

# Entrepreneurship Skills as a Factor Influencing Adoption of Innovations along Mango Value Chains in Meru County, Kenya

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**Abstract-** *The study used a descriptive survey design. The study was carried out in Meru County, Kenya. Population of the study comprised of 13,574 farmers, traders and exporters, 404 farmers, 12 traders and 2 exporters. Both secondary and primary data was collected. Primary data was collected from the respondents using a structured questionnaire with both open and close ended questions. Both qualitative and quantitative data were used in the analysis. Quantitative data obtained from the field was analyzed using descriptive and inferential techniques. The descriptive techniques used means and frequencies while the inferential technique used were regression and correlation to establish relationship between variables in the study and inferences made. Frequency tables and charts were used to present the findings. The study found out that entrepreneurial skills played a role on the innovations adoption along the mango value chain. However, a linear association does not exist as between entrepreneurship skills and innovation in mango. The researcher concludes that with such a steady growth in yields and development in mango farming in Meru County, Kenyan mango supply chain appears to be promising. In the adoption of new innovations and there is need to train the growers on entrepreneurship. Education tours should be organized for the value chain members to countries such as India and Brazil so that they learn what their contemporaries in these countries are doing and adopt more skills*

**Keywords-** *Value chain; Entrepreneurial skills; Agriculture; Mango; Adoption; Innovation.*

## 1. INTRODUCTION

The agriculture industry is a major player in Kenya's economy. It contributes about 26% of the Gross Domestic Product (GDP) and a further 27% through linkages with manufacturing, distribution and service related sectors. Agriculture provides a livelihood for about 70% of the population. The main food crops grown in Kenya are maize, wheat, sorghum, millet, cassava, Irish and sweet potatoes, bananas, mangoes and other fruits and vegetables (HCDA, 2008). The Government of Kenya has put in place and proposed a strategy for revitalizing agriculture, 2004 – 2014 with the aim of raising the sector's growth rate, reduction of unemployment and poverty. This revitalizing agriculture strategy aims at achieving the country's Millennium Development goal of Poverty Reduction (Horticultural Crops Development Authority, 2008). Despite the strategy, the agricultural sector continues to face major challenges affecting the value chain mainly due to poor productivity, poor land use, lack of markets and value addition. The improved processes at all stages of the value chain, from the farm to the consumer, will make significant contributions to an efficient and effective enterprise, with increased profitability at the small-scale production level and at the same time avail quality and safe mangoes and mango products to the Kenyan

consumers at affordable prices. According to the Republic of Kenya (2009), value chain analysis can strengthen the innovation process by determining the contribution of each actor with a view to maximizing synergies and complementarities between actors.

## 2. PROBLEM STATEMENT

Knudson et al. (2004) stated that the role of entrepreneurship and innovation has been given little emphasis in agricultural economics. However, whilst agricultural economists have not placed much emphasis on entrepreneurship and innovation, it has become a priority with policy makers and is a critical aspect of value-added agriculture. It has been observed that a lot (39%) of mangoes in Meru County go to waste. This is also emphasized by Danish International Development Agency (DANIDA) report (2010); however, technologies (innovations) exist such as Integrated Pest Management (IPM) techniques, improved mango processing and improved markets to arrest this situation, raising questions, why has the mango growers and traders not adopted the already established technologies? Why is there low uptake of these innovations by the mango value chain members? This study therefore sought to investigate the factors that

influence the adoption of innovations along the mango value chain in Meru county and consequently in Kenya.

### 3. HYPOTHESIS

H<sub>0</sub>: Entrepreneurship skills is not associated with innovation, and

H<sub>1</sub>: Entrepreneurship skill is associated with innovation.

### 4. REVIEW OF RELATED LITERATURE

Duczowska-Małysz (1993) farm entrepreneurship equates to all the activities, which help farmers to adjust to a free market economy. According to Firlej K. (2001). Farmers are becoming more entrepreneurial and developing new skills and functional capabilities in order to be competitive. According to Lauwere, Verhaar and Drost (2002), entrepreneurship is the mindset and process to create and develop economic activity by blending risk-taking, creativity and/or innovation with sound management, within a new or an existing organization. Hanf and Muller (1997) suggest that in a dynamic environment with fast technical progress, open-minded farm entrepreneurs will recognize more problems, as they are able to solve in a rational way. According to Smits and Mugabe, (2005), innovation in agriculture does not only look at the technology or products but also at the process by which knowledge is generated, crafted from various sources and put into use, thus creating new social and economic significance, improvements in technical and managerial issues, institutional and policy aspects which are attained through entrepreneurial skills. Ploeg (2003) connects entrepreneurship to the profit maximisation and the scale enlargement, which according to him has been a key trend in the structural development of Dutch agriculture in the last decades. Ploeg (2003) and Salamon (1992) equate farming to the agricultural primary production, when they associate entrepreneurship with increasing profits through expanding the farm. Various studies however have examined the relationship between the two variables and found income to be positively related with the adoption of agricultural innovations. Studies by, Abd El-Razek (2002) in Iraq on adoption of technology in Wheat crop, Mussei et al. (2001) in Tanzania on improved Wheat, Getahun et al. (2000) in Ethiopia on improved maize farming and in Tanzania on use of fertilizer, Negatu and Parikh (1999) in Ethiopia on improved Wheat, Bembridge and Tshikolomo (1998) in Phaswana on adoption of crop variety and Ayuk (1997) in Burkina Faso on adoption of live hedges reported a significant positive relationship between the two variables. On other hand few studies stated no relationship between the two variables. Example of these study were, Alsakran (2001), El-Gannam (2000), Madhukar and Ram (1996), and Singh et al. (1993).

### 5. RESEARCH METHODOLOGY

This research was guided by the methodology used by Nchinda and Mendi (2008) in the study of yoghurt

technology adoption in the western highlands of Cameroon.

#### 5.1 Research Design

This study assumed participatory action research to develop innovative technologies and products associated with mangoes. Baseline survey was done. The study districts included the former Meru Central and Meru North Districts currently known as Meru County. The County lies to the east of Mt. Kenya whose peak cuts through the southwest border of the County. To the North East it borders Laikipia county, to the West it borders Nyeri and Kirinyaga counties, TharakaNithi county in the south and Isiolo county to the north.

#### 5.2 Participant (Subject) Characteristics

The study was concentrated on seven divisions, which are highly productive in mangoes as shown in Table 1.1 in Annexure. The study area was limited to the lower part of the County whose climatic condition favors the production of mangoes. The population of the study included individual mango farmers, traders and exporters in Meru County. The mango farmers are approximately to be 13,442, traders are 120, while exporters were 12 (Ministry of Agriculture Survey, 2000). Therefore, the target population for the study was 13,574 traders, farmers and exporters.

#### 5.3 Sampling Technique

The Population of Mango farmers in the county was estimated at 13,454. Since the population is large (above 10,000), the following formula was adopted to calculate the sample size of farmers.

$$n = \frac{N}{[1 + Ne2]}$$

A sample size of 447 mango farmers/ growers was established. A stratified random sampling technique was used to get a sample size of traders and exporters since the target population was not homogeneous. The researcher therefore sub-divided it into groups or strata in order to obtain a representative sample. From the above population of thirteen thousand five hundred and seventy four, 10% from both traders and exporters, giving each item in the population an equal probability of being selected. This generated a sample size of 461 respondents from whom the study sought information. Table 3.2 in Annexure gives summary of the sample size. The questionnaires were then distributed through the ministry's division headquarters. Out of the target population, 447 questionnaires were administered to 447 farmers, 12 traders and 2 exporters. Out of the 418 questionnaires distributed, 296 questionnaires were returned with 283 coming from farmers, 12 from traders and one from an exporter.

#### 5.4 Measures and Covariates

Primary data (mainly information on factors influencing adoption) were collected from the respondents through questionnaires. Structured questionnaire with both open and close ended questions were the key instruments used in collecting primary data from the respondents. The

questionnaire was pre-tested before being administered to the respondents. Quantitative data obtained from the field was coded using the SPSS and analyzed using descriptive and inferential techniques. Descriptive techniques were adopted using frequencies to show the tendency of occurrence between study variables. Inferential techniques like regressions were used so as to establish the relationship between variables in the study and inferences made. A logit analysis was used to determine whether adoption of innovation is influenced by entrepreneurial skills. Logit regression is used to determine the probability of occurrence of an event with the presence of its determinants by fitting the data on a probability curve. A Logit model was found suitable by Nchinda and Mendi, (2008) who used the same approach to investigate the factors influencing adoption of milk technology in Cameroon. The Logit model was conducted by transforming 'innovation adoption' variable into binary (1 = adopted innovation, 0 = has not adopted innovation). Logit regression was preferred as it is not affected by other factors such as serial autocorrelations and would, thus, have a better presentation of the prediction. Innovation (I) was the dependent variable while entrepreneurial skills (X1), is the independent variables. These variables were measured based on the respondents' agreement or disagreement with the variable indicators whereby agreement was accorded value 1 and disagreement value 0. The analysis was done on four independent variables as shown below:

$$P_i/1-P_i = \beta + \beta_1 X_1 + \beta_2 X_2$$

Where: Entrepreneurial skills (X<sub>1</sub>): (0=do not have entrepreneurial skills, 1= have entrepreneurial skills);

I and X variables were converted into standard scores: Z<sub>y</sub>, Z<sub>1</sub>, Z<sub>2</sub>, ..... Z<sub>n</sub>.

## 6. RESULTS

The study shows that 10.6% of the growers took risk and started new ventures, while (89.4%) never took risk to start new ventures. It is further revealed that (66%) took risk and adopted innovations while (33.3%) did not adopt. Out of the growers who did not take risk, (3.2%) adopted and (96.8%) did not adopt. This shows that few growers took risk to engage into new ventures. The study also compared the indicators of entrepreneurship skills of trader/exporters with the grower. The results show that (53.8%) traders/exporters took risk and started new ventures, while (46.2%) never took risk to start new ventures. Out of the traders/exporters who took risk by starting new ventures, (86%) adopted innovations and (14%) did not adopt innovations. Out of the traders/exporters who did not take risk (50%) adopted innovations and (50%) did not adopt innovations. It can therefore be revealed that traders/exporters are more risk takers than growers. The study further shows that 62% of trader/exporter adopted innovations and 38% did not adopt innovations. Comparing both the grower and traders/exporters, indicates that the higher the net income,

the higher the adoption and vice versa. The trader/exporter had high (62%) adoption rate, while the grower had 38% adoption rate.

### 6.1 Inferential Analysis

The study conducted a logit regression analysis to establish the relationship between the independent and dependent variables. The objective was to show the relationship between entrepreneurial skills and the adoption of innovations along the mango value chain. The same approach was used by Nchinda and Mendi, (2008). This study by Nchinda and Mendi, (2008) has been critically reviewed in the literature as it guided our study methodologically. Table 1.3 in Annexure indicates the summary of logit model. The -2\*log likelihood (373.193) in the Logit model summary (Model 1) is used in comparisons of nested models. Cox and Snell and Nagelkerke R-square had values of 0.065 and 0.086 respectively. The study gives two measures of R-square which show a low goodness of fit in the regression model. That is, the Logit model has a low coefficient of determination and the independent variables would cause a paltry 6.5% or 8.6% variations in technology adoption. The compliments of these percentages are caused by other factors not in the Logit model. In model 2, the -2\*log likelihood value of 5.004 was established. Cox and Snell and Nagelkerke R-square had values of 0.572 and 0.807 respectively. These two R-square values illustrate a high goodness of fit in the Logit model. The Logit model shows that 80.7% variations in innovation adoption is brought about by variations in the independent variables. As shown by the Table in Annexure entrepreneurship, of traders/exporters would create more innovation than it would for growers.

From Table 1.4 in Annexure, the Logit model (Model 1) becomes:

$$\text{Logit (I)} = I/(1-I) = -1.148 + 0.351(\text{Entre})$$

Model 1 reveals that, holding other factors constant, entrepreneurship would lead to a 0.351 increase in innovation adoption. However, the relationship between entrepreneurship skills and adoption of innovations was found to be insignificant.

From second Logit model (Model 2) becomes:

$$\text{Logit (I)} = I/(1-I) = 42.365 - 40.978(\text{Entre})$$

The Logit model shows that, when other factors are held constant, entrepreneurship would decrease adoption of innovation by 40.978. This depicts that entrepreneurship skills would go against the same. However, these results are not significant and cannot be relied on as population parameter as shown by the p-values. For traders/exporters, these factors do not independently influence innovation to any degree of certainty.

### 6.2 Chi-square Test

Chi-square test was used to determine whether an association (or relationship) between independent and dependent variables in the sample is likely to reflect a real association between these variables in the population. On model 1 for growers; on entrepreneurship skills, a chi-



square test value of 31.717 was established at 0.007 margin of error. The null hypothesis two is, thus, rejected and alternative hypothesis accepted. However, a linear by linear association does not exist as a between entrepreneurship skills and innovation in mango given a p value of 0.756 ( $p > 0.05$ ). In traders/exporters perspectives, (Model 2) shows that entrepreneurship skills has a chi-square test value of 7.475 was established at 0.279 margin of error. In addition, a linear by linear association did not exist between entrepreneurship skills and innovation in mango given a p value of 0.192. ( $p = 0.067$ ).

## 7. DISCUSSION

It was found out that entrepreneurial skills play a role in adoption of innovations. The rate of adoption of innovation in traders/exporters was found to be higher (86%) than the one of growers (66.7%). However, 14% of traders/exporters and 96.8% of growers did not adopt innovations. According to Lauwere, C., de, Verhaar, K. and Drost, H. (2002), entrepreneurship promotes creativity and adoption innovation. The high adoption of innovations by exporters may be as a result of increased entrepreneurs' skills among the traders as compared to mango farmers.

## 8. CONCLUSION

Entrepreneurial skills influence innovation adoption; the study found that unlike traders/exporters, the number of growers who took risk and started new ventures were few of those adopted innovations. This shows that few growers took the risk of engaging in new ventures. The Ministry of Agriculture through Agribusiness Unit should, thus train the growers on entrepreneurship. The youth and women enterprise funds could be used for this purpose in consultation with the ministry of Gender. Education tours should be organized for the value chain members to countries such as India and Brazil so that they learn what their contemporaries in these countries are doing.

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## ANNEXURE

**Table: 1.1 Study Areas (Survey figures, 2010)**

MeruCounty	Study divisions	Area under mango per ha.	Production in Mt (2010)	Number of farmers
	Imenti North	275	2,586.97	910

Meru Central	1289	14,553.97	4,347
Imenti South	73	1,011.11	516
Igembe South	278	3,120.14	4,023
Igembe North	71	637.37	2,176
Tigania West	106	783.06	1,074
Tigania East	31	170.34	396
<b>Total</b>	<b>2,123</b>	<b>22,862.96</b>	<b>13,442</b>

Source Ministry of Agriculture (MOA), 2010

**Table 1.2 Sample Size (MOA, 2010)**

Sections	Population (Frequency) (N)	Sample Ratio	Sample (n)
Traders	120	0.1	12
Exporter	12	0.1	2
<b>Total</b>	<b>13,574</b>		<b>14</b>

**Table 1.3: Logit Model Results**

Model	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
<b>Model 1</b>	373.193 <sup>a</sup>	.065	.086
<b>Model 2</b>	5.004a	0.572	0.807

**Table 1.4: Logit Model Coefficients**

		B	S.E.	Wald	Df	Sig.	Exp(B)
<b>Model 1: Growers</b>	Entrepreneurial Skills	0.351	0.577	0.370	1	0.543	1.420
	Constant	-1.148	0.776	2.187	1	0.139	0.317
<b>Model 2: Traders/ Exporters</b>	Entrepreneurial Skills	-40.978	33680	0	1	0.999	0
	Constant	42.365	57340	0	1	0.999	2.51E+18

a. Variable(s) entered on step1: Entrepreneurial Skills

**Table 1.5 Chi-Square – Innovation and Independent Variables**

			Value	Degrees of Freedom (df)	Asymp. Sig. (2-sided)
<b>Model 1</b>	Entrepreneurship Skills	Pearson Chi-Square	31.717b	15	.007
		Likelihood Ratio	37.309	15	.001
		Linear-by-Linear Association	.097	1	.756
<b>Model 2</b>	Entrepreneurship Skills	Pearson Chi-Square	7.475f	6	.279
		Likelihood Ratio	10.052	6	.122
		Linear-by-Linear Association	1.701	1	.192