

An Assessment of Economic Profitability of Small Scale Farm Enterprises in Trans-Nzoia County, Kenya

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Abstract

The research set out to make an economic analysis of the small scale farm enterprises in Trans-Nzoia County with a view to determining the enterprise with the highest profit that would contribute to sustainable livelihood for the people in the County. The study adopted a descriptive survey research design in which interviews and questionnaires were used to collect data from the Agricultural Officer at the Trans-Nzoia County headquarters, the extension staff and selected farmers. A total of 357 respondents were selected using simple cluster sampling technique. The study employed regression model with a view to ascertain which of the farm enterprises would be appropriate in improving the farmer's livelihoods. Computation of the profitability revealed that maize growing is more profitable than beans. It is concluded that maize has higher economic returns per acre than beans, thus, if grown in large quantities, beans could equally be profitable. It is recommended that the government should formulate a food security strategy and incorporate low-cost, sustainable technologies which build on the resources, production capacities and innate potential of the small scale farmers.

Key Words: Economic Profitability, Small Scale, Farm Enterprises, Trans-Nzoia County, Kenya

INTRODUCTION

In developing countries, over 85% of the people depend on small scale farming and are involved in growing of crops both for cash and consumption (UIRI, 2004). The main crops include coffee, cotton, wheat, rice, simsim, maize, beans, sorghum, millet, bananas, sweet potatoes and cassava. They also rear goats, sheep, poultry and cattle. For years, many people have relied on the same crops and animals reared without expansion or any improvement. Many of them face significant challenges in the farming practices employed and have not been assisted in discovering why they have remained poor. The challenges that people experience in the development of farming include lack of farm management skills and abilities, inadequate and inaccurate economic analyses of what crops/animals would be better paying in their locations, inability to cope with environmental changes, fluctuating input and output prices; limited financial resources, limited exposure to role models and accessibility to markets. However, it is important to understand that people develop but they are not developed (Livingstone & Ord, 1982); implying that communities involved in farming have to be assisted to appropriately identify farm enterprises, products and employment opportunities that can help them out of their pathetic situations by widening their choices in the field of agriculture.

On the other hand, economic historians have pointed out that from the early twentieth century onwards there has been a growing relative importance of intangible capital in total productive wealth and a rising relative share of Gross Domestic Product (GDP) attributable to intangible capital (Ng'etich, Kariuki & Kanyi, 2007). Intangible capital encompasses investment geared at production and dissemination of knowledge on the one hand; and investment geared at sustaining the physical state of human capital on the other. In the USA, the value of the stock of intangible capital began to outweigh that of tangible capital at the end of the 1960s, with Western Europe trailing behind by a number of years. However, for developing countries and especially in Africa, disparities in productivity and growth have far less to do with their abundance or lack of natural resources than with the capacity to improve the quality of human capital and factors of production.

Economic Profitability of Different Farm Enterprises

In industrialized countries, maize is largely used as livestock feed and as a raw material for industrial products, while in developing countries, it is mainly used for human consumption. In the sub-Saharan Africa, maize is a staple food for an estimated 50% of the population. It is an important source of carbohydrate, protein, iron, vitamin B and minerals. Africans consume maize as a starchy base in a wide variety of porridges, pastes, grits and beer. Green maize (fresh on the cob) is eaten parched, baked, roasted or boiled; playing an important role in filling the hunger gap after the dry season (IITA, 2007). Observation shows that for many small scale farmers, in addition to eating what they produce, they also provide a large part of the marketable surpluses for food deficit households. In this way, small scale farmers play a significant role in national food security. This is an economic profitability because if any country was to import food for the food deficit households, huge amounts of foreign exchange would be needed; but this is saved by production from the small scale farmers dotted around the country.

However, small scale farmers lack knowledge on determining profitability of farm enterprises and quite often they engage in enterprises that are not profitable leaving out those that would greatly reduce on poverty levels through increased incomes. The small scale farmers therefore need to be assisted so that they can make informed choices of farm enterprises that will boost their incomes over time. In view of this, it was found necessary to consider an assessment of the profitability of different crops and livestock. As already indicated, profitability of any farm enterprise depends on the production trends. The production trends on the other hand depend on the cropping intensity and constraints to sustained growth in production (Mohiuddin & Poonam, 1991).

In regions where most agricultural production rely on seasonal rainfall, Trans-Nzoia County included, the variation in the timing and quality of the rains, timely planting and adequate amounts of soil moisture are essential for performance of crops during the growing season and eventually good yields. It is also important to note that in Africa, profitability in different crops and livestock is greatly affected by the vulnerability in the implementation of marketing policies. In Kenya, marketing of agricultural produce has been tightly controlled by the government since the colonial days (Nyangito & Ndirangu, 1997). Although controlled marketing is sometimes good especially in as far as protecting excessive sale of food crops is concerned, it does not provide fair prices for the

enterprises. This can be discouraging and can sometimes affect production of a given enterprise.

For instance, towards the end of the 1970s, controlled price of coffee in Uganda led to a serious reduction in the production of the crop (IITA, 2007). It is also known that at about the same time, many coffee growers in Uganda had to cut down the crop because of poor returns from the enterprise (Gordon, 2008). Although, the example cited was in Uganda, the same could be true of the situation in Kenya and for any other farm enterprise. To correct the situation, the government of Uganda decided to liberalize marketing of coffee and this has been followed by increase not only in the price of the crop but also in its production (IITA, 2007).

Although Kenya has now liberalized marketing of produce, it has not met the necessary conditions for successful liberalization of farm enterprises. A number of conditions have to be met to ensure success of liberalization. First, liberalization requires the requisite skills to mobilize and involve communities in planning, surveying and negotiating for market prices both at home and abroad (Gordon, 2008). The communities thus need to be organized, trained in management and marketing skills, assessment of profitability of enterprise and learning the dynamics of marketing procedures. These conditions have not been met in Kenya. Thus, it cannot reap the potential benefits from liberalization (Gordon, 2008). The communities cannot ably compute the profitability of given farm enterprises nor engage in serious planning and management of given enterprises. An empirical study that can collect data basing on the current market prices can provide a tangible basis for advising farmers.

The study, therefore, sought to compute the gross margin profits of the crops and livestock under study for Trans-Nzoia County and provide the necessary advice to small scale farmers. The computation was based on the current market prices taking into account the production costs and other management costs.

Statement of the Problem

Given the above background, it is evident that like in many parts of Kenya, the livelihood of the people in Trans-Nzoia County depends mainly on small scale farming. For a good livelihood, productivity from the small scale farm enterprises needs to be sustainable. However, there are a number of factors that undermine agricultural productivity in Trans-Nzoia County. Some of these include farm management skills, environmental changes, fluctuating input prices, inadequate technical support; but more importantly lack of accurate economic analyses as a basis for selecting farm enterprises.

In as far as productivity of small scale farming enterprises in the Trans-Nzoia County is concerned, there are several questions that need to be answered and these include; why has productivity from the small scale farm enterprises remained low? How much has the government done to support small scale farmers in management of farm enterprises? What challenges do the small scale farmers face in the production process, especially in terms of costs? What are the current production trends of the farm enterprises? Which farm enterprise would be suitable for small scale farmers in the Trans-Nzoia County? These and many other issues need to be ascertained so as to provide a plausible

explanation to the situation in Trans-Nzoia County. The small scale farmers also need to increase agricultural productivity and profitability by shifting from low-value to higher-valued enterprises. The increase in agricultural productivity and the shift from low-value to high-value enterprises has to be guided. The study of economic profitability of the small scale farm enterprises was carried out in order to secure empirical data that would form the basis for guidance to the small scale farmers.

MATERIALS AND METHODS

The study was conducted in Trans-Nzoia County, formerly one of the districts that constituted the Rift Valley Province of the Republic of Kenya. The study adopted a descriptive survey research design. This design was selected because it is convenient in collecting substantial amount of views from respondents over a large area (Koul, 1997). Trans-Nzoia County is quite big in terms of land area (2,487.3 Sq.Km) and so, this design was convenient in soliciting views from respondents on small scale farm enterprises in the County.

The study population constituted of officers from the District Agriculture and Livestock Office, extension staff and selected small scale farmers in the district. Agriculture and Livestock Officers were selected to participate because they are the ones who direct government policy and monitor implementation. The extension staff formed part of the respondents because they are the ones who liaise and work closely with farmers and provide extension services. The population of small scale farmers in Trans-Nzoia County was estimated at 5000 (GoK, 2006) and the district Agricultural Officer who is the implementer of government policy and is directly involved in the farming practices also constituted the population of study. Thus, all the categories of respondents in the study population were carefully selected because they had the kind of data that the study sought to find.

The proportion of the target population that met the inclusion criteria was estimated at 5000. These included the Agricultural Officer (1), eight extension staff (one from each division, two from Cherangany and Kiminini due to their large number of small scale farmers) and 348 small scale farmers (58 from each division. The divisions of Endebess and Kaplamai were combined due to the presence of the Agricultural Development Corporation-ADC farms). This cluster sampling technique was adopted to ensure that data collected was representative of the divisions of Trans-Nzoia district.

The extension staffs and the Agricultural Officer were purposively selected because, by virtue of their positions and responsibility, they are expected to have the kind of data that the study sought to find. However, the research used simple cluster random sampling procedure to select the small scale farmers from each division, each division formed a cluster. This technique was used because it provided for equal chances for each farmer to be selected. The author obtained lists of the small scale farmers in each division so that small ballot papers were made to enable the random sampling. For each division, the ballot papers were placed in a box and after carefully shaking it, one ballot was picked at a time and the name of the farmer on that ballot was recorded. After that the ballot was replaced and the box shaken again and the process continued until all the 58 farmers were

identified. In case a name was picked a second time, the ballot would be replaced to give a chance to another farmer. This procedure was repeated for all the divisions.

The author used questionnaires and interviews techniques for collecting data. The study adopted a descriptive analysis because the data collected was mainly qualitative in nature. This was done thematically and presented in tables so as to interpret the data analyzed. However, since the study sought to analyse the economic profitability for each farm enterprise, the author adopted the regression analysis in order to predict the relationships between the variables.

RESULTS AND DISCUSSIONS

Determining Profitability of the Farm Enterprises

The profit margin for each of the farm enterprises was the difference between total revenue (TR) and total cost (TC). The findings on the cost of production were as shown in Table 1.

Table 1. The mean values of maize and beans production per acre in Trans-Nzoia County

Variable	Average mean values		Difference
	Beans	Maize	
Total value from the sale of produce	29632.659	47663.032	-18030.373
Cost of hiring land	3532.1637	6438.8298	-2906.6661
Cost of ploughing	1398.1763	2614.6277	-1216.4514
Cost of seed	895.5747	2215	-1319.4253
Cost of planting	397.9725	830.5053	-432.5328
Cost of weeding	585.71	1134.9468	-549.2368
Cost of fertilizer	2789.006	6110.266	-3321.26
Cost of harvesting/shelling/drying	641.021	1705.1596	-1064.1386
Cost of pesticides/gunny bags	734.6839	1848.2447	-1113.5608

Source: Author's household survey, 2008

From Table 1, it is observed that the cost of hiring land is highest for both maize and beans at Ksh 6438.8298 and Ksh 3532.1637 respectively against a total return of Ksh 47663.032 and Ksh 29632.659 respectively followed by the cost of fertilizer at Ksh 6110.266 and Ksh 2789.006 for maize and beans respectively. The two variables mentioned above contributed to more than 50% of the total cost of producing both maize and beans. The high cost of pesticides and gunny bags for maize indicates that storing of the produce is costly. This could explain the reason why the small scale farmers prefer to sell the produce at a lower price to the middlemen than incur the costs of storage. This needs to be empirically looked into to find out the cause and suggest solutions if the small scale farmers are to maximize their returns. The difference between the means for maize and beans for each cost shows that the overall cost of producing beans is lower than that of producing maize thus the negative sign. The higher profit margin for maize can be explained by the larger farm sizes under maize cultivation.

From the above data, the profit is total revenue less total cost. Therefore, the profit for beans from Table 1 above is Ksh 18658.35:

$$TR = \text{Ksh } 29632.65$$

$$TC = \text{Ksh } 10974.30$$

Similarly, the total profits for maize were found to be Ksh 24766:

$$TR = \text{Ksh } 47663$$

$$TC = \text{Ksh } 22897$$

From the above calculations, the profit for maize and beans for the small scale farmer in Trans-Nzoia County are on average, Ksh 24766 and Ksh 18658.35 respectively.

The other common small scale enterprise in the County is goat rearing, information which was acquired through questionnaires. Unlike maize and beans growing, goat rearing does not require a lot of inputs but has to be critically considered when carrying out an economic analysis. Many of those who engage in goat rearing do it on free range or open grazing system. This, therefore, limits the inputs and data available in the goat rearing venture in the study area. Therefore there was no informational data on returns. However, what was available was data on the cost of goat rearing obtained from secondary sources provided by the extension officers for 100 goats. Inputs such as buying of kids, fencing and erecting a shade, drugs and treatment, feeds and wages, were included in the analysis, the average costs for goat rearing were then compared with the average cost of maize and beans. Table 2 reports the results for goat production per acre in Trans-Nzoia County.

Table 2. Economic analysis for goat production in Trans-Nzoia District

Input	Total cost (Ksh)
Cost of goats(kids)	50,000
Cost of fencing	15,000
Cost of shade	50,000
Cost of drugs and treatment	100,000
Feeds	4,000
Wages	24,000
Interest on working capital (20%)	11,400
Gross input in goat production (Total)	291,600

Source: Ministry of Agriculture, Kitale Office, 2008

The cost of goat production for one hundred goats per acre in Trans-Nzoia was Ksh 291.600 (Table 2). The above results show that it was more profitable for the small scale farmer to produce maize than beans. It was noted that it was more costly for the small scale farmer to rear goats than the other two farm enterprises. The cost of rearing goats is high probably because of the initial fixed costs; that is, construction of the shade, fencing and buying of the kids.

As noted in earlier, every country is currently concerned about food security, poverty eradication and sustainable development. In this regard, information on farming ventures is important to policy makers and farmers alike. An economic profitability of the small scale farming enterprises in Trans-Nzoia County has partly revealed the production cost of each of the farm enterprises (i.e. beans and maize). The comparison on the profitability of these farm enterprises was done using the regression equation to determine which one of them gives the highest economic returns. Table 3 shows the regression results of maize production.

Table 3. Regression results of maize production (dependent: total value of maize produced)

	Variable	Parameter estimates	p-value
X ₀	Constant	-	-
X ₁	Cost of hire of land	-0.353 (t = -4.230)	0.000
X ₂	Cost of ploughing	0.717 (t = 6.237)	0.000
X ₃	Cost of seed	-0.005 (t = -0.61)	0.951
X ₄	Cost of planting	0.176 (t = 2.382)	0.018
X ₅	Cost of weeding	0.232 (t = 2.863)	0.005
X ₆	Cost of fertilizer	-0.049 (t = -0.910)	0.364
X ₇	Cost of harvesting/ shelling/drying	0.171 (t = 2.483)	0.014
X ₈	Cost of pesticides/gunny bags	0.110 (t = 2.694)	0.008
R ² = 0.808		Adjusted R-squared = 0.800	Sample size = 187
F-value = 94.321		Degree of Freedom (df) = 8	

Note: The figures in the parenthesis are t-values

Source: Author's household survey, 2008

Table 3 depicts the individual effect of each value of the independent variable X to the dependent variable Y. Looking at all the X variables used in the analysis, the following was deduced: the cost of hire of land had a significant effect on the total value from the sale of maize with a beta value of -0.353 showing that one unit increase in the cost of hiring land would reduce the value from the sale of maize by 35% this is a negative effect that needs to be looked at in order to improve farm profitability of maize, the t value of -4.230 showed a high level of significance. The cost of ploughing as shown by the results had a very significant effect on the total value from the sale of maize with a parameter estimate of 0.717 showing that the increase in the methods and implements of cultivation by one unit would improve on the value from sale of maize produced by a magnitude of about 72% (a t- value of 6.237).

The effect on the value of sale of maize from the cost of seeds and cost of fertilizers had very little effect on total value of maize produced with parameter values of -0.005 and -0.049 respectively. Even then, their increase would negatively affect the value of maize yield. The other variables, cost of planting cost of weeding, cost of harvesting/shelling/drying, cost of pesticides/gunny bags, all have a high significance with a t-value greater than 2, meaning a one unit decrease in the costs would significantly result in an increase in the total quantity of maize produced. The above variables need to be closely looked at to be able to help the small scale farmers increase their revenue from the maize enterprise.

Table 4 shows the regression results of beans production. The table shows the results of the effects of the individual parameters (Xs) on the total revenue from the produce of beans for the small scale farmer in Trans-Nzoia County. The results show that the cost of weeding had the most significant effect on the beans produced. The parameter value of -0.757 for weeding shows that a unit increase in the cost of weeding would impact greatly on the amount of beans produced by reducing the total produce by about 76%, with t-value of -5.854.

Table 4. Regression results of beans production (dependent: total value of beans produced)

	Variable	Parameter estimates	ρ -value
X ₀	Constant	-	-
X ₁	Cost of hire of land	0.097 (t = 1.792)	0.075
X ₂	Cost of ploughing	0.267 (t = 2.092)	0.038
X ₃	Cost of seed	0.635 (t = 4.314)	0.000
X ₄	Cost of planting	0.057 (t = 0.581)	0.562
X ₅	Cost of weeding	-0.757 (t = -5.854)	0.000
X ₆	Cost of fertilizer	0.071 (t = 1.193)	0.235
X ₇	Cost of harvesting/ shelling/drying	0.357 (t = 2.786)	0.006
X ₈	Cost of pesticides/gunny bags	0.078 (t = 0.898)	0.371
R ² = 0.726		Adjusted R-squared = 0.711	Sample size – 154
F-value – 48.421		Degrees of freedom (df) = 8	

Source: Author's household survey, 2008

The cost of seed, harvesting and ploughing had t-values of 4.314, 2.786 and 2.092 respectively reporting a high significance in the variable's relationship to the revenue from beans produced, showing that the increase in the methods and implements of cultivation by one unit would improve on the value from sale of beans produced by a higher magnitude. Other variables of cost of hiring land, cost of fertilizers, harvesting and planting had t-values Of 1.792, 1.193, 0.898 and 0.581 respectively in order of significance to the total revenue from the beans produced.

The Test of the Goodness of Fit

The test of the goodness of fit was done using R-squared (R²) to determine how close the observations were to the regression line to be able to ascertain the percentage of the total variation of dependent variable (maize output) that is explained by the independent variable. In other words the R² value is the explanatory power of how much of the effect is explained by the model as a whole. The coefficient of determination assumes values lying between zero and one therefore the R² of maize 0.808 and of beans 0.726 meaning that the regression line gives a good fit to the observed data. That is, a greater percentage of the variation in the total revenue from the sale of produce is explained by the variables used in the model. However, the fact that the observations deviate from the estimated line shows that the regression line explains only a part of the total variation of the dependent variable. A part of the variation e remains unexplained and are attributed to the existence of the disturbance variable μ . These other factors can be explained by the presence of challenges earlier identified in this chapter; small farm land, the nature of farm

implements used, civil strife in the country, poor post harvest storage and the poor soils among others.

The Overall Test of Significance of the Regression Model

The overall significance of the model is normally tested using F test. From our results the value of F was found to be 48.42 for beans (8df at the 99% level of significance). From the F Tables we found $F_{0.001}$ was 2.01. Given that estimated F value (i.e. 48.421) is greater than tabulated F value (i.e. 2.01) we accept that the regression was significant. In other words the costs of production were significant factors in explaining beans production. Indeed the cost of production explain about 73% of the variation in beans output. Similarly, for maize, the value of F was found to be 94.321(8df at the 99% level of significance). From the F Tables, $F_{0.001}$ was found to be 2.01. The estimated F value (94.321) was therefore bigger than the tabulated F value (i.e. 2.01) suggesting significant relationships between output of each farm enterprise and the explanatory variables. The cost of production for maize explains about 81% of the variation in output.

CONCLUSIONS AND RECOMMENDATIONS

The results from the regression model show that growing of maize is more profitable than beans although if grown in large quantities, beans could be more profitable. The extension staff should endeavour to create economic awareness so that the small scale farmers make realistic choices of what to undertake in terms of farm enterprises. The extension officers may help farmers to grow a crop of a lower economic return but in large quantities so as to get more benefit out of it.

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BIO-DATA

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