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## Investigating Farmer's Participation in Value-Added Activities in Rural Kenya: Case of Kapkamak-Kabonon Irrigation Project in Aror Ward, Elgeyo Marakwet County

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### Abstract

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For a long time, agriculture has received little attention exemplified by only 4% of development assistance. Yet an important agriculture method such as value-added agriculture has drawn the attention of different stakeholders (including the government, farmers, NGOs, commercial entities) interested in maximizing the potential of farming operations and strengthening rural communities. This study sought to investigate value-added agriculture, including the extent to which food growers consider, or are involved in Kapkamak-Kabonon Irrigation Project in Aror Ward. The study was conducted in September 2017 using data and response from 41 questionnaires returned from the field survey. The findings show that even though farmers at scheme grow products that add value to food production, there is no attempt of processing them. Some of the barriers experienced at the scheme manifest itself in the form of added expenses, lack of time, knowledge, and markets, on value-added products. The study recommends that there is need for both national and county governments to support the farmers through training, financial support in order to improve the current farming situation. This study only utilized data from a limited number of project's database and future studies can be broaden the scope to gather from the farmers themselves or even other rural irrigation projects along Kerio Valley.

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**Keywords:** Value-addition, Rural, Crop, Agriculture

### 1 Background of the Study

For a long time, agriculture has received little attention exemplified by only 4% of development assistance and 4% public expenditure allocation in sub-Saharan Africa (World Development report (WDR),2008). Yet agricultural continue to be estimated at 86% of rural people livelihood and creates jobs to over 1.3 billion small holders and landless people (Ibid).According to the 2008 WDR report, an estimated 2.5 billion of 3 billion people living in rural areas participate in agriculture activities. Numerous studies provide evidence on the impact of Agriculture on hunger and poverty alleviation. A report in India growth of Agriculture had greater on rural than in urban (FAO, 2005) and although agriculture reduces poverty in countries around the world especially developing economies, high transaction costs staple food e.g. roots and timbers as well as local cereals have negatively affected food industry.

Arguably the decline in performance of the sector is one of the greatest concerns to the government of Kenya. Agricultural product which remains the backbone of the economy has witnessed a slow growth and consequently this has resulted in low employment income, and food insecurity for the growing rural population. Elsewhere most rural farmers perceive their land as inadequate for their children. This was evident in a data Population Reference Bureau 2011 which found that nearly 70% of the rural farmers believed that their land was not sufficient for their children compared to only 33%.

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Furthermore a large segment of rural farmers in Kenya experience poor marketing facilities arising from high transport costs due to bad road networks poor storage and high wastages. Efforts aimed at promoting agricultural production and marketing systems has been recognized in the policy agenda. For example Strategy for Revitalizing Agriculture (SRA) 2004-2015 emphasized on improving research increasing access to quality farm inputs and financial services and increasingly focusing on strategies that improves market opportunities. It is also important to mention that adding value to agriculture is an entrepreneurial process that creates wealth for both the farmers and the country (Ntale, Litondo, & Mphande, 2013). This study investigated farmer's participation in value-added activities in rural Kenya with particular focus on Kapkamak-Kabonon Irrigation Project in Aror Ward. Indeed adding value to agricultural products is very important because of its high returns that come with the investment, opens new markets farmers and extends their marketing season and creates new recognition for the farm produce (Alila & Atieno, 2006).

### 1.1 Kabonon –Kapkamak irrigation

The development of Aror ward, in Elgayo Marakwet County irrigation became inevitable due to dry-land conditions occasion by sporadic drought that characterize Kerio Valley. Most of the agricultural production in Aror is producers who often rely on seasonal rain which is unpredictable and sporadic. The area has experienced serious dry spell due to insufficient rainfall and uncontrolled floods that has resulted to failure of crop production affecting the larger population. As part of its efforts of reducing, poverty and promoting economic developments of Aror people who had suffered for long time, the government of Kenya with support from World Bank established Kabonon–Kapkamak irrigation scheme. The irrigation project covers areas of 2000 but is still underutilized.

Although this irrigation strategy is very paramount for the region which had experienced severe rainfall shortage the projects most certainly hasn't achieved its target as some farmers still practice traditional agricultural methods. Magistro, Robert, Haggblade, Kramer, Polak, Weight and Yode (2007) asserts that there is need to adopt approaches such as Poverty Reduction through Irrigation and Smallholder Markets (PRISM) a methodology for combining small-plot irrigation technology with complementary inputs and services to enhance small farmers' ability to participate effectively in markets for high-value agricultural commodities.

Kabonon- Kapkamak irrigation projects depends on Aror River which drains to Kerio River. The river stretches from Kipkumar forest passing through several farmers who depend on the water. The water levels continue to drop affecting the project which depends on gravity. The scheme has an estimated total population of 2000 farmers settled in 5 sub locations where each farmer has undefined land size. This has been one of the challenges in estimating farm production as farmers depend only on the quantity of their crop production on in terms of acreage. The land is community held and farming is collectively organized. The farms are cleared and fencing is traditionally done which exposes the crops to domestic livestock grazing in uncultivated land.

Studies have shown that food products from land irrigation are a major source of wealth creation (Williamson, 2017). Farmers are able to generate income enabling them to meet their basic needs. Surprisingly poor crop production lack of fencing lack of capacity building of farmers, insecurity arising from cattle rusting etc have hindered some farmers keep livestock which constraint them from giving attention to farms. Historically the people in Aror Ward were pastoralist who kept livestock and practiced crop farming. Considering sporadic drought, the people grew drought resident crops-finger, sorghum, Cassava and maize. Most of these crops had been introduced by colonial agricultural services.

One remarkable result of the scheme and the consequent of improved infrastructure is the introduction of commercial crops, watermelon, soya beans tomatoes green gram, maize. As suggested by studies Kabonon–Kapkamak project has been able to increase farm revenues and a case in point is 2014-2015 where farmers with support from Kenya Seed Company generated a total of Kshs 15 million with the one farmer making Kshs 1.5 million. According to a study in Ethiopia by Genregziablier et al (2009) farm income are positively correlated to irrigation and off-farm income was negatively related to access to irrigation. Another study in Mali by Dillon (2011) confirms the positive role played by irrigation schemes on household consumption and assets accumulation. Moreover in Pakistan, more studies found high poverty levels among to household depending on rain-fed farms. As Chazovachii (2012) observes Kabonon-Kapkamak Irrigation scheme is considered as a means of increasing production, reducing overdependence on rainfall and creates employment to poor.

## 1.2 Research Questions

1. To what extent are farmers involved in value adding activities, for instance, by using a commercial kitchen to add value to their produce?
2. What are the main reasons, if any, for farmers not adding value to their products?
3. Are farmers interested in selling produce that does not sell as best for processing?

Farmers in Kabonon–Kapkamak irrigation scheme have greater market in Eldoret, Iten, Kabarnet towns. The main reason why these farmers haven't explored these markets is lack of knowledge on providing unique brands. In addition, third parties have exploited farmers with little or lack of knowledge on emerging market. As Mathewson (2007) in his article "exploring value added agriculture", remarks value addition to agricultural products is very valuable endeavor because it has high returns, opens new markets and the farmer is able to create recognition for the farm. Even though value added agriculture comes with advantages, there is need to recognize challenges that has confronted farmers in Aror. One of the greatest besides lack of knowledge is food business and safety regulations. Similarly the lack of storage facilities for the farmers is another concern and as a result, farmers in the area end up selling their grain soon after harvest, only to buy it back at an expensive price at some point after harvest, falling in a poverty trap.

## 2 Literature Review

Value Added is defined and enhancement individual or companies gives their products and service to look unique from those of competitors. According to Merriam Webster dictionary value added describes products and services whose value has increasingly been altered through manufacturing, marketing or processing. US Department of Agriculture defines value added products as a change in physical state or form of products and enhancing the value of products and consequently any physical and consequently any physical change or production of agricultural commodity expands revenue. Based on these definitions, it is true agricultural products have to explore ways of adding value to their crops and livestock by creating market for their products. By joining cooperative for example farmers are able to purchase farm inputs while at the same time providing better prices.

Previous studies have shown that value-added products can take many forms; in essence, these can be raw products that farmers grow, modify, enhance or change; in this process, the raw product can change significantly and fetch a higher value (Ohmart, 2003). In most instances, value-added products originate from vegetables or fruits and can be transformed into processed foods; examples of these foods include sauces, vinegars, pickles, jams, spreads and preserves (Horwitz, Hashley, & Norder, 2008; Ohmart, 2003). However as argued by Ohmart (2003), other forms of value-added products, many of which are not edible, do exist and these include wreaths, sachets, soaps or dried flower arrangements or, as in the case of bees, wax, pollen, or even venom are some of many variations (Krell, 1996).

Hanley and Dillon (2012) studied effects of farming attitudes on farm credit use in Ireland. They used a sample of 607 farmers in a 12 week study and followed quota-controlled sampling procedure in a population aged 15 years and above. They found that farmers aged below 20 were 1.83 times more likely to accumulate farming debts compared to those aged 45 years old. Moreover their study found that farm size and farm system especially larger size were likely to save farm debts and granted loans by lenders more easily. They concluded that farmers are motivated primarily by lifestyle or social goals associated with family.

Alonso (2011) examined the extent to which farmers in USA who sell their produce directly to the public can maximize their produce. He posed the question: Do farmers consider developing value added products when they have fruit or vegetable leftovers? His focus was on involvement of grower's on value-added food production. Alonso used two data collection methods: telephone and face to face interviews among 30 farm owners. The study sampled 64 farmers who sold their produce directly through on-site at the farm gate sales but only 30 accepted to participate making about 51% response rate. Alonso found that only 10 farmers out of 30 interviewed were developing value-added products and recognized importance of product in maximizing the potential. Indeed lack of information prevents farmers from developing value added produce and maximizes marketing opportunities He argued that there is little information on farmer's development of value-added products and he recommended that further studies can be conducted on value-added products among farmers using large sample and adoption longitudinal approach. It is on this background that the present study used a sample of 41 farmers who have been actively engaged at Kabonon-Kapkamak irrigation scheme for the last three years.

Jones, Ecalante and Rusiana (2015) sought to clarify that farmers reluctance to take loan was as result of information gap that existed between them and lenders. First the researchers conducted two focus group discussions among organic farmers before concluding with face-to-face discussions with available organic farmers who attended farmer's workshops in Georgia in late 2013. Their study was biased towards only farmers with farm size of 84.8 acres and aged 51 years. They found a significant population of farmers either avoided loan or could not take a loan from financial institutions despite they had been applying them. They concluded that organic farmer's attitudes towards credit facilities are shaped by lack of information that exists between borrowers-lender relationships. Although it concentrated on credit facilities, this study is important to our study in that it helps understand importance of information to developing of value – added farmer practices.

Lewis, Tzilivakis, Green, Warner and Coles (2008) examined whether farm stands assurance schemes improve farming standard. According to them, food products in UK are influenced by several assurance initiatives in which over 78,000 UK farmers are members of assured Food Standards (AFS). Their study was purely desk research focusing on published material and historical documentation. They concluded that what is considered good practice in food production varies from one country to the other. Advocates of organic farming argue that of improves soil structure, has less aquatic population and safeguard biodiversity (IFEAM 2007).

Aditto, Gan and Nortea (2014) investigated farmers risk aversion in Central and Northern-Eastern Thailand. The authors used Speeded Up Robust Features (SURF) method, which ranks farming options using Cross-Entropy (CE) method over a range of values of risks aversion. Similarly they measured small holder farmer's attitudes towards using Equal Likely Certainty (ELCE) techniques. Aditto, Gan and Norte found that 70% of farmers rain-fed regions were experiencing challenges in growing monoculture crops and multiple lowland rice-cropping pattern were practiced by farmers in areas under irrigations. Their study is important to the current study because the area under study is a lowland irrigated farming area. The data used by the Aditto, Gan and Nortea came from 207 Central Region Famers and 228 North-Eastern farmers and in conclusion they noted that integrated crop-livestock farming enhances income stability of rural farmers.

Raising small herds of cattle increases diversity of farm income and protects income variations. Mishra, Wilson and Williams (2009) investigated factors affecting performance of new and beginning farmers in USA. They used Return On Assets(ROA) to measure performance from Agriculture Resources Management(ARMS). Their findings show that value-added farming completed with good business plans leads to higher performance among new and begging farmers. Farmer's financial performance is affected by farmer's educational attainment, size of farm and controlled cost production.

Wolf, Lupi and Harsh (2011) used experiment to examine farmers demand for attributed of financial record keeping systems. The authors used a sample of 2742 from university, agribusiness and commercial farms in Michigan, USA in 2009. Data collection was conducted through mailed survey and they found that field crops such as corn, soybeans, wheat were mainly grown by the university agribusiness enterprises and commercial farms. Regarding financial record keeping they found that farmers used paper system (20%) general cash/accrual system e.g. quick books (20%) and spread sheet (27%).The factthat wolf and college contracted in a university does not mean it cannot be replicated in rural areas. The focus of both my study and there is valuing the attributes.

Zhan, Wu, Zhang and Zhoua (2012) investigated why farmers in China were quitting grain production drawing implications for devising policies owing to such exits. Using descriptive statistics and econometric technique, they found quitting of grain product is correlated with family size, small farming labour, small farm size and small family income. In additional the cost of agricultural production contributes to farmers existing grain production. Joshi and Mathur (2015) analyzed nutrition composition and the acceptability of value – added products prepared from the dehydrated leaf mixture of underutilized green leafy vegetables (GLVs). Their study was based on collection in Indians farms. The added products were prepared by various cooking methods they found that leaving of dehydrated vegetables can be used throughout for the preparation of value – added products.

### **3 Materials and Method**

#### **3.1 Research and Study Sample**

In this study, we employed a cross-sectional research design with a population which is estimated to be more than 500 farmers and used a sample size of 50 farmers in Kabonon-Kapkamak farm consistent with Krejcie Morgan 1970 sample size selection guidelines.

We purposively selected the farmers; the procedure involving generation of identification numbers to all farmers. The target groups were all farmers both male and female farmers. The list of the farmers was obtained through several field visits to identify and notify them of their intention to participate in the study. We enlisted 50 respondents from the farmers covering the entire farm. Overall, the complete and used response came from 41 respondents (or about 82 percent). Most of the respondents were male (54 percent) and this does not affect the study because it is not gender sensitive. Moreover, the level of education of the respondents is such that majority (29 percent) have tertiary college, followed by 27 percent with university degree. This implies that the respondents are reasonably educated to understand the questions and also their farming information.

Regarding the age bracket of the respondents, most of them (37 percent) were aged 29-39 years implying that most of the farmers are youthful and were available to take part in the study. Concerning land ownership, most of them (78 percent) are owned by the family compared to 22 percent) who rented. This implies most of them have undertaken farming activities since the commissioning of the poor irrigation and hence in position to provide a uniformed farming activities since the commissioning of the poor irrigation and hence in position to provide a uniformed respondents to the study questions. In fact the average years farmers have been at the Kabonon-Kapkamak irrigation scheme is 4years and giving the study conference of the study respondents in providing information reserved by the study. Regarding the number of employees employed by farmers, most of them (66 percent) did not have fulltime employees while (15 percent) had between 1 and 100 full time employees. This implies that the study was dealing with farm owners and hence they are better placed to provide informed information regarding value additions.

### 3.2 Questionnaires

Questionnaires were used to obtain data from selected farmers. The questionnaires had two sections A and B and respondents were required to indicate their level of interested with a series of question. The validity of the questionnaires was established by use of content validity index which was able to determine relevance of questions in measuring the variables. Elsewhere, the reliability of the questionnaires was tested using Cronbach's alpha coefficient (Nunnally, 1978). According to Nunnally (1978) Cronbach's alpha coefficient above 0.6 are accepted. Overall, Cronboch's alpha coefficient for this study was 0.76 and hence we are able to conclude that the study items elicit internal consistency on multiple administrations.

**Figure 1 Demographic characteristics of farmers**

	Item/factor	Frequency	Percent
Gender	Male	22	54%
	Female	19	46%
	Total	41	100%
Highest Level of education	University	11	27%
	Tertiary College	12	29%
	High School	5	12%
	Primary School	10	24%
	None	3	7%
	Total	41	100%
Age bracket	18-28 Yrs	13	32%
	29-39 Yrs	15	37%
	40-50 Yrs	8	20%
	51 Yrs & Above	5	12%
	Total	41	100%
Land Onwership	Family-owned Land	32	78%
	Rented	9	22%
	Total	41	100%
Number of employees	No Full Time Employee	27	66%
	Between 1 and 100 Full Tume Employees	6	15%
	No Answer	8	20%
	Total	41	100%

**4 Results and Discussion**

**4.1 Extend to which farmers got involved in value addition**

Although the farmers didn't participate in value addition directly, the results revealed that farmers in Kabonon-Kapkamak farm grew crops that qualify for value addition. We tested 10 categories of crops and found that watermelon (20 percent) was the most grown crop followed by (14 percent) Tomatoes and Okra as well as general vegetables each 10 percent (See Table 1). On a smaller scale, respondents also indicated growing of peas, sweet potatoes, peppers and bananas and this is evident the farm is potential for engaging in value addition. While farmers indirectly engaged in value addition, lack of information and support have led to farmers selling their farm produce to third parties who convert them to applying enhancements to the product or service before offering them to customers.

**Table 1 Type of crop grown in the farm**

Items/crop	Count	Percent
Watermelon	19	20%
Tomatoes	13	14%
Okra	9	10%
General Vegetables	9	10%
French Beans	8	9%
Seasonal Vegetables	8	9%
Bananas	7	8%
Peppers	7	8%
Sweet Potatoes	7	8%
Peas	6	6%
Total	93	100%

**4.2 Would You Be Interested In Value Addition**

The majority of the respondents seem to be aware on the value addition; this has been demonstrated in many ways. Table 4 shows respondents were interested in someone processing their farm produce (66 percent) and this followed by those [22 percent] who were interested in someone packaging their farm produce. However, few of the respondents were interested in someone marking their farm produce with their names in the container. In fact asked whether they were interested in forming a group to supply processed farm produce to the market, an overwhelming majority (59 percent=likely and 34 percent=very likely) of the participating farmers indicated their desire. Only 7 percent could not form or were not interested in forming a group.

Similarly the founding's of this study shows that farmers at Kabonon-Kapkamak farm sell their farm produce to various. Table 3, shows that the larger group of respondents sell their farm produce directly to consumer at the farmer's market (41 percent) followed by those (32 percent) who sell wholesale to buyers, market or grocery. Very few of the respondents sell to hotels (2 percent).

**Table 2 Response**

	Item/factor	Count	Percent
Interest in any price	Interested	22	54%
	Not Interested	19	46%
	Total	41	100%
Interest in someone	Processing your farm produce	27	66%
	Packaging your farm produce	9	22%
	Labeling your farm produce with their names in container	3	7%
	Marking your farm produce with their names in container	2	5%
	Total	41	100%
Likelihood of forming groups	Very likely	14	34%
	Likely	24	59%
	Unlikely	3	7%
	Total	41	100%

**Table 3 Market of selling the farm produce**

Items/factor	Count	Percent
Direct to consumers at the farmer's market	17	41%
Wholesale to buyers, market or grocery	13	32%
At a road stand/farm gate	6	15%
Consumer-supported agriculture (e.g. Kenya seed)	4	10%
Restaurant/hotel	1	2%
Total	41	100%

### 4.3 Reasons why farmers not engaging in value addition

Previous studies have shown that low involvement of farmers in value added activities comes with cost especially when buying the equipment and supplies (Bachmann, 2004). Carter (1998) acknowledges the existence of low involvement of farmers in value addition citing preparation, packaging, and processing. Despite Kabonon-Kapkamak farm being potential for farm produce that qualify for value addition, farmers who participated in this study cited several reasons why they don't engage in value addition. For example table 4, indicate that most of them (39 percent) could not add value to their farm produce because they are costly, and followed by those (34 percent) who sell their produce and hence none to add value.

Moreover water shortage (20 percent) and crop disease (20 percent) are the most challenges that confront farmers at the scheme. The other challenges include lack of market (15 percent), lack of knowledge of crop management (12 percent), theft of pipes (8 percent), lack of initial capital (8 percent) etc.

**Table 4**

	Item/factor	Count	Percent
Obstructing value addition	I sell most of my produce	14	34%
	It is costly	16	39%
	No economic incentive	4	10%
	I don't understand value addition	4	10%
	I have never thought about it	3	7%
	Total	41	100%
Challenges facing farmers in the scheme	Water shortage	12	20%
	Crop disease	12	20%
	Lack of market	9	15%
	Lack of knowledge of crop management	7	12%
	Theft of pipes	5	8%
	Lack of initial capital	5	8%
	Lack of protection/fencing	3	5%
	Shortage of drugs	2	3%
	Insecurity	2	3%
	Poor infrastructure	2	3%
	Expensive seeds	1	2%
	60	100%	

## 5 Conclusion

The results of the present study clearly revealed high potential of farmers participating in adding value to their farm produce. While farmers have shown their interest in participating in adding value to food production, there are very little studies done particularly from Kenya's perspective. Based on the results presented, the study concludes that the farm is utilized properly is able to produce more yields and initiating a value-added agricultural business in the region is an exciting opportunity for the farmers interested in diversifying and exploring new markets, becomes essential to their long-term success.

The results clearly indicate that farmers in Kabono-Kapkamak farm in Aror Ward participate indirectly in value addition agriculture. For instance the results shows farmers have been growing farm produce that potentially fit in value addition e.g. watermelon, French beans, tomatoes etc (See table 1). Although the farmers are interested in value addition, the cost of production and exploitation by middle business person prevents them as they sell their produce in the farmer's market while others lack knowledge on crop management and they see no value from modifying their farm produce.



Moreover, farmers identified factors that prevent them from engaging value addition and these include inadequate water supply, lack of market, crop diseases, theft of pipes, capacity building of farmers and provision of credits facilities to boost their capital. The study recommends that while increasingly, value-added products are taking over the local market as farmers take advantage of high-demand product niches; there is need for County government to consider supporting the farmers by solving the challenges facing them. It is also important to note that farmers can form groups to which they market their products and the most notable recommendation is that more awareness should be sustained to sensitize farmers of value of improved market.

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