# An Analysis of the Current Production Trends of Farm Enterprises in Trans-Nzoia County, Kenya

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**Abstract**
An economic analysis of small-scale farming enterprises in Kenya was carried out in Trans-Nzoia district. It focused on growing of beans, maize and goat rearing, to a less extent. The study aimed at establishing current production trends of the farming practices. The study adopted a survey research design in which interviews and questionnaires were used to collect data from the Agricultural Officer at the Trans-Nzoia district headquarters, the extension staff and selected farmers. A total of 357 respondents were selected using simple cluster sampling technique. The findings of the study indicated that the current production levels of beans, maize in the district have been declining over the years. Despite continued planting, the people have remained poor. Analysis and comparison of the economic returns per acre revealed that more maize is produced per acre than beans. The study recommends that the government of Kenya and the respective departments should give the necessary attention to agricultural issues by providing support services for small scale farmers. Involving the small scale farmers in self-help rehabilitation measures, greater reliance on mobilization of grass root resources particularly among the poor and women would go a long way to enhance and increase production levels.
**Keywords:** Current Production Trends, Farm Enterprises, Trans-Nzoia County, Kenya

## 1. Introduction

Recent economic studies suggest that developing countries can make strides in catching up with the richer economies if they decide to systematically invest more in meaningful agriculture and value addition to the products from this sector (UIRI, 2004). At the same time, knowledge-based competition within the globalized economy has prompted consideration of the role of farming in sustainable development that encompasses both improvement in livelihoods and environmental protection.

Like many African countries, Kenya is mainly an agricultural country. Majority of the people in Kenya and particularly those in Trans-Nzoia County, rely on small scale farm enterprises for their livelihood. For a long time, people of Trans-Nzoia have grown maize, beans and reared goats. Maize, which is often referred to as corn (in USA, Canada, New Zealand and Australia) is a cereal crop that was domesticated in Meso-America and then spread throughout the American continents. According to IITA (2007), maize is now the most important cereal crop in the sub-Saharan Africa because it is a staple food to an estimated 50% of the total population of Sub-Saharan Africa. It is high yielding (8.6 tons in developed countries and 1.3 tons in developing countries); a versatile crop that grows across a range of agro ecological zones. Every part of the crop has an economic value; the grain, leaves, stalk, tassel and cob can all be used to produce a variety of food and non food products.

Throughout the tropics and even within the sub tropics, maize is grown mostly for subsistence as part of the agricultural systems that feature several crops and sometimes livestock production. In Kenya, maize is a staple food for a large proportion of the population in both urban and rural areas. By 2001, maize accounted for roughly 28% of the gross farm output from the small scale farming sector (Jayne *et al.*, 2001) of Kenya's crop production. However, between 2001 and 2007, maize production greatly declined and currently a lot of maize is bought across borders (Suam, Malaba, Busia) from Uganda (KARI, 2008).

Another crop that has been predominantly grown on small scale farms in Kenya and especially in Trans-Nzoia County is beans. Production of beans by the small scale farmers in Kenya and in Trans-Nzoia County has deteriorated in the recent past. Table 1 presents figures on maize and beans production from Kenya's small scale farming sector from 2001 to 2007.
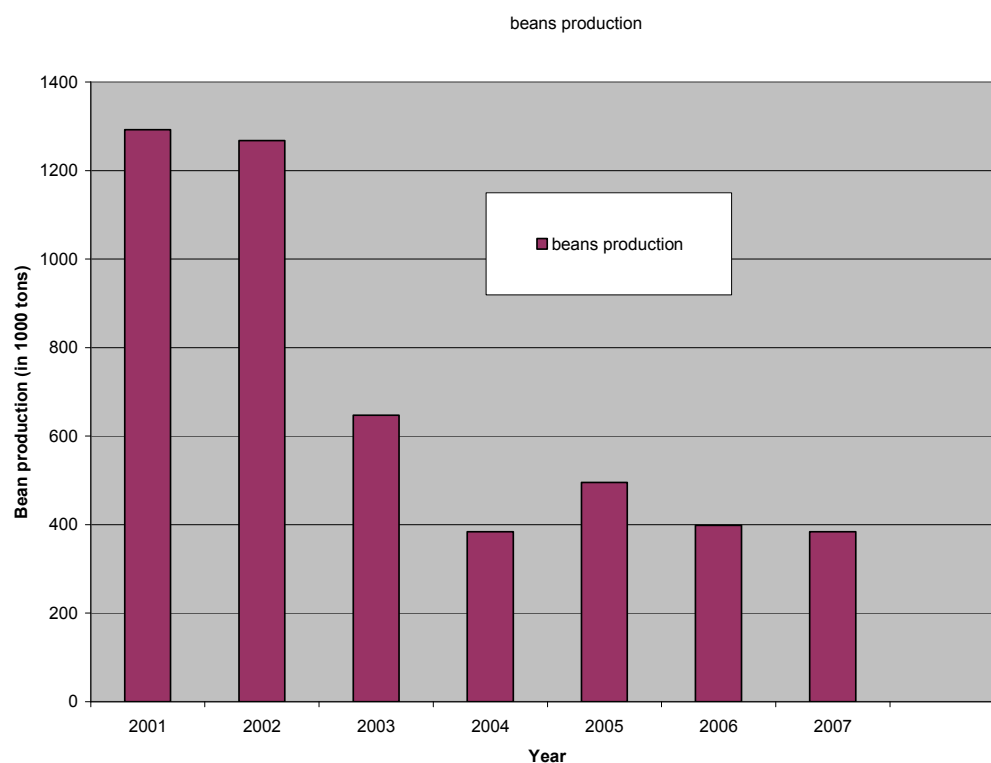
Figure 1: Beans production from Kenya's small scale farming sector (2001-2007)
*Source: Kenya Agricultural Research Institute (KARI), Kitale, 2008*

From Table 1, it can be noted that beans production from Kenya's small scale farming sector greatly declined after 2002 and the situation has not improved to date. According to the report of KARI (2008), the production levels of beans which used to be high in Trans-Nzoia than in any other district in Kenya, is now much lower than that of other districts. This situation deserves attention of researchers, academicians and policy makers alike in order to adequately respond to the livelihood of the people of Trans-Nzoia County in particular and Kenya in general.

The scenario above is the same for maize. The decline in maize production from small scale farms may be a result of the instability (political, social) that rocked Kenya between 2002 and 2008 but there could still be other factors of environmental or economic nature (climatic changes, disease and pests, lack of drugs, deterioration in soil fertility, economic liberalization, costs of production and privatization). These need to be empirically ascertained.
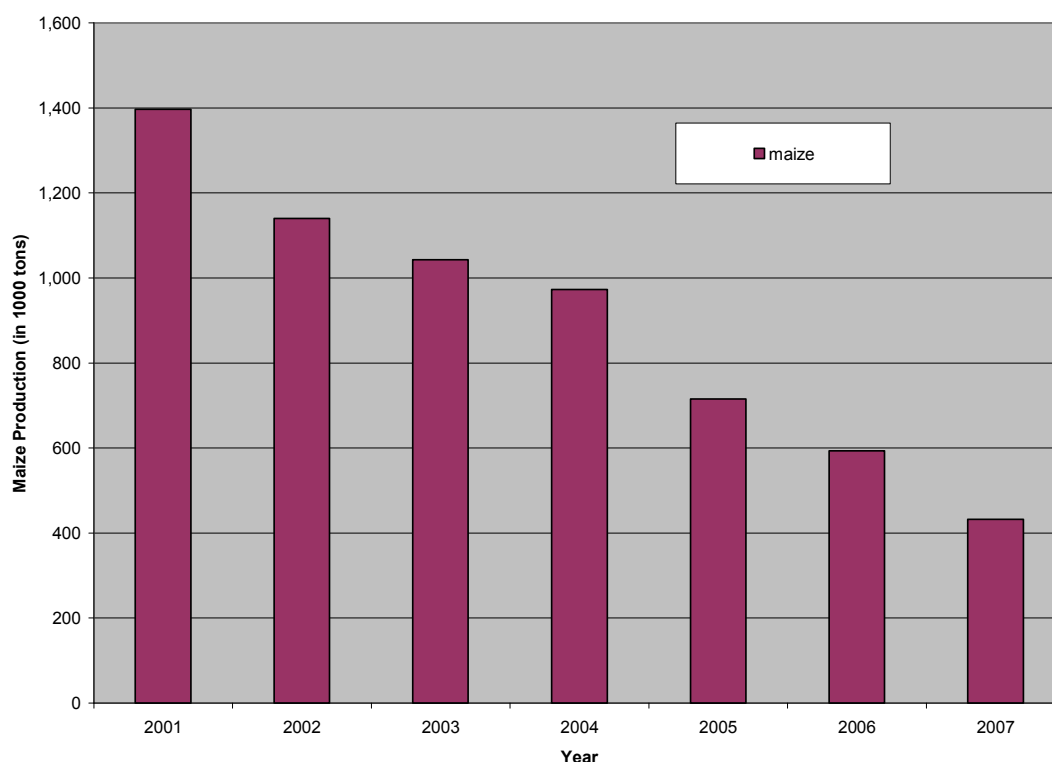
Figure 2: Maize production from Kenya's small scale farming sector (2001-2007)
*Source: Kenya Agricultural Research Institute (KARI), Kitale, 2008*

Goat rearing is another farming practice that has been typical of the small scale farming sector in Kenya and Trans-Nzoia County in particular. Generally, goat rearing in Kenya is found among pastoralist communities living in arid and semi-arid areas characterized by low rainfall and relatively high temperature throughout the year leading to seasonality in feed supply and movement of communities from time to time in search of pasture and water. Goats are valued and preferred to cattle and sheep because of their ability to survive periods of drought better and their high production (Peacock, 1996).

Although Kenya is estimated to have 12.442 million goats (Kenya's Ministry of Livestock Report, 2006), which is about 2% of the total population of goats in the world, the economic contribution of goats has been eluded for so long. This is perhaps due to the fact that goats and goat products seldom enter the formal marketing system leading to underestimation of their contribution in both the rural and national economic trends and ultimately in the country's GDP. However, according to Peacock (1996), goat rearing has a higher economic value if it is done on a larger scale. In this respect therefore, it may not be cost effective for people practicing small scale farming to rear goats. This, however, has to be empirically proven in order to adequately and appropriately advise farmers in Trans-Nzoia County and throughout Kenya.

*1.1 Production Trends for various Farm Enterprises*

Throughout the tropics and subtropics, small-scale farmers grow maize, mostly for subsistence as part of agricultural systems that feature several crops and sometimes livestock production. Unlike the developed countries where hybrid maize varieties are commonly grown with high inputs using mechanized operations, the production systems in the sub-Saharan Africa often lack inputs such as fertilizer, improved seed, irrigation and provision of extension services. At the same time, an array of diseases plagues crop-growing (especially maize, beans) areas in Sub-Saharan Africa (Ikisan, 2009). For maize, these include downy mildew, rust, leaf blight, stalk and ear rots, leaf spot, and maize streak virus (Burns, 2008). Insect pests, including stem and ear borers, armyworms, cutworms, grain moths, beetles, weevils, grain borers, rootworms, and white grubs are also a great threat to the survival of maize in Africa (Onyango *et al.*, 2001). All these factors affect not only the growing of crops but the yields and the soil composition. Therefore, except for those countries which provide support services for the farmers, the production trends in developed countries differ substantially from those in developing (and the sub-Saharan) countries like Kenya.

In the Nigerian savannah, for example, weed-related yield losses ranging from 65% to 92% have been recorded. The parasitic weed, known as witch weed (*Striga*), is a major pest in the sub-Saharan Africa and causes estimated cereal grain losses of up to US$7 billion. This adversely affects the lives of about 300 million people (Tamika, 2008). On the other hand, the limited use of nitrogenous fertilizers and the declining soil fertility are

problems for maize production in Sub-Saharan Africa (Martin, 2001). In addition, periodic drought caused by irregular rainfall distribution reduces maize yields by an average of 15% each year. This is equivalent to at least US$200 million in foregone grain (KARI, 2005). The effects of prolonged droughts, such as those that have struck Eastern and Southern Africa in recent years, have been disastrous. This is also true of the situation in Kenya where Trans-Nzoia County was equally affected by prolonged drought and perhaps this partly explains the decline in production trends of the farm enterprises.

Goat rearing in many developing countries and Kenya in particular, has not received much attention as it should despite the country having thousands of these animals (IITA, 2007). Many goats die from various diseases that can easily be cured. A survey of the common concerns of small scale farmers regarding goat rearing is required if steps can be taken to help them improve on the production trends. Once this information is attained, government and particularly the Ministry of Agriculture and Livestock have to involve extension officers in providing support services such as knowledge on disease prevention and feeding to farmers. This can help in identifying, preventing and treating common goat problems. Disease prevention through good nutrition, kid rearing, and adequate housing; teaching farmers how to identify diseases through physical and post-mortem examination; promotion of goat health and optimal production through selective breeding can significantly improve on the production trends in goat rearing (Martin, 2001).

### 1.2 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 analysis of the current production trends 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.

## 2.    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 County.

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 to collect data. The study adopted a descriptive analysis because the data collected was mainly qualitative in nature. This was done thematically and presented in tables and graphs so as to interpret the data analyzed. Some of the data from interviews has been reported verbatim to capture the actual opinion of the respondents. However, since the study sought to analyze the current production trends for each farm enterprise, the author adopted the regression analysis in order to predict the relationships between the variables.

## 3.      Results and Discussion

### 3.1 Current Production Trends of farm Enterprises in Trans-Nzoia County

Data collected from the various categories of respondents indicated a variation in their opinion on production levels for each of these farm enterprises. For instance, preliminary data collected from the respondent (extension staffs) through the face to face interviews revealed facts about production levels. Data analyzed revealed that 57% of the responses from the extension staff indicated that current production level of the farm enterprises in Trans-Nzoia district is low while 33% of them indicated that production level is very low. Only 10% of the responses indicated that production levels are moderate. Generally, it was found out that the current production levels for the farm enterprises in Trans-Nzoia County are low. However, the study used three categories of respondents and it is important to compare the views of all these categories in order to comprehensively determine the current production levels of the farm practices in Trans-Nzoia County.

Data collected from the small scale farmers in the district revealed that the current production levels for all the three farm practices actually range from moderate low to very low. Table 1 presents the views of the respondent small scale farmers on the current production levels of beans, maize and goats in Trans-Nzoia County.

**Table 1: Small Scale Farmers' views on Current Production Levels**

| Farm enterprise | Moderate | Low | Very Low |
|---|---|---|---|
| Beans | 84 | 200 | 64 |
| Maize | 105 | 217 | 26 |
| Goats | 38 | 100 | 210 |

*Source: Author's household survey, 2008*

From Table 1, it can be noted that the small scale farmers indicated that the current production levels for the three categories of farm practices in Trans-Nzoia County are moderate, low or very low. Out of the 348 respondent small scale farmers, 24.1% of them indicated that current production level of beans is moderate, 57.5% of them indicated that current beans production is low and 18.4% of them indicated that the current beans production in Trans-Nzoia County is very low.

The data in Table 1 further reveals that although majority (62.4%) of the respondent small scale farmers indicated that the current maize production level in Trans-Nzoia County is low; 30.2% of them indicated that current maize production level is moderate while 7.4% of them felt that current maize production level is very low. As far as the current goat production levels in Trans-Nzoia County are concerned, the data in Table 1 reveals that at least 11% of the small scale farmers indicated that the current goat production level in Trans-Nzoia County is moderate while 28.7% of them indicated that the goat production level is low. However, majority (60.3%) of them were of the opinion that the current goat production levels are very low.

The views of the respondent extension staffs and small scale farmers were triangulated with those of the officer in charge of Agriculture during a face to face interview at the Trans-Nzoia County headquarters. Data collected during the face to face interview with this officer bears a close similarity with the views of the respondent small scale farmers and the extension staffs. Further analysis of documents secured from the Agriculture and Livestock officer at the district headquarters indicated that the average national production levels for the farm enterprises stood at 32% for beans, 47% for maize and 12.6% for goats. This was for the period from 2005 to 2008. In a face to face interview, the Agricultural and Livestock Officer at Trans-Nzoia district headquarters remarked that:

> It has to be noted that these figures may not be very accurate because not all production is reported and documented by the responsible officers. Also some of the production is consumed locally and therefore not reflected in these figures. However, these figures present a substantial level of accuracy of the production levels and according to me, the production levels in Trans-Nzoia have greatly reduced in the past five years. This is because Trans-Nzoia district has been the highest producer of maize in the country with more than 50% of the national production (Personal Communication, Agricultural and Livestock Officer, Trans-Nzoia, 2008).

The remarks of the Agriculture Officer are not very different from the ratings of the extension staff and the small scale farmers. Comparing the views of all the respondents and rating them against the national production levels presents the respondents' overall view of the current production levels of the three farm activities in Trans-Nzoia district. Figure 3 presents the overall respondents' view of the current production levels in Trans-Nzoia district against national production levels.
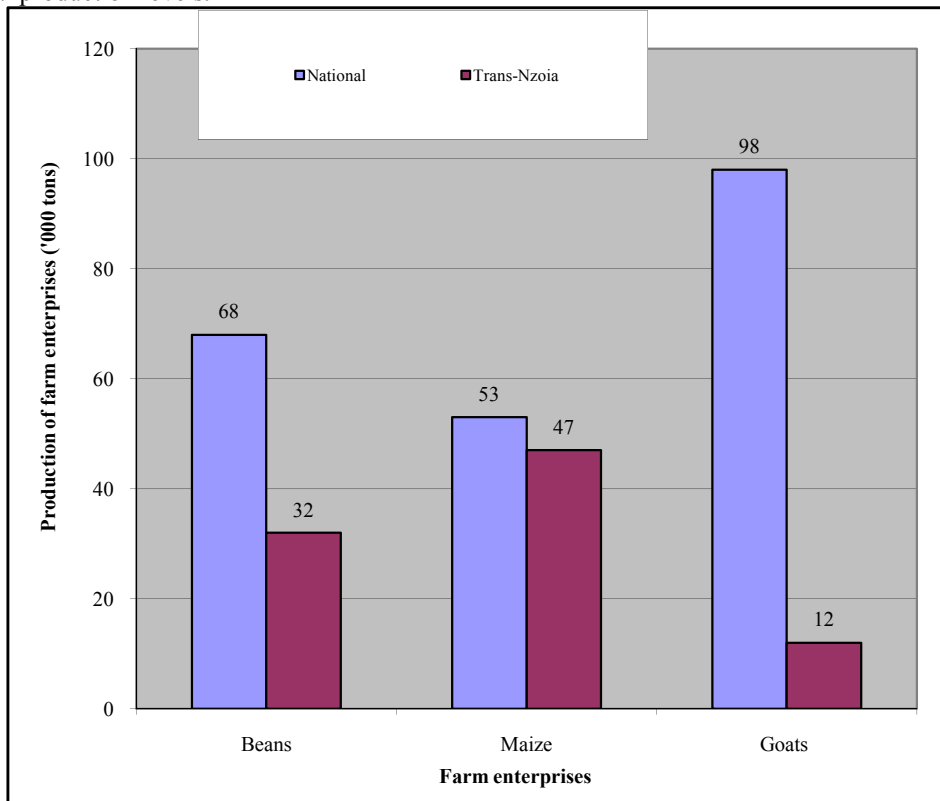


Figure 3: Comparison of production levels in Trans-Nzoia with national figures

From Figure 3, maize production where the Trans-Nzoia County was producing more than 50% of the national production; is now well below 50%. This is an appropriate indicator of decline in production. This is an indication that there could be challenges that farmers encounter in the production process.

### 3.2 Average Production Cost per Acre of each Farm Enterprise

In making a critical analysis to find out the production cost per acre of each farm enterprise, it was important to have sufficient information on the inputs, process and outputs for each activity. The study used information obtained from the small scale farmers to make the analysis for each farm activity. In this analysis, the study first considered the costs of purchasable inputs in production of each enterprise. These included hire of land, hire of machinery and equipment, hybrid seed, inorganic fertilizers, gunny bags and pesticides. The labour costs were obtained through interview with the small scale farmers in order to get the cost of production for each farm enterprise. The above were analyzed using the linear regression model.

$Y = ß_0 + ß_1X_1 + ß_2X_2 + \ldots\ldots\ldots + ß_8X_8 + e$ (for each farm enterprise)

Where:

$Y$ = is the total value of farm production for each enterprise

$x_1$ = is the total cost of hiring land

$x_2$ = is the cost of ploughing

$x_3$ = is the cost of seeds

$x_4$ = is the cost of planting

$x_5$ = is the cost of weeding

$x_6$ = is the cost of fertilizers

$x_7$ = is the cost of harvesting/shelling/drying

$x_8$ = is the cost of pesticides and gunny bags

On the basis of these results, Table 2 presents the mean values for the costs of production and from sale of produce for each of the farm enterprises selected in Trans-Nzoia County.

**Table 2: 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 2, 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.

## 4.    Conclusion and Recommendations

The production levels of beans and maize in Trans-Nzoia County are declining. Analysis of the costs of production shows that they are higher for maize than for beans. A greater percentage of the variation in the total revenue from the sale of produce (maize and beans) is explained by the variables used in the model.

The government of Kenya and the respective departments should give the necessary attention to agricultural issues by formulating food security strategies and providing support services for the farmers. Involving the small scale farmers in self-help rehabilitation measures, greater reliance on mobilization of grass root resources particularly among the poor and women would go a long way to enhance and increase production levels.

The Ministry of Agriculture should consider increasing the extension services to the small scale farmers so as to change the thinking of the farmers and ultimately their farming practices. This could lead to improvement in the production levels of the farm produce and sound environmental conservation measures.

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