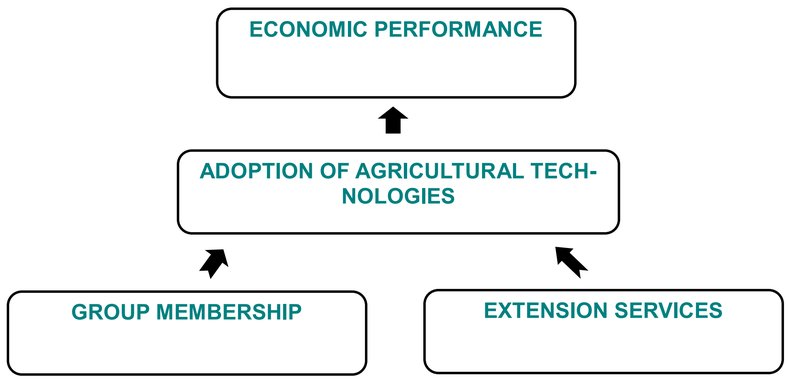

Figure 1; Conceptual Framework

Logit regression analysis was used to establish the relationship between modern agricultural technologies – such as fertilizer use and chemical spraying – with other variables of interest which is empirically specified as follows (2) and (3):

$$Fertuse = \alpha_0 + \alpha_1 Age + \alpha_2 Edu + \alpha_3 Hhhead + \alpha_4 Farmsize + \alpha_5 Hlabour + \alpha_6 Offfarm + \alpha_7 Groupmem + \alpha_8 Loans + \alpha_9 Exten + \alpha_{13} Psesame + \mu \quad (2)$$

$$Chemspray = \beta_0 + \beta_1 Age + \beta_2 Edu + \beta_3 Hhhead + \beta_4 Farmsize + \beta_5 Hlabour + \beta_6 Offfarm + \beta_7 Groupmem + \beta_8 Loans + \beta_9 Exten + \beta_{13} Psesame + \mu \quad (3)$$

While, linear regression model (4) was used to investigate planting density and the consequent effect of adoption on farmers' economic performance. Empirically, the impact of adoption of modern agricultural technologies on farmers' economic performance is specified in (5):

$$Plantden = \omega_0 + \omega_1 Age + \omega_2 Edu + \omega_3 Hhhead + \omega_4 Farmsize + \omega_5 Hlabour + \omega_6 Offfarm + \omega_7 Groupmem + \omega_8 Loans + \omega_9 Exten + \omega_{13} Psesame + \mu \quad (4)$$

$$Pef = \varphi_0 + \varphi_1 Age + \varphi_2 Edu + \varphi_3 Hhhead + \varphi_4 Farmsize + \varphi_5 Hlabour + \varphi_6 Offfarm + \varphi_7 Groupmem + \varphi_8 Loans + \varphi_9 Exten + \varphi_{10} Plantden + \varphi_{11} Chemspray + \varphi_{12} Fertuse + \varphi_{13} Psesame + \mu \quad (5)$$

Results

Table 1 : Logit regression models and multiple linear regression

Regressors	Fertilizer usage		Chemical spraying		Planting density	
	Mean Marginal Effects	Std. Err.	Mean Marginal Effects	Std. Err.	Coef.	Std. Err.
Age (years)	0.002	0.002	0.002	0.002	**0.073****	**0.036**
Education (schooling	0.014	0.008	-0.003	0.011	**-2.233****	**1.132**
Household head (gender)	0.010	0.061	-0.102	0.069	-0.031	0.172
Farm size (acres)	**-0.011****	**0.006**	-0.002	0.006	**1.980***	**1.070**
Hired labour	-0.026	0.056	**0.173*****	**0.060**	0.084	0.087
Off farm income (dummy)	0.022	0.050	**0.106***	**0.058**	0.961	0.929
Group membership (dummy)	**0.231****	**0.105**	**0.226***	**0.133**	**7.096*****	**2.197**
Loans (dummy)	**0.118****	**0.048**	0.030	0.059	-1.019	0.950
Extension (dummy)	**0.087***	**0.048**	0.083	0.058	**1.980****	**0.980**
Plant sesame (dummy)	**0.131*****	**0.050**	**0.228*****	**0.056**	**2.625*****	**0.960**
Constant	-	-	-	-	1.582	2.225

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

Authors' computations, 2019

Table 2 : Results of multiple linear regression (dependent variable: Income in value of Kenyan shilling per unit acres)

Regressors	Coef.	Std. Err.	P>t
Hired labour (dummy)	**1521.582*****	**427.369**	**0.000**
Off farm income (dummy)	**-1211.753*****	**393.322**	**0.002**
Group membership (dummy)	-1006.125	842.923	0.234
Extension (dummy)	-81.899	410.792	0.842
Plant density (trees per acre)	**70.400*****	**24.218**	**0.004**
Fertilizer use (dummy)	**-1046.537****	**436.296**	**0.017**
Plant sesame (dummy)	**2364.191*****	**392.988**	**0.000**

Conclusion

⇒ access to extension services and group membership ***both have significant effects*** on the **adoption of modern agricultural technologies** namely fertilizer usage and appropriate **planting density – which consequently has a significant effect on economic performance**.

Policy Implications

Here are some of our recommendations from the study conducted;

⇒ we propose that the government of Kenya and the policy makers should focus resources on facilitating more farmer groups to increase information flow – especially the promotion of **increased cashew planting density** among farmers resident in the three major cashew dominated counties.

⇒ In the last 5 years the level of trust and solidarity in the community has become better in the coastal regions, thus, the local government can **tap into this high social capital to further strengthen existing farmer groups** and encourage formation of new groups – with an aim of introducing modern technologies to boost the cashew sector's performance.

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