

INFLUENCE OF ACCESS TO ADVISORY SERVICES ON ADOPTION OF INDIGENOUS AGRICULTURAL PRACTICES IN CHUKA SUB-COUNTY, KENYA

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ABSTRACT

The study examines factors that could be addressed to increase the adoption of Indigenous Agricultural Practices (IAPs) among smallholder farmers. Data were collected from 100 farmers who were already using IAPs, selected through stratified sampling; data collection was conducted in June 2020 structured questionnaire was used to gather information, and the data were analyzed using both descriptive and inferential statistics. The results showed a significant positive correlation between access to advisory services and the adoption of IAPs but also revealed that these services were often inaccessible and not useful to farmers. The study further found that extension agents were not readily available and that lack of relevant training materials and untimely service delivery hindered the adoption of IAPs. Despite these challenges, farmers reported that radio and farmer-to-farmer contact were affordable, reliable, and readily available sources of agricultural information. The current results suggest that access to agricultural advisory services needs to be improved to increase the adoption of IAPs. The findings of the study have implications for extension education and the development of policies and incentives to enhance access to these services for smallholder farmers. The results can also be used to promote sustainable agricultural productivity through the adoption of IAPs.

Keywords: Adoption, Indigenous agricultural practices, Radio, Farmer-to-farmer contacts, Advisory services, Smallholder farmers

INTRODUCTION

The growing human population has caused significant changes in global food production systems, characterized by unsustainable conventional farming practices. To address this pressure on the planet, farmers should focus on practices that enhance sustainability (Abdullah & Hassan, 2015). Indigenous knowledge-based practices, such as agroforestry, crop rotation, intercropping, organic manure, and minimum tillage, have gained prominence as they boost soil nutrients and structure, and are locally developed farming systems adopted by farmers in specific agroecological zones (Abid *et al.*, 2016). However, in Indonesia, agroforests have been replaced with monoculture plantations (Alufah *et al.*, 2012). Agroforestry promotes soil carbon enrichment and reduced soil erosion, improving food security.

Crop rotation discourages soil degradation and crop pests and diseases, and is less vulnerable to the impacts of climate variability. Despite these benefits, IAPs have become less popular among farmers in recent times (Casmir *et al.*, 2012). Low

adoption of these on-farm technologies can be linked to various factors, including access to credit and poor access to advisory services (Chaudhry, 2011). Better access to advisory services can improve the adoption of IAPs. Research in Kenya has shown that socio-economic factors, such as land tenure, sources of finance, farm size, and access to credit, influence the adoption of IAPs for soil conservation practices among farmers (Duchene *et al.*, 2017). However, there is a lack of research on the relationship between access to advisory services and the adoption of IAPs in the Chuka sub-county (Feintrenie *et al.*, 2010; Faure *et al.*, 2012). Therefore, this study aimed to examine the relationship between access to advisory services and the adoption of IAPs in Chuka sub County, Kenya. The findings of the study will be beneficial in promoting the enhancement of access to agricultural advisory services towards the adoption of IAPs. The purpose of the study was to examine the contribution of access to advisory services to the adoption of Indigenous Agricultural Practices (IAPs) among farmers.

METHODOLOGY

Study Area and Participants

The study was conducted in the Chuka sub-county to examine the correlation between socioeconomic factors and the adoption of Indigenous Agricultural Practices (IAPs) among smallholder farmers. Agriculture is the primary source of livelihood in the area and many farmers use IAPs in various forms (Ketema & Bauer, 2012; Lavison, 2013). Chuka sub-county is located in an agroecological zone on the upper midland with an altitude of approximately 1,500 meters above sea level (Okeyo *et al.*, 2014). The area is primarily composed of smallholder livestock and crop farmers who raise cattle, goats, sheep, and poultry, and grow crops such as coffee, maize, beans, tea, bananas, sunflower, tobacco, and vegetables (Muchunku, 2014). A sample of 100 farmers was used for the study, as it is considered sufficient for a survey study according to Fraenkel *et al.* (2015). The farmer population was divided into three wards (Mugwe, Karinagni, and Magumoni) from which the study participants were randomly selected.

Data Collection

The study used a descriptive correctional design to examine the relationship between access to advisory services and the adoption of IAPs. Lodico *et al.* (2010) noted that this type of design is useful when the researcher has no control over the independent variable. Data was collected through a structured questionnaire given to farmers practicing IAPs. Muchunku (2014) stated that this method offers advantages in its application and can reach a large audience. A pilot study was conducted in Muthambi Ward with a sample of 15% ($n = 18$) of the full sample, which is considered acceptable in social sciences (Hazzi & Maldaon, 2015). The results of the pilot study were used to confirm the validity and internal consistency of the research instrument. The reliability coefficient for access to advisory services and adoption of IAPs was + 0.89 and + 0.68, respectively. Nunnally *et al.* (1994) and Ferketich (1991) cited in Moorthy *et al.* (2012) suggest that a Cronbach's alpha coefficient of at least 0.60 is acceptable in social sciences (Table 1).

Table 1: Reliability Coefficients

Items	No. of items	Cronbach's Alpha
Access to advisory services ^a	8	0.89
Adoption of IAPs ^b	5	0.68

Note: ^a = Independent variables, ^b = Dependent variable; ^a = 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree; ^b = 1 = Not at all, 2 = Very low, 3 = Low, 4 = High, 5 = Very high; $N = 18$

Data Analysis

Access to advisory services was the independent variable and the adoption of IAPs was the dependent variable. A 5-point Likert scale was used to measure the variables, which were then converted into continuous data. Data analysis was conducted using SPSS version 22 and descriptive statistics, including percentages, means, frequencies, and standard deviation. A Pearson's correlation was utilized to determine the relationship between access to advisory services and the adoption of IAPs in terms of direction and strength. The Pearson correlation coefficient, denoted by r , indicates the strength of the linear relationship between two variables (Jaleta *et al.*, 2013). The coefficient ranges from +1 to -1, with a value of zero indicating no relationship between the variables. A value above zero denotes a positive association and a value below zero indicates a negative association (Porro *et al.*, 2012; Kuntashula *et al.*, 2014). The correlations were evaluated at a 95% significance level, with a p-value of less than 0.05. Linearity was determined through the examination of two scatterplots: access to credit and adoption of IAPs, and access to advisory services and adoption of IAPs

(Prager & Posthumus, 2010). It was found that the adoption of IAPs was a linear function of both access to credit and access to advisory services.

RESULTS AND DISCUSSION

The study included 100 farmers, with 60% being male and 40% being female. This indicated that the majority of farmers in the region are men. The ages of the farmers varied from 24 to 80 years, with an average of 47.11 and a standard deviation of 13.71. Half of the farmers had completed secondary education (50%), while a small number had no formal education (9%). The average annual income for the farmers was Kshs. 62,820, with a standard deviation of 58176.16 and a range of Kshs. 10,000 to 400,000. This suggests that a significant portion of the farmers have low incomes.

Adoption of IAPs

The participants were asked to rate how frequently they implemented different IAPs and the results were displayed in Table 2.

Table 2: Adoption of IAPs^a

	<i>M</i>	<i>SD</i>
Crop rotation	4.01	0.88
Agroforestry	3.73	0.76
Intercropping	3.92	0.75
Organic manure	3.41	0.88
Minimum tillage	2.69	0.81

Note: ^a1 = Not at all, 2 = Very low, 3 = Low, 4 = High, 5 = Very high

According to the survey results, crop rotation was found to be widely adopted among smallholder farmers, with a mean score of 4.01 and a standard deviation of 0.88. Agroforestry and intercropping were also identified as common practices, with mean scores of 3.73 and 3.92 respectively, and standard deviations of 0.76 and 0.75. However, the use of organic manures and minimum tillage was found to be less frequently adopted, with mean scores of 3.41 and 2.69 respectively, and standard deviations of 0.88 and 0.81.

Previous research has identified access to information as a key factor in the adoption of IAPs (). The current study's findings, which show a high level of adoption of crop rotation, agroforestry, and intercropping, contrast with other studies that have suggested a decline in the importance of agroforestry in upland farming and limited experimentation with agroforestry in the Amazon region (Lorenz & Lal, 2014). In Kenya, there is both a gap in research and the adoption of agroforestry practices among subsistence farmers. Despite its potential benefits, such as reducing soil erosion and increasing soil fertility, it is not widely adopted (Martini *et al.*, 2017). The findings of this study are consistent with previous research that has shown crop rotation to be a commonly practiced method among farmers (Duchene *et al.*, 2017). Increasing the area allocated to legumes could improve the impact of crop rotation on staple crops, as noted by Kuntashula *et al.* (2014).

Intercropping, which involves planting different crops in the same field, has been a common practice for centuries and is still used on many farms today. Studies have shown that intercropping can reduce production costs, improve water efficiency, and increase productivity (Ngwira *et al.*, 2012). However, despite these benefits, the adoption of intercropping among smallholder farmers is relatively low, particularly among those with smaller landholdings. This is partly because intercropping

is used to maintain soil fertility rather than add to it. In addition, intercropping is often seen as a traditional farming method, primarily used on small farms in Africa, which promotes soil fertility and food security. It has been found that intercropping coffee and banana can be more profitable than growing these crops separately.

The use of organic manure, such as animal and green manure, is also low among farmers, but studies have shown that its adoption is increasing (Ishida *et al.*, 2018). Organic farming has the potential to feed the world at the same level as conventional agriculture, and organic manure is becoming increasingly important for sustainable crop management among smallholder farmers. Additionally, the integration of bio-fertilizers is seen as a superior soil treatment for high crop yields, and organic food products are considered safer for human and animal consumption (Nyaga *et al.*, 2015). Research in Chuka sub-county has shown that crop residues are often used for both mulch and livestock feed, leading to less soil organic matter (Muchunku, 2014). This may be due to a lack of information about the importance of organic manure among farmers.

According to Ishida *et al.* (2018), the adoption of organic manures and minimum tillage practices is low. However, it is important to note that these practices have a higher potential for adoption compared to the use of agrochemicals (Patil *et al.*, 2014). The study by Holden *et al.* (2018) in Malawi found that lack of access to relevant information is a major constraint for farmers in adopting these methods. Similar findings were reported in previous studies in Accra and Zambia by Lavison (2013) and Ngoma *et al.* (2014), respectively; the studies found that farmers with larger farm sizes and access to information, capital, and labor were more likely to use minimum tillage and organic manure.

Access to Advisory Services and Adoption of IAPs

The survey participants were prompted to select their preferred source of advisory services from a list of options. The data collected from these responses are presented in Table 3. This information allows one to gain an understanding of the most popular choices among the respondents and can be used to inform decisions and strategies related to

advisory services in the future. Additionally, by analyzing the data in Table 3, it is possible to identify patterns or trends that may exist within the responses, such as a particular source being more popular among certain demographic groups or industries. Overall, the results from this question provide valuable insight into the preferences and needs of the survey participants regarding advisory services..

Table 3: Sources of Advisory Services (N = 100)

	Frequency	Percentage
None	1	1.0
Radio	30	30.0
Radio/television	6	6.0
Extension agents	14	14.0
Agricultural books/manuals	1	1.0
Agricultural books	7	7.0
Other farmers	25	25.0
Television	16	16.0

Table 3 illustrates the diverse sources of information that farmers utilize to obtain agricultural knowledge. The data suggests that the majority of farmers utilize a variety of sources, including interpersonal contacts, mass media, and various forms of advisory services. The data also demonstrates that farmers rely heavily on different forms of advisory services to gain knowledge. The least source of information was none, 1%, ($n = 1$) while 30% ($n = 30$) of farmers received advisory services from the radio. The findings indicated that radios are the most commonly utilized source of information for farmers. This could be attributed to the fact that radios are easily available and accessible in many agricultural rural settings, and provide reliable information (Ronald *et al.*, 2015). The finding highlights the importance of radio as a tool for disseminating agricultural knowledge and information to farmers.

Analysis of Correlation between Access to Advisory Services and the Adoption of IAPs

A Pearson correlation analysis was conducted to determine the correlation between access to advisory services and the adoption of IAPs. The findings are displayed in Table 4.

Table 4: Access to Advisory Services and Adoption of IAPs

	Advisory Services	Adoption of IAPs
Pearson Correlation	1.00	0.51**
Sig. (2-tailed)		0.00
Pearson Correlation	0.51**	1.00
Sig. (2-tailed)	0.00	
**. Correlation is significant at the 0.01 level (2-tailed).		

The findings of the study indicate that there is a strong and positive correlation between the availability of advisory services and the implementation of IAPs ($r = 0.51$, $N = 100$, $p = 0.01$). This suggests that when farmers have access to advisory services, they are more likely to adopt IAPs on their farms. The correlation is significant, which means that there is a real and meaningful relationship between the two variables. Additionally, the correlation coefficient of 0.51 indicates that the relationship is strong, further emphasizing the importance of advisory services in the adoption of IAPs.

Furthermore, this association implies that as access to advisory services increases, the adoption of IAPs also increases linearly. This current study agreed with Qadri *et al.* (2013) who reported that for every unit increase in access to advisory services, there is a corresponding unit increase in the adoption of IAPs. This highlights the need for farmers to have access to advisory services to promote the adoption of IAPs on their farms.

Descriptive Statistics on Access to Advisory Services

The correlation between accessibility to advisory services and the adoption of IAPs among farmers was evaluated using a 5-point Likert scale, with one indicating strong disagreement and five indicating strong agreement. The average scores for the responses were recorded and presented in Table 5.

Table 5: Descriptive Statistics on Access to Advisory Services

	<i>M</i>	<i>SD</i>
The extension program training I usually attend is useful in the adoption of indigenous agricultural practices on my farm.	2.07	1.31
The extension worker provides relevant information that helps me in the adoption of indigenous agricultural practices.	2.16	1.37
The extension worker is always readily available hence enabling the adoption of indigenous agricultural practices on my farm.	1.58	0.89
The extension training service is usually timely and hence useful to the adoption of indigenous agricultural practices.	1.54	0.70
The extension worker often uses training materials relevant to the adoption of indigenous agricultural practices.	2.01	1.24
The extension workers are approachable and hence promote the adoption of indigenous agricultural practices.	1.97	1.11
I am aware of extension program training on the adoption of indigenous agricultural practices in my Ward.	1.80	1.08
I frequently attend extension program training pertaining adoption of indigenous agricultural practices.	1.49	0.58

Note: ^a = 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

According to the results from Table 5, farmers reported that they did not participate in any useful extension program training related to the adoption of IAPs on their farms ($M = 2.07$, $SD = 1.31$). They also expressed dissatisfaction with the information provided by extension workers ($M = 2.16$, $SD = 1.37$) and the availability of these workers to assist with the adoption of IAPs ($M = 1.58$, $SD = 0.89$). Additionally, the farmers felt that the training provided by extension services was not timely or useful for the adoption of IAPs on their farms ($M = 1.54$, $SD = 0.70$) and that the training materials used by the workers were not relevant ($M = 2.01$, $SD = 1.24$). The farmers also had negative opinions about the approachability of extension agents ($M = 1.97$, $SD = 1.11$) and their awareness of extension program training in their local areas ($M = 1.8$, $SD = 1.08$). They further reported that they did not frequently attend extension program training related to the adoption of IAPs ($M = 1.49$, $SD = 0.58$). Overall, the mean scores of the responses to accessibility to advisory services were low, indicating a weak relationship between access to advisory services and the adoption of IAPs. This aligns with previous studies that have found both public and private extension services have failed to effectively disseminate information to rural farm families (Ragasa *et al.*, 2016).

The provision of service delivery to farmers has been a crucial concern, with various factors impacting the effectiveness of extension services. These factors include extension experience, training, frequency of contact, participation in services, and the use of different communication methods. Lack of coordination, ambiguous policies and mandates,

insufficient funding, aging, and under-skilled agents, and limited interaction and mobility of agents with other stakeholders also play a role in determining the effectiveness of extension services. Therefore, the ratio of extension agents to farmers is not a reliable indicator of performance, and an effective system should focus on the environment in which the agents operate (Rick *et al.*, 2011).

CONCLUSION AND IMPLICATIONS

The results of the current study suggest that agricultural advisory services play a crucial role in determining the adoption of indigenous agricultural practices (IAPs). It was found that access to advisory services is a key determinant, with radio being the most widely used source of information among farmers. However, farmers also reported a lack of access to relevant and useful extension programs, which may be hindering the adoption of IAPs. The study also found that there is a significant relationship between accessibility to advisory services and the adoption of IAPs, highlighting the importance of effective extension services in promoting the adoption of IAPs. Besides, the study found that certain IAPs, such as crop rotation, were more widely adopted than others, likely due to efficient agricultural advisory services. This highlights the need to consider the specific needs and characteristics of farmers when designing and implementing extension programs. Overall, the study emphasizes the importance of addressing socioeconomic factors in promoting the adoption of IAPs among farmers.

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