

Impact of Kaguru Agricultural Training Centre Curriculum on Gaining Knowledge among Smallholder Farmers in Imenti South Sub-County, Meru County, Kenya

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ABSTRACT

Modern reforms in agriculture triggered by the critical decline in food security, the empowerment of smallholder farmers through systematic training has become one of the most influential factors in the socio-economic growth. This paper assesses the importance of the curriculum that is used at the Kaguru Agricultural Training Centre (ATC) in enhancing the knowledge of smallholder farmers in Imenti South Sub-County, Meru County, Kenya. The study was built on the wider vision of spreading research work on innovative technology and creations as far as social-economic growth is concerned. The research design being descriptive used both analyses of quantitative and qualitative data to bring out a balanced determination of the curriculum effectiveness. A sample of 217 participants was selected through a stratified type of random sampling. Structured questionnaires and interview schedules were used to collect data for statistical and contextual information. The statistical tools were used in analysing quantitative data, and thematic analysis were used in analysing qualitative responses. The findings revealed that curriculum used at Kaguru ATC imparted knowledge on modern farming methods among farmers with medium to high degrees of effects in specific areas such as management of crops and animals. The study concluded that the curriculum helped to improve the knowledge and its effectiveness was impeded by too outdated content outdated and lack of proper training facilities and budget. The study recommended that there is need to redesign the ATC curriculum to be more in touch with the modern agricultural developments, more funding of training facilities and implementation of constant feedback system between the farmers and the institution.

Keywords: Impact, Agricultural Training, Smallholder farmers.

INTRODUCTION

Background of Study

Sustainability of agriculture is highly dependent on the relevance and flexibility of the agricultural training curricula that determine how farmers learn new knowledge, skills, and techniques that fit their production requirements. (Skrimizea et al., 2020). As it was mentioned by Dhanaraju et al. (2022), sustainable agriculture supports techniques and approaches that will preserve natural resources and the livelihoods of farmers. Training sessions are needed, either in the short/long-term and formal/informal, in preparing farmers to overcome the challenges posed by modernity as climate change, food insecurity, and environmental degradation (Wonde et al., 2022). According to Smith (2018), these programs address a wide range of concerns, including aspects of pest management, soil fertility, crop production, sustainable farming practices, and others. The eventual outcome is to improve the ability of small-holder farmers (SHFs) to maximize yields of crops and livestock by means of modernized farming styles. The agricultural education is then regarded as another pillar toward the enhancement of food security and economic stability (de Janvry & Sadoulet, 2020). Evidence indicates that farming training programmes increase their yields, decrease environmental influence and farming systems resiliency (Gupta et al., 2020; Mueller et al., 2017).

At the continental scale, African states are taking up training programs as one of the avenues of contemporary and sustainable agricultural practices. Nigeria, in particular, has embraced new technologies, i.e., conservation agriculture and integrated input packages with the objective of modernizing farming, youth employment, and sustainability of agriculture as a source of income (Momoh et al., 2018). Nevertheless, there is still a series of obstacles facing African farmers, including poor access to extension services, exposure to innovations in agriculture, and institutional support of the farmers (FAO, 2019).

In sub-Saharan Africa and especially East Africa, smallholder farmers have been empowered through agricultural training centres (ATCs) and through farmer fields schools. It was determined by Davis et al. (2012) that those institutions increase the availability of knowledge in the market, the use of technology, and ultimately more productivity and income. In the same vein, Mbeche et al. (2020) reported a positive relationship existed between continuous training and extension services on one hand and increasing sustainability of agricultural practices and better farm management by farmers on the other hand. These results echo the objectives of ATCs in East Africa, which is to increase agricultural literacy and productivity among SHFs.

In Kenya, farming stands out as the core sector of the economy and most of the farmers are smallholders (Kinyanjui, 2019). SHFs may not use modern techniques in food production, and the main problems affecting them include the lack of the adoption of modern technology, pests and diseases, and soil erosion (Dhillon & Moncur, 2023; FAO, 2014). In Kenya, training programs, as represented by Murithi et al. (2016) create an opportunity to enhance production by giving each farmer a chance to acquire appropriate skills through methods that standardize the knowledge of skills directly to local contexts. Mwangi and Kariuki (2020) feel that to design effective agricultural training programs, there must be thorough knowledge of the unique issues of SHFs such as limited resources, low levels of extension coverage and the exposure to climatic variability.

Agriculture is still the primary means of subsistence in Meru County, with Kaguru ATC being one of the institutions that offer education and capacity building to farmers (Dave, 2020). However, studies indicate that not much has been done to assess how effective tailored agricultural training programs in Meru County are in consideration to the unique needs of smallholder farmers (Mbugua et al., 2018). This is particularly important in the Imenti South Sub-County whereby SHFs overwhelmingly dominate the agrarian setting but still struggle with various problems including invasion of pests, a lack of soil fertility, scanty access to modern inputs, and an insufficient level of technical competence. It has been suggested by Rasanjali et al. (2021) that environmentally friendly practice readiness depends significantly on the effective agricultural learning and preparation.

The study thus aims at investigating the impact of Kaguru ATC towards knowledge and farming practices of SHFs in Imenti South Sub-County, Meru County, Kenya. The study will provide answers to the role of agricultural training in closing knowledge gaps and the potential it holds in improving the uptake of modern farming technologies especially in the developing world that depend on farming to support their livelihoods and contribute to their economies.

STATEMENT OF THE PROBLEM

Despite the fact that Kaguru ATC over the years has trained smallholder farmers, reports interviewed show that a significant number of farmers continue to use primitive ways of farming. This paradox begs the question as to whether the ATC curriculum is sufficient in equipping the students with a means of contesting the dynamic challenges of the contemporary global agriculture industry. Obsolete training material, inadequate resources, and poor institutional and (farmer) connections jeopardize the relevancy of the centre programs. Without problem-solving these gaps, they can make the role of ATCs in overcoming food insecurity and poverty in rural areas quite minimal.

Objective of the Study

To evaluate the influence of Kaguru ATC Agricultural curriculum in modern farming practices on enhancement of knowledge among smallholder farmers in Imenti South Sub County, Meru County Kenya.

Research Hypotheses

Within the framework of the identified specific objectives, the present study sought to test the following hypotheses:

H₀₁: The Kaguru ATC Agricultural Curriculum in modern farming practices has no significant influence on the enhancement of knowledge among smallholder farmers in Imenti South Sub-County..

RESEARCH METHODOLOGY

A descriptive study design was used. The smallholder farmers sampled were 217 as determined through stratified random sampling. They were done through structured questionnaires and interviews. Data were also analysed descriptively (mean, median, frequency) and regression applied. Qualitative data were studied in theme form.

RESULTS AND DISCUSSION

Demographic Characteristics of Respondents

The demographical features of the respondents are important to the interpretation of the findings of the current research because such variables as age, gender, education level, and experience of farm work determine access to and utilization of agricultural training. These attributes give context to the smallholder farmers participating in the research and facilitate the understanding of differences in the knowledge acquisition and the adoption of Kaguru Agricultural Training Centre curriculum. The sample (n = 217) was compared and contrasted with the national population margins (Table 1). Findings show that the sample is widely representative of the Kenyan farming population although middle-aged farmers and secondary educated slightly overrepresented.

Table 1: Demographic Characteristics of Kenyan Farmers (N = 217)

Variable	Category	Frequency	Percentage (%)	National (%)
Gender	Male	128	59.0%	55
	Female	89	41.0%	45
Age	Below 30 years	36	16.6%	26
	31–50 years	122	56.2%	49
	Above 50 years	59	27.2%	25
Education Level	No formal education	42	19.4%	
	Primary	89	41.0%	47
	Secondary	58	26.7%	36
	Tertiary	28	12.9%	17

Majority of the participants were male (59%) and in the middle age bracket (31- 50 years). There was at least primary education among the majority of them, and 12.9% had attained tertiary level. This implies that Kaguru ATC will mostly attend to semi-educated smallholder farmers and education levels will vary to a large degree.

Influence of Agricultural Curriculum on Knowledge Enhancement

Agricultural curriculum is the focal point in developing the way small holder farmers learn and apply new knowledge. A good curriculum does not only expose the modern agricultural practices and technologies but makes the training practical, localized, and based on the needs of the farmers. The study of the impact of the Kaguru Agricultural Training Centre curriculum is thus valuable in offering imperative information on the level of success in developing knowledge among farmers and the promotion of the use of sustainable farming methods.

Levels of Agreement about the Curriculum

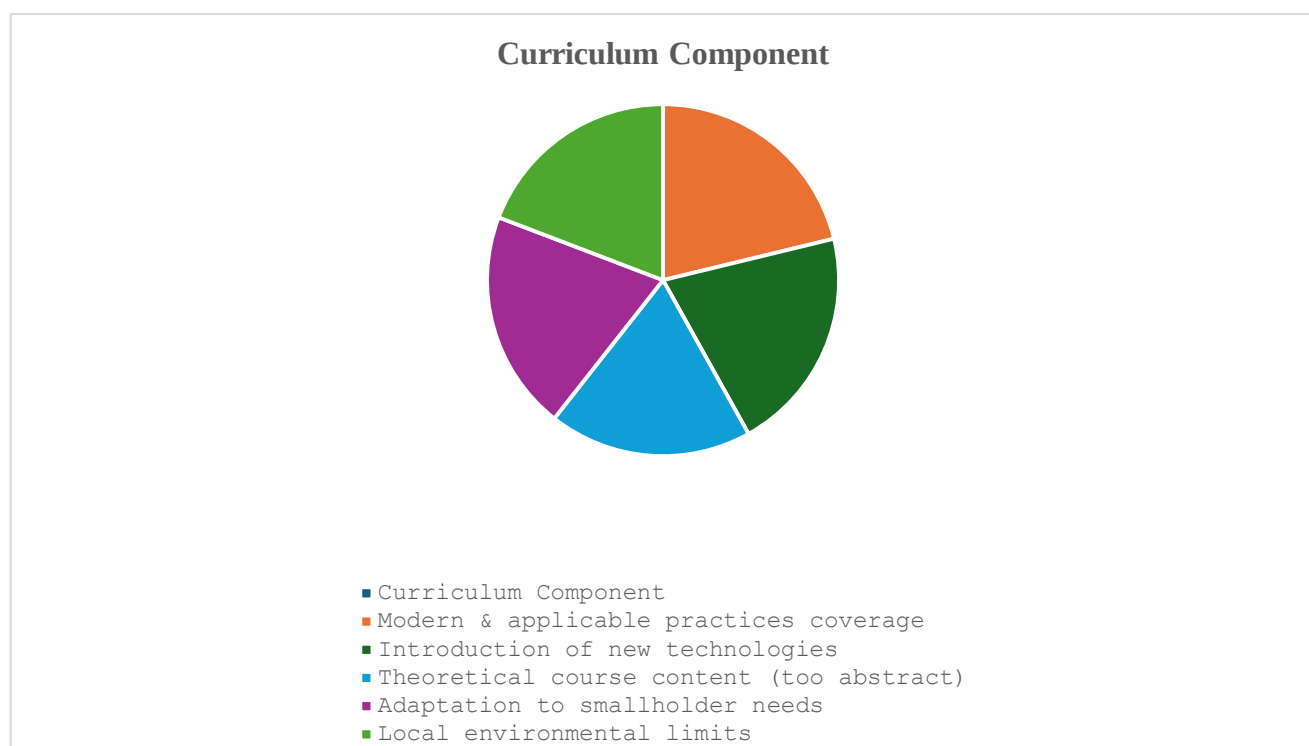
The evaluation of the extent of consensus among farmers on the agricultural curriculum presents useful information on how farmers perceive that it is relevant, applicable, and effective. The opinions of respondents

emphasize the availability of the content in the curriculum to meet their practical needs, use of modern farming methods and aiding the acquisition of knowledge. The knowledge of these levels of agreement assists in analyzing how the Kaguru Agricultural Training Centre curriculum is in line with the expectations of the smallholder farmers and their actual situations.

Table 2: Levels of Agreement about the Curriculum

Curriculum Component	Mean Score	%Agreement
Modern & applicable practices coverage	4.2	78%
Introduction of new technologies	4.1	74%
Theoretical course content (too abstract)	3.7	64%
Adaptation to smallholder needs	4.0	70%
Local environmental limits	3.8	66%

The curriculum is seen as relevant at large (78% agree) but it is too abstract (64%) and not really localized.



Regression Results on Curriculum

A regression analysis was performed to establish how much the agricultural curriculum contributed to knowledge improvement of the smallholder farmers. The finding revealed the curriculum positively influenced the score significantly and explained a large percentage of the variance in the knowledge scores. This implies that the design, content and delivery of Kaguru Agricultural Training Centre curriculum are essential in enhancing knowledge and skills of farmers. Table 3 shows the regression results on curriculum.

Table 3: Regression Results on Curriculum

Curriculum Variable	Coefficient (β)	Std. Error	95% CI	p-Value
Relevance to Modern Practices	0.35	0.12	[0.11, 0.59]	0.003
Integration of New Technologies	0.31	0.11	[0.09, 0.53]	0.007
Theory-Practice Balance	0.27	0.10	[0.07, 0.47]	0.010
Adaptation to Smallholder Needs	0.29	0.11	[0.08, 0.50]	0.006
$R^2 = 0.68$				

$N = 217$ Mean VIF = 1.82 (no serious multicollinearity)

In the type of curriculum, relevance proved to be the most significant predictor of improvement in knowledge (0.35). Altogether, knowledge enhancement was determined by 68% variance attributed to the currency factors.

Bootstrap Confidence Intervals

The stability of the main coefficients was proved by bootstrap estimates (1,000 resamples). The bootstrapped 95% CIs were very similar to the standard regression estimates.

Influence Diagnostics

The Distance analysis and leverage analysis of Cook has resulted in two possible influential cases. The omission of these did not significantly alter the results, which was found to be robust.

Unweighted vs Weighted Results

In cases where there was post-stratification, there were post-stratification weights. The weighted and unweighted regression estimates were similar indicating external validity.

Power Analysis

The design was over 80% powerful to identify standardized effects of medium size (Cohen's $f^2 \approx 0.15$) with $n = 217$ and $k = 6$ predictors. It is however too weak to pick small effects. Therefore, the null results cannot be taken to be the conclusive results of no effect.

Example statement: At $n = 217$, $k = 6$ predictors, the design will have greater than 80 per cent power to identify standardized medium effects, but will be underpowered to identify small effects.

Cluster Robustness

Considering that the participants were sampled among the households in the villages, the cluster-robust standard errors were re-estimated in regression analysis. The results were stable and the design effects were found to have a good sample size of about 202.

SUMMARY

The research was able to determine that the Kaguru Agricultural Training Centre curriculum significantly influenced the deepening of the knowledge of the smallholder farmers in the Imenti South Sub-County, Meru County. Demographic factors indicated that the majority the respondents are male (59%), aged 31-50 years (56.2%), and had not gone beyond primary education, 12.9% having had tertiary education. This implied that most of the respondents were semi-educated smallholder farmers with different education levels. On the question of curriculum, most respondents said it was current and pertinent (78%), and that it presented new technologies (74%). Nevertheless, a significant percentage (64%) of those saw it as being too theoretical, and 70% of those felt that it was not localized enough to meet the special requirements of smallholder farmers. The regression findings showed that the curriculum played a significant role in enhancing the knowledge with an explanation of 68% of the variance in the knowledge scores ($R^2 = 0.68$). The most powerful predictor of knowledge gain was relevance to modern practices ($b = 0.35$, $p = 0.003$), then, the integration of new technologies ($b = 0.31$, $p = 0.007$), the adaptation to the needs of the smallholder, and the balance between theory and practice ($b = 0.29$, $p = 0.006$). In general, the curriculum was discovered to have a positive effect on knowledge gain in domains of crop and livestock management, but farmers noted a need to have more practical, localized, and context-focused training methods.

CONCLUSIONS

The paper concludes that the Kaguru Agricultural Training Centre curriculum is central towards increasing knowledge among smallholder farmers in Imenti South Sub-County, Meru County. It was observed that the curriculum was quite relevant, up to date and efficient in delivering modern farming practices and technology and regression results have discovered that the curriculum explained 68 percent of the variation in terms of knowledge gain. Nevertheless, regardless of its merits, the curriculum was found too abstract and not focused enough on the particulars of the domestic setting and issues of the smallholder farmers. These results emphasize that, although Kaguru ATC curriculum does contribute greatly to knowledge of farmers in fields like crop and livestock management, its success is limited by the lack of contextualization and the undue focus on theory rather than practice.

RECOMMENDATIONS

1. The Kaguru ATC curriculum must be restructured to lessen its intellectual-focused nature and more realistic and field-based education and contextualized to meet the specific problems of smallholder farmers which include invasion of pests, soil fertility control and climate variability issues in Imenti South.
2. It should be in the curriculum and should also consist of updated modules of modern farming technologies, climate-smart practice and sustainable management of resources so that the farmers can be in touch with the new development of agriculture.
3. There should be investment in establishing and improving of laboratory facilities, demonstrations farms, and other practical learning areas to enhance experiential learning.
4. Kaguru ATC must initiate ongoing feedback mechanisms that capture the experiences, problems, and changing needs of farmers in order to make curriculum changes and be responsive to the realities of farmers.
5. Funding and mobilization of resources ought to be given first priority and government, NGOs and partnership between the government and the private sector should be allied to enhance the implementation of the curriculum and delivery of training.
6. The trainers and facilitators must also experience on-going professional development in order to be able to demonstrate competence in both contemporary agricultural methods and participatory instructions to adult learners.

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