International Journal of Social Sciences and Management Review

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

ADOPTION OF TECHNOLOGY BY COCOA FARMERS IN KAILAHUN DISTRICT

[1]JOE DIAWO, [2]ADOLPHUS JOHNSON & [3]TAMBA SESIE

[1]Head, Department of Community Development Studies, Eastern Technical University of Sierra Leone

[2]Corresponding Author

[3]Lecturer, Department of Agricultural Extension and Rural Sociology, Njala University

https://doi.org/10.37602/IJSSMR.2024.7209

ABSTRACT

The adoption of improved agricultural technologies by cocoa farmers is an important component for improvement in agricultural productivity especially in developing countries. This study assessed the adoption of improved agricultural technologies among 1000 cocoa farmers in eight chiefdoms in Kailahun District. The research used the non-experimental design which was the mixed method type where both qualitative and quantitative data were used. Four enumerators (one assigned to two chiefdoms) were hired and trained to collect the data. The data collection instrument was developed and explained to the enumerators in a mini pre-enumeration training session. The soft copy of the research instrument, Kobo Collect was forwarded to each of the enumerators via their mobile phones and pre-tested, gaps identified and corrected before they went out in to the field to administer the instrument. Each enumerator was facilitated to go to their assigned chiefdoms to collect the research data.

From the data gathered from the questionnaires, key issues were earmarked for focus group discussions with farmers based on set criteria such as sex and age as a means of validating the data gathered from the questionnaires.

Key Informant Interviews (KIIs) were also conducted with institutions including ministries, departments, and agencies providing support to cocoa farmers to ascertain the level of adoption of technology-facilitated by their support to the sector.

Field observation (non-participant observation) of cocoa farmers was also done to further ascertain the validity of the quantitative data.

Data from the questionnaire after being collated shed light on a number of issues which were seen to be needing clarifications. The issues which needed clarification by the farmers were made part of the focus group discussions while those needing clarification by the Ministry of Agriculture and Forestry, departments, agencies interested in cocoa farming and cocoa dealers were the subjects of the key informant interviews.

Quantitative data was analysed using excel software and Statistical Package for Social Sciences. The data was downloaded from the Open Data Kit (ODK) using the Microsoft Excel Software.

Excel was used to clean, transform and manipulate some variables and the data was exported to the Statistical Package for Social Scientists (SPSS). The SPSS was then used to do both

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

descriptive and inferential analyses. The descriptive analyses were done using frequencies and percentages, and the results were presented in tables.

The findings reveal that some cocoa farmers have indeed adopted some production technologies in nursery establishment, cultivation, shade management, pruning, harvesting, and drying of the beans and storage. The findings also reveal that though some farmers have not received any training and are therefore not knowledgeable about some cocoa production technologies, there are those who have the knowledge, but are simply too lazy to apply the knowledge acquired from trainings received over time.

It is therefore recommended that more training opportunities should be made accessible to cocoa farmers and those who are seen to be simply too lazy to apply technology acquired from trainings received should be encouraged to do so.

Keywords: Technology, Adoption, Cocoa,

1.0 INTRODUCTION

Technology is a term that dates back to the early 17 century that meant 'systematic treatment' from Greek art, craft and study knowledge. It is predated in use by the Ancient Greek used to mean 'knowledge of how to make things', which encompassed activities like architecture. Technology attracts a multiplicity of definitions. The Merriam Webster English Dictionary of 1 December, 2022 defines it as:

- The activities or function of an engineer;
- The application of science and mathematics by which the properties of matter and the sources of energy in nature are made useful to people;
- The design and manufacture of complex products and
- The capability given by the practical application of knowledge
- A manner of accomplishing a task especially using technical processes, methods, or knowledge
- The specialized aspects of a particular field of endeavor

Borrowing the National Committee on Technological Literacy definition of technology, “Technology is more than computers, digital devices, and machines. It includes a body of knowledge, people, processes, and skills involved in the design, creation, and modification of the natural state of the world. In its broadest sense, technology is the process by which humans modify nature to meet their needs and wants”. (Pearson, D.P., Duke, N.K., 2002).

Technology is the application of knowledge to reach practical goals in a specifiable and reproducible way.

While technology contributes to economic development and human prosperity, it can also have negative impacts like pollution or resource depletion, or cause social harms like technological unemployment caused by automation. As a result, philosophical and political debates have arisen over the role and use of technology, its ethics and the mitigation of the potential downsides. Many negative impacts of technology can be mitigated through technological

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

innovations like renewable energy in transportation and industry, genetically modified crops to address soil depletion, and space exploration to mitigate global catastrophic risks.

Cocoa production, by all accounts, has been the backbone of the Sierra Leone economy, contributing significantly to the country's foreign exchange earnings while also employing over 35,000 organic certified cocoa farmers making a crucial contribution to poverty alleviation in the country. (MoFA, 2019)

The findings reveal that:

- Relevant technology was adopted in the following practices in the cocoa value chain in Kailahun District : land preparation, adequate spacing of cocoa trees, cocoa propagation by seeds, careful selection of planting materials, pruning of cocoa trees, harvesting and breaking of pods, fermentation, drying, sacking, weighing and price determination.
- On the other hand, the following were identified as relevant technologies that needed to be adopted: vegetative propagation, grafting, manure application, irrigation, removal of infected pods, removal of infected seedlings, sorting of dried cocoa beans, grading of dried cocoa beans and environmental issues. In the Key Informant Interview with the Country Director of Lizard Earth, Daniel Scholler had this to say "Some of the cocoa farmers have the knowledge; their problem is the implementation of what they know from the trainings they have attended. Many are poor because they simply have low targets".
- Majority of the cocoa farmers stated they did not keep record of their farming activities. It is recommended that cocoa farmers in the District improve on the technological practices that they have adopted and adopt the ones they have not adopted.

They should try to keep record of their farming activities as that could aid easy referencing as and when the need arises.

2.0 OBJECTIVES/PURPOSE OF THE STUDY

The objectives of this research exercise were to:

i. Identify the technology needs of cocoa farmers in Kailahun District.
ii. Analyse the technologies adopted by the farmers in the District.
iii. Identify the challenges faced by the farmers in the adoption of technologies.

3.0 METHODOLOGY

The research used the non-experimental design which was the mixed method type where both qualitative and quantitative data were used. One reason for the use of this method was to ensure data triangulation confirming both quantitative and qualitative data.

3.1 Description of Study Area

Kailahun District the study area is in the Eastern Region of Sierra Leone. Its capital and largest city is Kailahun Town located270miles from Freetown.

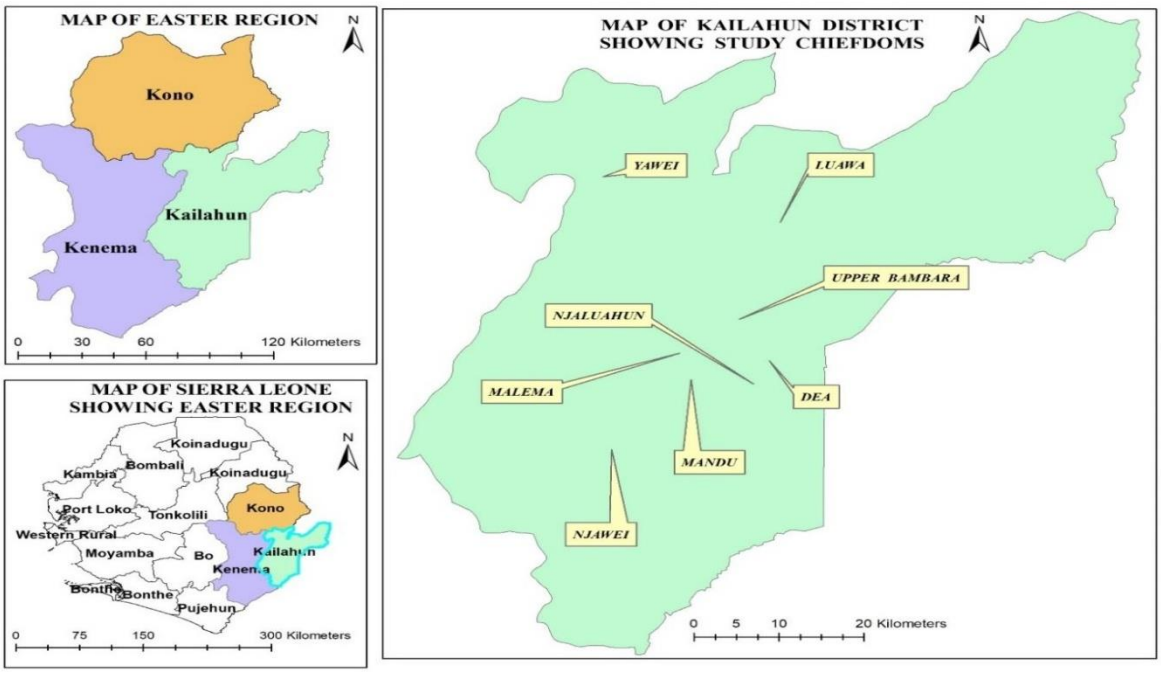
Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

Administratively Kailahun Districts are divided into fifteen (15) Chiefdoms; the newest chief dombeing Jahn Chiefdom DE-amalgamated from the Njaluahun Chiefdom. The second most populous city in the district is Segbwema. Other major towns in the District include Koindu, and Pendembuand Daru. As of the 2015 census, the district had a population of525,372. Kailahun District borders Kenema District to the west, Kono District and the Republic of Guinea to the north, and the Republic of Liberia to the east. The border of the district with Guinea is formed by a section of the Moa River. The total area of the district is 4,859 km2 (1,876sq.mi).The vast majority of the people of Kailahun District areethnic Mende. However, the district is hometo significant minority of Mandingo, Kissi, Fula, Golaand Vai. The Vai, Kissi and Gola make up the majority of the population in the villages and small towns in the district at the international border with the Republic of Liberia.(Wikipedia, 2012)

The major economic activities in the district are farming, mining, and trade. Kailahunis rich in both mineral and agricultural wealth. It has deposits of diamond and gold; and vast expanses of arable land. Food crops such as rice, the country's staple food; cassava, the fallback; oil palm and a few others as well as cash crops such as cocoa and coffee are cultivated in the district.

The topography of the district is undulating, ranging from low-lying inland plains to more disserted upland areas with elevations between 600-700 meters altitude. Most of the area has an average annual rainfall of over 2,500 mm, with 80 percent of this average falling during the period of June to November. Average annual temperatures vary between 25°C and 28°C with higher values occurring in March/April when solar radiation is most intense. The vegetation of the district is dense farm bush dominated by fast-growing, fire-resistant species that thrive under the bush fallow system. The district also has over 5,000 acres of forest reserves and protected forest areas (Gola rainforest).The district experiences two seasons; the rainy season which usually sets in in May and lasts till October and the dry season which sets in November and lasts till April.



Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

Study Area Map

4.0 RESULT/FINDINGS/DISCUSSIONS

4.1 Status of Adoption of Relevant Technologies

Having knowledge about something is good, but what makes a better difference is using the knowledge and how it is used to bring about improvements in living standards. The table below shows the level of adoption of relevant technologies in the cocoa value chain in Kailahun District.

Table 1: Status of Adoption of Relevant Technologies

Adoption Status of Relevant Technologies	Adopted		Not Adopted	
	Freq.	%	Freq.	%
Land preparation (land clearing, removal of stumps, pegging and lining)	673	67.3	327	32.7
Planting and spacing (the sowing of cocoa seeds and leaving appreciable gaps between seeds sown to promote healthy growth and good yield)	784	78.4	216	21.6
Vegetative propagation	239	23.9	761	76.1
Vegetative cutting (the use of cocoa stem or branch to obtain another cocoa tree)	189	18.9	811	81.1
Grafting (joining parts from two or more cocoa plants so that they appear to grow as one tree)	118	11.8	882	88.2
Seed propagation (sowing cocoa seeds to have new cocoa trees)	785	78.5	215	21.5
Selection of planting materials	758	75.8	242	24.2
Manure and fertilizer application	59	5.9	941	94.1
Irrigation (the process of applying controlled amount of water to plants at needed times)	313	31.3	687	68.7
Pruning (the selective removal of certain parts of cocoa tress-branches, leaves, roots)	590	59.0	410	41.0
Pest and disease control (the process of getting rid of or reducing animals, organisms or sicknesses that damage or destroy cocoa trees or pods)	359	35.9	641	64.1

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

Spraying of chemicals (the process of sprinkling liquids that control, kill, destroy, reduce organisms or sicknesses that affect cocoa trees or pods)	40	4.0	960	96.0
Removal of infected pods (the process separating pods that are not of any economic value to farmers and that are likely to affect other healthy pods if not removed)	411	41.1	589	58.9
Removal and destruction of infected seedling(s)	436	43.6	564	56.4
Cutting of pods (the removal of cocoa pods from the trees)	844	84.4	156	15.6
Breaking of pods (the process of opening cocoa pods to remove the beans from the pods)	843	84.3	157	15.7
Fermentation	858	85.8	142	14.2
Drying	858	85.8	142	14.2
Sacking (putting cocoa beans into bags)	846	84.6	154	15.4
Value addition (the process of treating cocoa beans so as to obtain increase in price over and above the price they would be sold for if they are not treated that way)	482	48.2	518	51.8
Weighing (the process of ascertaining the quantity of cocoa by measuring in kilograms)	665	66.5	335	33.5
Sorting (the process of categorising dried into grade 'A', 'B', or 'C' as the case may be based on the moisture content and the number of flat beans)	355	35.5	645	64.5
Quality determination (the process of assigning the letters 'A', 'B', or 'C' as the case may be to dried and sorted cocoa based on the factors above)	347	34.7	653	65.3
Price determination (what influences how much cocoa farmers will receive per kilogram of cocoa sold)	564	56.4	436	43.6
Environmental Issues (problems posed by using chemicals and fertilizers on cocoa plantations)	326	32.6	674	67.4
Child Labour Exploitation (the use of children to work on cocoa plantations for long hours as sources of cheap labour instead of adults)	594	59.4	406	40.6

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

Source: Data collected, 2022.

The table shows the level of adoption of various technologies in the cocoa value chain. From the table, over 50% of the following activities had low adoption rates (indicated by the number of cocoa farmers who stated that they had adopted the practices)- spraying of chemicals (96.0), manure and fertilizer application (94.1%), grafting (88.2%), vegetative cutting (81.1%), vegetative propagation (76.1%), irrigation (68.7%), Environmental Issues (67.4%), quality determination (65.3%), pest and disease control (64.1%), removal of infected pods (58.8%), removal and destruction of infected seedlings (56.4%), value addition (51.8%).

4.2 Challenges Faced by Cocoa Farmers in the Adoption of Relevant Technology

Every human undertaking is bound to face challenges. Challenges faced by cocoa farmers in Kailahun District in the adoption of relevant cocoa technology are reflected in table 2 below.

Table 2: Challenges Faced by Cocoa Farmers in the adoption of Relevant Technology

Challenges Faced	**Percentage of cocoa farmers affected**
High Level of Illiteracy	85
Remoteness of cocoa farmers	90
Inadequate resources for the adoption of relevant technology	72
Low targets of cocoa farmers	65
Poverty	78
AVERAGE	**78**

Source: Data collected, 2022.

Table 2 shows that the major challenge faced by cocoa farmers in the adoption of relevant technologies in the cocoa value chain is the remoteness of the farmers (90%). As a result of this, extension personnel who usually provide information about the technologies normally do not go to the communities where the farmers are and so cocoa farmers in those areas do not have the information about the technologies; let alone adopt them.

Another big challenge identified is the high rate of illiteracy among cocoa farmers in the District ((85%). Literacy plays a major role in technology adoption in that literate people can easily learn and implement new technological practices. Where there is widespread illiteracy technology adoption becomes a challenge. Other challenges in the adoption of relevant technologies were poverty of the farmers (78%) and low target of farmers (65%) as indicated in the key informant interview with the Director of Lizard Earth as earlier specified.

The findings revealed that:

- The following practices were said to be adopted by some cocoa farmers: land preparation, adequate spacing of cocoa trees, cocoa propagation by seeds, careful

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

selection of planting materials, pruning of cocoa trees, harvesting and breaking of pods, fermentation, drying, sacking, weighing and price determination.

- On the other hand, the following were identified as relevant technologies that needed to be adopted: vegetative propagation, grafting, manure application, irrigation, spraying of chemicals, removal of infected pods, removal of infected seedlings, sorting and grading of dried cocoa beans, and environmental issues. In the Key Informant Interview with the Country Director of Lizard Earth, Daniel Schaller had this to say "Some of the cocoa farmers have the knowledge; their problem is the implementation of what they know from the trainings they have attended. Many are poor because they simply have low targets".
- Challenges faced by cocoa farmers in the adoption of relevant technology included remoteness of the farmers, poverty, illiteracy, low target of farmers and the inadequacy of resources for the adoption of required technology.
- Majority of the cocoa farmers did not keep record of their farming activities.

5.0 CONCLUSION AND RECOMMENDATIONS

Cocoa farmers have adopted a number cocoa farming technologies ranging from nursery establishment to the harvesting, fermentation, drying and marketing of cocoa. One thing that came out very clearly from the research findings was that some of the farmers were very conservative and therefore resistant to the adoption of some of the technologies that are believed to have significant impacts on cocoa production. In the key informant interviews, the Director of one of the agencies providing support to cocoa farmers had it to say "Though we have applied every effort to provide relevant training opportunities including technologies to be adopted to boost cocoa production, some of the farmers are simply too lazy and have very low targets. They are pleased with the few Leones they earn from the sale of their cocoa beans per year and do not bother to go the extra mile to raise the level of their production by taking appropriate steps to foster such".

Some of the technologies they need to adopt to raise the volume of cocoa production include pruning, shading and shade management, proper drying of cocoa to obtain the desired grade that attracts appreciable cocoa price.

It is not strange to mention that some cocoa farmers sell raw cocoa especially when they are pressed for money because they know cocoa is in high demand. Some mix beans from infected pods with seeds from good pods thinking that buyers cannot refuse them failing to realise that cocoa price is influenced by the quality of the beans. Others think that pruning cocoa is a waste forgetting that it has the advantage of promoting free air circulation among the remaining trees and branches and reducing competition for nutrients culminating into increased yield by the few trees and branches that are maintained.

In a training organized by the Cocoa Unit of the Gola Rainforest National Park Conservation Limited by Guarantee, it was realized that cocoa farmers use only soil rich in organic manure to fill poly bags to nurse cocoa beans instead of a mixture of loamy, sandy and soil rich in organic manure and that in order to remove the mucilage from cocoa beans to be sown in poly

Volume: 07, Issue: 02 March - April 2024

ISSN 2582-0176

bags they use sand instead of saw dust. Sand is coarse and bruises the cocoa beans having a negative impact on germination; sometimes making the seed not viable.

It is therefore recommended that cocoa farmers should adopt appropriate cocoa technologies as specified above that have the capacity to raise cocoa yield as well as improve the quality of the product all of which will end up attracting better price and therefore increased income for farmers. An increase in farmers' income can help them invest part of their earnings to expand and improve on their farms and raise their standard of living such as building more and better houses, access medical facilities, clothing and education for their family members. In addition, increased cocoa yield and quality can raise government income from taxation on cocoa exports and increased foreign exchange earning which can tremendously help to reduce the country's stress for foreign currencies such as the Dollar and the Pound Sterling.

In the midst of many odds, extension personnel and others who help cocoa farmers with relevant technologies should do all they could to reach cocoa farmers in the remotest communities especially for the dissemination of information about relevant technology adoption by cocoa farmers.

REFERENCES

(2015). Sierra Leone Kailahun District Profile. Freetown: OCHA.

(2019). Brazil Ambassador to Sierra Leone visits Cocoa Farmers in Kenema and (2019). Brazil Ambassador to Sierra Leone visits Cocoa Farmers in Kenema and Kailahun. Freetown: Sierra Leone Telegraph. Kailahun. Freetown: Sierra Leone Telegraph.

Aremu, P. A., Longe, M. F, Adewale, G. A., Olagoke, O., and Isong A. (2019). Imperativeness of Training and Re-Trainig of Extension Workers for Efficiency in Agricultural Technology Transfer. Ilorin: International Journal of Pure and Applied Bio Science.

Casaburi, L., Reed, T., Suri, T. (2017). Agricultural Technology Initiative. Barkeley: University of California.

The German Initiative on Sustainable Cocoa. (2017, April). Retrieved June 10, 2022, from info@kakaoforum.de.

Sierra Leone web. (2022). Retrieved May 23, 2022, from Sierra Leone National Tourist Board.

