

Relationship Between Level Of Education Of Farmers And Use Of Information And Communication Technologies In Marketing Of Farm Produce By Small Scale Farmers In Manga Sub-County, Kenya

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Abstract: Limited access to accurate and timely market information continues to be a major impediment in the marketing of farm produce by farmers in Africa and in Kenya, especially in Manga Sub-County, Nyamira County. This limited access to market information has led to high cost of transaction and emergence of middlemen. Information and Communication Technologies (ICTs) have the potential to assist in addressing this problem by creating awareness, linking and distributing information on marketing. It is evident that farmers in Kenya have focused their attention in acquisition of ICT resources because of widespread coverage of mobile telephony, low call rates, affordable data bundles, increasing internet connectivity and other forms of ICT applications for example the M-pesa services with little application in marketing. This study aimed to determine the relationship between level of education of farmers and use of ICTs in marketing of farm produce by small scale farmers in Manga Sub-County in Nyamira County, Kenya. Descriptive research design was adopted in the study. The target population of the study was 11,040 commercial farmers in Manga Sub-County from which a sample size of 109 small scale farmers was selected using stratified random sampling technique. A questionnaire administered to farmers in the Sub-County was used to collect data. Validity of the instrument was enhanced by subjecting the instrument to examination by three experts in the Department of Agricultural Education and Extension of Egerton University. Analysis of piloting results using Cronbach's coefficient alpha method yielded a reliability index of 0.896 indicating the instrument was reliable. The collected data were analyzed using both descriptive and inferential statistics. The descriptive statistics used were the frequency and percentages. Pearson's correlation coefficient analysis was used to test the hypotheses. Statistical Package for Social Sciences was used in data analysis. The hypothesis was tested at a significance level of 0.05. Findings of the study identified that high level of education of farmers significantly influenced the use of ICTs in marketing farm produce by small-scale farmers in Manga Sub-County. This study recommends improvement in level of education of farmers, in order to improve the farmers' use of ICTs in marketing of farm produce in the study area.

Index Terms: Information and Communication Technologies (ICTs), Marketing, Education, Small Scale Farmers, Relationship

1 INTRODUCTION

Agriculture plays an important role in the world economy (FAO, 2010). It provides 60 per cent of all employment in Africa with seventy to eighty per cent of the total population living in rural areas and being dependent mainly on crop and livestock farming for livelihood. In Kenya, farming contributes 26% of the Gross Domestic Product (GDP). Farming is the main occupation in Manga Sub-County and is the major source of income. The major enterprises in the Sub-County include tea, coffee, maize, dairy and horticulture, most farm produce are sold in the local market or to the middle men who sell to major markets outside the Sub-County. The area is characterized by limited factories for farm produce. Marketing of farm produce in Kenya is personalized in farms or village markets. Small scale farmers, who form the bulk, trade in local markets usually in small volumes (Poulton et al., 2006). This has given rise to thriving business for middlemen. The rural assemblers collect and bulk produce from small scale farmers and sell to other intermediaries who sell to urban brokers. The urban broker then sells to urban traders, which could be urban wholesaler or retailer. Thus the value chain involving marketing of farm produce tends to be long and fragmented, leading to information poverty traps on marketing. Information poverty traps limit small scale farmers to subsistence farming, thereby preventing them from adopting profitable production alternatives and keeps them supplying low-paying marketing outlets (Ashraf, Gine & Karlan, 2006). The right of access to markets presents complexities in marketing of farm produce. Linking small scale farmers to markets remains a major challenge in Africa and is associated with the lack of commercialization in the continent (Barrett, 2008; Poulton,

Doward & Kydd, 2006). Marketing of farm produce in the study area is done in farm gates or village markets. Such village markets however tend to offer low prices and are characterized by significant price variation (Aker, 2008; Fafchamps & Gabre-Madhin, 2006). Information poverty increases the transaction costs making the cost of doing marketing unaffordable to majority of small scale farmers (Shiferaw, Obare & Muricho, 2007). Small scale farmers respond to the high cost of marketing by selling their produce at the farm gates rather than travelling to the market where they could get better prices (Fafchamps & Hill, 2005). Most buyers physically inspect the produce when buying because there are no well-defined quality grades and standards in such markets. In the absence of market information, opportunistic behaviour tends to develop. Such behaviour encompasses cheating on quality and quantity which in turn results into the failure of traders to establish long-term business relations with farmers and other traders (Fafchamps & Gabre-Madhin, 2006). Use of ICTs in marketing farm produce by small scale farmers is dependent on various socio-economic factors, namely; level of education of farmers, availability of ICTs, training farmers on the use of ICTs and extension services. In most African countries, modern ICTs like e-mails, World Wide Web (www) and cellular telephony have been used by rural farmers alongside traditional ICTs like radio and TVs (Farrell, 2007). Among the ICTs used by farmers in Kenya, the mobile phones emerge as the preferred ICT tool due to affordability, ease of use, and a reliable network. According to the quarterly sector statistics report by the Communication Authority of Kenya (CA), at the end of the first quarter of the year 2016, mobile penetration stood at 88.1% with 37.8 million

subscribers up from 36.1 million in the previous quarter (Communication Authority of Kenya, 2016). Use of ICTs encompasses innovative ways of capturing, processing, storing, and displaying information and is capable of increasing productivity and marketing through information provision (Mangesi, 2010). In Manga Sub-county, available ICTs already in use to improve marketing of farm produce by small scale farmers include the use of popular social sites e.g. face book. Some farmers are already using these sites to advertise their products and to communicate with potential customers. Use of such sites will address the constraint of market spaces, high marketing costs, and use of intermediaries to reach more potential customers. Social sites have a very high traffic of potential customers who can be reached. Rathgeber and Adera (2000) and Bartholomew et al., (2009) noted that although ICTs have enhanced information exchange amongst farmers and improved farmers ability to make decisions, develop ideas and consequently improve their livelihoods through better marketing, is use in agricultural marketing still poses serious challenges and low adoption. Use of ICTs in marketing of farm produce could be influenced by various socio-economic factors such as level of education of farmers, training of farmers in ICTs, availability of ICTs and extension services. The study singled out on the level of education of farmers. Studies have shown that high ICT literacy levels among employees and owners translated to higher degree of ICT use in enterprises (Kiveu & Ofafa, 2013). Use of ICTs in agricultural extension services especially mobile phone services in the agricultural sector has provided information on market, weather, transport and agricultural techniques to contact with concern agencies and department (Aker, 2011). Marketing of farm produce by farmers in Manga Sub-county has experienced problems due to limited access to accurate and timely market information. One strategy of improving farmers' access to market information is integration of Information and Communication Technologies (ICTs) in marketing of farm produce (Shepherd, 2007). There is limited information on the relationship between level of education of farmers and the use of ICTs in marketing farm produce in the study area. This study sought to fill this gap by investigating on the relationship between level of education of farmers and use of ICTs in marketing of farm produce by farmers in Manga Sub-county.

2 RESEARCH METHODOLOGY

The study used a descriptive survey research design. It was considered appropriate because it facilitates the collection of data through direct enquiries and observations and allow researchers to gather information summarize, present, and interpret for purposes of clarification (Orodho, 2005). The study was conducted in Manga Sub-County which is one of the sub-counties in Nyamira County with 11,040 farmers. The target population for this study was all 11,040 farmers in the Sub-County. The accessible population was 109 commercial small scale farmers engaged in production since they are in a position to embrace ICT in marketing. Stratified random sampling technique was used to select the farmers from the three categories of farmers based on administrative divisions. Simple random sampling technique was used to select respondents from each frame. The following formula was used to come up with appropriate sample for the study (Nassiuma, 2000).

$$n = \frac{NC^2}{C^2 + (N - 1) e^2}$$

Where: n = Sample size,
N = Population,
C = Coefficient of variation,
e = Standard error.

For this study N = 11,040 farmers in the Sub-County, C = 21% and e = 0.05.

The instrument used in this study was a questionnaire containing structured and closed ended questions. The instrument was validated in consultation with the three experts in the Department of Agricultural Education of Egerton University. Reliability of the questionnaire used in this study was determined by pre-testing 30 farmers in the neighbouring Kiogoro Division with similar characteristics as the one of study area. The instrument used in this study was considered reliable as it achieved a reliability co-efficiency of 0.896 using Cronbach alpha scale. Quantitative methods of data analysis were used with both descriptive as well as inferential statistics being used to explain the results of the study. The types of descriptive statistics used were the frequency and percentages while and inferential statistics was the Pearson's correlation coefficient analysis. All tests of significance were computed at $\alpha = 0.05$. The statistical package for social science version 15.0 was used to aid in data analysis.

3 RESULTS AND DISCUSSIONS

Socio-economic Characteristics of the Farmers

The study established that the majority (68.1%) of the farmers were male as compared to 31.9% who were female. This implies that most farming related decisions such as what to produce, how to produce and how to market the surplus produce could be dominated by male. The farmers that were sampled to participate in this study were of varying age brackets with majority of them being in their middle ages. Most of the farmers were aged between 30 – 39 years as represented by 34.5% of the farmers. This was closely followed by 21.8% of the farmers who were aged between 20 – 29 years. About 14.3% of the farmers were aged 40 – 49 years with a similar proportion aged 50 – 59 years. It was just 7.6% who were in the 60 – 69 years bracket and a similar proportion in the 70 years and above bracket. Majority of the farmers had farming as their primary occupation as represented by 54.7% of the total farmers. About 30.0% of the farmers were further involved in business while 13.3% of the farmers were engaged in public service jobs. It was just 2.0% of the farmers in this study who were also students. Different types of crops are grown in the study area. These crops range from food crops (both annual and perennial) to cash crops. The most common crop grown in the study area was tea which was grown by 22.8% of the total farmers. This is closely followed by banana (16.8%), maize (13.2%), sugarcane (10.8%), trees (8.4%) and coffee (7.2%). Other crops grown, though not by many farmers were Passion (3.0%), Beans (3.0%), Avocadoes (3.0%), Napier grass (2.4%), Wheat (1.8%), Pineapple (1.8%), Tomatoes (1.2%), Millet (1.2%), Kales (1.2%), Carrots (1.2%) and Cabbages (1.2%). There are a variety of livestock enterprises in the study area. Poultry

keeping is the most prevalent livestock enterprise in the study area. About 44.8% of the farmers kept poultry in their farms. This was closely followed by 37.1% of the farmers that kept cattle (mainly for dairy production). Other farmers were engaged in bee (7.6%), Sheep (3.8%), Fish (2.9%), Goats (2.9%) and Rabbit (1.0%) farming. The livestock enterprises engaged on offers a significant avenue for marketing a number of livestock produce such as eggs, chicken, honey, goats and sheep meat, fish, rabbits, etc. Majority of the farmers in the study area were involved in marketing of farm produce. Most of the farmers were involved in marketing of their own produce while only a few were marketing produce that they had not produced for themselves. This is as shown in Figure 1.

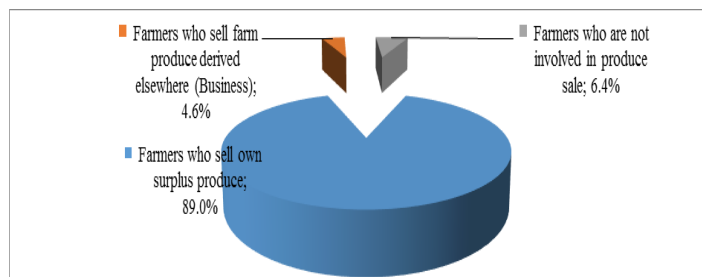


Figure 1: Farmers' Involvement in marketing of farm produce

The above results show that most farmers were selling their own surplus as represented by 89.0% of the total farmers. However, about 4.6% of the farmers who were also engaged in business were selling agricultural produce not derived from their own farming. On the other hand, about 6.4% of the farmers were not involved in any form of agricultural produce marketing. Majority of the farmers (30.3%) were involved in marketing of their farm produce for a period of less than 5 years. About 20.2% of the farmers had marketed their farm produce for a period of 5 – 9 years while about 17.4% had marketed their produce for 10 – 14 years. Those who had

been marketing farm produce for 15 – 19 years and 20 years and above were 16.5% and 15.6% respectively. These results imply that most farmers had adequate experience in marketing of farm produce.

ICT Resources Used in Marketing of Farm Produce

Majority of the farmers had used ICTs in their day to day life activities. An overwhelming majority (98.2%) had ever used ICTs and it was only 1.8% of the farmers who had not used ICTs. The high usage of ICTs could be attributed to the recent advancement of IT infrastructure in the country. This study noted that there is a variety of ICTs that were being used by the farmers for marketing in the study area as shown in Table 1.

Table 1: ICTs Resources Used in Marketing of Farm Produce by Small Scale Farmers

ICTs	Percentage use	Percentage that do not use	Totals
Radio	88.1	11.9	100.0
Mobile Phone	86.2	13.8	100.0
TV	46.8	53.2	100.0
Internet Services	23.9	76.1	100.0
Computer	15.6	84.4	100.0

Table 4 shows that the most popular ICTs used in marketing farm produce in the study area was radio as used by about 88.1% of the total farmers. This was closely followed by mobile phones with a representation of about 86.2% of the farmers. About 46.8% of the farmers confirmed to be using internet services in their different life activities. However, it was just 15.6% of the farmers that were noted to have been using computers. ICTs were being deployed in a variety of ways in the marketing of farm produce in the study area. The various ways in which ICTs were being used by farmers are shown in Table 2.

Table 2: Ways ICTs was Used in Marketing Farm Produce

ICT-deployment in marketing	Not at all	Low	Moderate	High	Very high	Total	Mean	Std. Dev
Search for markets of farm produce	9.0	23.0	63.0	5.0	0.0	100.0	3.84	1.03
Receiving payments on sale of produce	11.0	23.0	58.0	6.0	2.0	100.0	3.77	1.91
Inquiry of prices for farm produce	4.0	27.0	49.0	19.0	1.0	100.0	2.96	1.20
Advertisement of farm produce	31.0	69.0	0.0	0.0	0.0	100.0	1.32	0.48

The results in Table 2 shows that search for markets of farm produce had the highest mean (3.84) with a standard deviation of 1.03. This was closely followed by receiving of payments on sale of produce as represented by a mean of 3.77 with a standard deviation. Some of the other uses of as deployed in marketing includes inquiry of prices and advertisements of farm produce. About 63.0% of the farmers indicated to deploy ICTs in marketing through search for markets of farm produce in a moderate extent. This was followed by 23.0% of the farmers who cited to use ICTs in search for markets of farm produce in a low extent. About 5.0% of the farmers indicated to use ICTs in search for markets of farm produce in a high extent. However, 9.0% of the farmers did not use ICTs at all. None of the farmers indicated to use ICTs in search for markets of farm produce in a very high extent. About 58.0% of the farmers cited that they used ICTs in receiving payments on sale of produce in a moderate manner. About 23.0% used ICTs in receipt of produce payments in a low extent. However,

11.0% of the farmers did not use ICTs in receiving payments of farm produce at all. Only 6.0% used ICTs in a high extent and 2.0% of them used ICTs in a very high extent. About 49.0% of the farmers used ICTs in a moderate extent in inquiry of price for farm produce. Farmers who used ICTs in a low extent in the inquiry of prices were 27.0%. About 19.0% of the farmers used ICTs price inquiry in a high extent. On the extreme sides, 4.0% did not use ICTs in inquiry of prices while 1.0% used ICTs in a very high extent. As far as the advertisements of farm produce using ICTs was concerned, this study noted that 69.0% of the farmers used the technologies in a low extent while 31.0% did not use ICTs in advertisement of farm produce at all. None of the farmers indicated to use ICTs in advertisement of farm produce in moderate, high or very high extent. The most popular ICT-based marketing services from service providers are M-pesa and texting. This is revealed in Table 3.

Table 3: ICT-Based Training Services from Service Providers the Farmers

ICT-Based marketing services	Not at all	Low	Moderate	High	Very high	Total	Mean	Std. Deviation
Operate M-Pesa	10.1	6.4	19.3	36.7	27.5	100	3.651	1.235
Access Mobile banking	65.1	18.3	15.6	0.9	0	100	1.523	0.789
Use OLX services	92.7	1.8	2.8	2.8	0	100	1.156	0.596
Use Mkesho	89.9	7.3	1.8	0.9	0	100	1.138	0.461
Texting(sms)	25.7	10.1	29.4	18.3	16.5	100	2.899	1.407
Training from Extension	71.6	9.2	12.8	1.8	4.6	100	1.587	1.082

The mean scores by farmers for use of M-pesa services in ICT based marketing was the highest and calculated to be 3.614 with a standard deviation of 1.2351. M-pesa services assist in financial transaction; which is a crucial component of marketing of farm produce. Specifically, 36.7% and 27.5% of the farmers indicated to have been using M-pesa services in a high and very high manner. This is against 19.3%, 6.4% and 10.1% of the farmers that indicated to be using M-pesa services in a moderate, low and not at all (never). As far as farmers' texting for use in ICT marketing was concerned, the mean scores was the second highest and calculated to be 2.8991 with a standard deviation of 1.40729. Specifically, the highest portion of the farmers indicated to be using texting services in a moderate way as represented by 29.4%. About 18.3% and 16.5% of the farmers indicated to using texting services in a high and very high manner. However, 25.7% of the farmers were not using texting services at all with about 9.2% of the farmers only using the service in a low manner. Mobile banking, OLX, Mkesho and E-extension were the least popular ICT based services with mean scores of 1.5229, 1.1560, 1.1376 and 1.5872 respectively. It was just a mere 0.9%, 2.8%, 0.9% and 6.4% of the farmers who reported to be using mobile banking, OLX, Mkesho and E-extension services in either high or very high magnitude. In fact, majority of the farmers reported never to have used these services at all as represented by 65.1%, 92.7%, 89.9% and 71.6% for mobile banking, OLX, Mkesho and E-extension services. According to Munyua (2008), SAFARICOM dominates the Kenya's mobile phones services with notable monopoly in MPESA, texting and voice services. MPESA has transformed lives in Kenya, socio-economically, especially to the rural poor who can receive small amounts of money from their relatives working in urban areas to invest in their farms. This flow of financing makes a huge difference since the farmer can liaise with market operators' kilometers away making business flow much faster and smoother. (<http://en.wikipedia.org/wiki/M-pesa>.) Those farmers who were not using ICTs in marketing of farm produce provided a number of reasons as shown in Table 4.

Table 4: Reasons for not Using ICTs

Reason	Frequency	Percentage
Never heard about it	2	7.1%
ICTs too expensive/costs don't justify the use	8	28.6%
Lack of exposure/awareness	10	35.7%
Lack of interest/poor attitude	2	7.1%
Old age	6	21.4%
Totals	28	100.0%

Table 4 shows that the reason that was advanced to have contributed to lack of use of ICTs in marketing was lack of exposure/awareness as represented by 35.7% of the total

responses. This was closely followed by farmers who indicated ICT gadgets/services as too expensive and hence were not able to use them as represented by 28.6% of the total responses. However some farmers (21.4%) were not using ICT gadgets/services due to their old age. About 7.1% of the farmers were not using ICTs since they had not heard about them before while a similar proportion reported to have had lack of interest and poor attitude towards ICTs. These results are consistent with Patrick and Rosemary (2006) who noted that lack of exposure to ICT gadgets contributes to lack of use and eventually poor utilization of the gadgets in marketing in Kenya. Likewise, according to Chowdhury (2006), the high cost of ICT gadgets significantly reduce the ability of farmers to access their services and impairs the economic performance of small and medium scale enterprises in East Africa. This study was interested in the frequency of use of ICTs in marketing of farm produce. Table 5 summarizes how the studied farmers were using ICT in marketing.

Table 5: Frequency of Use of ICTs in Marketing Farm Produce

Responses	Frequency	Percent	Cumulative Percent
Not at all	20	18.3	18.3
Low	23	21.1	39.4
Moderate	45	41.3	80.7
High	20	18.3	99.1
Very high	1	0.9	100.0
Total	109	100.0	

ICTs were mainly used in search for markets, receiving payments on sale, inquiry of prices and advertisement of farm produce. The results in Table 9 show that a cumulative of 80.7% of the farmers were either not using ICTs in marketing or were using it in a low or moderate manner. Specifically, majority of the farmers (41.3%) were using ICTs in a moderate manner while 21.1% were using the ICTs in a low manner. However, about 18.3% were not using the gadgets at all in marketing of farm produce. On the other hand, it was only 18.3% and 0.9% of the farmers who were using the ICT gadgets in a high and very high manner. This observation is consistent with Huyer and Sikoska (2003) who noted that although ICT's have the immense potential to reshape, reorganize, and restructure marketing of farm produce in Kenya, its potential have not been adequately utilized. Likewise, these results are consistent with Rathgeber and Adera (2000) and Bartholomew et al, (2009) who noted that although modern ICTs have enhanced information exchange amongst farmers and improved farmers' ability to make decisions, develop ideas and consequently improve their

livelihoods through better marketing, its use in agricultural marketing still poses serious challenges and low adoption. Some of the challenges that farmers indicated to encounter their use of ICT in marketing are shown in Table 6.

Table 6: Challenges of using ICTs in Marketing

	Not at all	Low	Moderate	High	Very high	Total	Mean	Std. Deviation
Lack of electricity	2.8	3.7	15.6	19.3	58.7	100	4.275	1.035
Inaccessible internet/connectivity	2.8	10.1	12.8	25.7	48.6	100	4.073	1.128
Inadequate services from extension officers	1.8	10.1	20.2	14.7	53.2	100	4.073	1.144
Lack of ICT gadget/tool	7.3	19.3	32.1	14.7	26.6	100	3.339	1.264
Lack of motivation	7.3	17.4	39.4	17.4	18.3	100	3.220	1.158
Lack of awareness	15.6	15.6	26.6	24.8	17.4	100	3.128	1.313
Negative attitude	13.8	17.4	30.3	21.1	17.4	100	3.110	1.279

Table 6 shows that the most serious challenge in the use of ICTs in marketing was found to be lack of electricity to run some of the gadgets, inaccessible internet/connectivity and inadequate services from extension officers as reflected with a mean score of 4.275, 4.073 and 4.073 respectively. The results indicate that a total cumulative of 93.6% of the farmers indicated lack of electricity to be a moderate, high or very high challenge on the use of ICT in marketing. These responses were distributed as very high (58.7%), high (19.3%) and moderate (15.6%). It was just 3.7% and 2.8% of the respondent who indicated that the challenge was low or inexistent at all, respectively. The results further indicated that a total cumulative of 87.1% of the farmers as facing a great challenge to the use of ICTs in marketing due to inaccessible internet (connectivity) in a moderate (12.8%), high (25.7%) or very high (48.6%). It was just 10.1% and 2.8% of the respondent who indicated that the challenge was low or inexistent at all, respectively. Inadequate service from extension officers was reported to be another major challenge of using ICTs. A cumulative of 88.1% of the farmers indicated to have experienced a moderate (20.2%), high (14.7%) and high level (53.2%) challenge in the use of ICTs in marketing as a result of inadequate extension services from extension officers. With regard to the extension services received, only 10.1% and 1.8% of the farmers indicated to have had either low or no challenge at all respectively. Other challenges that were reported to be contributing to low use of ICTs in marketing were identified to be lack of ICT gadgets/resources, lack of motivation, lack of awareness and negative attitude with mean scores of 3.339 (1.264), 3.220 (1.158), 3.128 (1.313) and 3.110 (1.279) where the bracketed values are the standard deviations. Some of the suggested solutions that could be used to improve the farmers' use of ICTs in marketing as proposed by the respondent farmers were as depicted in figure 2.

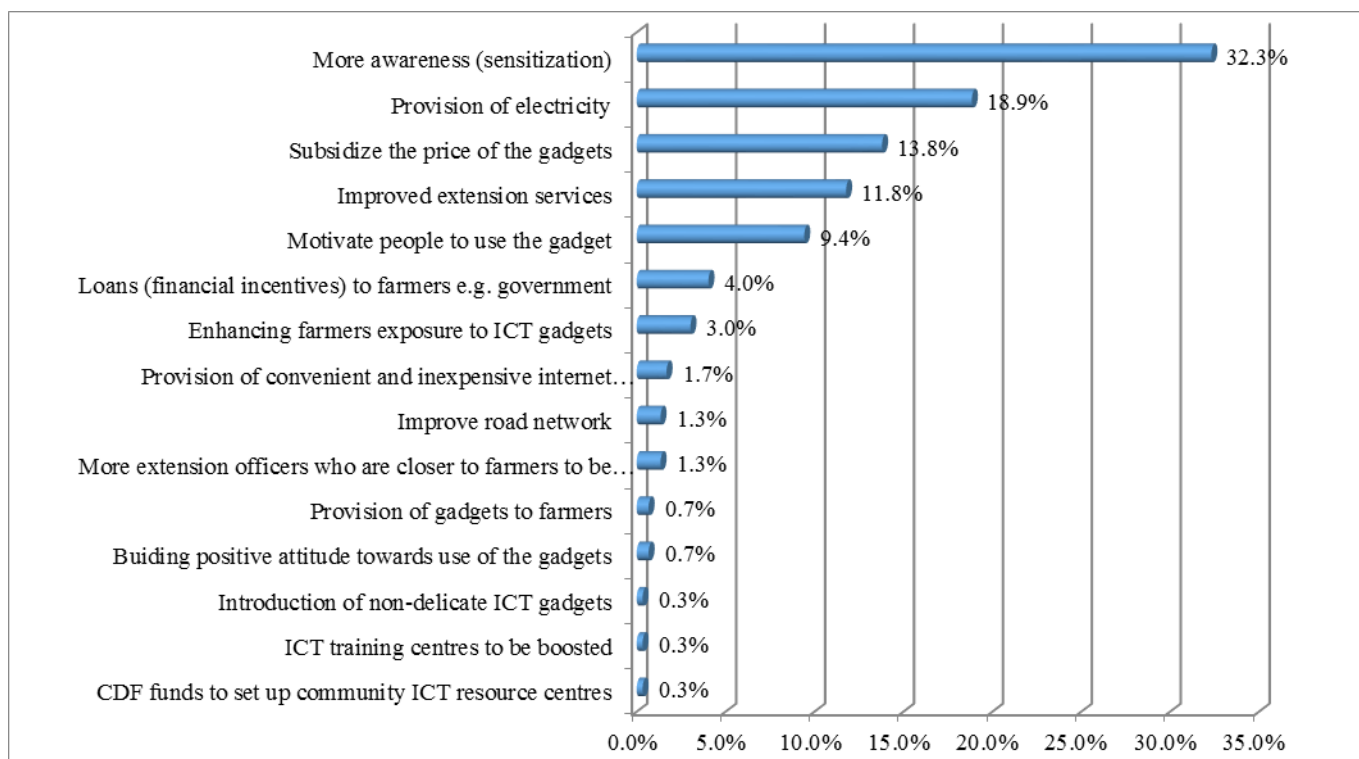


Figure 2: Suggested Solutions for Improving Farmers' Use of ICTs in Marketing

Figure 2 shows the solution that was suggested by most farmers (32.3%) as the creation of more awareness (sensitization). This could be implemented through seminars, media, barazas, education centres among other avenues. Provision of electricity in the rural areas was suggested as a possible solution by a total of 18.9% of the farmers and was closely followed by subsidizing of the price of the gadgets (13.8%), improvement of extension services (11.8%) and motivation of people to use the gadget (9.4%). Other suggestions were: provision of loans (financial incentives) to farmers (4.0%), enhancing farmers' exposure to ICTs (3.0%), and provision of convenient and inexpensive internet connectivity (1.7%), availing of more extension officers closer to farmers (1.3%) and improvement of road networks in the study area (1.3%). Other solutions that were cited by few farmers were building of positive attitude towards use of ICTs (0.7%), provision of gadgets to farmers (0.7%), mobilization of CDF funds to set up community ICT resource centres (0.3%), boosting the establishment of ICT training centres (0.3%) and introduction of non-delicate ICT gadgets (0.30%).

Relationship Between Level of Education of Farmers and Use of ICTs in Marketing Farm Produce by Small-Scale Farmers in Manga Sub-County

This section covers the results and discussion on the relationship between level of education of farmers and use of ICTs in marketing farm produce by small-scale farmers in Manga Sub-County. This study sought to determine the highest levels of education by the farmers. Table 7 shows the distribution of the farmers' highest level of education. It can be noted that most of the farmers had secondary and post-secondary level of education.

Table 7: Farmers' Highest Level of Education

Highest Level of Education	Frequency	Percent
No formal education	10	8.4
Primary	28	23.5
Secondary	37	31.1
Post-Secondary Education	44	37.0
Total	119	100.0

The results show that about 37.0% of the farmers, forming the majority, had post-secondary level of education. This was closely followed by farmers with secondary level of education as represented by 31.1% of the farmers. About 23.5% of the farmers had primary level of education. However, about 8.4% of the farmers had no formal education. The high representation of farmers with post-secondary level of education could be attributed to farming being a lucrative activity. It could also be due to the current high rates of unemployment in the country in which majority of the youths with tertiary education, who could otherwise be engaged in other sectors of the economy are forced to result to farming

(Government of Kenya, 2010). The low representation of the farmers with polytechnic level of education could be attributed to the lack of government emphasis and support of these types of institutions for a long time (Kimaru et al., 2001).

Test of Hypothesis H₀₁

This section presents the result of testing hypothesis at 95% significance level of objective one. The objective was translated into the following hypothesis:

H₀₁ There is no statistically significant relationship between the level of education of farmers and use of ICTs in marketing of farm produce by small-scale farmers in Manga Sub-County.

The hypothesis was tested using Pearson's correction coefficient. The Pearson's correction coefficient analysis of the relationship between the level of education of farmers and use of ICTs in marketing of farm produce among small-scale farmers in Manga Sub-County is shown in Table 8.

Table 8: Relationship Between Level of Education of Farmers and Use of ICTs in Marketing of Farm Produce by Small-Scale Farmers

		Use of ICTs in marketing	Highest Level of Education
Use of ICTs in marketing	Pearson Correlation	1	.256**
	Sig. (2-tailed)		.007
	N	109	109
Highest Level of Education	Pearson Correlation	.256**	1
	Sig. (2-tailed)	.007	
	N	109	109

** . Correlation is significant at the 0.01 level (2-tailed).

On testing the relationship between level of education of farmers and use of ICTs in marketing farm produce by small-scale farmers in Manga Sub-County, a Pearson's Correlation coefficient of +0.256 with a P-value of 0.007 was obtained. Since a level of $P \leq 0.05$ significance level was adopted, the results of the study indicate that level of education of farmers has a significant relationship with the use of ICTs in marketing farm produce by small-scale farmers and hence the null hypothesis was rejected. Thus the level of education of farmers has a significant relationship with use of ICTs in marketing farm produce among small-scale farmers in Manga Sub-County. This study also made effort to determine the farmers' perception on the relationship between level of education and use of ICTs in marketing of farm produce. The results are summarized in Table 9.

Table 9: How Level of Education Affects Use of ICTs in Marketing Farm Produce

Effect of Level of education on use of ICTs	SD	D	U	A	SA	Totals
Search for markets of farm produce	2	8	5	62	23	100
Receiving payments from sale of produce	5	13	13	54	15	100
Inquiry of prices for farm produce	8	16	22	45	9	100
Advertisement of farm produce	8	15	27	42	8	100

Majority (85%) of the farmers agreed with the assertion that level of education affects ICTs adoption as shown in Table 9. Specifically, 62% agreed while 23% strongly agreed. Only 10% of the respondent disagreed (8% disagreed and 2% strongly disagreed). Further, 5% of farmers were undecided on whether education has effect on use of ICTs in their marketing. As far as the effect of level of education on use of ICTs in receiving of payments from sale of produce was concerned, majority of the farmers (54%) agreed with the statement. A further, 15% of the farmers strongly agreed with the statement. About 13% disagreed, 5% strongly disagreed while 13% were not decided. This study noted that majority of the farmers (45%) were of the opinion that the level of education of farmers influence their use of ICTs in inquiry of prices for farm produce. This was closely followed by farmers who were undecided as represented by 22%. About 16% of the farmers disagreed. On the extreme ends, this study noted that it was only 9% of the farmers who strongly agreed and 8% who strongly disagreed. Most of the farmers (42%) were of the opinion that the level of education of farmers influence their use of ICTs in advertisement of farm produce. A further 8% strongly agreed on the matter. This was closely followed by farmers who were undecided as represented by 27%. It was just 16% of the farmers who disagreed (and a further 8% who strongly disagreed), that it was only 9% of the farmers who strongly agreed and 8% who strongly disagreed. This agrees with Olwande et al., (2009) who carried out a study on agricultural technology adoption (including modern marketing) and observed that the farmers' level of education was one of the strongest determinants of intensity of adoption. Likewise, Mburu et al., (2007) noted that education level of the farmers was a significant factor that influences the farmers' adoption of various milk marketing methods in Kenya Highlands.

4 CONCLUSION AND RECOMMENDATIONS

This study concludes that there was a significant relationship between level of education of farmers and use of ICTs in marketing farm produce among small-scale farmers in Manga Sub-County. Education level is an important determinant of intensity of adoption of ICT in marketing of farm produces. The study recommends on enhancement of different project about ICTs where farmers could get easy access to communicate with people to sell their goods in market. The government and other related department should also plan to reach these farmers and provide latest information about prices, market and markets on the time for their farm produce. Adequate forums (seminars) meant to train farmers on use of ICTs in the marketing of farm produce should be encouraged. Once the skills are disseminated to some few farmers, it becomes very easy for other farmers to learn from their fellow farmers on how to use the ICT gadgets and achieve good results in farm produce marketing.

REFERENCES

- [1] Aker, J. C. (2011). Dial "A" for agriculture: a review of information and communication technologies for agricultural extension in developing countries. *Agricultural Economics*, 42 (6), 631-647.
- [2] Aker, J.C. (2008). Does digital divide or provide? The impact of cell phones on grain markets in Niger. *Job Market Paper*, Berkeley.
- [3] Alonge, J.A. (2005). Beyond technology determinism, Applying technology triangle model to assess the integration of technology by Florida's secondary Agriculture Teachers. *Proceedings of the 21st Century Association of American Agricultural Educators Annual conference*, San Antonio, Tx.
- [4] Ashraf, N., Gine, X. and Karlan, D. (2006). Finding missing markets (and a disturbing epilogue): Evidence from an export crop adoption and marketing intervention in Kenya, Nairobi.
- [5] Barrett, C. (2008). Small scale market participation: Concepts and evidence from eastern and southern Africa. *Food Policy*, 34, 299-317.
- [6] Bartholomew, A., Wainwright, D. and Green, G. (2009). Policy Issues of e-Commerce Technology Diffusion in Southeast Nigeria. *Case of Small Scale Agribusiness 2* (1): 39-48
- [7] Chowdhury, S.K. (2006). Investments in ICT-capital and economic performance of small and medium scale enterprises in East Africa. *Journal of International Development*, 18, 533-552.
- [8] Communication Authority of Kenya (2016). *Mobile Penetration in Kenya: Quarterly Sector Statistics Report (2016)*. Retrieved from www.ca.go.ke/index.php/what-we.../366-kenya-s-mobile-penetration-hits-88-per-cent.
- [9] Fafchamps, M. and Gabre, M.E. (2006). Agricultural markets in Benin and Malawi. *African Journal of Agricultural and Resource Economics*, 1: 67 – 94.
- [10] Fafchamps, M. and Hill, R.V. (2005). Selling at the farm gate or traveling to the market. *American Journal of Agricultural Economics*, 87 (3), 717-734.
- [11] FAO (2010). "Climate-Smart" Agriculture Policies, Practices and Financing for Food Security, Adaptation and Mitigation. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy.
- [12] Farrell, G. (2007). *Survey of ICT and Education in Africa*. Information Development, Uganda
- [13] Government of Kenya (2010). *Agricultural Sector Development Strategy 2010 – 2020*. Government Printer, Nairobi, Kenya.
- [14] Hussein, M.S. and Safa, L. (2009). Factors affecting use of information and communication technologies (ICTs) by Iranian agricultural faculty members. *World of Applied Science Journal*, 6 (8), 212-250
- [15] Huyer, S. and Sikoska, T. (2003). 'Overcoming the Gender Digital Divide: Understanding the ICTs and their potential for the Empowerment of Women. In straw Research Paper Series No. 1', Retrieved from http://www.uninstraw.org/en/research/gender_and_ict/virtual_seminars

- [16] Kimaru, P. K., Nafula, N.N., Manda, D.K., Bedi, A.S. Mwabu, G. and Kimenyi, M.S. (2001). Education Indicators in Kenya. KIPPRA Working Paper No. 4. Nairobi: Kenya Institute for Public Policy Research and Analysis.
- [17] Kiveu, M. and Ofafa, G. (2013). Enhancing market access in Kenyan SMEs using ICT. *Global Business and Economics Research Journal*, 2(9): 29-46.
- [18] Mangesi, K. (2010). A comparative study of approaches to ICT policy formulation and implementation in Ghana and South Africa. Unpublished M.Sc Thesis, Natal: University of Kwa-Zulu.
- [19] Nassiuma, D.K., (2000). Survey sampling: Theory and methods. Nairobi: University of Nairobi.
- [20] Orodho, A.J. (2005). *Statistics Made User Friendly for Education and Social science Research*. Masola Publishers.
- [21] Patrick O.A. and Rosemary, A. (2006). *Agricultural Policy in Kenya: Issues and Processes*. A paper for the Future Agricultures Consortium workshop, Institute of Development Studies, 20-22 March 2006
- [22] Poulton, C., Kydd, J. and Doward, A. (2006). Overcoming market constraints on pro-poor agricultural growth in sub-Saharan Africa. *Development Policy Review*, 24 (3), 243-277. Presentation at the University of Illinois at Urbana-Champaign. Retrieved from http://lightning.itcs.uiuc.edu/india2007/grahame_dixie.html
- [23] Rathgeber, E.M & Adera, E.O (2000). Gender and the Information revolution in Africa.
- [24] Shepherd, W. (2007). Approaches to linking producers to markets: A review of experience to date. *Agricultural Management, Marketing and Financial Occasional paper 13*, FAO, United Nations, and Rome.
- [25] Shiferaw, B, Obare, G. and Muricho, G. (2007). Rural market imperfections and the role of institutions of collective action to improve markets for the poor. *Natural Resources Forum*, 32 (1), 25-38