Evaluation of Factors Affecting Sustainability of Upland Rice Value Chain Development for Food Security in Kakamega County, Kenya.

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Abstract- Upland rice value chain development for food security studywas done in Kakamega county to contributeto knowledge on sustainability of new innovative technologies thus achieve food security and overall development as intended. Solutions and suggestions regarding what promoters of new technologies such as upland rice value chain should do to ensure that even after promotion period the value chain continues to be implemented by value chain actors and that the benefits are maintained and well distributed among the direct actors (input suppliers, producers, transporters andtraders). The data was analyzed by descriptive statistics and chisquare. The study established that demographic factors such asgender of householdhead,age of household head, and educational level of household head,methods of food acquisition and unreliability of socially inclusive credit affected sustainability more than other factors analyzed.Dependency on free inputs, donors withdrawal before development of upland value chain and Value chain growth plan not wellunderstood byVCAs least affected sustainability of the new technology upland rice. This implies that some little intervention on these factors will shed light on the value chain development thus its sustainability. Government and donors alike have focused heavily on production to improve food security in Kenya while ignoring the wider value chain development and factors affecting sustainability, adoption and upgrading of new innovative technologies such as upland rice which could save the 7billion spent on rice imports and humiliating hunger and poverty in the country. Implementing recommendations made in this study will reducevulnerability to disasters such as food insecurity. Sustainable upland rice value chain will increase cash incomes and create assets which families can fall back to when disasters occur hence the concept of pro poor growth in value chains can be achieved.

Index Terms- credit products, demographic, donor support, growth plans, value chain organizations factors.

I. Introduction

A handful of the rapidly growing literature on upland rice value chain and food security focuses on routine production and little marketing and that is the information relied on by implementers of the value chains to steer food security campaigns. Small scale Farmers take up the inadequate information, make little increase in production and income while in the value chain is being promoted but when promoting programmes wide up, farmers are not able to maintain even the little benefits and therefore fall back intograve food insecurity. KALRO scientists researched on adaptability of upland rice technology at Alupe Busia County, and then trials were done in Kakamega and other counties, after realizing that the production was okay the rest of the value chain nodes were not considered how they were to be sustained for food security attainment. Rice yield in upland systems in Africa is about 1 ton ha-1 (Africa Rice Center, 2008Kijimaet al.2006). According to Africa Rice Center (2008), NERICA responds better to inputs than the traditional varietieshence producing enhanced yield. Preliminary evaluations from WARDA showed that NERICA has surpassed the local landraces in yield with a potential to revolutionize the rice industry. Reutlinger and selowsky argue that food insecurity is caused by poverty. Entailments approach by Sen (1986), postulates that food security depends on production of own food, ability to buy food and accessibility to food on market in terms of transport facilities and prices. Seavoy (1989) pointed out that most households suffer from food insecurity due to lack of transformation from subsistence to commercial farming. Value links, a manual on the methodology of value chain promotion reprint of first revised edition, January 2008 describes procedures of promoting value chains from deciding whether to promote up to monitoring without guidance on how the sustainability will be done. The finding of this study will guide and fill the gaps that exist on sustainability of the upland rice value chain for benefits of farmers to finally realize food security and sustained benefits of commercialized value chain.The study is based on the theory that;Upland rice Value chain development is for business purpose where farmers invest to produce rice, process it, feed their households and market surplus product to larger community thus achieving food security. Value chain theory by Michael porter describes a value chain as processes by which businesses receive raw materials, add value to create a finished product and then sell the finished product to customers. The findings of this study on the demand for rice among the 172 HH sampled in Kakamega county were that55HH (32%) of HH take at least 0.5 kg of rice per day, 103 HH(60%) take at least 1kg of rice, 10HH(6%) take at least 2kg of rice per day and 4 HH(2%) take none.

II.   RESEARCH METHODOLOGY

Study site

The study was conducted in Kakamega (Kakamega central (Lurambi and Navakholo) of Kakamega County, Kenya which was purposively chosen for being pioneers inimplementation of upland rice value chain. Kakamega County is one of the 4 counties in the former western province. It comprises of 13 sub counties namely; Kakamega central, Navakholo, Kakamega east, Kakamega south, Mumias west, Mumias East ,Butere, Kakamega north, Matungu, Lugari, Matete, Likuyani and Kwisero figure 1 below. TheCounty is food Deficit despite funding of various value chains which makes it difficult to meet the needs of its growing population through formal and informal imports of maize as well as rice and wheat.Thepoverty rate of the two study sites Kakamega central and Navakholo is at 53% which means more than a half of the population in the two sites lives below poverty line. Information provided by this study on how to develop and sustain benefits of upland rice value chain was important for attainment of food security and poverty alleviation.
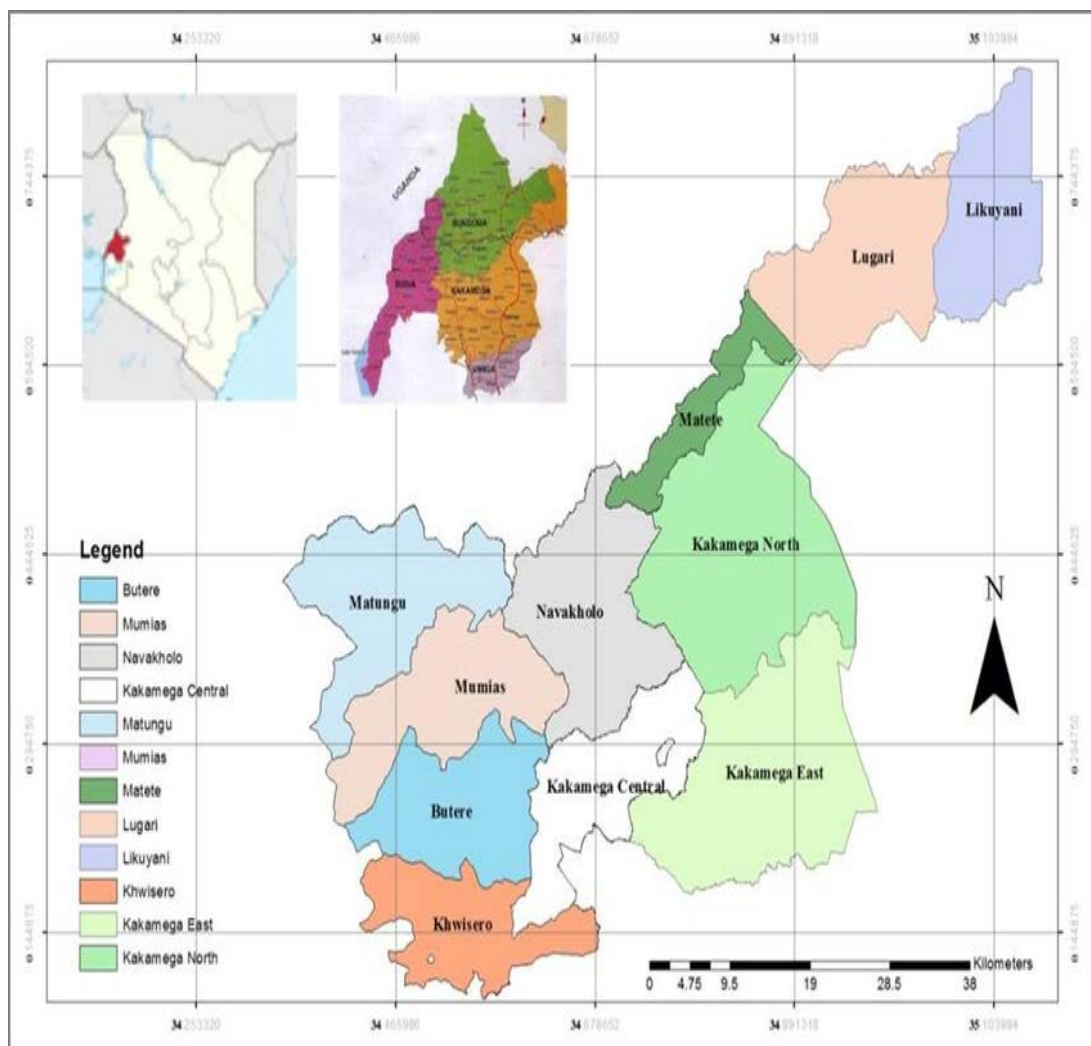

Figure 1: Map of Kakamega County showing study site Kakamega central
Source: The Kenya County map (2010)

Descriptive research design was used to describe the variables as they exist. The relationship between upland rice value chain development and its effects on food security were analyzed as they existed to fill the knowledge gap that was necessary for use by development partners and researchers. To solve the problem on food security and show the way to anti-poverty programmes that have

been concentrating on production and wide up without putting in place sustainability of the value chain measures, a study was conducted in Kakamega (Lurambi and Navakholo) of Kakamega County, Kenya which was purposively chosen for being pioneers implementation the value chain and being one of poorest counties where half of the population lives below poverty line despite implementing many value chains. In 2014,Kakamega County was ranked the poorest county in Kenya with a poverty incidence of 49.2 percent (more than 809,500 of its people live below poverty line) according to ministry of planning on socio economic atlas of Kenya. After understanding the challenges of the county on value chains through thefew literature available, this study was doneto find solutions tothe problem. A population sample of 172 out of the 573 HH that were implementing upland rice value chain was taken. According to Luvisia, (2002), a sample of 10-30% of total population is appropriate in social studies. The study population comprised of individual household under shiba rice SACCO,10 community groups with an average membership of 20 making a total of 200 beneficiaries /members, key informants were purposively selected from opinion leaders, GOK departments, NGOs involved in implementation of the VC Kakamega central (Lurambi and Navakholo divisions) as shown in table 2. Evaluation research design was used in this survey to get factual information necessary for decision making. The variables, upland rice value chain sustainabilityand effect on food security were described and analyzed as they exist as per table 1. The purpose of this design in the study was to establish factorsaffecting upland rice value chain sustainabilityfor foodsecurity in Kakamega.

Table 1: Specific objective and indicators

SPECIFIC OBJECTIVES	MEASURABLE VARIABLES/INDICATORS
To determine the factors affecting sustainability of upland rice value chain for food security.	Social demographic factors, inputs, donor support, growth plans, credit products, factors value chain organizations.

Table 2: Sample and sampling technique

Study population	Total number of HH/FGs growing rice	Sample Determination method	sampling	Sample size(n)

The	Kakamega central(Lurambi)HH	382	30% of total Population	random sampling	115 HH
	Navakholo Nambacha) HH	191	30% of total Population	random sampling	57HH
	Kakamega central(Lurambi) FGs	7		Purposive sampling	7 FGs
	Navakholo Nambacha)FGs	3		purposive sampling	3FGs
	2 Sub County Agriculture Officers			purposive sampling	2
	1Assistant county commissioner Lurambi			purposive sampling	1
	1 Equity bank representative			purposive sampling	1
	1 SHIBA Rice director			purposive sampling	1
	Chief Lurambi			purposive sampling	1
	1 Lake basin authority staff			purposive sampling	1
	1 KALRO staff			purposive sampling	1
	1 ward officer Lurambi			purposive sampling	1

collected data was analyzed based on the specific objective of the study; specific objective was to determine the factors affecting sustainability of upland rice value chain development for food security. The Variables were: demographic factors, Dependency, beyond donor funding challenges, value chain growth path not well understood, lack of socially inclusive credit and mistrust in value chain organizations.

III. RESULTS AND DISCUSSION

The study sought to determine the factors affecting sustainability of upland rice value chain development for food security in Kakamega County as follows:

Table 3:Gender distribution of household head in Kakamega County

GENDER	FREQUENCY	%
Male	120	69.8
Female	52	30.2
Total	**172**	**100**

Source: Field data, 2017

The chi-square test ($X^2_{1,\,0.01}=26.8$) shows the variation in the distribution is highly significant ($P<0.01$) among the household head, the majority of the households were headed by males as per analysis in the table above.

Most households in the region were male headed. According to the VCAs in this study, upland rice value chain products are some of the assets owned by women in male headed households just because it is a new technology and men have not yet realized the value of it due to low volumes being realized due to lack of value chain coordination and sustainability. The land resource allocated to the women by men for rice production is therefore small ranging from 0.025 to one acre which in return affects the volumes produced. It was observed during the field study that men are majority in value chain organized trainings whereas women are majority in provision of labour. Thus gender inequality in knowledge acquisition leading to unsustainable value chain. Gender inequalities at household level affect the technical know-how particularly for women who are majority in provision of labour. .

Table 4:Age household head in Kakamega County

Age bracket	Number	Percentage %
19-35	33	19
36-52	104	61
53-69	26	15
Over 70	9	5
Total	172	100

Source: Field data, 2017

The Chi square ($X^2_{3,\,0.01}$ =122.47) shows there is a highly significant (P<0.01) variation among age group distribution for household head.

The finding shows that this region has most household heads aged between 36-52 years with the youngest and the oldest being 19 and 78 years respectively. These results imply that more than a half of middle age adults in the county are actively involved in food security activities and therefore with proper sustainability of the value chain food security can be achieved.

Educational level of household head

The data on education of household was essential to establish how value chain business sustainability was being affected by the level of education especially in terms of documentation of farm records and profits.

Table 5: Education of household head in Kakamega County

Education level	Frequency	Percentage
Primary	120	70
secondary	38	22
Tertiary level	14	8
Total	172	100

Source: Field data, 2017

The Chi-square test ($X^2_{2,\,0.01}$ =107.7) shows there was a high significant (P<0.01) variation household head level of education as shown in above. Education level of the household head is important when it comes to analysis of the value chain profitability, record keeping and overall assessment of the value chain at farm level by individual farmers.

Household food acquisition in Kakamega County, Kenya.

Kakamega County is food insecure due to unsustainable value chain development and thus the study analyzed food acquisition methods in the county.

Table 6: Household food acquisition in Kakamega County, Kenya.

How food is acquired	frequency	percentage
On farm	37	22
purchase	133	77
Assisted	2	1
Total	**172**	**100**

Source: Field data, 2017

The chi-square test ($X^2_{2,\,0.01}$ =181.65) shows there is a highly significant (P<0.01) variation among household food acquisition methods. Most households at 77% purchase food, 22% have sufficient food throughout the year and 1% are assisted. Most of

household income in the county goes to food purchase and therefore the households are not able to accumulate enough assets for wealth making.

Food self-sufficiency will make the value chain sustainable since the income accrued from the surplus rice will be used to invest continuously on the chain development.

Number of meals taken by household

The respondents in the sample were asked to state the number of meals taken per day /HH to establish whether the HH were food secure.

Table 7: Number of meals taken by household per day in Kakamega County

Number of meals	Frequency	percentage
Three	**57**	33.1
Two	104	60.5
One	11	6.4
Total	**172**	**100**

Source: Field data, 2017

The chi-square test ($X^2_{2,\,0.01}$ =75.43) shows there is a highly significant (P<0.01) variation among household number of meals taken per day. Majority of households at 60.5 take two meals per day as shown in the table 7.

The study established that even the food consumed is purchased from the market due to limited food self-sufficiency at household level. Dependency on food from market is at 77%. This simply means that the purchases consume household savings as a result of high costs of food leading to a decline in the household asset base. Inadequate food and low asset base status at household level. That affects families both economically and nutritionally and this study has come on board to provide the necessary information required for development of viable value chains such as upland rice for food self-sufficiency and sustainable development.

House hold demand for rice per day

The household respondents were asked to state the amount of rice consumed in the household per day and the average price of rice in the market. Each household stated on average the amount of rice eaten either as breakfast, lunch or supper and the price at which they buy it per kg. The data collected was used to project the county demand for rice.

Table 8:Household demand for rice per day in Kakamega County, Kenya.

Quantity In Kgs	No of household demanding rice per day	Total rice Volume in Kgs consumed by household	No of HH in Kakamega county	County projection	Price per kg	Value of rice in KES
0.5kg	55(32%)	27.5kgs	37689	5672194.5 kgs	100	567,219,450
1kg	103(60%)	103 kgs				
2kg	10(6%)	20 kgs				
none	4(2%)					
Total	172(100)	150.5	37689	5672194.5	100	567,219,450

Source: field data, 2017

In terms of quantity demanded and consumed per household ; 32% take at least 0.5 kg of rice per day, 60% take at least 1kg of rice, 6% take at least 2kg 0f rice per day and 2% take none. According to this study, the projected consumption per day of rice per day in the county is 5672194.5 kgs valued at 567,219,450 KES. This implies that a lot of money is spent on purchasing food especially rice and that could be saved through adoption and sustainability of the new technology of rain fed rice production.

Table 8: Other Sustainability factors affecting upland rice value chain development in Kakamega County Kenya.

Factor affecting sustainability	Number of micro actors ranking it as a major factor	Percentage as ranked by micro actors
Dependency on free inputs	15	8.7%
Donors withdraw before proper value chain development	24	13.9%
Value chain growth plan not well understood by VCAs	27	15.6%
Unreliable socially inclusive credit	60	34.8%
Mistrust at value chain organizations	46	26.7%
Total	**172**	**100%**

Source: Field data, 2017

Among the reasons given unreliability of socially inclusive credit affects the value chain sustainability more than other factors at 34.8 %. Mistrust at VCOs affected sustainability at 26.7%. It was observed that there was need for building trust in value chain organizations for upland rice value chain to be sustainable. The trust could be built through conflict resolution mechanisms and coordination of actors. Unless some coordination mechanism of the value chain actors is already in place sustainability of the value chain will not be easily achieved. The value chain growth plan should be well understood by actors. Donors should incorporate sustainability mechanisms in the design of the value promotion plan. Actors should invest on value chain development and avoid dependency on free inputs.

IV. CONCLUSION

Kakamega County is food insecure. Dependency on free inputs, Donors withdraw before development of upland value chain and Value chain growth plan not well understood by VCAs least affected sustainability of the new technology upland rice. This implies that some little intervention on these factors will shed light to the value chain development. Social demographic factors that constraint the value chain sustainability significantly were; gender of household head, age of household head, education of household head, Household food acquisition and number of meals taken by household per day. Similarly, unreliability of socially inclusive credit and Mistrust at value chain organizations affected upland rice sustainability more. The implication is that the above factors that hinder sustainability must be addressed as per the finding of this study for the value chain to be sustainable.

V. RECOMMENDATIONS

The study recommends that for the value chain development to be sustainable and food security achieved, Support activities and interventions of the upland rice chain development should actually be taken up and maintained by value chain actors even after the support programmes wide up or cease to fund .Both direct and indirect actors of upland rice value chain should build synergy to identify and engage a reliable credit service provider for interventions on socially inclusive credit provision for sustainability of the value chain.

ACKNOWLEDGEMENT

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