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Factors Influencing Diversification to Banana Farming in Kenya: A Case of Imenti South Sub-County

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Abstract:

Banana farming has been practiced extensively over the world for a long time with the origin being Malaysia. India is the leading producer in the world and Uganda the leading producer of banana in sub-Saharan Africa. Kenya is one of the nations practicing banana farming, and the country has embraced this activity, with several regions in the country practicing banana farming for subsistence and commercial purposes. Meru County, specifically Imenti South sub-County, has embraced the activity with households in Imenti South sub-County engaging in banana farming at a high rate. This is an area that has formerly been associated with coffee farming as the major cash crop. Therefore, this study sought to investigate drivers of diversification to banana farming among selected households in Imenti South sub-County. The objective of the study was to determine factors influencing diversification to banana farming among households in the study area. The study used a cross-sectional study design employing mixed methods of data collection. Systematic random sampling was used to select a study sample of 388 farmers to participate in the study. Descriptive and multinomial logistical regression was used to analyze quantitative data using SPSS version 20. Findings indicated that 67% of the respondents were males. About a third (32%) of the respondents was aged 41-50 years while only 13% were aged 18-30 years. Close to half of the respondents (48%) had attained primary level of education as the highest education attainment and 39% of the respondents earned an average monthly income level of 5,000 and below. Regression analysis model revealed that Age, monthly income level, land size, access to reliable markets, access to sufficient farm inputs, access to hybrid planting materials, better payment/returns, high crop productivity, availability of sufficient water influence diversification to banana farming ($P < 0.05$). In conclusion, there is high rate of diversification to banana farming which is driven by high returns and productivity of the crop. However, the study established the need for the government and its allied stakeholders to develop and implement policy guidelines which create an enabling environment for diversification to banana farming such as proper market price regulation, supply of water to farms, easy access to production inputs and provision of high quality, hybrid planting materials to farmers.

Keywords: Diversification, Drivers, Banana farming and Banana farmers

1. Background to the Study

Banana is a perennial crop that is grown and harvested all the year-round. The precise origin of edible banana is not known but the generally accepted theory is that Malaysia, a region including the Malay Peninsula, Indonesia, the Philippines and the New Guinea was the primary center while India was a secondary center (Simmonds and Shepherds, 1955). It is likely that, it dispersed out of Asia due to entirely human movement. The modern-day edible banana is a mixture of wild cultivated species and hybrids associated with *musaacuminata* and *musabalbisiana*. *Musa acuminata* is the most widespread of the species (Bosma et al., 2010).

Banana production in India supports livelihood of millions of people with a total annual production of 116,555.9 ton with a national average of 26.7 tons per hectare during 2003-2004 (Anonymous, 2006). To the Indians, it is used as subsidiary food, while leaves are universally used for serving meals; and chopped banana stems are used as cattle feeds. The flower from the banana tree is sacred and is used in religious and important ceremonies such as weddings where banana flowers are tied around the head, believing that it brings good luck. Some species of the banana yield fiber used for making ropes. Banana is also used as a raw material in industries for preparation of banana powder, chips, juices and beer (Anonymous, 2006). The juice of banana stems is used in making paper bond and tissue paper, among others. Other countries where banana is useful is South East Asia, where it is eaten raw or cooked, processed into flour and fermented for the production of beverages such as banana juice, beer, vinegar and wine (Pillay and Tripathi, 2007). In Burma and Bengal, leaf buds are eaten as vegetables; the core of the pseudo stem is used for cooking, while the corm is a source of starch and has been eaten in times of famine (Nelson et al., 2006).

Banana is a popular food crop in sub-Saharan Africa, with Uganda being the leading producer of bananas in Africa and second from India, with an annual output of 9.84 million tons, accounting for 11.8 5% of the world total production (FAO 2006). It's a major staple food crop in Uganda with consumption of 10.5m tones per annum, accounting for approximately 10.5% of the total global production. Millions of small-scale farmers in Africa grow this crop for household consumption or local market. The highest consumption of banana per person is in Uganda, estimated at close to 1kg per person per day (Edmeades *et al.*, 2006).

Nigeria is one of the largest banana producing countries in Africa with the crop being ranked third among starchy staples after cassava and yam (IITA, 2009). Despite its prominence, but it does not feature among banana exporting nations because it produces more for local consumption. Consumption of banana has risen tremendously in Nigeria in recent years because of the rapid increase of urbanization and the big demand for easy and convenient foods by non-farming urban population. Besides being the staple for many people in more humid regions, banana is a delicacy and favored snack for people even in other ecologies. A growing industry, mainly plantain chips is believed to be responsible for high demand being experienced now in the country. Banana has provided humans with food, medicine, clothing, tools, shelter, furniture, paper and handicrafts (E-book, 2015). It provides food security and income for small-scale farmers who represent the majority of producers.

It remains as the staple food as well as the raw material for any products producing value-added products in many parts of Nigeria. Immature fruits are peeled, sliced, dried and made into powder and consumed as 'plantain fufu'. The mature fruits (ripe and unripe) are consumed boiled, steamed, baked, pounded, roasted, or sliced and fried into chips. Overripe banana is processed into beer or spiced with chili pepper, fried with palm oil and served as snacks ('dodo ikire') (E-book, 2015). In Rwanda, banana is an important food crop and cash crop covering 23% of the total cultivated land (Mpyisiet *et al.*, 2005) and is grown by 90% of the households. Banana cultivars in Rwanda exists under local names and often within limited distribution. Different species of banana in Rwanda are green –cooking type with limited distribution. Other cultivars exist for brewing and cooking banana which many believe they originated through mutation of cooking and brewing cultivars or vice-versa (Okechet *et al.*, 2005).

In Tanzania, banana is main staple food for roughly 30% of the total population. (Kalyebara *et al.*, 2007). In the high-rainfall highlands of Kagera, Kilimanjaro and Arusha, about 70-90% of households grow banana for their own consumption or as a cash crop, making banana the second or third biggest cash crop in these local economies. Banana in lake zones of Tanzania is well known for its soft matoke bananas. It's also used for roasting and as a starchy food for other areas. Banana is a popular food crop in Kenya, with about 2 million tons produced annually from approximately 80,000 ha (M.O.A, 2006). It plays a key role in the economy and food security in Kenya and it is mainly grown in Central, Eastern, Western, Nyanza and Coast regions.

There are two main products of banana in Kenya are desert or fruit bananas and cooking or plantain bananas; with different geographic origins. Desert bananas originate in the Central provinces like Kirinyaga, Murang'a and Meru. Plantains are mainly produced in Western and Nyanza region like Kisii (IITA, 2010). These two products have different varieties and some of these varieties include: *Lacatan, Apple, Gross Michael, Kampala, Dwarf Cavendish, Uganda green, Giant Cavendish, Williams, Varely, Grand Nain, Muraru, Kiganda and Sukari*.

Kisii County has been the major producer of banana in Kenya with a national farmer average production of 12 tons/ha, but

Meru County has topped to emerge national leader with a revenue now of Ksh.77 billion annually (Koigi, 2013). Though taken as just any other horticultural crop, only about a decade ago, banana farming has now overtaken coffee as a dominant crop in Meru (Techno Serve, 2009). This study tries to establish the extent of diversification and factors which influences this diversification and benefits as well as the constraints of diversification in Imenti South sub-County in Meru County.

2. Statement of the Problem

Imenti South sub-County is known to be agriculturally productive with the major cash crops being coffee, tea and cotton. Other subsistence crops are maize, millet, cow peas, sorghum green grams and many more. However, around a decade ago, parts of Meru County diversified to banana farming, abandoning coffee and other subsistence crops. They have been diversifying gradually as opposed to the major cash crops in the area like coffee, tea, cotton and other subsistence crops. Farmers in Imenti South sub-County had tea as the dominant crop on the upper zone and coffee on the lower zone. This has gradually changed, with most of the farmers diversifying to banana farming from coffee in the lower zone and becoming the dominant crop. This could have possibly been necessitated by several factors, which this study set out to investigate. This diversification has caused many households to compete for the farming lands due to sub-division because every member of the household wants to have a portion of land where he or she will practice banana farming. Cultivation of subsistence crops have also reduced in the study area due to this diversification; many households have gone a step further to leasing lands away from the study area for subsistence farming because the land they have been cultivating subsistence crop have been overtaken by banana. Leasing lands for cultivating subsistence crops in the neighboring areas have also become problematic because of high demand, hence exaggerating the prices and reducing leasing period. Rivers in this study area have been adversely affected because piped waters have been tapped from the rivers for banana farming during dry spell. This has made every household to have piped water from many water projects in the study area. Therefore, this study aimed at determining the drivers of diversification to banana farming in Imenti South sub-County to facilitate formulation of appropriate policy actions for scaling up and supporting diversification to banana farming in the sub-county.

3. Research Hypotheses

- H_0 : There is no significant relationship between socio-economic factors and diversification to banana farming in Imenti South sub-County.
- H_1 : There is significant relationship between socio-economic factors and diversification to banana farming in Imenti South sub-County.

4. Empirical Literature Review

4.1. Requirements of Diversification to Banana Farming

Banana is essentially a tropical plant requiring a warm and a humid climate. However, it can be grown from sea level up to an altitude of 1200 meters (Nelson *et al.*, 2006). Banana can be cultivated in temperature ranges between 10°C and 40°C, with higher yields when temperatures are above 24°C for a considerable period. In cooler climate, the crop requires longer time to mature. Plants exposed to low temperature and humidity during active growth stage show reduced growth and yields. It requires an average of 1700mm rainfall distributed throughout the year for its satisfactory growth. Stagnation of water is injurious and may cause diseases like Panama Wilt. It is generally considered that fertility of the soil is very important for successful diversification to banana farming, as the plant is a heavy feeder. Banana is one of the few fruits which has restricted root zone. Hence, depth and drainage are the most important considerations in selecting the soil for banana (Wairegiet *al.*, 2007). The soil suitability for banana should be 0.5m to 1m in depth, rich and well drained, fertile and moisture retentive, and soil containing plenty of organic matter. Alluvial and volcanic soils are the best for banana cultivation. A soil pH of 5.5-7.5 is suitable for growing bananas, with a pH of 5.5 considered optimal (Macharia *et al.*, 2010). A low pH however, solubilizes elements like iron, aluminum, and manganese; these can be toxic and have negative effects on the plants such as reduced root growth. This is exacerbated when the soil becomes water logged or has low carbon levels. A low pH also reduces the availability of other nutrients such as calcium. Careful fertilizer management reduces soil acidification. A pH higher than 6.5 can reduce the availability of trace elements such as boron, zinc, copper and iron. These studies have tried to reveal the ecological requirements for a successful diversification to banana farming, but the current study seek to know whether those ecological factors play any role in the diversification to banana farming in Imenti South sub-County.

4.2. Theoretical Perspective

The proposed study adopted Fuzzy Logic Model (Figure 2.1). This is a model that was introduced by LoftiZadeh in 1965 in Berkeley (Nelson *et al.*, 2006). He coined the word fuzzy because he felt it was the most accurate description of what was going on in the theory. Fuzzy Logic Model (FLM) can handle problems with imprecise and incomplete data and it can model unilinear functions of arbitrary complexity. If one does not have a good plant model, or if the system is changing, then fuzzy will produce a better solution than conventional control technique. One can create any Fuzzy system to match any set of input-output data. The model uses three variables for family motives to diversification; these variables are potential to crop diversification, the production factors, and farmers' appreciation of the market prices and knowhow. The model sensitivity to variables determining diversification is of the same magnitude as its sensitivity to market prices and farmer's knowhow to the activity, but less than its sensitivity to labor, capital and land endowment (Bosmaet *al.*, 2011).

5. Research Methodology

The study adopted a descriptive survey design to determine factors influencing diversification to banana farming in the study area. The design incorporated both quantitative and qualitative study methods for data collection. The study used a sample size of 384 respondents. Purposive sampling technique was employed. The study utilized both primary and secondary data. Primary data was collected using pre-tested questionnaires which were administered to farmers who were the study respondents. Data collected from the questionnaires was cleaned and verified for correctness and consistency, before being entered into the SPSS for further analysis. Descriptive statistics was done to provide a descriptive summary on the quantitative data collected from the study respondents and regression analysis was done to provide inferential deductions on factors influencing diversification as well as establish the extent of diversification. The appropriateness of the regression was tested by F-test in the ANOVA table, where a significant F indicated a linear relationship between Y and one of the X's. The T- test of a regression coefficient was significant due to the indication that variables influenced Y significantly while controlling other independent variables.

6. Findings and Interpretations

The study sought to establish the factors influencing diversification to banana farming in Kenya, a case of Imenti South Sub- County.

7. Report on Factors Influencing Diversification to Banana Farming in Imenti South Sub-County

7.1. Age and Level of Education

The study sought to determine the influence of age on diversification to banana farming. Regression analysis results revealed that age of the farmer was significantly associated with diversification to banana farming ($P < 0.05$). A farmer who was aged 41-50 years was 1.960 times more likely to diversify to banana farming compared to one who was

over 60 years old ($P=0.013$; $CI=1.545-2.440$) (Table 1). This means that young farmers embrace diversification easily than their elder counterparts. Therefore, age of the farmer is an important factor which predicts the potential of a farmer to diversify to banana farming. According to the study, farmers who are younger tend to have stronger motivation for wealth and income creation and have more energy to invest in high value crop farming. Findings agree with Ibrahim *et al.* (2009) who found that younger farmers embrace diversification more easily than those who were older. The study found younger people to value and embrace farming opportunities which generated higher income and revenues which lead to better living standards and greater wealth accumulation. Therefore, diversification to banana farming is highly perceived by young people as a venture which has the potential of transforming their lives and improving their economic status. The study also found out that level of education was significantly associated with diversification to banana farming ($P<0.05$). According to the study, farmers with secondary level of education were 4.230 more likely to diversify compared to those with primary level of education ($P=0.004$, $CI=2.957-6.798$) (Table 1). This means that farmers with higher education attainment have a higher probability of embracing banana farming than those with lesser education level. The study found higher education level to be correlated with ease to acquire better knowledge and skills on new farming practices and ability to articulate important issues key in successful farming as explained by one of the key informants:

Table 1: Influence of Age and Level of Education on Diversification
Source: Field work Data, 2015

7.2. Land Size

Respondents were asked to state the size of their land in acreage. Results of the study indicated that the highest proportion of respondents (40%) had land size of less than 1(one) acre while only 5% had more than 5(five) acres of land as shown in Figure 1:

Figure 1: Farmers' Land Sizes
Source: Field Work, 2015

Regression analysis revealed that land size was significantly associated with diversification to banana farming ($P<0.05$). A farmer who had 3-5 acres of land was 2.437 times more likely to diversify to banana farming compared to a farmer who had less than less than 1 acre of land ($P=0.014$, $CI= 1.965-3.312$). In addition, a farmer who had 1-2 acres of land was 1.280 times more likely to diversify to banana farming compared to one who had less than one acre of land ($p=0.016$, $CI= 0.994-2.791$) (Table 4.5). This indicates that bigger land sizes predict higher probability or potential for diversification to banana farming. Small size of lands owned by the study respondents is attributed to increased population in the study area that led to sub divisions of available land by family members. As a result, the resulting land sizes for individual family members reduced considerably, thus leading to many farmers ending up with land which was less than one acre.

7.3. Availability of Labor and Means of Transportation

Respondents were asked whether labor for banana farming was readily available. Findings revealed that 65% of the study respondents had access to adequate labor for banana production. In addition, when respondents were asked whether they had a reliable means of transporting their produce from the farms to the market, 63% of them said they had no access to reliable transport for their farm produce. These results were summarized and presented in Figure 2:

Figure 2: Availability of Adequate Labor for Banana Production
Source: Field Work Data, 2015

The study revealed that availability of labor was significantly associated with diversification to banana farming ($P=0.014$). A farmer who had access to adequate labor was 2.847 times more likely to diversify to banana farming compared to a farmer who had no access to adequate labor ($P=0.014$, $CI= 2.847-2.006$) (Table 4.6). This means that farmers who had sufficient access to labor had higher chances of diversifying to banana farming compared to those who did not have access to sufficient labor. Availability of sufficient labor for banana productions provides an opportunity for higher productivity through proper and appropriate farming practices which do not compromise the quality of farming.

8. Conclusion

The study concludes that, firstly, diversification to banana farming is high in the study area due to higher productivity, good market returns and favorable ecological conditions associated with the crop. However, a substantial proportion of small-scale farmers have not diversified to banana farming due to the challenge of small land sizes and lack of adequate resources for diversification. Secondly, higher education attainment and access to bigger land sizes were key drivers influencing diversification to banana farming. It is therefore upon the stakeholders to provide opportunities for higher education attainment, availability of labour and means of transport, and creation of good market.

9. Research Study Recommendations

The government should provide appropriate banana market regulation to reduce price fluctuation, enhance market reliability and ensure farmers obtain good value for their products. This requires provision of adequate facilities and infrastructure such as the provision of adequate water supply to offset adverse effects of drought, and for banana value-chain addition such as processing facilities and marketing of the banana products as well as elimination of unnecessary intermediaries in the production process

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