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International Journal of Curriculum and Instruction 15(3) (2022) 1414–1428

IJCI
International Journal of Curriculum and Instruction

Influence of non-formal agricultural education on uptake of tissue culture banana technology in Kiambu county, Kenya

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Abstract

The study objective of this study was to determine the influence of non-formal agricultural education on uptake of tissue culture banana in Kiambu County, Kenya. The theoretical foundation for this study was diffusion innovation theory and technology acceptance model. This study utilized a descriptive survey research design. The target population for the study were 1881 farmers in the 12 sub-counties in Kiambu County. The purposive sampling method was used to select 6 sub-counties which included Gatundu South, Thika Town, Githunguri, Kiambu, Kabete and Limuru. Therefore, the sample size for the study was 302 farmers from 6 sub-counties in Kiambu County. Primary data was collected using questionnaires. Descriptive statistics was adopted to analyze quantitative data. A linear regression analysis was conducted to determine the relationship between non-formal agricultural education and the uptake of improved agricultural technology. The study found that non-formal agricultural education had a significant and positive influence on uptake of tissue culture banana in Kiambu County, Kenya. The study concludes that non-formal agricultural education has a significant influence on uptake of improved agricultural technology of tissue culture banana in Kiambu County. The study recommends that more vocational institutions offering agricultural education should be established in Kenya. This would increase the number of individuals in agriculture who are innovative.

Keywords: Non-formal educaton, agricultural education, tissue-culture, banana

1. Introduction

Agriculture is the backbone of many economies globally. This is because agriculture contributes highly to nation's gross domestic product (Ofoegbu, 2015). Therefore, education is very important in agriculture in a rapidly changing technological or economic environment. Agricultural education may have both cognitive and non-cognitive effects for farmers. Cognitive outputs include the transmission of specific information as well as the formation of general skills and proficiencies. The education also produces non-cognitive changes in attitudes, beliefs and habits (Osongo, 2014). Therefore, increasing

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literacy and numeracy may help farmers to acquire and understand information and to calculate appropriate input quantities in a modernizing or rapidly changing environment. Improved attitudes, beliefs and habits may lead to greater willingness to accept risk, adopt innovations, save for investment and generally to embrace productive practices (Asfaw & Admassie, 2014). Agricultural education covers non-formal learning activities that build capacity within the agriculture sector. Non-formal education includes agricultural extension contacts, apprenticeships, adult literacy training, vocational and in-service training (Qin & He, 2015). Non-formal education most often serves to transmit specific information needed for a particular task or type of work.

The study used diffusion innovation theory and technology acceptance model. Technology acceptance model is tailored to agricultural education in that when individual is educated on agricultural activities, perceived ease of use and usefulness would influence their uptake of an agricultural technology. The diffusion of innovation theory explains how, over time, an idea or product gains momentum and diffuses (or spreads) through a specific population or social system. The end result of this diffusion is that people, as part of a social system, adopt a new idea, behavior, or product. In relation to the study, diffusion of innovation can be applied since providing agricultural education is a form of communication and can communicated over time, through various types of communication channels. Individuals who are taught about agricultural technology can pass the knowledge to other individuals, hence, the diffusion of innovation.

Production of bananas in Kenya is basically a small-scale farm activity, with a national average of 0.32 ha of bananas per farm (Muyanga, 2009). Banana production in the country has been on the decline over the last decade due to invasions by pests and diseases. Traditional cultural practices in banana production have been a major cause of this problem. Farmers transmit inadvertently most of the banana pests and diseases through banana suckers through the practice of sourcing planting material from fellow farmers (Mathenge, Smale & Tschirley, 2015). Responding to this challenge of declining banana production, Kenya Agricultural Research Institute (KARI) and several non-governmental organizations (NGOs) have been in the forefront promoting adoption of tissue culture banana technology since 1997. Tissue culture technology, popularly known as TC, is a method of biological research in which fragments of tissue from a plant are transferred to an artificial environment in which they can continue to survive and function (Collier & Dercon, 2014). The main aim is to provide clean and disease-free planting material. This process does not alter any genetic make-up of the plant (Kabunga, Dubois & Qaim, 2012).

While some households have opted not to adopt tissue culture banana biotechnology, almost all the adopters are growing tissue culture bananas alongside non-tissue culture banana varieties (Muyanga, 2010). The scale of production and productivity of non-tissue banana varieties significantly exceeds that of tissue culture bananas. The cost of production of tissue culture bananas exceeds that of non-tissue varieties. Among the key drivers of adoption include education level of the household head, land tenure and credit availability. Incomes of households that have adopted tissue culture banana biotechnology are not a significantly different from those of the non-adopters. The results generally indicate that smallholder farmers in Kenya are yet to realize the full potential of tissue culture banana biotechnology.

The agricultural education can contribute to agricultural development by strengthening capabilities for innovation and willingness to adopt and apply new technologies. In addition, farmers would be able to engage with traders and other actors on a more equal footing. Although collective action in the form of farmer associations or cooperatives can be a source for continued agricultural education, they tend to be more effective when farmers have achieved a minimum level of literacy and numeracy (Ahmed, 2015). Globally, in the US Agricultural education is an old and well-established area of study. Formal programs in agricultural education are conducted at secondary schools, community colleges and universities. As a vocational educational program, agricultural education focuses on three major components formal classroom instruction, career experience programs and leadership development. These components are delivered through a competency-based curriculum in the context of agriculture in the USA. Beyond the secondary agriculture program, community colleges and universities provide excellent opportunities for students to specialize and gain skills and knowledge in agriculture (Knight, Weir & Tassew, 2013). In Malaysia, the government provides informal courses to farmers. The courses concentrate on teaching managerial skills as inevitable means for small farms to succeed by making farmers more creative and innovative (Lee, Gereffi & Beauvais, 2012).

In Africa, since the end of The Second World War, the role and importance of agricultural education has undergone profound and unprecedented change. From being a relatively minor activity principally concerned with the training of junior field staff for work in agricultural extension, forestry and animal health, technical education and training in food and agriculture are now universally recognized as key factors in the whole process of economic and social development in African countries. Agricultural education at all levels, from university faculties through intermediate levels to framer training, has developed out of all recognition during the past 10 years. In some African nations like Nigeria, South Africa Ghana and Kenya, agriculture has been introduced in general school curricula at secondary education levels as a compulsory or as an optional subject (Olwande & Mathenge, 2010).

In Kenya, in the 1990s, agriculture was taught in schools mainly to impart knowledge to pupils and inculcate in them a positive attitude towards farming (Ayua & Omware, 2013). Today, agricultural education has been incorporated in the school curriculum and is taught in secondary schools and tertiary institutions. As a result, the government provides resources to support agricultural education in partnership with the private sector such as seed and agricultural chemical companies and foreign donors, educate farmers through short courses, field tours and demonstrations that lead to the usage of new technologies (Nyang'au *et al.*, 2020, 2021, 2022a, 2022b). The expansion of agricultural education at theoretical and practical levels in Kenya is anticipated to positively impact on farming standards and increase production (Omiti, 2012). However, in Kenya, most farmers only have access to primary education. Basic education is also frequently biased against agriculture since most school curricula do not incorporate agriculture as part of learning (Ouma et al., 2010). The quality of tertiary agricultural education is critical because it determines the expertise and competence of scientists, professionals, technicians, teachers, and civil service and business leaders in all aspects of agriculture and related industries. It raises their capacities to access knowledge and adapt it to prevailing challenges and to generate new knowledge and impart it to others. The absence or decline of education and training institutions leaves a large gap in a country's innovation capacity. Even so, government and donor investments in agricultural education and training have become negligible (Ahmed, 2015).

2. Research methodology

2.1 Setting

This study was conducted at Kiambu County. The County is one of the 47 Counties in the Republic of Kenya that was established under the constitution of Kenya 2010. Its location is the central region and covers a total area of 2543.5 Km^2 43.6 Km^2 under forest cover. The county borders Nairobi and Kajiado Counties to the South, Machakos to the East, Murang'a to the North and North East, Nyandarua to the North West, and Nakuru to the West. The county lies between latitudes 00 25'and 10 20'South of the Equator and Longitude 360 31'and 370 15'East. Currently, Kiambu County has twelve (12) constituencies, which are Gatundu South, Gatundu North, Juja, Thika Town, Ruiru, Githunguri, Kiambu, Kiambaa, Kikuyu, Kabete, Limuru, and Lari. These constituencies are further divided into 60 electoral wards. Ruiru Constituency has the highest number of wards with eight wards, while the rest of the constituencies have five each with the exemption of Kiambu, Gatundu South and Gatundu North, which has four each.

The county has a total population of 2.417,735 of which 1,187,146 are males, 1.230.454 females and 135 intersex persons. There are 796.241 household with an average household size of 3.0 persons per household and a population density 952 people per square kilometre (KNBS, 2019). On education, there are 1515 ECD centers, 948 primary schools, 365 secondary schools, 33 youth polytechnics, 165 adult education centers, 1 technical training institution, 1 technical institute of technology and five universities.

The county annual rainfall varies with altitude, with higher areas receiving as high as 2,000 mm and lower areas of Thika Town constituency receiving as low as 600 mm. The average rainfall received by the county is 1,200 mm. The mean temperature in the county is 26o C with temperatures ranging from 7oC in the upper highland areas, to 340C in the lower midland zone. The county's average relative humidity ranges from 54 percent in the dry months and 300 percent in the wet months of March up to August. Agriculture is the predominant economic activity in the county and contributes 17.4 per cent of the county's population income. It is the leading sub sector in terms of employment, food security, income earnings and overall contribution to the socio-economic well-being of the people. Majority of the people in the county depend on the sub sector for their livelihood, with 304.449 directly or indirectly employed in the sector (Kiambu County, 2020).

2.2 Research Design

The study adopted a descriptive survey research design. Descriptive survey research design can be explained as a statement of affairs as they are at present with the researcher having no control over variable. Descriptive survey research is aimed at casting light on current issues through a process of data collection that enables them to describe the situation more completely than was possible without employing this method (Fox & Bayat, 2007). The main purpose of a descriptive survey study is describing, explaining and validating research findings. It also provides the opportunity to integrate the qualitative and quantitative methods of data collection. Therefore, this design was suitable in establishing the influence of agricultural education on uptake of improved agricultural technology: a case of tissue culture banana in Kiambu County.

2.3 Participants

A population is any group of institutions, people or objects that have common characteristics (Creswell, 2013). Mugenda and Mugenda (2009) describes the target population as complete set of individual cases or objects with some common characteristic to which the research wants to generalize the result of the study. In this study, the population comprised farmers in Kiambu County. The farmers were targeted because they are involved in agricultural activities and hence, they were able to explain whether agricultural education has been helpful in their use of technology in their farming activities. The study targeted farmers in the 12 sub-counties in Kiambu County. The population of farmers as obtained from Kiambu County is as shown in Table 1.

Table 1: Target Population

Sub-County	*Frequency (Farmers)f*	*Percent %*
Gatundu South	146	8
Gatundu North	169	9
Juja	98	5
Thika Town	155	8
Ruiru	88	5
Githunguri	116	6
Kiambu	189	10
Kiambaa	134	7
Kikuyu	181	10
Kabete	157	8
Limuru	243	13
Lari	205	11
Total	**1881**	100

Source: Kiambu Agriculture, Livestock & Fisheries (2020)

2.4 Sampling Procedure and Sample Size

Sampling is a procedure, process or technique of choosing a sub-group from a population to participate in the study. This subgroup is carefully selected so as to be representative of the whole population with the relevant/similar characteristics (Ogula, 2005). Sampling is also the process of selecting a number of individuals for a study in such a way that it is fairly a representative of the large group from which they were selected. The purposive sampling method was used to select the sub counties that were part of the study. In purposive sampling the researcher relies on their own judgment when choosing members of the population. Out of the 12 sub counties in Kiambu, the study sampled 6 sub-counties. This includes; Gatundu South, Thika Town, Githunguri, Kiambu, Kabete and Limuru. The stratified random sampling method was used to select the farmers in the selected sub counties. It is a method of obtaining a representative sample from a population that have been divided into relatively smaller sub-populations. Stratified random sampling method is suitable because it minimizes ample selection bias. Sample size refers to the number of participants or observations included in a study. This number is usually represented by n. To determine the population, the researcher adopted 30% of the target population. According to Mugenda and Mugenda (2009), in a descriptive study, a sample size of 10-50% is acceptable. The study sample size was 302 respondents. This is a shown in Table 2.

Table 2: Sample size

Sub-County	*Frequency (Farmers)*	*Sample Size*
Gatundu South	146	44
Thika Town	155	47
Githunguri	116	35
Kiambu	189	57
Kabete	157	47
Limuru	243	73
Total	*1006*	*302*

2.5 Research Instruments

Primary data was collected using questionnaires. The questionnaire was structured into close ended questions. Closed questions structure the answer by only allowing responses which fit into pre-decided categories. Close ended questions provide quantitative data. The questionnaires was used because they allow for a greater geographical coverage of respondents within a short time and are flexible enough to give the respondents adequate time to respond to the items, they are cheap to administer given that the only costs are those associated with printing or designing the questionnaires, their postage or electronic distribution, the absence of an interviewer provides greater anonymity for the respondent and when the topic of the research is sensitive or personal it can increase the reliability of responses.

The questionnaire was structured in line with the study objectives. It had six sections: section one covered the demographic information of the respondents, section two, three, four and five had questions on the independent variables while section six covered questions on the dependent variable.

2.6 Validity

Validity is the degree to which the instrument measures the constructs under investigation (Kothari, 2013). To test for validity, the study used the content validity method. Content validity was used since it measures the degree to which the sample of the items in the research instrument represents the content that the test is designed to measure. Validity was affirmed by discussing the instrument with experts in this study field who include the supervisors because it is believed that they are conversant with this activity. From the discussion, the researcher was able to correct the questionnaire.

2.7 Reliability

Reliability refers to the extent that the instrument yields the same results over multiple trials (Miana, 2012). To determine the reliability the test-retest method was used. Test-retest is a method that administers the instrument to the same sample at two different points in time.

In this study the questionnaires were administered to the same sample for an interval of one week. If the scores at both time periods are highly correlated, > .70, they can be considered reliable. The scores from the tests was assessed using the cronbach's alpha. Cronbach alpha is a correlation coefficient between two sets of data. Field (2009) argues that Cronbach's alpha value that is at least 0.70 suffices for a dependable research instrument. In this study a threshold of 0.70 was espoused to establish the reliability of the data collection instrument. The reliability results are as shown in Table 3 below.

Table 3. Reliability Results

Variable	*Cronbach Alpha*	*Verdict*
Formal Agricultural Education	0.748	Reliable
Non-Formal Agricultural Education	0.761	Reliable
Informal Agricultural Education	0.734	Reliable
Uptake of Improved Agricultural Technology	0.772	Reliable

The results show that formal agricultural education had a Cronbach alpha value of 0.748, non-formal agricultural education alpha of 0.761, informal agricultural education alpha of 0.734 and uptake of improved agricultural technology alpha of 0.772. This implies that all the variables were reliable.

2.8 Data collection procedures

The researcher obtained an introduction letter from the university. Further a research permit was obtained from NACOSTI. This assisted in introducing the study to the respondents. During data collection, the researcher introduced the study to the respondents. The researcher administered the questionnaires to the farmers. The researcher gave the respondents one week to give feedback on the questionnaire. This gave them enough time to fill up the questionnaires and return them to the researcher either via mail or the hard copy. Participation in the study was voluntary. The respondents were not coerced to participate in the study. Those willing to take part were provided with a consent form to sign. Anonymity was ensured since the respondents were not to appear anywhere in the research. The respondents were informed that the study is only meant for academic purposes and that their information will be treated confidentially.

2.9 Data analysis

The questionnaires were checked for completeness and edited. Data was then coded using Statistical Package for Social Sciences (SPSS version 23). Descriptive statistics was adopted to analyze quantitative data. Descriptive statistics are mean, standard deviation, frequency and percentages. The analyzed data was presented in form of tables for easy understanding. Correlational analysis was conducted to determine the strength and direction of the relationship between the independent and dependent variables. A linear regression analysis was conducted to determine the relationship between and independent variable and a dependent variable. The model was as follows;

$Y= \beta_0+ \beta_1X_1+ \varepsilon$ ……………………………………………………………………1

$Y= \beta_0+ \beta_2X_2+ \varepsilon$……………………………………………………………………..2

$Y= \beta_0+ \beta_3X_3+ \varepsilon$……………………………………………………………………..3

Multiple regressions also were conducted to determine the relationship between the independent and the dependent variable. The regression equation was:

$$Y= \beta_0+ \beta_1X_1+\beta_2X_2+ \beta_3X_3+ \varepsilon$$

Where:

Y= Uptake of improved agricultural technology

β_0 = Constant term

X_1= Formal agricultural education

X_2= Non- formal agricultural education

X_3=Informal education agricultural

ε=error term

$\beta_1, \beta_2, \beta_3$ are coefficients of determination and ε is the error term.

3. Results

The findings show that majority of the respondents were in agreement that agricultural field officers are always available to provide updated information on technologies in the county as shown by a mean of 3.80 and standard deviation of 0.72, through extension education have been able to acquire knowledge on farming technologies as shown by a mean of 3.93 and standard deviation of 0.81, extension education has been highly helpful in the use of technology in my farming activities as shown by a mean of 3.73 and standard deviation of 0.76, in-service training about agricultural technology is conducted for farmers through the county government support as shown by a mean of 3.89 and standard deviation of 0.83, adult literacy training is held to train farmers on new farming technologies as shown by a mean of 3.97 and standard deviation of 0.87, through vocational training have been able to acquire new skills on usage of farming technologies as shown by a mean of 3.85 and standard deviation of 0.77 and vocational training has been highly helpful in the use of technology in my farming activities as shown by a mean of 3.83 and standard deviation of 0.79. The findings concur with those of Chimoita, Onyango, Kimenju and Gweyi-Onyango (2017) who found an association between the extension agents and agents work experience with the work experience enhancing the uptake of improved sorghum technologies by farmers.

Table 4. Non-formal agricultural education

Statements	*1*		*2*		*3*		*4*		*5*		*Mean*	*Std. dev.*
	f	*%*	*F*	*%*	*f*	*%*	*f*	*%*	*F*	*%*		
Agricultural field officers are always available to provide updated information on technologies in our county	16	5.6	26	9.2	48	16.9	104	36.6	90	31.7	3.80	0.72
Through extension education have been able to acquire knowledge on farming technologies	12	4.2	21	7.4	41	14.4	111	39.1	99	34.9	3.93	0.81
Extension education has been highly helpful in the use of technology in my farming activities	17	6.0	30	10.6	36	12.7	130	45.8	71	25.0	3.73	0.76
In-service training about agricultural technology is conducted for farmers through the county government support	11	3.9	25	8.8	32	11.3	131	46.1	85	29.9	3.89	0.83
Adult literacy training is held to train farmers on new farming technologies	13	4.6	28	9.9	34	12.0	89	31.3	120	42.3	3.97	0.87
Through vocational training have been able to acquire new skills on usage of farming technologies	18	6.3	24	8.5	43	15.1	98	34.5	101	35.6	3.85	0.77
Vocational training has been highly helpful in the use of technology in my farming activities	15	5.3	26	9.2	35	12.3	124	43.7	84	29.6	3.83	0.79

The farmers were further asked to indicate how many acres of land they use four farming activities. Table 5 below is a presentation of the results.

Table 5. Acres of Land used for Farming

Acres of Land	*Frequency*	*Percent*
1 – 4 acres	118	41.5%
5 – 8 acres	89	31.3%
9 – 12 acres	45	15.8%
Above 13 acres	32	11.3%
Total	***284***	***100.0%***

Table 5 indicates that majority (41.5%) use 1-4 acres of land for farming, 31.3% used 5-8 acres, 15.8% use 9-12 acres and 11.3% use more than 13 acres for farming. This implies that farmers at Kiambu County use more than one acre in their farming activities.

The farmers were requested to indicate the number of bananas suckers they plant per stool. The results were as presented in table 6 below.

Table 6. Number of Banana Suckers Planted Per Stool

Banana Suckers	*Frequency*	*Percent*
Three	147	51.8%
Four	86	30.3%
Five	51	18.0%
Total	*284*	*100.0%*

The results in Table 6 shows that majority (51.8%) of the farmers plant three banana suckers per stool, 30.3% four banana suckers while 18.0% plant five banana suckers per stool. This implies farmers at Kiambu Count plant at least three banana suckers per stool.

The study sought to determine the yields in kgs that farmers get from your farming activities as shown in Table 7 below.

Table 7. Yields (kg)

Yields	*Frequency*	*Percent*
100kg-500kg	103	36.3%
501kg-1000kg	114	40.1%
Above 1001 kg	67	23.6%
Total	*284*	*100.0%*

The results in Table 7 depict that majority (40.1%) of the farmers get 501kg-1000kg of yields from their farming activities, 36.3% get 100kg-500kg of yields while 23.6% get more than Above 1001 kg. This implies that farmers in Kiambu County get more than 100kg of yields from their farming activities.

The study sought to determine the level of income the farmers get from their farming activities. The results are as shown in Table 8 below.

Table 8. Income Level of Farmers

Income Level	*Frequency*	*Percent*
Ksh 100, 000 to 250, 000	139	48.9%
Ksh 250,001 to 500, 000	90	31.7%
Above Ksh 500, 001	55	19.4%
Total	*284*	*100.0%*

Table 8 shows that majority (48.9%) of the farmers level of income is between Ksh 100, 000 to 250, 000, 31.7% level of income is between Ksh 250,001 to 500, 000 while 19.45 level of income is above Ksh 500, 001. This implies that farmers in Kiambu County level of income form farming activities is more than Ksh 100,000.

3.6 Regression Analysis for Non-Formal Agricultural Education

A linear regression analysis was conducted to determine the influence of non-formal agricultural education on uptake of improved agricultural technology. The regression analysis comprises of the model summary, analysis of variance and beta coefficients.

In model summary the study determined the variation of uptake of improved agricultural technology due to change in non-formal agricultural education. Table 9 is a summary of the results.

Table 9. Model Summary for Non-Formal Agricultural Education

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	0.701 [a]	0.491	0.486	0.27306

The model summary results in Table 9 shows that the adjusted R-square is 0.486. This indicates that 48.6% variation in uptake of improved agricultural technology was caused non-formal agricultural education. The remaining 51.4% implies that there are other factors influencing uptake of improved agricultural technology that were not used in this model.

Analysis of variance was used to determine whether the data is significant at 0.05 significance level. Table 10 below is a summary of the results.

Table 10. ANOVA for Non-Formal Agricultural Education

Model	*Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
1 Regression	8.306	1	8.306	130.672	0.001[a]
Residual	17.925	282	0.064		
Total	26.231	283			

From the findings in Table 10, the F-calculated (130.672) is greater than the F-critical (3.875) from the F-distribution tables. Also, the significance value (0.001) is less that (0.05). This implies that the model is significant in predicting uptake of improved agricultural technology by farmers in Kiambu County.

A t-test was conducted to determine if there is a significant relationship between non-formal agricultural education and uptake of improved agricultural technology. The coefficient results were summarized in Table 11 below.

Table 11. Coefficients for Non-Formal Agricultural Education

Model	*Unstandardized Coefficients*		*Standardized Coefficients*	*t*	*Sig.*
	B	Std. Error	Beta		
1 (Constant)	1.604	0.236		6.797	.001
Non-Formal Agricultural Education	0.382	0.112	.294	3.411	.001

The model was fitted as follows;

$Y= 1.604+ 0.382X_2$

The equation shows that holding non-formal agricultural education at a constant zero, uptake of improved agricultural technology will be at a constant of 1.604. The results also show that, non-formal agricultural education had a significant and positive influence on uptake of improved agricultural technology (B = 0.382, p = 0.001). Therefore, an increase in non-formal agricultural education would result to an increase in uptake of improved agricultural technology by 38.2%.

4. Discussion

4.1 Non-Formal Agricultural Education

The study found that majority of the respondents agreed that agricultural field officers are always available to provide updated information on technologies in the county (m= 3.80, SD = 0.72). Further, through extension education have been able to acquire knowledge on farming technologies (m = 3.93, SD = 0.81), extension education has been highly helpful in the use of technology in farming activities (m = 3.73, SD = 0.76), in-service training about agricultural technology is conducted for farmers through the county government support (m = 3.89, SD = 0.83), adult literacy training is held to train farmers on new farming technologies (m = 3.97, SD = 0.87), through vocational training have been able to acquire new skills on usage of farming technologies (m = 3.85, SD = 0.77) and vocational training has been highly helpful in the use of technology in my farming activities (m = 3.83, SD = 0.79).

The study also established that, non-formal agricultural education had a significant and positive influence on uptake of improved agricultural technology (B = 0.382, p = 0.001). Therefore, an increase in non-formal agricultural education would result to an increase in uptake of improved agricultural technology by 38.2%.

5. Conclusion

The study sought to determine the influence of non-formal agricultural education on uptake of tissue culture banana in Kiambu County, Kenya. The study concludes that non-formal agricultural education has significant influence on uptake of improved agricultural technology of tissue culture banana in Kiambu County. Through extension education, in-service training, adult literacy training and vocational training farmers have been able to acquire new skills on usage of farming technologies which has been highly helpful in the use of technology in my farming activities.

6. Recommendation

The study found that non-formal agricultural education has significant influence on uptake of improved agricultural technology of tissue culture banana in Kiambu County. Therefore, the study recommends that more vocational institutions offering agricultural education should be established in Kenya. This would increase the number of individuals in agricultural education who are innovative.

7. Acknowledgement

The article is based on chapter 5 of master's thesis study conducted by the first author.

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