

Indicators of Value Added Agri-Businesses on Small Farms in Kenya: An Empirical Study of Kiambu and Murang'a Counties

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Abstract

Kenya is ranked among the top ten largest economies in Africa and bearing the tag of middle income. This tag should motivate the country to have food security but this does not seem to be the case as many small farmers, who are the backbone of the economy, are not adding value to their agricultural produce. Adding value is an entrepreneurial process that creates wealth for both the farmers and the country. This study investigated the factors that influence value addition on small farms in Kenya. The study employed a cross-sectional survey design and a multi-stage sampling technique where 15 locations from Kiambu and Murang'a counties were identified. 388 farms were selected by line transect technique for this study. Descriptive statistics was used to estimate the extent of value addition in agri-businesses on small farms. Linear Probability Model (LPM), Logit, and Probit models were used to estimate the determinants of value addition on the small farms. The study reveals that Kenya's agrarian economy is suffering from limited value addition as the statistics show that 6% of small farmers add value to their agricultural produce. It was discovered that farm sizes are negatively correlated with value addition. The distance to the market and accessibility to loan facilities were found to be the major determinants of value addition in Kenya. The study recommended that the government should create rural markets for the farmers and facilitate financial institutions to lend money to small farmers at reasonable interest rates. Small and Micro Enterprises should be encouraged to play an active role of value addition in the agri-businesses of the Kenyan middle-income economy.

Key words: Agri-business, Value Addition, Entrepreneurship, Linear Probability Model, Logit and Probit Models

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Introduction

Agriculture in Africa is supporting 70% of the rural people however; the problem facing small farmers is limited value addition in their economic activities (Makaya, 2007; Butler & Mazur, 2007). Michuki (2008) observed that the Kenyan economy is not purely agricultural, close look shows that rural households are doing more than farming. The Kenyan government has put up institutions like Kenya Tea Development Authority (KTDA), Arid Lands Resource Management Project (ALRMP), Kenya Agricultural Research Institute (KARI), Kenya Agricultural Productivity Programme (KAPP), Eastern Province Horticulture and Traditional Food Crops Project (EPHTFCP) to help farmers in value addition in the agricultural sector. Braganza (2014) explained that Kenya rebased her economy from a third world country to a second world country sixteen years ahead of the scheduled Vision 2030. This means that after recalculating the Gross Domestic Product (GDP), which is the total value of goods and services produced in a year, it was realized that Kenya's GDP had expanded by more than a quarter.

This recalculation ranked the country among the top ten largest economies in Africa. According to The World Bank (2014) latest economic analysis for Kenya forecasts a growth rate of 4.7% in 2014, and says the economy has the potential to achieve a higher growth rate of 5% in the next two years. Even though Kenya has become a middle-income economy, it is estimated that four in ten Kenyans are living below the poverty line. The majority of the poor are living in rural areas where they are involved in agriculture (Ntale and Litondo, 2013). Farmers get limited income due to inflation, taxation, and the middlemen who add value by processing, distributing and marketing their products (Barringer & Ireland, 2008; Ochango, 2007; Butler and Mazur, 2007). Society for International Development (SID) (2004) report explained that inequality and poverty in Kenya are not just a result of the lack of economic growth. This is because the economic growth is not sufficient enough for uplifting the poor. Increased equality can create faster growth but without an equitable distribution of benefits from growth, its effects on wealth creation will be marginal. In addition, inequality is also a matter of human rights, as inequalities can give rise to exclusion and the failure of people's voice being heard. This can trigger crime, disease, ignorance and ultimately poverty.

Middle income economy status for Kenya should translate to better livelihoods, that is, increased school enrolment, better housing, healthcare, access to clean water and food security. But this seems not to be the case as many Kenyans in the rural areas are still poor (Braganza, 2014). Masinde (2014) that argues middle income status would not take away the country's poor infrastructure, insecurity and high cost of production challenges. He further says that statistical figures alone are not important if they don't transform rural livelihoods. It is important for the country to attract investments in value addition in agriculture which is the backbone of the economy. Value-added agriculture entails changing a raw agricultural product into something new through storage, packaging, processing, cooling, drying, extracting or any other type of process that differentiates the agricultural product from the original primary agricultural products (Dose, 2007; Alila and Atieno, 2006). Examples of value added agricultural products include mango and pineapple juice, cassava and potato crisps, honey, peanut butter, soaps and sausages. Adding value to agricultural products is a worthwhile effort because of the higher returns that come with the investment, the opportunity to open new markets and extend the farmer's marketing season as well as the ability to create new recognition for the farm (Alila and Atieno, 2006). Ndemo (2005) stated that value-added products are hitting the local market as entrepreneurial farmers take advantage of high-demand product niches. The key to success in value added agriculture-niche markets are where small farmers can be most successful in creating value and establishing profitable businesses (FAO, 2002). Butler and Mazur (2007) observed that Uganda's agrarian economy is suffering from limited value addition.

Amanor-Boadu (2003) explains that a farmer qualifies as an entrepreneur if he/she performs an activity that traditionally has been performed at another stage further down the supply chain. In the first instance, farmers might bypass wholesalers through direct marketing by selling directly to consumers. He goes on to say that farmers might be able to get high prices for their agricultural produce by adapting new varieties that yield a more uniform agricultural produce, which reduces the need for sorting at the processing level. Since the processor does not incur this cost of sorting, the savings could be passed on to the farmer in the form of higher agricultural produce prices. Another example would be the transformation of a primary agricultural produce into a processed finished product desired by consumers.

Value addition in agriculture can also be described as any activity a farmer does outside of traditional agricultural production to receive a higher return per unit of any product sold. This includes activities such as agri-tourism, storage, processing and marketing. Litondo and Ntale (2013) suggested that farmers should establish micro and small enterprises (MSEs) in the rural areas as an addition source of income.

Rantamaki-Lahtinen (2008) stipulated that the general concept of value addition in agri-business has several implications. First, it implies that a value added initiative leads to an increase in the net return per unit of the product sold. A case in point is where farmer provides farm tours (agri-tourism) as a means of increasing net farm income. Even if the price of the produce remains the same, as long as the overall net income of the farm increases, the initiative is considered to be value addition. Secondly, a process is only considered to be value added if the client is willing to pay for it. Hence, at the end of the day, the costs incurred for carrying out the activity should be less than the benefits received. Thirdly, while such processes are aimed at increasing net farm returns, they do not necessarily imply a reduction in the levels of risk faced by the farmers. In fact, they more often than not increase the level of risk exposure. This is because farmers are forced to undertake activities they are not familiar with. This implies that the farmer needs to acquire additional skills to adopt risk management tools to minimize the level of risk as much as possible. Ntale (2013) argues that a hungry nation is a burden to economic growth and development. He continues to say that the cost of doing business in Kenya must be reduced to make the country competitive in the world market. He further states that more infrastructural investments are needed in roads, electricity and water supply to facilitated efficient production.

Methodology

Data was collected from a cross-sectional survey of 388 small farms from Murang'a and Kiambu counties of Kenya. A multistage sampling technique was used to identify the locations where sample was drawn from. Line transect sampling technique was used to identify the farms of the respondents. LPM, logit and probit models were used to estimate the determinants of value addition in agri-business in Kenya. While qualitative and quantitative descriptions were used to estimate the extent of value addition among small farmers. The probability estimates of small farmers adding value due to farm & farmer characteristics and motivating factors were estimated by the following logistic model.

$$P_i = \frac{1}{1 + e^{-Z^*}} \quad (1)$$

Where P_i is the probability of farmer i adding value to his or her primary agricultural produce. Z_i is the logit index which estimates the benefits a farmer perceives in value addition. e is a natural number. The parameters of logit model are estimated by maximum likelihood estimates (MLE). This study investigated farm characteristics which included farm size, electricity supply, running water and distance to market as determinants of value addition. The farmer characteristics and motivating factors were used as control variables. The estimating model suggests that value addition is a function of farm & characteristics and motivating factors: $VA = f(\text{Farm, Farmer, Motivating})$

$$Z^*_{VA} = \beta_0 + \beta_1 \text{Farm} + \beta_2 \text{Farmer} + \beta_3 \text{Motivation} + \varepsilon \quad (2)$$

Where VA is value addition in agriculture, Z^*_{VA} is a logit index denoting benefits a farmer perceives is value addition. Farm is a set of farm elements namely farm size, water supply, distance to the tarmac road and distance to the market. Farmer is a set of farmer characteristics like number of years of schooling, age and gender of the farmer. Motivation is a set of motivating factors like food security, desire for financial security and access to loan facilities. While ε is the error term.

Data Analysis

Qualitative Description

Kiambu and Murang'a counties are a prototype of the smallholder agriculture in Kenya (Kinyanjui, 2007). The agricultural sector in the study area comprises of food and cash crop farming, forestry, livestock, wild life and fisheries. The counties have a number of large manufacturing industries including factories like textile for cotton, food processing for pineapples, macadamia nuts and wheat. There are also factories for tannery, and cigarette manufacturing which rely on the smallholder agriculture for the supply of primary products. Other factories belong to tea and coffee growers' co-operative societies, and are found in different parts of the counties.

Quantitative Description

Descriptive statistics was used to estimate the extent of value addition among the small farmers in Kiambu and Murang'a Counties. The study indicates that 6% of the farmers were adding value by storing their products in granaries, 2% of them were processing and another 2% were packaging their products. Granaries are taken to be a value addition venture because they protect agricultural produce from deterioration and post harvest losses. Farmers can also preserve their produce in granaries when the prices are low and sell at their convenience when the prices are high. Only 29% of the respondents had electricity on their farms. This implies that Kenya needs to intensify the rural electrification to maintain her attained economic status of a middle income. The average income of the farmers is Ksh.10,000 ranging from Ksh.500 to Ksh.100,000 per month. This concurs with SID (2004) report which stated that inequalities in Kenya were manifested in different forms. Differences in share of income and social services were observed across regions, genders and even specific segments of the population. The report further showed that the country's top 10% households control 42% of total income while the bottom 10% control less than 1%. The study found out that 53% of small farmers were members of Savings and Credit Cooperatives (SACCOs). This is an indication that farmers possess social capital which can be earned by the policy makers to improve the rural livelihoods.

Predictive Model Analysis

The predictive models namely; LPM, logit and probit were used to estimate the effect of farm & farmer characteristics and motivation on value addition. According to the marginal effects of the models in the table below, distance to market is the major determinant of value addition among farmers. The OLS results (LPM model parameter estimates) show that a one kilometre increase in the distance to the market increases value addition by 1.49% ($t = 5.73$), while in the logit model a one kilometre increase in the distance to the market increases the probability of a farmer adding value to farm produce by 0.69% ($t = 4.18$) and in the probit model by 0.8% ($z = 4.81$). This implies that the further the farmers are from the market, the more likely they are to have granaries for their agricultural produce. Most farmers in value addition have granaries as the main form of value addition. The low return on agricultural produce is likely to be due to limited value addition in agriculture where Kenya exports primary agricultural produce to developed countries.

The developed countries add value to Kenyan primary products and resell to the world market at exorbitant prices, while the small farmers who toil daily remain poor. A case in point is Kenyan coffee which is highly valued in the world market but the small coffee farmers are poorly paid for their produce.

The results for LPM indicate that having electricity increases the probability of value addition by 7.4% ($t = 2.79$). Similarly, the marginal effect for the logit is 4.79% ($z = 1.84$) while the marginal effect for the probit is 54.3% ($z = 2.3$). The results therefore, concur with Ntale (2013) observation that the cost of power is way above the reach of the rural folk and therefore, value addition in agriculture will remain a mirage if the issue is not addressed. The size of farm has no significant effect on value addition in all the three models. These results are as expected in the normal circumstances. For example, processing of horticultural products does not require one to have a big farm. The coefficient of determination, R^2 is 0.0949 which means that 9.5% of the variations in the probability of value addition is explained by instrumental variables, that is, electricity, running water, size of the farm and distance to the market. The p -value for F -statistic and χ^2 -statistics is zero and therefore the null hypothesis that farm characteristics jointly have no effect on value addition among farmers is rejected.

There is much talk about the middle-income economy and what it means to the Kenyan rural livelihoods. This research therefore, attempted an investigation into the value addition determinants that lead to better rural livelihoods. Vision 2030 advocates for value addition in agriculture as one of the initiatives to improve the rural livelihoods. Scholars consider value addition in agriculture as one of the most promising, challenging and rewarding undertaking farmers can have. Ideally, entrepreneurial farmers should make great contribution to the economy and themselves if they add value to their primary produce. Even though Kenyans may not see an improvement in their incomes due to the rebase of the economy, value addition should contribute significantly to their livelihoods. One would be tempted to ask, what is the importance of statistics that ranked Kenya as a middle-income economy? The answer to this question would be that the new statistics raises Kenya's profile as a credit worthy economy. This also gives the country a greater positive outlook in terms of economic size and the country's per capita income. The economic status of middle-income brings about a feel-good effect among the Kenyan elites. Ultimately, it gives the country a positive image to potential investors.

In reverse, the much sought after middle-income tag would translate to an improved capacity indicator for Kenya. Essentially, value addition in an agrarian economy should be a pre-requisite for ranking a country as a middle-level income as this is an indicator of wealth creation which should be fantasized. The easiest way to create wealth in agriculture is by creating value for the consumers instead of being pre-occupied with middle income myth. This will give farmers the right mindset to improve their livelihoods. It is understandable that the small farmers have limited income from their agricultural production due to small farm sizes. They cannot enjoy economies of scale like the large-scale farmers. The Kenyan government has an ambitious plan of putting one million acres of land under irrigation.

After controlling for the other covariates, only one instrumental variable, namely, distance to the market has a statistically significant coefficient. However, a one year increase in the average age of a farmer decreases the chance of value addition by 0.02% ($t = 2.03$) in the LPM and 0.07% ($z = 1.77$) in the probit model and 0.01% ($z = 2.12$) in the logit model. These results indicate that young adults tend to be more innovative than old people. This aspect of the youth needs to be analyzed further as a press report recently indicated that about 50,000 young graduates are leaving Kenyan universities each year and there are about 2.3 million unemployed youth in Kenya. It is estimated that by the year 2030 Kenya will have a population of 60 million people. This implies that the economy must grow enormously to manage the need of the swelling young population.

Table: Determinants of Value Addition (Absolute *t* Statistics in Parentheses)

Variables	Model parameter estimates (marginal effects)					
	LPM		Logit		Probit	
<i>Farm Characteristics</i>						
Electricity (1 = available)	.0741 (2.79)	.0369 (1.33)	.0479 (1.84)	.0003 (0.04)	.0509 (2.30)	.0013 (0.19)
Running water (1 = available)	.0444 (1.79)	.0169 (0.64)	.0318 (1.74)	.0023 (0.29)	.0414 (2.00)	.0040 (0.48)
Farm size (in acres)	-.0014 (0.08)	.0056 (0.28)	-.0060 (0.44)	-.0036 (0.62)	-.0107 (0.69)	-.0044 (0.70)
Distance to the market (in km)	.0149 (5.73)	.0162 (5.81)	.0069 (4.18)	.0022 (1.73)	.0082 (4.81)	.0026 (3.95)
<i>Farmer characteristics</i>						
Years of schooling		-.0050 (1.49)		-.0013 (1.21)		-.0016 (1.66)
Gender (1 = male)		.0239 (0.99)		.0050 (0.73)		.0071 (1.03)
Age		-.0020 (2.03)		-.0005 (1.09)		-.0007 (1.77)
<i>Motivating factors (dummies)</i>						
Desire for financial security		.0254 (0.45)				
Desire for food security		-.0900 (1.60)		-.0317 (0.70)		-.0320 (1.10)
Cost of farming		.0242 (0.90)		.0071 (0.84)		.0062 (0.75)
Unfavourable government Regulations		.0088 (0.32)		-.0020 (0.26)		-.0028 (0.34)
Access to loan		.1049 (3.84)		.0457 (1.82)		.0499 (3.06)
Insurance availability		.0666 (2.33)		.0104 (0.99)		.0128 (1.41)
Existence of business opportunity		.0402 (1.34)		.0194 (1.58)		.0171 (1.55)
Desire for independence		.0549 (1.64)		.0087 (1.11)		.0100 (1.28)
Desire for achievement		-.0787 (1.90)		-.0527 (0.78)		-.0728 (1.66)
Desire for social status		.0404 (1.35)		.0079 (0.81)		.0069 (0.67)
Weather conditions		.0411 (1.00)		.0037 (0.35)		.0056 (0.53)
Constant	-.0579 (1.39)	-.0101 (0.12)				
<i>R</i> ²	0.0949	0.1815				
Pseudo <i>R</i> ²			0.1904	0.4207	0.1951	0.4268
<i>F</i> -Statistics (<i>p</i> -value)	11.15 (0.0000)	5.77 (0.0000)				
χ^2 -Statistics (<i>p</i> -value)			34.29 (0.0000)	74.36 (0.0000)	35.14 (0.0000)	75.44 (0.0000)
Observations	388	388	388	363	388	363

Source: Ntale 2013.

The results of all the models show that having access to a loan increases the probability of a farmer adding value by 10.49% ($t = 3.84$) in the OLS, and 4.57% ($z = 4.26$) in the logit model, while in the probit model the chance increases by 4.99% ($z = 3.06$). Taking a loan is a risky venture and according to Cantillon (1931), and Casson (1982) risk taking is an indicator of entrepreneurship. The study shows that years of schooling have limited impact on value addition. It should be noted that the value farmers are adding to their produce is only limited to storage in granaries. This finding makes sense because building granaries does not require high education level. R^2 in the LPM is 0.1815 meaning that 18.15% of the variation in the probability of value addition among farmers is explained by all the variables in the model. In the logit model, the pseudo R^2 is 0.4207 this means that 42.07% of the variations are explained by the explanatory variables jointly, while probit model has a pseudo R^2 of 0.4268 meaning that 42.68% of the variations are explained by all the independent variables together. The p -values of the F -statistic and χ^2 statistics for all the models is zero, therefore, the null hypothesis that all the variables in the model, namely, farm characteristics, farmer characteristics, and motivation factors jointly have no effect on value addition is rejected.

Conclusion and Recommendation

The study found out that most small farmers in Murang'a and Kiambu Counties have less than one acre of land. This is not good for commercial farming. It can be concluded that limited value addition on small farms is one of the reasons for low income of farmers. This is understandable because value addition is too expensive for small farmers as it is too costly to purchase machinery and technology. The country being labeled a middle-income economy does not translate into better rural livelihoods for the millions of Kenyans living below the poverty line. The agricultural sector suffers from limited value addition, electricity and water supplies. It is therefore, desirable for the Kenyan government to improve the agricultural sector for sustainable economic development Kenya continues to suffer from social inequalities which trigger crime, disease, poverty and ignorance. Value addition in primary agricultural product in the form of proper storage, processing or marketing is an indicator of economic development. The farmers continue to get limited income from their produce due to inflation and taxation. The middle-men, who process, distribute and market the agricultural produce, earn much more than small farmers.

The situation is discouraging but clearly indicates the potential opportunities available for the entrepreneurial farmer who can bypass the middle-men to sell to the final consumer.

This study recommends farmers to capture value by entering the processing arena by turning farm products into food products. This will definitely involve risk taking and farmers will be required to get new skills in farm management. Farmers are hereby advised to create alliances in SACCOs or cooperatives that can combine resources to achieve economies of scale in production and value addition. Farmers are expected to play an active role in direct marketing as a way of capturing value and can be done in a variety of ways like on-farm stores, farmers' markets, and Internet sales that have proven to be beneficial in capturing value in many of the middle-income economies. Many entrepreneurial farmers are achieving big profit margins by direct sales to the food service industry, restaurants, schools and hospitals. Creating value is an entrepreneurial strategy that should be encouraged in developing products that are differentiated in one way or another. The product differentiation may be real or perceived. The key to success is that the consumer feels that there is value addition to the product and is ready to pay for it.

The finished products produced using special methods such as organic or environmentally friendly practices also create value. The current consumer trend preferences for locally produced foods resonate well with value creation concept and practice. In this case the production practice is not different but methods of marketing the products become key in creating the perception of value to consumers. Solid and long-term plans for food production should be put in place by the policy makers to improve rural livelihoods and the economy in general. The starting point should be value addition in agriculture as it is the backbone of Kenya's middle-income economy. The government should come up with policy to limit the partitioning of agricultural land to allow farmers to produce more food and get more income from their farms. The government should invest more in institutions like KARI, KAPP, KTDA, ALRMP and EPHTFCP to spearhead the value addition process in the agricultural sector if the country is to sustain the middle-level income status. Financial institution should be established in the country to facilitated accessibility to credit services to small farmers.

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