E-EXTENSION FRAMEWORK AND TOOLS FOR SIERRA LEONE

BOOSTING AGRICULTURE AND FOOD SECURITY (BAFS)

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LIST OF ABBREVIATIONS

AICU	Agriculture Information and Communication Unit
BAFS	Boosting Agriculture and Food Security
BES	Block Extension Supervisors
EAS	Extension and Advisory Services
FAO	Food and Agricultural Organisation
FEW	Frontline Extension Worker
FGD	Focus Group Discussion
FP	Focal Point
DAO	District Agriculture Officer
DSTI	Directorate of Science, Technology and Innovation
EAS	Extension and Advisory Services
GDP	Gross Domestic Product
GoSL	Government of Sierra Leone
ICT	Information Communication Technology
IITA	International Institute for Tropical Agriculture
INGO	International Non-Governmental Organisation
KII	Key Informant Interviews
MAF	Ministry of Agriculture and Forestry
MNDP	Medium Term National Development Plan 2019-2023
MNOs	Mobile Network Operators
NARC	Njala Agricultural Research Centre
NAT 2023	National Agriculture Transformation Programme 2023
NGO	Non-Governmental Organisation
NU	Njala University
PEMSD	Planning, Evaluation, Monitoring and Statistics
SLARI	Sierra Leone Agricultural Research Institute
SLIHS	Sierra Leone Integrated Household Survey 2028
SMS	Short Message Service
TOR	Terms of Reference
TV	Television

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EXECUTIVE SUMMARY

Sierra Leone's agriculture sector continue to be the mainstay of the country's economy and the largest contributor to the Gross Domestic Product (GDP). Despite its important role, the sector is plagued with rudimentary crop production techniques. This report presents a consultancy that examined the current Extension and Advisory Services in Sierra Leone and proposed an E-extension framework for the provision of extension services for the thousands of farmers that cannot be reached with rudimentary extension techniques.

Sierra Leone's Medium-Term National Development Plan (MNDP) 2019-2023 identified agriculture including fisheries and forestry as a priority area for growth; with emphasis on increase productivity and commercialization. This is clearly outlined in the four pillars of Sierra Leones's agricultural development strategy: (a) Agricultural Intensification (b) Crop Diversification (c) Natural Resource Conservation, and (d) Food Safety. The achievement lies largely in strengthening the extension and advisory services (EAS) provided by the Ministry of Agriculture and Forestry. EAS are the activities that provide the needed information and services to farmers and other actors in rural communities with the aim of developing their technical, organisational and managerial skills and practices to improve their well-being

Boosting Agriculture and Food Security (BAFS) project, which is implemented through the MAF in the 16 districts across the country hired a consultant to develop an E-extension framework for Sierra Leone. This consultancy required the identification of key bottlenecks in the current agricultural extension services delivery system and recommend appropriate approaches to developing a national E-extension framework that will help connect farmers across the country to receive extension services in real time and share knowledge and information that will increase agricultural productivity and facilitate trade. With reference to the Terms of Reference (ToR), the assignment has three specific deliverables.

1. To assess the various components required for the development and implementation of a successful E-extension in Sierra Leone.

2. Based on the assessments, recommend the design and development of appropriate E-extension packages (each package option should include an implementation plan, timeframe and provisional costing for its implementation); and
3. Develop the E-extension framework and tools indicating clearly specified institutional roles and responsibilities for implementing extension interventions and results in Sierra Leone

The desk review, interviews and focus group discussions show that the Ministry of Agriculture and Forestry is the main provider of extension services. Notwithstanding their roles, several non-governmental organisations provide extension services. The study shows that coordination between the NGOs and the Ministry is challenging. Although it is cordial at the nation level, it is largely loose at the district levels. The study also shows that financial support to extension services is limited. The capacity of extension workers especially in ICT use is very limited.

Based on the review, and the considerations advanced, the study propose the following components as part of the proposed framework for the successful implementation of E-extension in Sierra Leone: (1) Formation of Extension Advisory Board (EAB) (2) Establishment of an E-extension Data Center (3) Farmers as users and beneficiaries, and (4) Extension Service Providers

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CHAPTER 1 – INTRODUCTION

1.1 Background

Sierra Leone's agriculture sector continue to be the mainstay of the country's economy and the largest contributor to the Gross Domestic Product (GDP). By 2017, the agricultural sector's contribution to the GDP was estimated at 55.1%. Although the practice remains largely rudimentary, it provides employment for approximately two-thirds of the country's population and is the main source of livelihood in Sierra Leone; particularly for the poor who constitute around 54% of the population. The sector is a major source of foreign exchange inflows, through its contribution to exports.

Given the importance of this sector to the country's economy, improving agricultural productivity has always been a key pillar in Sierra Leone's development agenda for more than two decades. This was clearly encapsulated in May 2002 food security presidential proclamation, when President Ahmed Tejan Kabba noted that "… no Sierra Leonean should go to bed hungry by 2007". Following the May 2002 Presidential Proclamation, various Poverty Reduction Strategy Papers including the 2018-2023 Mid-Term Development Plan have had outcomes that sought to improve agricultural productivity, food security, increased rural income, employment, and foreign exchange.[1] The Ministry of Agriculture and Forestry (MAF) through the National Agricultural Transformation 2023, set out an ambitious agriculture transforming programme. In the policy document, government has a target that by 2023, agricultural production will be doubled through attracting and retaining large investments and by supporting smallholders to exit subsistence farming. The 2019-2023 Medium-Term National Development Plan (MNDP) identified agriculture including fisheries and forestry as a priority area for growth; with emphasis on increase productivity and commercialization.

Essentially, the Government's agriculture development strategy has four pillars. This includes:

[1] Past ones are the Poverty Reduction Strategy Paper 2003-2007, are the Agenda for Prosperity 2013-2018. The existing national development plan is the Medium-Term National Development Plan 2019-2023.

a) Agricultural Intensification which underscores the need of cultivating improved varieties through appropriate agronomic practices, including the use of fertilizers and pesticides to ensure increased yields;
b) Crop Diversification which promotes the cultivation of improved varieties of other crops other than rice through sensitization and awareness raising on their nutrient value to reduce the dependence and demand for rice;
c) Natural Resource Conservation which encourages the prudent use of water and watershed resources in an effort to increase agricultural land resources; and
d) Food Safety Nets which provides food aid support to farmer and their dependents during hunger seasons to prevent them from eating seed rice and vulnerability to sicknesses.

To increase crop yield and promote commercialization, there is need for a departure from the current rudimentary agricultural practices to modern crop production techniques including the provision of Extension and Adversary Services (EAS) to farmers. EAS are the activities that provide the needed information and services to farmers and other actors in rural communities with the aim of developing their technical, organisational and managerial skills and practices to improve their well-being[2].

Boosting Agriculture and Food Security (BAFS) project is implemented through the MAF in the 16 districts across the country. The overall objective of the European Union funded BAFS project is the "reduction of poverty and food insecurity in Sierra Leone through better governance and household improved living conditions and higher incomes".

The consultancy is to help MAF's Extension Division improve its outreach programme including the use of Information Communication Technology facilitated agricultural education platforms, primarily for supporting its frontline extensionists.

2GFRAS. (2011). Rural advisory services worldwide: A synthesis of actors and issues. GFRAS synthesis report. Lindau, Switzerland: Global Forum for Rural Advisory Services.

1.2 Objective and Scope of Work

1.2.1 Objective

The objective of the consultancy is to develop a national E-extension framework that will connect farmers across the country to receive extension services in real time and share knowledge and information that will increase productivity, with the framework capable of accommodating appropriate E-extension packages, applications, tools, adoption and usage.[3]

1.2.2 Scope of Work

This consultancy required the identification of key bottlenecks in the current agricultural extension services delivery system and recommend appropriate approaches to developing a national E-extension framework that will help connect farmers across the country to receive extension services in real time and share knowledge and information that will increase agricultural productivity and facilitate trade. With reference to the Terms of Reference (ToR) (see Annex 1), the assignment has three specific deliverables.

(1) Assess the various components required for the development and implementation of a successful E-extension in Sierra Leone.

I. Assess current MAF extension service delivery and E-extension needs of farmers and private sector players and to identify key challenges to E-extension in the agriculture sector in Sierra Leone,

II. Assess the current capacity of the MAF extension staff on content development and the use of ICT technology for dissemination of extension messages;

III. Assess the ICT platform and applications readiness of E-extension workers in data collection, reporting dissemination, and information sharing,

IV. Assess private sector involvement and participation in ICT applications in E-extension in Sierra Leone,

[3] The Term "e-Extension" is defined here as the use of electronic technologies (especially Information and Communication Technologies) to enhance face-to-face (f2f) and paper-based interactions[3]. It maximises the use of ICT to attain a modernised agricultural sector. E-extension focuses on creating an electronic and interactive bridge where farmers and other stakeholders meet and transact to enhance productivity.

V. Assess the ICT and telecommunications policy and framework for e-agriculture vis-a-vis E-extension,

VI. Assess the e-agriculture infrastructure, ICT solutions, applications for e-agriculture & extension in the Ministry of Agriculture and in the country

VII. Assess current challenges facing private sectors that prevent them from participating in ICT applications in E-extension in Sierra Leone,

VIII. Assess the Telephone and Internet Service Providers in the country that can provide the most appropriate platform where farmers can call for information on various Agricultural extension and advisory services.

(2) Based on the assessments, recommend the design and development of appropriate E-extension packages (each package option should include an implementation plan, timeframe and provisional costing for its implementation);

(3) Develop the E-extension framework and tools indicating clearly specified institutional roles and responsibilities for implementing extension interventions and results in Sierra Leone. Assessing the Extension landscape of the country with a bid to recommend appropriate E-extension packages to be developed, and to develop an appropriate framework will require an in-depth assessment of all the required components. This will include;

CHAPTER 2 – RESEARCH APPROACH

The approach adopted for this exercise involved the following;

- Desk review
- Key Informant Interview
- Focus Group Discussion
- Questionnaire survey

2.1. Desk Review

Government generated literature, including laws, policies, and national development strategy plans were reviewed to avail the critical overarching issues regarding the state's agricultural development objective and strategies and approaches. The key documents reviewed in this tier of literature included the National Sustainable Agricultural Development Plan 2010-2030, the National Agricultural Transformation 2023, the MNDP 2019-2023, and the National Agricultural Extension Advisory Policy of Sierra Leone and Action Plan 2013.

A second tier of literature reviewed included publications gathered via the internet, including books, and project reports on EAS in Africa in particular, or in contexts similar to Sierra Leone. The review of this set of literature was done to primarily gain comparative insights and ideas on approaches to ICT in agricultural extension services.

Lastly, relevant BAFS project documents were reviewed. These were reviewed to understand the project context, objective and strategies and approaches; and such other issues relevant to developing a national E-extension framework.

2.2 Key informant interview

In order to gather information on the components required for the development and implementation of a successful E-extension in Sierra Leone, Key informant interview (KIIs) were carried out at two levels; national and at district level.

The following institutions were interviewed;

Table 1: Consultations and interviews at the national level

No	Institution	People interviewed
1	Extension Division of MAF	The Director and all Assistant Directors
2	Other MAF Divisions; Crops, Livestock, Forestry, Engineering, and PEMSD	The Directors and Assistant Directors
3	MAF ICT Unit	Head of ICT Unit
4	Ministry of Information and Communication	Assistant Director, ICT
5	National Telecommunications Commission	
6	Telephone companies and ISPs; Orange, Africell, Sierratel, & Afcon	Commercial and Technical Units
7	Sierra Leone Women Farmers Forum	President
8	SLARI Rokupr	Station Manager and the Extension Officer
9	SLARI Njala	Station Manager
10	Njala University	Head of the Extension Department
11	Amsoft Technologies	Senior Software Developer & Systems Analyst
12	JenMaa Data & Information Management Consultants	Mobile Applications Development team

The aim of the interviews was to assess the current extension service delivery in the country, the EAS providers, the capacity of MAF extension workforce, content development, needs of farmers and challenges to E-extension, existing ICT applications and platforms, readiness and barriers to E-extension, and appropriate E-extension packages that fit the Sierra Leone context. In addition, the private sector was also interviewed to access their needs and current challenges they face that prevent them from participating in developing ICT applications in E-extension in Sierra Leone.

Annex 2 shows the list of Key Informants interviewed at the national level.

2.3 Focus Group Discussions

Four districts (see Map 1) were selected for carrying out the field work; Moyamba, Kailahun, Koinadugu, and Rokupr (*Table 2*). In each of the district, Focus Group Discussions (FGDs) were carried out targeting Farmer groups/associations, extension service providers of MAF, and NGOs. Annex 3 shows the list of participants for the FGDs carried out in the field. In total 134 people were interviewed; MAF – 79, Farmers – 34, NGOs – 17, and Research/University 4.

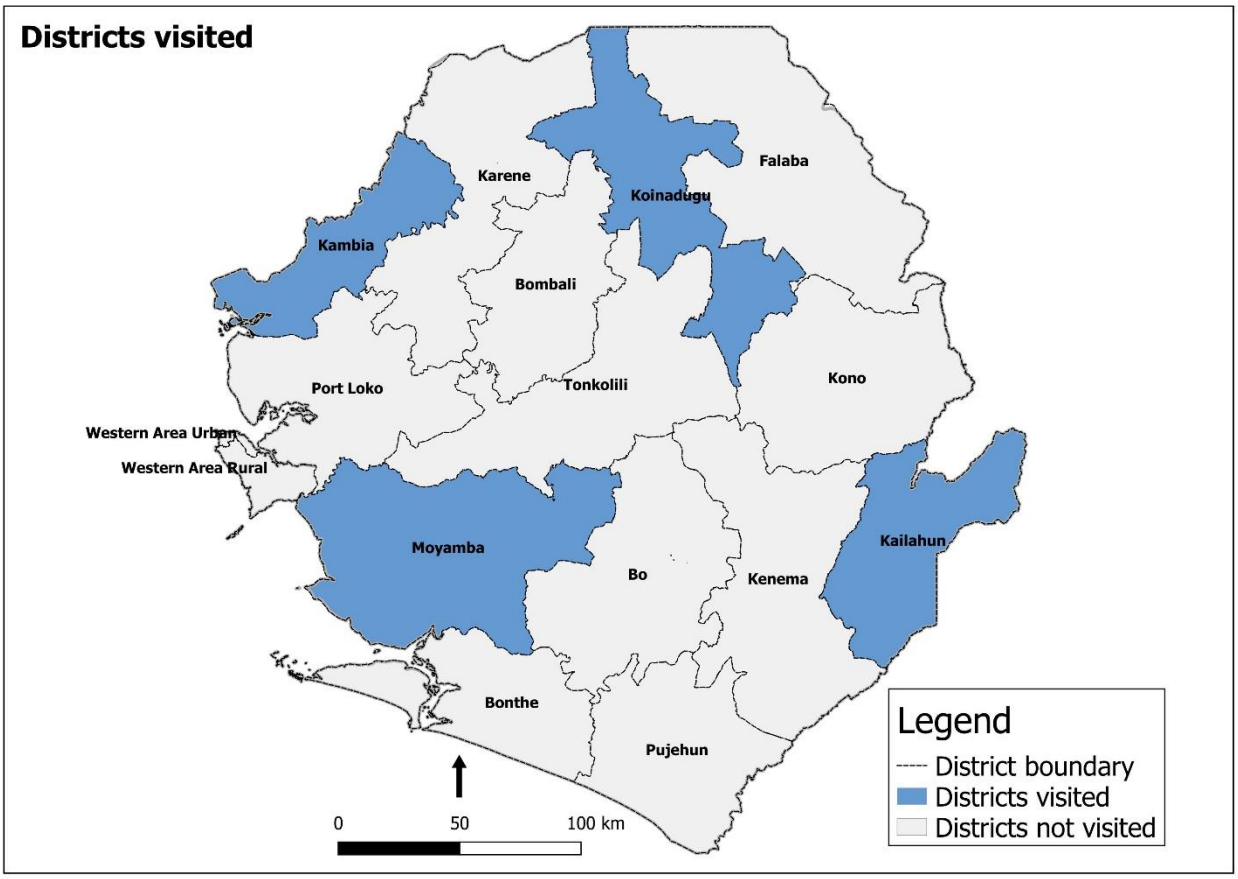
Data from the FGDs and KIIs were recorded and transcribed.

Table 2: FGD and KIIs carried out in the field

NO	Regions	District	Activity
1	South	Moyamba district headquarter town	FGDs conducted; 1) Moyamba district MAF Field staff, 2) NGOs resident in Moyamba 3) Moyamba Junction ABC Rice Farmer Organisations, 4) SLARI, Njala Agricultural Research Centre (RARC) 5) Department of Extension, School of Agriculture, Njala University
2	East	Kailahun district headquarter town	FGDs conducted; 1) Kailahun district MAF Field staff, 2) NGOs resident in Moyamba 3) Kailahun ABC Cocoa/Coffee Farmer Organisations,
3	North	Kabala, Koinadugu district	FGDs conducted; 1) Koinadugu district MAF Field staff, 2) NGOs resident in Moyamba

NO	Regions	District	Activity
			3) Kabala Women farmers Organisation & Small Ruminant Farmers Organisation
4	North West	Kambia town, Kambia district	FGDs conducted; 1) Kambia district MAF Field staff, 2) NGOs resident in Moyamba 3) Kambia town ABC Rice Farmer Organisations, 4) SLARI, Ropupr Agricultural Research Centre (RARC)

Map 1: Districts visited for the field assessment



2.4 Questionnaire survey

In addition to the FGDs and KIIs, a quantitative questionnaire was developed to complement the KIIs and FGDs. The survey was designed and configured for mobile data collection via KoboCollect, and sent to all District Agriculture Officers, SMSs, and BESs with smart phones across the country. The links to the forms were sent through WhatsApp or via email addresses thus allowing them to respond to the questionnaire. Unfortunately, most of the MAF staff had challenges in accessing the questionnaire and with that only about 20 respondents returned the questionnaires.

The questionnaire (see Annex 4) was structured around the following themes;

- Number and Quality of Human Resources - educational level and years of experience of staff,
- Field Presence and extension service delivery,
- Clientele Being Served and the Extension Methods Used;
- Content development, and
- ICT use, readiness, and barriers;

Another questionnaire meant for the NGOs was developed with the link sent to the email addresses of NGOs registered in the NGO database with the NGO Desk of the Extension Division of MAF. Unfortunately, despite several reminders, the response rate was very poor and did and was not part of the analysis.

CHAPTER 3 – ASSESSMENT FINDINGS

3.1 Introduction

This section discusses the findings of the assessment of the various components required for the development and implementation of a successful E-extension in Sierra Leone.

3.2 The Agricultural Innovation System

The Sierra Leone Agricultural Innovation System consists of a number of public research institutes, universities, agricultural education institutions, donor organisations and international research (International Institute for Tropical Agriculture (IITA) and Africa Rice and others), public, NGOs, and private sector. The main agricultural research institutions and universities include:

- Sierra Leone Agricultural Research Institute (SLARI)
- Njala Agricultural Research Centre (NARC).
- Rokupr Agricultural Research Centre (RARC).
- Kabala Horticultural Crops Research Centre (KHCRC).
- Teko Livestock Research Centre (TLRC).
- Freetown Fisheries Research Centre (FFRC).
- Kenema Forestry and Tree Crops Research Centre (KFTCRC).
- Magbosi Land and Water Research Centre (MLWRC).
- Njala University (NU)
- University of Makeni
- Institute of Marine Biology and Oceanography (IMBO)

SLARI conducts most of the agricultural research which according to its mandate conducts food and cash crops production, livestock production and health, fish production, land and water management, forestry production and conservation, food and nutrition, technology and socioeconomics of post-harvest activities, emerging technologies in agricultural science, biosafety and environmental conservation.

Njala University and the University of Makeni, a Catholic owned university, both have a faculty of agriculture where they conduct agricultural research and provide higher education in agricultural related degrees; BSc, MSc, and Ph. D programmes. The Extension Department of Njala University also conducts research and trains graduates in BSc and MSc in Agriculture and Extension and BSc and MSc in Agriculture, Communications, and Media.

Many of the past and present donor organisations, international research institutions, NGOs and universities all work on agricultural projects of which extension is part of it. These have been described in detail in the sections that follow.

3.3 Agricultural Extension and Advisory Services Policy and Governance

For a policy responsive National E-extension framework and appropriate E-extension packages is developed, an understanding of the governance framework and policy environment in relation to extension is required. This understanding was provided by reviewing past and present agriculture policies.

3.3.1 Sierra Leone's Agricultural Policies and Strategies: Past and Present

Sierra Leone has experienced significant policy changes since the colonial period:

- Phase 1 (1945-1961) - the colonial era and periods towards independence
- Phase II (1962-1990) - post-independence era
- Phase III (1991-1999) - civil conflict period
- Phase IV (2000-2004) - post-conflict reconstruction
- Phase IV (2005 to date), development and poverty reduction period

The first phase, 1945-1961, referred to as the colonial era and period towards independence: The policy by then focused on three sectors: conservation of land and forestry, attainment of self-sufficiency in food crop production, and rapid expansion of agricultural exports

The second phase, post-independence era (1962 to 1990): With the aim to diversify the agriculture sector rather than one dependent on primary produce, and at the same time increase in export for foreign exchange. This period witnessed the provision of intensive extension services to small scale farmers, supply of improved planting materials, tools, fertilizers and other chemicals at subsidized prices, provision of seasonal credit to farmers, and the development of infrastructure such as feeder roads and wells.

The third phase, (1991-1999), period of civil conflict-The Interregnum and Civil conflict Period: There was no agriculture specific policy during this period; the bulk of the productive agriculture land was not cultivated as most of the rural population was either on the run or at displaced camps. For areas where farming was still possible, movement of inputs and extension personnel was almost impossible along the highways. All of these negatively affected the agriculture sector as Structural Adjustment Policy lead to a

reduction in the use of fertilizers and increased the cost of conveying commodities to market centres.

The fourth phase, (2000-2004), period of the post-conflict reconstruction: When the war was officially declared over in January 2002, speedy recovery was experienced in stabilizing the economy and removing many of the structural impediments to growth. The post-conflict development agenda was articulated in the Interim Poverty Reduction Strategy Paper (I-PRSP), National Recovery Strategy (NRS) and Vision 2025. The I-PRSP which was finalized in June 2001 had no agriculture specific programmes. The IPRSP aimed at restoring civil authority and rebuilding the country while addressing the causes of the war through a responsive poverty reduction but provided the basics for sectoral growth.

The fifth phase, (2005 to date)-Period of Development and Poverty Reduction: Unlike the I-PRSP and the NRS, the PRSP had agriculture specific objectives. The major objectives were promoting food security and job creation through (a) achieving high and sustained broad-based economic growth, particularly in rural areas where agricultural development and increased food production are central; (b) providing essential social and economic services and infrastructure to the poor; and (c) improving governance consolidation of peace and security is essential if the country is to attract the investment necessary to break the cycle of poverty.

The Food Security Policy (FSP): 2002-2007 was based on the following pillars:

Agricultural Intensification which underscores the need of cultivating improved varieties through appropriate agronomic practices, including the use of fertilizers and pesticides to ensure increased yields;

Crop Diversification which promotes the cultivation of improved varieties of other crops other than rice through sensitization and awareness raising of their nutrient value to reduce the dependence on, and demand for rice;

In recent times two key agricultural policies have been developed:

- National Sustainable Agriculture Development Plan 2010-2030, under the Comprehensive African Agriculture Development Programme (CAADP). The policy presents an investment plan for the agricultural development for the period of 2010-2030.

- National Agricultural Transformation Programme 2019-2023 (NAT -2023). The NAT 2023 provides the roadmap to implement the agricultural targets set out in the 5-year National Medium-Term Development Plan (MNDP 2018-2023). The major priorities within the NAT 2023 are as follows:
    - Encourage private sector involvement throughout the agricultural value chain,
    - Increased linkages between agro-businesses to smallholder farmer
    - Improved data systems,
    - Investment in quality research with farmers benefiting from the latest research,
    - Agricultural machinery services and Agribusiness Service Centres made available nationwide.

3.3.2 Extension and Advisory Services (EAS) Policy

Review of relevant literature revealed that very little exist in the EAS policy environment. Interviews with staff of the Extension Division in the MAF revealed the lack of an Extension Master Plan. However, discussions with extension staff in the MAF suggest that extension interventions in Sierra Leone has been guided by the various agricultural policies. In recent times, extension services have been guided by the by the *National Agricultural Extension Advisory Policy of Sierra Leone (And Action Plan) 2013*. According to the policy, the role of the Agricultural Extension Service is to transfer knowledge, technologies and agricultural information to farmers and to link them to other value chain actors in the economy. This is aimed at enhancing their productivity and motivate them to become market oriented.

The overarching goal of the national extension policy is to "*guide the development and delivery of agricultural extension advisory services in Sierra Leone to primarily small-holder farmers and other actors in the agricultural value chain for; the adoption of innovative technologies, commercialization, enhanced productivity and increased incomes".* The National Agriculture Transformation Programme 2023 (NAT 2013) aimed to double agricultural productivity by 2023 and to support smallholder farmers to transit from subsistence to commercial farming.

The National Agricultural Extension Advisory Policy 2013 aligns with NAT 2023 as it identifies smallholder farmers through its vision; "*Small-holder farmers in Sierra Leone are empowered to demand the extension and advisory services they need to become highly productive and a well-financed and capable pluralistic extension system supplies the needed*

services". In particular, the National Agricultural Extension Advisory Policy 2013 addresses the following:

I. Supports a pluralistic extension system that is decentralized, demand-driven, market oriented, and responds to key cross-cutting issues,
II. The extension service delivery system should empower farmers and farmer-based organizations to demand and access real time critical extension services efficiently and effectively,
III. Improving access of smallholder farmers to improved technologies and practices will support government's target to double agricultural productivity by 2023, increase their household incomes and eventually enable them to exit subsistence farming,
IV. Provide an enabling environment for private sectors to deliver services on commercial basis,
V. Public sector funding and delivery of services should be targeted at programs which the private sector cannot finance commercially,
VI. That the content for the pluralistic extension system is to come from MAFFS, SLARI, as well as international centres (IITA and Africa Rice and others), NGOs and INGOs and private sector firms,
VII. That the key extension method should be delivered to groups such as farmer field schools, farmer groups, and farmer-based organizations.

To strengthen farmer input, coordination and consultation, the policy proposes the following. First, the development of farmer platforms with MAFFS extension staff and other extension service delivery providers at ward, chiefdom and District levels. Second, the establishment of national committee with strong farmer and research representations to help formulate research proposals and review MAF extension programs and other major projects of NGO and INGO extension efforts. Thirdly, the national Chapter of the African Forum for Agricultural Advisory Services (AFAAS) should be strengthened and supported in its capacity building and advocacy role for extension services in Sierra Leone.

3.4 Major EAS Providers

The main actors in extension in Sierra Leone are public, private and NGOs. In principle, they tend to be complementary to each other, as explained below, while not necessarily coordinating. According to the National Extension Policy 2013, and emphasised by the National Agricultural Transformation Programme 2023, the public extension service focus is on smallholder agricultural production with an emphasis on doubling agricultural production by attracting and retaining large investments and as well as by supporting smallholders to exit subsistence farming. Private sector tends to focus on specific crops, usually cash crops, and NGOs on both small and medium-sized farming households. The EAS is provided by various state and non-state actors in the public and private sectors. The following categories of EAS providers exist across the country.

3.4.1 Public Sector Providers (State Actors)

The main public sector EAS providers include

- Ministry of Agriculture and Forestry (MAF),
- Sierra Leone Agricultural Research Institute
- The Universities and other Public Training Centres
- Donor funded Projects

A Ministry of Agriculture and Forestry

MAF is the principal provider of public extension services to farmers. Figure 1 depicts the organisational structure of MAF composed of seven specific divisions: Crops, Livestock, Forestry, Agric-Engineering and Services, Planning, Evaluation, Monitoring and Statistics (PEMSD), Agricultural Extension Services, and administration support of district MAFFS branches. Besides Western Urban and Western Rural, there are 14 district offices across the country. Western rural has MAF district Office as well. The role of MAF is primarily the drafting agricultural development policies, advising the government on policies that concern the agricultural development of Sierra Leone, and providing extension and support for the agricultural sector.

Until 2009, when the Department of Agricultural Extension Services was created, within the MAF, Extension services were carried out mostly by the Crops Division. The

Extension Division of MAF is charged with the responsibility to provide EAS to farmers and other actors.

The Extension Division is further divided in to the following units:

I. **Field Operations**- This unit is responsible for the coordination and supervision of all extension activities in the field and solicit feedback from farmers through the network of the FEWs, BESs, District Extension Officers, SMSs, NGOs and private sector AES providers

II. **Research and Extension Liaison** – responsible for liaising with research institutions for the transfer of new technologies

III. **NGO Coordination**- This unit is responsible for the coordination of the activities of the NGOs in the agriculture sector in the country

IV. **Agricultural Information Communication Unit (AICU)-**The AICU is responsible for knowledge management in agricultural extension. In addition to providing public relation for the Ministry, the unit pass on extension messages to farmers through radio, cine van, brochures and newsletters. The unit was host to the defunct Agricultural Documentation Centre.

V. **Women in Agriculture and Nutrition (WAIN)** – This unit is responsible for addressing gender issues, nutrition and other cross-cutting issues in the agriculture sector

VI. **Agribusiness Promotion Unit (APU)** – The APU is responsible to guide and provide required information to large scale agribusiness investors in the country.

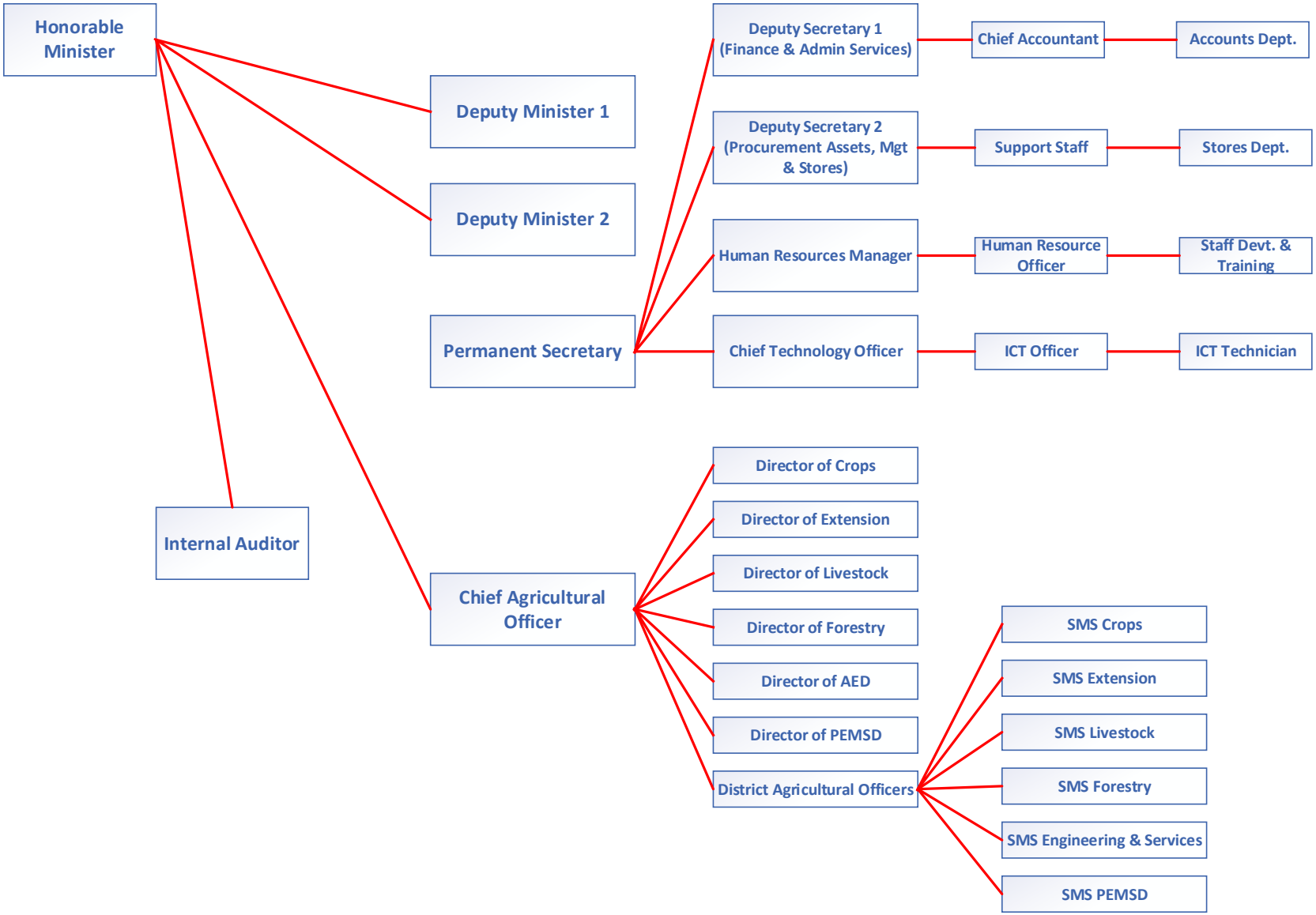


Figure 1: Organisational Structure of MAF

VII. **Training and Staff Development Unit-** This unit is responsible for coordinating training and capacity development of the staff of the Ministry and the farmers. There is a Training Officer in every district working with the District Extension Officer (DEO).

VIII. Another unit that is not directly under the Extension Division but relevant in the proposed E-extension system is the information communication and technology (**ICT)** unit. This unit supports the MAF in all ICT related issues including managing and operating the Agriculture Market Information system (AMIS), the Management Information System (MIS) Database and internet services. The ICT unit is manned by staff of the Ministry of Information and Communication (MIC), and are transferable from ministry to ministry.

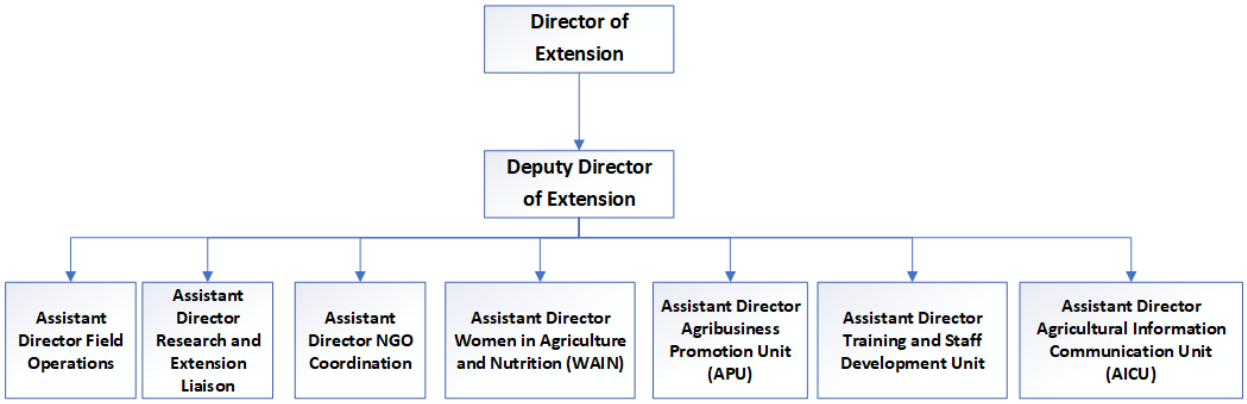


Figure 2: Extension Division Organisation Structure

The interaction with farmers takes place at the district level. Figure 3 shows the organogram at the district level. At the district level, the District Agriculture Officer (DAO) heads a team of Subject Matter Specialists (SMSs) representing the six Divisions. The districts are divided into Blocks which are manned by a Block Extension Supervisor (BES). On average, there are five Blocks for each district making a total of 75 blocks for the 15 District, excluding. Western Area Urban District. Each Block is further divided into Circles which are headed by the Frontline Extension Workers (FEWs). The FEWs directly interface with the farmers, thus taking extension messages and technologies to farmers The FEWs work with Farmer Field School (FFS) Trainers and farmers to establish Farmer Field and Business Schools (FFBS). Most often, some trained farmers do emerge as trainers to their colleague farmers.

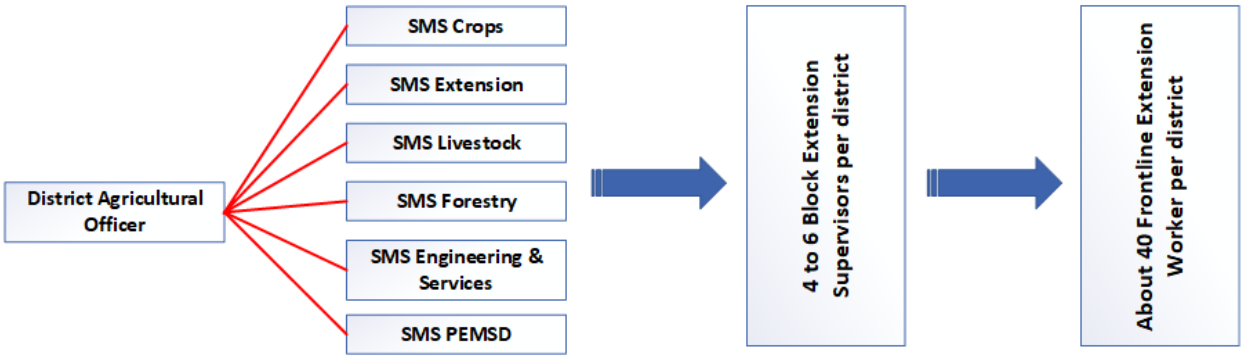


Figure 3: MAF Organisational Structure at the District

B Sierra Leone Agricultural Research Institute (SLARI)

According to the SLARI Strategic Plan 2012-2021, the evolution of Agricultural Research in Sierra Leone spanned for almost 100 years. Earlier agronomic research started at the Njala Experimental Station, which was established in 1910. The Rice Research Station (RRS) that was established at Rokupr in 1934, focused their research on mangrove and inland valley swamp rice production. By, 1953 it was transformed into the West African Rice Research Institute. Veterinary and livestock stations were setup in Teko, Bombali District and Musaia, Koinadugu District by 1942 and 1943, respectively. By 1953, the oil palm research programme at Njala University became the West African Institute for Oil Palm Research (WAIFOR). Forestry research was largely undertaken at the Forestry Research Station at Bambawo in Eastern Region. This help the multiplication and distribution of high yielding Amazonian cocoa planting materials from Kpuwabu clonal garden in the eastern region. Research on fisheries were conducted at the West African Fisheries Research Institute at Kissy near Freetown.

The Njala Experiment Station which later became the Njala Agricultural Research Centre (NARC) has outstations/crop sites in eight districts (Moyamba, Bo, Kenema, Kailahun, Koinadugu, Bombali, Port Loko and Kambia). By 1976, the Government of Sierra Leone requested assistance from the United States Government for an improvement in agricultural extension. In response, the United States Agency for International Development (USAID) together with the MAF) and Njala University College (NUC) carried out several feasibility studies for an agricultural adaptive research

and extension programme. The outcome from their investigation saw the establishment of the 'Adaptive Crop Research and Extension' (ACRE) Project. With the end of the ACRE project ended in 1987, the Institute of Agricultural Research (IAR) was established with Ministry of Agriculture providing supervision.

The IAR inherited all the infrastructure, administrative, research and extension mechanism left behind by the ACRE project. By 1985, the National Agricultural Research Coordinating Council (NARCC) was established to coordinate research and harmonize research activities. The mandate of NARCC was to support the promotion of pro-poor sustainable growth for food security and job creation as part of Sierra Leone's Poverty Reduction Strategy approach. The activities of NARCC was limited to the cultivation of annual crops. The two constituent institutes of NARCC included the Rice Research Institute (with focus on rice, millet, sorghum, banana, plantain and vegetables) and IAR (with focus on cassava, sweet potato, yam, maize, cowpea, groundnut, soybean and sesame).

The civil war of the 1990s, which caused the destruction of research infrastructure and the displacement of well-trained scientists brought agricultural research to a halt. Following the end of the war in 2002, some of the scientists have returned and there is goodwill from the Government and partners to resuscitate the agricultural research. After a period of coordination of agricultural research under NARCC, the Government of Sierra Leone (GoSL) established the Sierra Leone Agricultural Research Institute (SLARI) through the SLARI Act of Parliament of 2007. SLARI is now the agricultural research and agricultural technology generating body for the benefit of the farming, fishing and forestry sectors and to provide for other related matters. When fully operational, SLARI will have the following centres:

- Njala Agricultural Research Centre (NARC).
- Rokupr Agricultural Research Centre (RARC).
- Kabala Horticultural Crops Research Centre (KHCRC).
- Teko Livestock Research Centre (TLRC).
- Freetown Fisheries Research Centre (FFRC).
- Kenema Forestry and Tree Crops Research Centre (KFTCRC).
- Magbosi Land and Water Research Centre (MLWRC).

SLARI's mandate and core functions include taking a leading role in addressing the many challenges facing the agriculture, fishery and forestry sectors in the country. As the national agricultural research institution, it is expected to conduct research and generate knowledge, information and technologies needed for sustainable agricultural development. Among other functions, some the principal mandate of SLARI in relation to extension as defined in the SLARI Act of 2007 include:

I. Provide information that will assist the Government and other stakeholders in the development of agricultural policies for poverty alleviation, food security and improved livelihoods of the citizens of Sierra Leone.
II. Formulate agricultural research policies and programmes considering the vision, mission, goals and objectives of the agricultural sector, in line with government policy, and views of stakeholders, especially those which relate to sustainable food security, and conservation of renewable resources of Sierra Leone.
III. Conduct food and cash crops production, livestock production and health, fish production, land and water management, forestry production and conservation, food and nutrition, technology and socioeconomics of post-harvest activities, emerging technologies in agricultural science biosafety and environmental conservation.
IV. Establishment of strong working relationship with extension agents in the public and private sectors in the transfer of technology.
V. Facilitate and provide the relevant training and manpower development to serve the agricultural needs of the country.
VI. Establish strong links with national, regional and international agricultural research institutions or agencies involved in science and technology development and transfer
VII. Enhance public awareness on importance of scientific research to agricultural and economic development.
VIII. Disseminate knowledge on improved technologies to stakeholders.
IX. Monitor and evaluate adoption and impact of agricultural research on agricultural productivity.

The vision for the government for commercializing agriculture by linking farmers to markets as outlined in the National Agriculture Transformation Plan (NAT 2023)

recognised the critical role agricultural research and extension services. It is therefore a requirement for SLARI to conduct research and generate the needed knowledge, information and technologies for increased agricultural productivity for the enhancement of sustainable development. To enhance research, SLARI adopted the Agricultural Product Value Chain (APVC) approach to research for development within the framework of Integrated Agricultural Research for Development (IAR4D) by 2010 This approach to research requires SLARI to take a paradigm shift from the production of commodities to differentiated agricultural products including increased value-addition to commodities in the rural areas. It also requires the development and promotion of new products that fit the demands of the target market.

While undertaking research, SLARI staff also provide extension and advisory services in their out outstations. During the experimental trials with farmers, extension services are for the most part provided. SLARI is also responsible for the development of content (extension messages) for new technologies they develop. These technologies and contents are supposed to be passed over to the Extension Division of MAF for dissemination to farmers. However, collaboration in that direction seems to be very weak.

C. The Universities and other Public Training Centres

In addition to the research institutes, Universities also provide extension and advisory services through their research, teaching and collaborative activities with other entities. Scholars and scientist at Njala University (NU), University of Sierra Leone (USL) and University of Makeni (UNIMAK) undertakes agriculture related research.

Njala University College (renamed Njala University (NU)

The Njala University College (NUC) was originally opened as an agricultural college under the University of Sierra Leone (USL). The promulgation of the 2005 University Act, gave birth to two public Universities; University of Sierra Leone and Njala University. Njala University train students at Certificate, Diploma, Bachelors, Masters and Doctoral levels in Agriculture General, Agriculture Education, Agriculture Extension, Agribusiness Management, Nutrition and Food Technology, Soils, Land and water Management, Forestry, Agriculture Communications and Agriculture Engineering among others. Agricultural Officers (AOs) or BESs employed by the MAF, NGOs and private sector investors are mostly graduating from NU. With upward mobility, some of

these employees will later become Directors, Assistant Directors, Senior Agriculture Officers and Deputy Directors of the various division in the Ministry

The Extension Department, School of Agriculture and Horticulture often collaborate with other organizations to promote latest agricultural technologies. One such collaboration is the promotion of the 'Orange Fresh Sweet Potato' technology across the country by Hellenkeller International, SLARI, NU and MAF. Over the years, the Agriculture and Horticulture Department has collaborated with the University of Illinois to support 44 extension workers to deliver extension services in nine Districts. The department has worked with BBC Media Action to train cocoa farmers in the eastern region. Currently, there is collaboration between Solidaridad (an NGO operating in cocoa and oil palm value chains) and the Department of Agriculture and Horticulture. Additionally, the Extension Department is benefiting from the SASAKAWA and SAFE fund for the training of carrier extension people.

The extension department of the Njala University is already using some E-extension packages in their teaching and research activities. They have trained farmers in the use of mobile phones to get real time information in a Pineapple Project. They also conduct *Extension Field Days*, a teaching and learning activity confined to the University campus. The department is also using PICO Projectors to pass on extension messages to farmers.

The Department has approached AFRICELL to broaden the E-extension activities of the University. The proposed AFRICELL support will be used to register 1,000 farmers and ABCs to be receiving extension messages at discounted rates and establish call centres for feedback. The support will also extend the 1- day Extension Field Day to 3 days. Although AFRICELL has signed the Memorandum of Understanding with NU, the Extension Department is yet to receive the needed support.

Certificate Training Centre (CTC)/National Agriculture Training Centre (NATC)-Njala

The Certificate Training Centre, which later became the National Agriculture Training Centre (NATC) is part of the School of Agriculture and Horticulture, Njala University. NATC produces graduates at Certificate, Ordinary National and Higher National Diploma (OND and HND) levels. Certificate and OND graduates are appointed as Agriculture Instructors (A/I in Training) and deployed as Field Extension Workers (FEWs) in the agricultural Circles under the supervision of the Block Extension

Supervisors (BES) in the agriculture Blocks. The OND is a two-year programme while the HND last for three years.

The NATC was originally under the Training and Staff Development Unit of the Extension Division in the MAF. Through an MOU sign between the MAF and NU in 2014/15, the Centre was fully handed over to the Njala University. The Centre currently house the School of Agriculture and the various departments.

The Makali and Mange Agricultural Training Centres

In the 70s and 80s, the Makali and Mange Agriculture Training Centres were established to train Agro Technicians (Agro-Tec). The Course contents covered basic crop and animal science. It was a 6-month programme whose entry requirement was basic secondary education. Agro technicians were deployed as frontline extension workers in the field alongside the Agricultural Instructors (A/I). Handy man and Nursery Attendants were also deployed to work with the Agro-Techs.

These two institutions, Makali and Mange Training Centres are no longer functional. While Mange is completely closed as training center, Makali is now used occasionally for workshops. The infrastructure requires repairs and rehabilitation. In a Private Public Partnership (PPP) arrangement, Makali was handed over to private individual to operate and manage. This arrangement is considered by the Extension Division in MAF as a "failure", as trainings and workshops are hardly held there, while the infrastructure continue to deteriorate.

Teko Livestock Training Centres

The Teko Livestock Training Centre also provide training in animal health and animal production techniques. Graduates are posted at the Veterinary centres and at the Livestock Boarder Posts located at boarder entry points and along the highways. They could also serve as Community Animal Health Workers (CAHWs).

Other Universities and Training Institutions

The Institute of Marine Biology and Oceanography (IMBO), in the University of Sierra Leone (USL) undertakes research in marine biology and fisheries related areas. UNIMAK has a Faculty of Agriculture, offering agriculture training to postgraduate level. Other institutions that offers agricultural training to students include the Earnest Bai Koroma

University of Science and Technology, Milton Margai College of Education and Technology and the Eastern Polytechnic.

D. Donor Funded Projects

Donor funded projects within the agriculture sector have significantly contributed to the provision of extension services across the country. This has mostly been archived either directly from the Project Management/Coordination Units (PM/CUs) of those organisations or working in partnership with the Extension Division and other division of the Ministry. Projects that have taken such approach includes the EU Food Facility/FAO/GAFSP components of the Smallholder Commercialisation Programme; IFAD supported RCPRP and AVDP project; World Bank funded RPSDP, WAAPP and EU funded A4D and BAFS; ADB funded ASREP and SLARIS; and IDB funded DFPP and LFM projects. Japan International Cooperation Agency proposed a technical package; System of Rice Intensification for rice based on the research findings. These new technologies go with their extension package.

E. Private Sector and other Non-State Actors Providing EAS

Sierra Leone Agricultural Policy recognised a pluralistic delivery of extension and advisory service across the country. Besides public-sector players, non-state actors are also very active EAS providers, including:

- Non-governmental Organisations
- Agro-Input dealers
- Agro-processors
- Other Value Chain Actors

i. NGOs in Agricultural Extension and Advisory Services

During the civil conflict of the 1990s, agricultural EAS collapsed across the country. However, ad hoc collaboration between the MAF and some NGOs provided extension services to Internally Displaced Persons in refugee camps. Following the end of the war in 2002, NGOs have played a significant role in providing EAS to farmers during the recovery and post-conflict development phase.

Evidence from the field work suggest that several international and national NGO are providing EAS in some of the 16 Districts. For instance, GIZ and WHH are using the

Integrated Farmer Training (IFT) extension approach in the cocoa growing region of the country. The IFT approach combine good agricultural practices with business models. Their approach is similar to the farmer field school approach, which is widely used by EAS providers across the country.

Oxfam, COOPI, Inter-Aid and Solidaridad are providing EAS for food, tree crops and livestock production. CRS is also very active in extension activities in the implementation of the food security and livelihood projects. World Vision, Action Aid and CARE International have also been active EAS providers for their respective agricultural projects. MOPADA-SL, CEPA-SL, Save the Children and Fambul Tok are active EAS providers in Kailahun District. Action Against Hunger (AAH), FINNIC and FORUT are providing EAS for farmers in Moyamba District. AAH for example, is working with 22 FBOs in Funkuya and Kayamba Chiefdoms on the groundnut value chain. In Kabala, Koinadugu district, OXFAM (Livestock project), OXFAM (Crop project), KADDRO, and the Sierra Leone Animal Welfare Society (SLAWS) are active EAS providers. In Kambia town, Kambia district, AIUDO, CAWeC, ABC-Development, and KADDRO are also actively providing EAS.

In addition, other private sectors in the technology sector were interviewed to assess the challenges they face that prevent them from participating in ICT applications in E-extension in Sierra Leone. These include; Amsoft, Afcom and Jenmma Data and Information Management Consultants.

ii. Agro-Input Dealers

Agro-input dealers also provide EAS for farmers. Some of the major EAS providers are as follows.

i. **Seed Multiplication Project (SMP)** is a semi-autonomous seed multiplication outfit with large stores and seed processing centres in Makeni and Kobia with outstations in Blama and the 'Thakoblo' Swamp in Binkolo. For the most part, SMP deals in certified rice and groundnuts seeds. SMP was established with support from the German Government to produce cleaned and processed and certify cereals and groundnuts seeds. During their engagement with farmers for the production of quality seeds, technical staff of often provide EAS to formers

particularly for good and sound agronomic practices for pure and viable seed production.

ii. **SeedTech Seed Company** is private sector input seller located along Old Railway Line, Freetown; wit outlet in Makeni. They sell imported vegetable seeds, agrochemicals including fertilizers, farm tools, sprayers, jut bags and sometimes rice and groundnut seed seeds. To provide EAS to farmers and show the viability of their seeds, SeedTech has established a demonstration plot at Rolakoh, near Makeni.

iii. **SAKATA Seed Company** is located along Circular Road, Freetown. The company operates mostly in vegetables seeds. The seed selling business entity does not have any extended advisory services relationships with their customers beyond the initial advice at the point of purchase. Over the past two years, Sakata Seeds have been conducting training from time to time, for 'would be vegetable farmers' around the country. This is however not intended to be a long-term practice.

iv. **Holland Farming Company** is another agro-dealer though engaged in selling seeds and other inputs, provides EAS for farmers.

v. **FRESH SALONE** is involved in marketing Green House equipment, planting materials and fertilizers. In doing so, they also provide EAS to their clients.

In addition to the dealers and suppliers discussed, there are other certified individuals, small and medium enterprises, cooperatives and ABCs that provide similar services. To enhance quality seed supply, some trainings have been provided by CNFA under the SCP-GAFSP project.

iii. Agro-processors

Since the paradigm shift from subsistence farming to commercialization of agriculture, a few large-scale investors have emerged in the agriculture sector. Some of them include the following:

I. The SOCFIN Agricultural Company established an oil palm plantation palm oil extraction in Malen Chiefdom, Pujehun District. The establishment support rice farmers with in and technical support in the Malen Chiefdom, Pujehun District.

II. GOLD TREE is engaged in palm oil production in Daru, Kailahun District. To increase farmers income, GOLD TREE is supporting farmers with seedlings to cultivate oil palm through the Out-grower Scheme.

III. NED Oil is operational in the Yele, Tonkolili District

IV. ADDAX Bioenergy, a subsidiary of SUNBIRD is using sugar cane and cassava to produce ethanol. Situated in the Bombali and Tonkolili Districts, the company provide support for rice farmers in the affected communities. This is undertaken alongside the provision of EAS to farmers.

V. Sierra Leone Agriculture Company also operates on oil palm block in Port Loko District

VI. MIRO Forestry is operating a forestry plantation with different species along the Masiaka-Mile 91 highway in the Tonkolili Distract

iv. Other Value Chain Actors

i. Several cocoa, coffee and cashew exporters such as AYUB, CAPITOL, ORGANIC COCOA, BALMED, etc. are also providing extension service through the 'Block Framing' approach. These exporters are active in the Eastern Region.

ii. The Sierra Leone Brewery Ltd operates an out-grower scheme for the cultivation of a key raw material, sorghum for brewing beer. They provide EAS to the sorghum farmers for quality sorghum production.

iii. Bennimix Food Company is a baby food processing company that source their raw materials from farmers. They advise farmers on the importance of quality raw material production.

iv. The Sierra Leone Produce Marketing Company process and package rice and palm oil for sale. They offer advisory services to farmers that cultivate rice and oil palm in their operational areas

v. West Africa Rice Development Company (WARDC) and Ahbaja Rice Producing Company are also rice producers and processors that are engaged in providing extension and advisory services.

vi. The Sierra Leone Chamber for Agribusiness Development (SLeCAD) provide business advisory services and training to farmers and other value chain actors

3.5 Workforce

In terms of geographic coverage, MAF extension covers almost all the districts including Western Urban where vegetable production takes place.

Table 3: Planned Number of MAF Extension Workers

No	District	District Agric Officers	No of SMSs	No of BESs	No of FEWs	TOTAL
1	Bo	1	6	6	40	52
2	Bombali	1	6	6	40	52
3	Bonthe	1	6	5	40	52
4	Falaba	1	6	6	40	52
5	Kailahun	1	6	5	40	52
6	Kambia	1	6	4	32	43
7	Karene	1	6	6	40	52
8	Kenema	1	6	6	40	52
9	Koinadugu	1	6	5	40	52
10	Kono	1	6	5	40	52
11	Moyamba	1	6	5	40	52
12	Port Loko	1	6	5	40	52
13	Pujehun	1	6	5	40	52
14	Tonkolili	1	6	5	40	52
15	Western Rural	1	6	5	40	52
	TOTAL	**15**	**90**	**79**	**592**	**771**

Table 2 shows that there should be 771 MAF Extension staff of which 74 should be BES, and 592 should be FEWs. The reality is that out of 771 only about 204 (26%) are with Pin codes and receiving salaries.

According to the Assistant Director of Field Operations;

- Out of 79 blocks, only 50 are manned,
- There are 632 cycles (79 Block x 8 Cycles), a block is made up of 8 cycles. Each cycle should be managed by 1 FEW,
- Out of the 632 cycles, only 51 FEWs are on payroll with the rest being volunteers,
- 1 FEW oversee about 8 to 10 villages.
- Volunteers survive through receipt of cash input from the DAO using devolved funds. In addition, the volunteers are involved in workshops, trainings or data collection exercises as a means of collecting per diem. The involvement of the

FEWs in activities outside the delivery of extension services further adds to the problem of farmers not accessing critical EAS.

- It was clear from the interviews and table below that there are agricultural blocks that are not reached by extension workers for an entire crop cultivation cycle.

Table 4: Actual Number of MAF Extension Workers

No	District	DAOs	No. of SMS	No. of SMS with PIN Code	No. of Blocks	BES	FEW	Total
1	Bo	1	6	6	6	5	10	22
2	Bombali	1	6	6	6	4	3	14
3	Bonthe	1	6	6	5	5	0	12
4	Falaba	1	6	5	6	0	0	6
5	Kailahun	1	6	6	5	3	4	14
6	Kambia	1	6	6	4	3	5	15
7	Karene	1	6	5	6	0	0	6
8	Kenema	1	6	6	6	4	2	13
9	Koinadugu	1	6	6	5	4	1	12
10	Kono	1	6	6	5	5	0	12
11	Moyamba	1	6	6	5	2	8	17
12	Port Loko	1	6	6	5	4	10	21
13	Pujehun	1	6	6	5	3	0	10
14	Tonkolili	1	6	6	5	5	6	18
15	Western Rural	1	6	6	5	3	2	12
	TOTAL	**15**	**90**	**88**	**79**	**50**	**51**	204

The ratio of public extension agents to households is quite small (204 pin coded extension agents and the volunteers to cover 4.9 million[4] households). This means that each extension agent would have to assist more than 3,000 households in order to reach all the farmers. FGDs with farmers showed that the percentage of farmers receiving visits or being reached by MAF frontline extension workers have considerably declined over the years.

From the interviews and FGDs, reasons for this include:

- Compulsory retirement policy implemented by government some five years ago,

[4] SLIHS 2019

- About 74% of MAF extension agents are volunteers bringing into question their commitment,
- Poor transport conditions, and requisite logistics,
- Budget cuts

3.6 Coordination in the current Extension service delivery

There is limited coordination between EAS providers and other related institutions in Sierra Leone. A Memorandum of Understanding exists between MAF Extension Division and SLARI for the development of extension messages. The messages are usually developed by SLARI, Njala University, IITA and to some extent other donor project such as the JICA Technical Package on Rice Production (TP-R). The messages are disseminated to framers through MAF. However, coordination between MAF and the research/university institutions is weak both at the national and at field level. The consequence of this is that little or no feedback is received by the research/university institutions.

One key area where coordination is seemingly lacking is the RSEARCH-EXTENSION-UNIVERSITY-FARMER linkages. Though there is a Research/Extension Liaison at the level of Assistant Director at MAF and an Outreach Officer at SLARI, there is no clear and tangible coordination mechanism between SLARI and MAF with regard to dissemination of new technologies to farmers, and soliciting farmers' feedback for the attention of the researchers. However, some work is seen being done for the Orange Fresh Sweet Potato variety; probably as a result of the support of Hellenkeller International NGO.

We believe coordination at this level is very important, irrespective of funding from an NGO or not.

Another area where weak coordination is observed is the linkage between the SLARI and the extension training institutions, such as the Universities and polytechnics. According to the Agriculture Product Value Chain (APVC) research approach adopted by SLARI in 2010, the market demand dictates the production needs of the farmers, and this in turn should inform the research work. Therefore, the dynamics in the market demand can bring about the advent of new technologies which should also influence the teaching syllabi and curricula in the training institutions. This linkage is also not very

clear as there is no functional modus operandi for research to continuously influence the training syllabi for would-be extension graduates to be abreast with the new technologies.

The study also could not ascertain detail coordination mechanisms between and amongst the different Divisions in the MAF with regard to the development and dissemination of extension messages. It seems most times Divisions do extension activities in silos. The view is that the contents for the messages can be developed by the specialist Divisions, but the packaging and dissemination of those messages should be coordinated with the Extension Division.

NGO presence is not only influenced by the crop but could be by the project deliverables such as increasing productivity or marketing a commodity. All NGOs interviewed admitted having their own extension staff rather than depending on MAF. However, NGOs and private sector extension providers admitted using MAF Extension staff to carry out trainings, beneficiary selection, seed quality testing and seed input to farmers.

The monthly NGO coordination meetings at headquarter and at district level are insufficient and irregular. NGOs interviewed admitted that since the COVID-19 pandemic in Sierra Leone, monthly meetings have been irregular and, in some places, no longer taking place. MAF staff admit that some NGOs only participate because it is mandatory for them to do so either by the donor or as an avenue to present their work plans, and reports. MAF staff also admitted that some NGOs do not coordinate with MAF staff when implementing their programmes in the field even though they attend the meetings. *It is only when they fall into problems that they will call on MAF staff in the field* says one BES. Some partners even agreed that they sometime develop their own extension contents without approval from MAF headquarter. At the time of the assessment, in addition to the government's EAS, there are at least 20 NGOs and INGOs engaged in some sort of EAS provision.

It is found out however, there is no mechanism for linkages between government's EAS work and the non-profit organisations; or coordinating among the non-profit organisations. Even among NGOs, there was no evidence of coordination approaches in their work.

Private extension is usually focused on certain crops that the company is interested in buying from smallholder farmers, such as cocoa, coffee, cashew, and groundnut. They

tend to be profit-oriented and usually work with farmers in out-grower schemes. These private extension providers are not part of the coordination mechanism both at the national and at the field level.

No donor-funded project was interviewed in this assessment, so we cannot describe the coordination between them and MAF Extension staff.

Coordination at headquarter and field level for all EAS providers is very essential, in fact mandatory.

3.7 Principal Extension Methods

Agricultural extension service in Sierra Leone has tried various approaches ranging from Model Product Point Village (MPPV), Training and Visit (T&V), The Unified Extension Service (UES), farmer field schools, and Agricultural Business Centers (ABCs).

Since the end of civil conflict in 2002, the main extension approach has been the Farmer Field School (FFS). The FFS is a platform for group learning and group work. An FFS is an on-farm school where farmers are trained in agronomic practices, finance and business, numeracy, and climate smart agriculture, among other issues. Demonstrations Plots used separately or as part of FFSs, have also, been a key approach in EAS; by which farmers are exposed to new farming methods. Demonstration Plots may be owned by either master farmers or by the government. Since 2013, Agricultural Business Centers have become a key entry point for MAFS extensions services; providing a range of services including marketing, business training for smallholder farmers; with emphasis on food crops, and livestock.

MAF, SLARI and Njala University are also using Field days and agricultural shows or World Food Day to provide extension messages from the various participants.

These various approaches have not been effective enough to enable extension reach out to all farmers, particularly those in remote areas, especially during the rainy season. Alternatively, extension workers have not taken full advantage of the basic ICT tools available to them, such as cell phones and the Internet to make their jobs more effective. They continue to use traditional extension methods of communication as shown below, which are no longer adequate in serving the purpose of disseminating time-bound research discoveries. As a result, the huge spending on agriculture by the government and non-governmental organisations (NGOs) in order to increasing agricultural

productivity, increasing household income of smallholder farmers and transforming them to commercial farming will not be feasible.

From the interviews and FGDs held with farmers, NGOS and MAF revealed that, Extension agents usually use mixed methods in delivering EAS. These include:

- Face to face meetings/trainings either for individual farmers or mostly by groups (FFS, FBOs, ABCs, Cooperatives)
- Demonstrations and farm trials with the active participation of the farmers
- Weekly Radio Talk shows and Phone in Programmes
- Field Days/ Agricultural and Cacao Shows
- Cinema/Audio/Video shows
- Newsletters
- Limited use of ICT through phones to pass on extension messages
- Input supply
- Linking producers to market

3.8 Content Development and Dissemination

Contents for extension messages are mostly developed by research and the respective specialists in the various divisions of MAF. The contents are sometimes passed on the Extension Division for dissemination to farmers through the district offices. However, as stated above, in some occasions the research institution or the specialist Division send the messages straight to the farmers without recourse to the Extension Division as expressed by senior officers of the Division during interviews. NGOs also play a major role in either developing their own content or bringing content specific to a project or crop. Examples include the Orange Fresh Sweet Potato' technology by Hellenkeller International, and the JICA Technical Package on Rice Production (TP-R).

There is need for coordination in content development and dissemination. Interviews and FGDs revealed that in some cases, NGOs and other EAS providers may come with their technologies and their contents for dissemination to their beneficiaries, sometime without the prior approval or knowledge of the Extension Division and Headquarter.

The contents are prepared in English language; therefore, they always require translation into the national languages of Krio, Mende, Temne, Limba, Kono and others when transmitting them to farmers. There is the special care required here not to lose the

original meaning of the contents. At the moment translation are done by the frontline extension agents into the local language in that location. Frontline extension agents who do not speak the local language are not able to do the translation and may depend on one of the farmers to do the translation. The development, translation and packaging of contents and extension messages need to be well coordinated at central and decentralized levels so that the same messages are passed to farmers irrespective of the medium of communication used.

Currently, there is no database, website or any kind of repository of extension and advisory messages and packages in the MAF. *Storage and knowledge management for contents and messages for extension is recommended.* The Agricultural Management Information System (AMIS) mostly provide market information while the MIS mostly deals with production figures. The former Agriculture Documentation Centre which used to provide reference materials in the form of reports, books, publications, newsletters, etc. is no longer operational.

The use of ICT technology for dissemination of extension messages has been adequately described in Chapter 4.

3.9 Technical Capacity of Extension Workers

In terms of academic qualification, majority of the government extension workers from BES level have degrees in agriculture, with very few in Extension and/or Agricultural Communication. The FGDs also revealed that most of the FEWs also have degrees in agriculture. Most of the content disseminated in the field by frontline extension workers come from either their undergraduate, or graduate trainings or trainings received during the course of the work. Government extension workers knowledge is mostly, if not exclusively limited to agriculture. It should be noted that government's agricultural development objective prioritizes among others things, rural livelihoods strengthening and resilience. At the moment, government agricultural extensions workers do not have the educational and training requirements to support such an objective through EAS. Training of agricultural extension worker hardly ever takes onboard broader development issues like livelihoods strengthening, climate change, zoonotic diseases, plant health and other emerging issues. Very few government extension workers have been trained in the "soft skills" of extension; including communication, facilitation, and

informal adult education methods. This is mostly because EAS traditionally has been about improving delivery of key agricultural production technologies; and distributing inputs to farmers. As noted, this perspective has the negative connotation that training and recognition of other critical issues affecting farmers overall wellbeing, such as marketing, entrepreneurship, and how to communicate with farmers, are ignored.[5] The need for these soft skills was highly expressed by extension officials themselves during the interviews.

3.10 Readiness of Workers for E-extension

The use of ICT for extension services is very basic at the moment in Sierra Leone. There are a few ICT applications developed by the private sector, (GoMakit); and NGOs like Welthungerhilfe's Integrated Farmer Training approach. Within MAF, there is AMIS and the MIS as stated above. Conventional methods of information sharing with both farmers and the general public are mostly used. Other approaches include a weekly radio talk show and phoning in programmes at district level during which, farmers are informed on various agronomic practices; the production of a print newsletter AgriNews that address agricultural themes, and the screening of videos at some ABCs. There is the Animal Disease Surveillance Database, under the One Health Programme jointly implemented by the Ministry of Health and Sanitation and MAF; with support from the FAO. At the time of this assessment a proposed e-Voucher System in respect of inputs purchase and sale of products were being discussed by MAF. Beyond MAF, the MIC and DSTI are working on the roadmap for e-governance framework that will include E-agriculture under the national digitalisation programme.

However, the assessment found out that the current challenges facing extension workers need to be addressed in order to achieve a successful implementation of E-extension. Significant effort is required to upgrade the staff both in terms e-extension technical know-how and equipment. Almost 80% of the FEWs, where available, do not have smart phones, they do not use social media such as WhatsApp for any extension related activities. Though the other field staff (including the BESs, SMSs, DAOs, HQ) have smart phones, there has not been a situation where all of them can be found in one

[5] Feed Future. Senegal: In-depth Assessment of Extension and Advisory Services. March 2018.

WhatsApp platform for easy communication. We found the situation where the HQ staff could be in one WhatsApp group but not the field staff or the reverse. Even at field level, SMSs might belong to one group without their BESs.

Knowledge base in the use of computers is generally low. Most field officers do not have computers (personal or official). Most extension staff at HQ admit browsing websites in their stations to update themselves with latest extension approaches and messages. No doubt, intensive training is required for the extension workers to be E-extension ready.

3.11 Challenges of MAF Extension Worker

Government's agricultural extension service is beset with numerous problems including poor infrastructure, poor and inadequate delivery systems. In the National Sustainable Agriculture Development Plan 2010-2030, government recognized the limited capacity of extension services. All the key informants interviewed agreed that the current extension system is "inefficient" as a result of these constraints. A World Bank study found that agricultural extension coverage declined after the devolution, with only 17.6 % of farmers saying that they had been visited by an extension worker during the previous year in 2007, down from 23.1% in 2005. Only 12.8% of households engaged in agriculture were visited by an extension worker during the 12 months prior to the survey for the Sierra Leone Integrated Household Survey in 2018. Most of these extension workers were from NGOs 70.5% with less than one-third of them coming from the government.[6]

Some of the challenges faced by the extension workers based on the interviews include the following:

Low levels of staffing

MAF Extension Division is understaffed. MAF extension services do not have the capacity to reach all smallholder farmers, they lack the field staff to cover all areas of jurisdiction and physically meet clientele (see Table 4). The ratio of extension staff to farmers, as estimated at 1:3,000, is a far cry from the recommended 1:300 (Ministry of Agriculture, 2002).

[6] World Bank Report 78195. June 14, 2013. Sierra Leone Social Protection Assessment

As a result, extension workers have large number of farmers which they are unable to reach. The situation is compounded by the poor logistics available to extension workers, implying that extension workers cannot be effective in disseminating agricultural information through personal contact that largely relies on the commonly embraced farm and home visits.

At the time of this assessment, the total number of personnel in the division was said to be 204 out of a total number of expected 771 extension workers. A good number of the Blocks and Circles are empty, there are no staff. Volunteers are manning some Blocks acting as FEWs and BESs. There is a moratorium on employment issued by the Government, so the Ministry cannot recruit field officers. So, the introduction of E-extension is a step in the right direction so that messages will reach farmers in real time without face to face contact with them.

Inadequate Logistics for Extension Workers

For the extension officers on post, they are faced with serious logistics issues such as mobility, fuel supply and the like. They are underfunded, poorly resourced, and lack adequate contact to farmers. The Motorbikes available to the BES' are old and inadequate in the field.

Lack of Computers and Other Equipment for Extension Work

Most extension workers do not have computers and accessories officially assigned to them. Some have personal computers which they use for official work. No maintenance facilities are provided for such computers and no compensation paid. Even those who have computers and smart phones, they face the problem of electricity supply and internet facilities. Even where Helenkeler provided routers, in some places where only 3-G connectivity is available, they cannot work since they are 4-G.

Low Remuneration and Motivation incentives

Extension workers complained of low salaries with little or no motivation. Promotions are far and wide to experience. One could be in an acting position for over 5 years without being confirmed or promoted, even after upgrading of oneself through training. Training opportunities are also very scare. These de-motivate extension workers to perform. When these same workers are employed by NGOs and other private sector, they most times

perform excellently as a result of the higher salaries, logistics and motivation incentives made available to them.

Lack of a Coordinating Mechanism for ESA in Sierra Leone

A further problem is the lack of coordination among EAS providers and other actors along the agricultural value chain from farm inputs to food processing, which increases the cost of production and lowers revenue for farmers. There is no coordination between the various providers of EAS in Sierra Leone namely government; NGOs, cooperatives, community-based organisations, and some businesses. There is no coordination requirement and mechanism established in the policy; and there is none in practice between the various providers of EAS. At time of this assessment, NGOs provided the bulk of EAS in the country. However, even among NGOs, there was no evidence of coordination approaches to their work. Agricultural extension is one of the functions devolved to Local Councils in 2005.

Language Barrier

During the deployment of field staff, no consideration was taken with regard the ability to speak the local language of the area where they are posted. They have to rely on interpreters, who may alter the original message.

3.12 Challenges of Non-governmental Organisations and the Private Sector

The key challenge reported by the NGOs and other non-state actor EAS providers is the lack of effective coordination by the Government and among themselves. The coordination is not regular and are sometimes too long. They also have the problem of absorbing government regulations such Duty-free issues, presentation of budgets and work plans to government, and the like. Other challenges faced by NGOs include:

- Poor roads and lack of accessibility to certain parts of the country,
- Poor telephone and internet connectivity in rural areas,
- High expectations from farmers that is difficult to manage,
- Language barrier,
- Lack of adequate farmer trainings over the years.
- Limited or lack of presence of MAF Extension workers to work with NGOs in the field staff

- Lack of knowledge in innovation by MAF Extension staff
- High cost of top up,
- Lack of electricity to charge phones,
- High cost of hourly radio programme by Radio stations,
- Bad weather during the rainy season leading to frequent shut down of stations.

3.13 E-extension Needs of Farmers and Private Sector players

As earlier stated, extension services bring information and new technologies to farming communities. The information helps farmers to improve on their production, income and standard of living.

From the desk review, interviews, FGDs, and analysis revealed that farmers need timely information that can be disseminated using ICT;

- Agriculture Inputs
    - Farmers would like to know more about where to get fertilizers, improved variety of seeds and seedlings, feeds, plant protection chemicals, agricultural machinery, and equipment and water.
    - Obtaining inputs on time results in carrying out operations on time and hence increase yields and higher incomes.
- Crop Management
    - Farmers would like more information on best practices for general crop management questions; this can include seasonal information, irrigation schedule, soil management, diseases and pests, etc.
    - Farmers would like to know of area specific crop management strategies. What are the current local agriculture conditions? For example, is there a pest in the area right now?
- Weather
    - Farmers would like to know what the current weather conditions are for their community.
- Agricultural Technology
    - Respondent would like more information on production technology that involves cultivating, fertilizing, pest control, weeding and harvesting
- Agriculture Credit and Resources

    - Farmers would like information concerning all loans and advances granted to finance production activities relating to agriculture, fisheries and forestry and also for processing, marketing, storage and distribution of products resulting from these activities.
- Marketing
    - Farmers would like information on product planning, information on current prices, sales timing, post-harvest marketing decisions, or group marketing.
- Harvest and Post-Harvest
    - Farmers would like information on storage, transportation, packaging, handling, or other methods to preserve product after harvest.
- Climate change and adaptation
    - Farmers would like information on changing rainfall, temperature, and/or general climate conditions, due to climate change.
- Linkages
    - Farmers need to link with other farmers for knowledge and experience sharing.
- Business community
    - The Business Community require information on the availability, quantity and quality of agricultural produce; availability and quality of transport as well as price information.

3.14 Major Challenges to E-extension

From the interviews, FGDs, and analysis, it is clear that above needs of farmers and private sector can be delivered using ICT tools. Several mobile applications and ICT applications in agriculture and specifically in extension have been developed and applied across the world and in particular several African countries that meet the E-extension needs of framers (World Bank, 2011; Brugger, 2011; Vignare, 2013; FAO, 2017).

However, EAS providers and farmers in Sierra Leone interviewed mentioned that the E-extension in Sierra Leone will not be devoid of challenges. From the desk review, interviews, FGDs, and analysis, the following key challenges were highlighted:

The Dominance of Basic and Cheap Mobile Handsets

About 77 percent households have mobile phone coverage in Sierra Leone, corresponding to 97.4 percent and 64.6 percent of urban and rural areas respectively (SLIHS, 2018). However, the BBC Media Action report states that 52% of the phones owned by adults are basic handsets. The situation is even worse in rural areas where farmers interviewed admitted owning basic and unsophisticated cheap handsets. There would therefore, be very limited applications that can be used on such phones.

High Levels of Illiteracy

Illiteracy rates in rural areas and particularly among farming populations are very high in Sierra Leone. It means that data-based applications for EAS would have very limited utility.

High Cost of Cellphone Usage for the Rural Populations

The cost to farmers and rural populations in general, when they use radio, cellphones, and internet, are considered high, according to the interviews and FGDs. The cheapest data bundle sold by Mobile Network Operators is Le.1,500 a day. According to the National Telecommunications Commission, the average per person expenditure a day on credit is Le.2,000. It is therefore easy to suggest that these people who spend only Le.2,000 a day on cellphone credit are going to be unwilling to spend extra on data bundle.

Very Low Internet and Social Media Usage in Rural Areas

Internet and social media usage in rural areas is very low in Sierra Leone; put at 18%.[7] The majority of internet and social media users in the country are young people, who mostly live in urban areas.[8] Farmers interviewed in the selected districts admitting that less than 10% of them use WhatsApp for communication.

Access to Electricity in Rural Areas

The three main sources of electricity in households in Sierra Leone are EDSA (19.5 percent), batteries (71.1 percent) and solar panel (6.6 percent) (SLIHS 2018). In the rural areas with large number of farmers, about 0.9 percent households receive light through EDSA; 89 percent using battery, and 8.2 percent on Solar panel. Charging phones in rural areas is a challenge not only faced by farmers but EAS providers including MAF, NGOs and the private sector. For instance, in Moyamba and Kabala, the MAF district headquarter offices do not have stable electricity. However, the electricity situation in rural areas will change with the completion of the West African Power Pool (WAPP) which will supply electricity to Sierra Leone.

Limited Involvement of the Private Sector

While for-profit private entities are not significantly present in EAS in Sierra Leone at the moment, any agenda for e-extension must bear in mind their potentials for agricultural development in the country. The lure of private EAS is that they are seen as more motivated, more conscious of cost and sustainability, and high uptake by farmers. However, a critical learning to take from other countries where they are significant players or have failed, is that for-profit EAS providers operate only on the basis of profit. This means that EAS recipients either have to have the purchasing power, or there is readiness on the part of government to subsidise their access to the services of for-profit EAS providers. Another critical learning to take from places where they are significant players or have failed, is that EAS are best suited for categories of activities as inputs

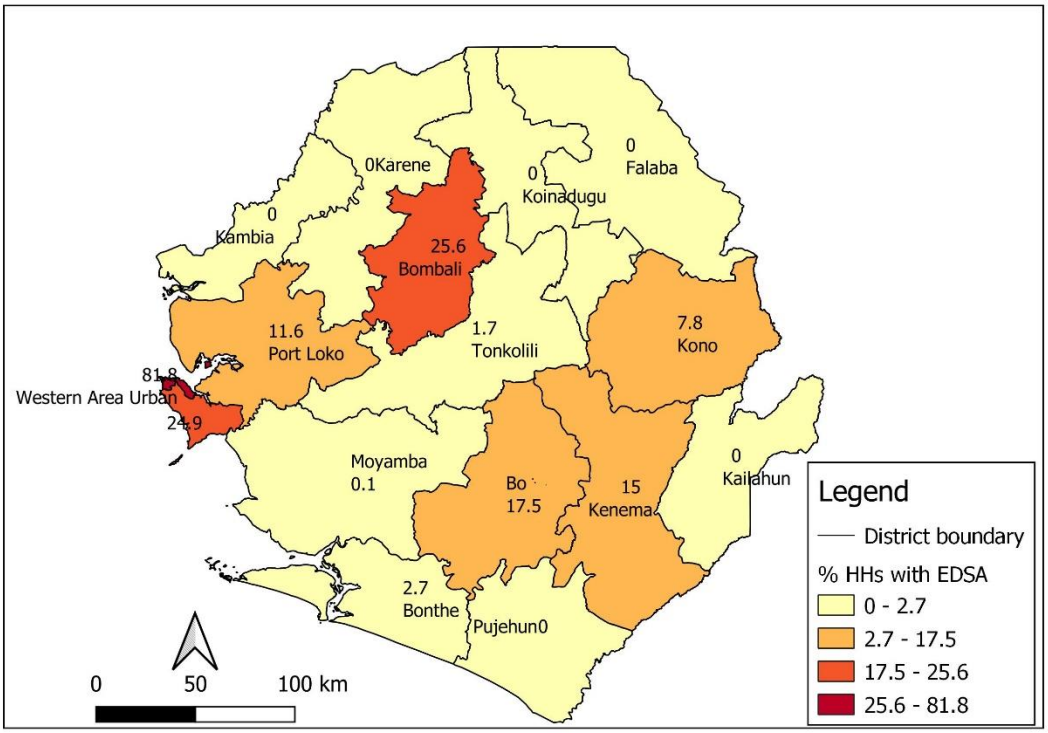
(seeds, fertilizers, feed, and chemicals), and livelihood innovations, including market linkages and financial services.

3.15 Existence of the Policy Space

The policy space exists to accommodate and facilitate any planned or intended efforts towards ICT-based agricultural extension and advisory services. Government's pronouncements of desire to increase uptake of Science, Technology, and Innovation to accelerate economic transformation have been clear. In a speech by His Excellency, President Julius Maada Bio, on 7th March, 2019 at Harvard University; said that "nations that have leapfrogged in the development process have a well-educated and trained workforce, and have taken advantage of science and technology". In line with these sentiments, one of the first actions of the President upon his election into office, was the establishment of the Directorate of Science, Technology, and Innovation (DSTI), in 2018. Government's aspirations to increase uptake of Science, Technology, and Innovation to accelerate economic transformation presents a critical window for facilitating Sierra Leone's up-take of ICT for EAS. Towards mainstreaming technology and innovation across government, the President on 1st November, 2019 launched the National Digital and Innovation Strategy.[9]

Within the framework of the National Digital Development Policy 2017, the NAT 2023, the National Sustainable Development Programme 2010 – 2023, and the National Agriculture Advisory Policy of Sierra Leone 2016, government has identified the enhancement of agriculture using ICT.

Map 2: Percentage of HHs using EDSA for lighting by District



Source: SLIHS 2018

In addition, the African Union and ECOWAS Digital Transformation Strategy for Africa has identified the following foundation pillars:

1. Enabling Environment,
2. Policy and Regulation,
3. Digital Infrastructure,
4. Digital Skills and Human Capacity,
5. Digital Innovation and Entrepreneurship

Within the digital infrastructure sector, government is making efforts to improve rural telecommunications infrastructure through the fiber optic backbone, the RuralStar to enhance rural connectivity.

3.16 Mobile Network Operators (MNOs)

There are two main mobile network operators in Sierra Leone; Orange and Africell providing both mobile phone and mobile internet services. Both MNOs have a large national subscription base. However, QCell became operational in 2019 but compared to the two main MNOs has limited coverage and subscription. Sierratel also provides both mobile phone and mobile internet but far lags behind Orange and Africell. In addition, Afcom and Onlime are both internet service providers with limited national coverage. Based on interviews with farmers in the field, most of the farmers are registered with Africell.

Both Orange and Africell report that they have been involved in providing telecommunications support to government. Orange cited the 177 short code used for reporting COVID-19 cases, the short code for reporting Pay No Bribe for the Anti-Corruption Commission (ACC) and the National Ambulance System to name few.

3.17 The Context Justifies the Need for E-Extension

The assessment has identified the major challenges facing the introduction of E-extension in rural Sierra Leone, including high illiteracy, poor network coverage, high cost of data and top up, low number of farmers and EAS providers with smart phones, lack of constant electricity to charge phones and to run local community radios adversely affect equitable distribution of information. In EAS, information is power and ICTs have been recognized as important elements in promoting connectivity among key players. In light of the prevailing challenges in the current EAS delivery and the E-extension introduction, the adoption of any E-extension should take into consideration the impact of the identified challenges and to develop strategies to limit their impact.

The examples of success from various countries on the African Continent demonstrate that Sierra Leone, with similar socio-cultural and economic development context, can equally harness the power of ICT for the benefit of agriculture. Importantly, again, these examples present useful entry points for approaches to ICT for extension in Sierra Leone. ICT can play a critical role in bridging information gaps, so that, even with few extension workers, a large number of farmers can be reached in Sierra Leone. A guiding principle to adopt for ICT is to see it as a newer approach to EAS that seeks to bring farmers to

exchange ideas; seek advice and guidance, connect with, relate to, and mobilize for the cause of agricultural revolution. ICT has, and continues to remove communication barriers and democratise communication channels and open the door for all to have a voice and participate in a democratic fashion.[10]

CHAPTER 4 - CURRENT AND RECOMMENDED ICT FOR EXTENSION SERVICES

4.1 ICT Platforms and Applications

Sierra Leone has benefited from the global mobile telecommunications revolution. Today, ICT devices in Sierra Leone encompasses radio, cellphones, computer and network hardware, satellite, and so on; as well as the various services and applications that go with them; such as video conferencing, and distance learning.

From the reviews, interviews, FGDs, and analysis, information was gathered on the use of ICT in agricultural extension in Sierra Leone. The key findings revealed the following:

Radio has the most significant reach and spread in Sierra Leone, with 81% of the population owning a radio set. As at 2015, there were 90 radio stations registered with the Independent Media Commission (IMC); although only about 50 radio stations across the country; including the state-owned broadcaster were active at the time.[11] Each of the country's 16 administrative districts has either a radio station, or can be reached by a radio station.

MAF Extension staff admitted carrying out weekly radio discussion programmes generally to address topics that improve agricultural productivity, informing farmers about the plant calendar, announcing ongoing events related to the agricultural season or informing about any upcoming changes that may affect farmers' activities. In cases of pests and diseases outbreak, radio is used to inform farmers on what to do. The cost of a one-hour radio varies across the regions. The Sierra Leone Broadcasting Corporation (SLBC) charges four hundred thousand leones (Le400,000) for an hour of radio discussion. In other areas like Kabala where the SLBC does not have coverage, the community radios; Radio Shallom and Radio Bintumani, charge between three hundred thousand to five hundred thousand leones. Most if not all of the MAF district offices cannot sustain the weekly radio programmes due to the cost. Most of the offices owe SLBC for radio programmes carried for which payment has not been made. In Rokupr, SLARI uses Radio Kaliza to run weekly radio discussion programmes where they bring

[11] BBC Media Action. Communication Media and Mobile

in subject matter specialists with farmers calling and asking questions. SLARI is able to run the radio programmes by giving 10 liters of fuel for the one-hour programme.

Mobile phone access in Sierra Leone is high. According to the Sierra Leone Integrated Household Survey 2018 (SLIHS 2018) 77.2% households have mobile phone coverage in the country. It is estimated that 81% of adults in the country had access to cellphones. Mobile phone is one of the two most widely used media platforms in the country. Mobile is predominantly used in Sierra Leone for making calls, according to the BBC Media Action report. Only 33% of phone owners use their handsets to send text messages.[12] Only 13% of cellphone owners use their phones for social messaging services such as WhatsApp and Facebook.[13]

While mobile phone coverage and usage in general is high, there are significant regional and district variances (see Map 3). Falaba, Moyamba, and Koinadugu districts have the lowest proportions of mobile phone coverage of 37%, 49.2%, and 59.9% respectively. At regional level, the Western Area has the highest number of households with mobile phone coverage of 97.7%, whilst the Eastern Region has the lowest of 66.4%.

Farmers in the rural areas are mostly illiterate and not technology savvy, they view their mobile phones simply as a tool to communicate, and not yet as a technology to access information. Farmers in the four selected districts admitted very little use of SMS. Mobile phones are mostly used to inform farmers of upcoming events such as trainings, workshops or meetings.

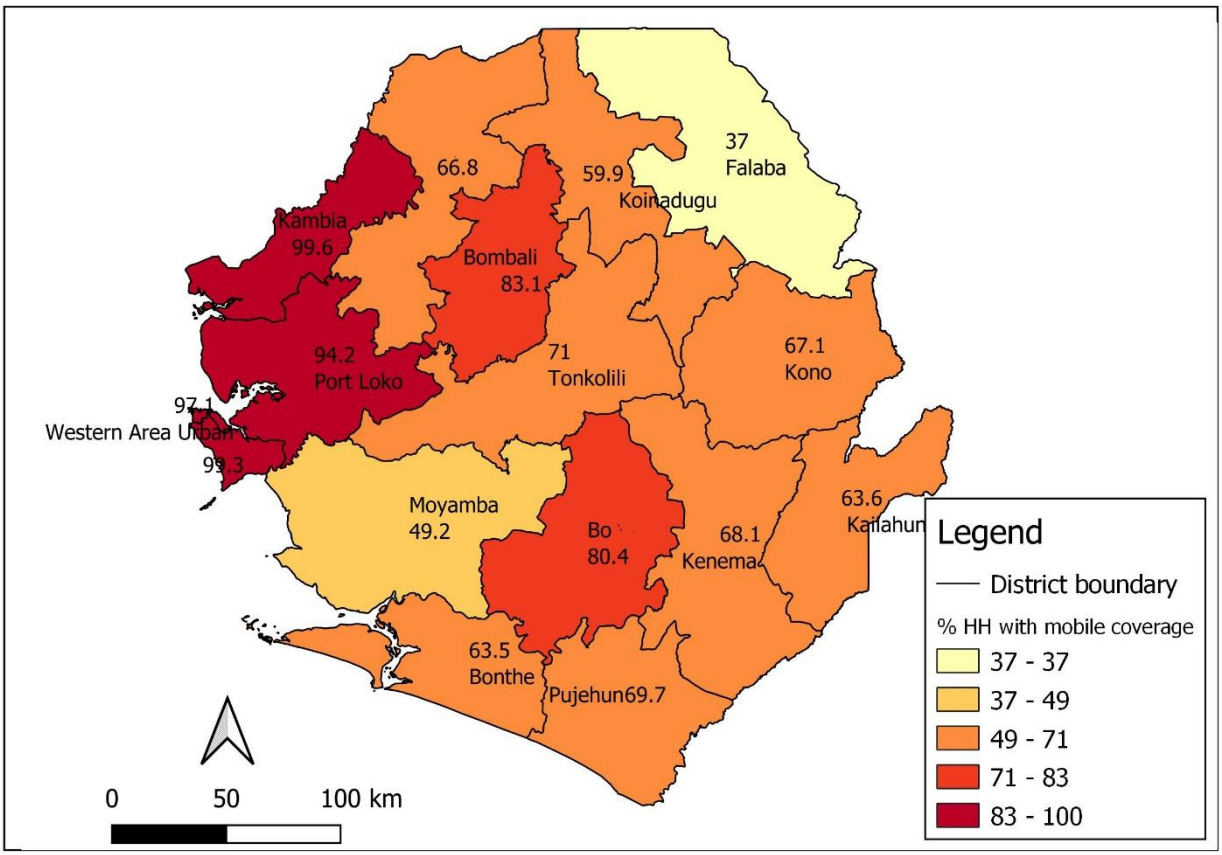
Mobile payment systems have become very popular in Sierra Leone. The two most popular mPayment programmes in Sierra Leone are Orange Money and Africell Money. A study undertaken by Bank of Sierra Leone in 2016 on Financial Inclusion reported that there were 1,356 mobile money agents spread across the country in places with mobile coverage (http://www.bsl.gov.sl/Geospatial.html). The number of mobile money agents may have increased since 2016. Though monetary transactions were not reported between MAF and NGO extension agents and farmers, however, farmers interviewed admitted using mobile money to transact business. They reported using mobile money

[12] BBC Media. Research Report May 2016.
[13] Ibid.

to receive payments for their goods and also making payments for seeds and other agro-inputs.

Close User Group (CUG) - Under the Orange Fresh Sweet Potato Programme of Hellenkeller, a CUG was established for all DAOs, SMSs and BESs to facilitate communication and passing of information relating to upcoming EAS events. Almost all the international NGOs interviewed reported having CUGs composed of staff of their district head office and the field office staff. Unfortunately, the CUGs do not have farmers in it.

Map 3: Percentage of Households with Mobile Phone Coverage by District



Source: SLIHS 2018

Television (TV) and Video has far less reach and spread in Sierra Leone. At the time of this report, there were 6 TV stations in the country; including the state-owned broadcaster, SLBC-TV. All the TV stations broadcast mostly in Freetown. None of the TV

stations has national coverage. Only 45% of the population can access TV; according to BBC Media Action report. Use of TV to deliver EAS was not mentioned.

Video content can be accessed on DVD players, computers, projectors, and smart phones around the country.

The use of videos for delivering EAS is limited to trainings mostly at FFS. However, the extension staff of the Extension Department of Njala admitted predominantly using videos via mobile Pico Projectors. The videos are made by the students offering BSc in Agriculture, Communication, and Media.

Internet is technically available everywhere in the country; either via mobile telephone, fiber optic, or satellite communication. However, internet penetration is extremely low particularly in the rural areas. Overall, internet usage is put at 15% of the population.[14] This will change when the fiber optic cable programme is complete in the country.

Each MAF district office was provided with 4G Router by HellenKeller. The Routers are in the custody of the SMS Extension. They are used to provide internet to enable reports produced to be emailed from the field to Freetown and to support communication and information sharing with the various MAF offices and Hellenkeller.

Social media in the form of WhatsApp is used for EAS delivery although on a very limited scale as most of the players do not have smart phones. However, some farmers admitted using it to report incidents on the farm like taking pictures of a disease or pest and forwarding it to a BES or directly to the SMS. Farmers with smart phones admitted using WhatsApp to communicate with other farmers and to share ideas. At the district level, MAF has a WhatsApp forum mostly composed of DAOs and SMSs. NGOs also admitted having a WhatsApp group that bring together their staff with the field staff.

DIGITAL 2020 Sierra Leone - https://datareportal.com/reports/digital-2020-sierra-leone

However, there is no WhatsApp group where farmers together with Extension agents interact within the realm of EAS.

Internet platforms: Within the ICT Unit, MAF has developed internet platforms that provide access to relevant agriculture information. These include:

- The Agriculture Marketing Information Systems (AMIS) - supported by SCADeP, to track and publish market data on key crops. The PEMSD uses its field Enumerator staff to collect data on seeds received, how much was planted, yield, post-harvest loss etc. When completed, AMIS will link farmers to prospective buyers.
- The Management Information System – it serves as an activity/project tracking system. It also collects information on input given to farmers.
- Integrated Voice Response (IVR) – the MAF ICT Unit has developed a proposal for the design and implementation of an IVR to provide agricultural information to farmers in their own local languages. According to the Head of ICT Unit, MAF, SCADeP has expressed interest in funding it.
- Animal Disease Surveillance Database, under the One Health Programme jointly implemented by the Ministry of Health and Sanitation and MAF; with support from the FAO.

AgriNews - the production of a print newsletter that address agricultural themes.

Data Collection – PEMSD responsible for planning, evaluation, monitoring and surveys, has moved from use of traditional form of data collection to an ICT based approach. Using tablets and smart phones, its field enumeration staff are trained to collect data for research, baseline surveys, monitoring, impact evaluation, to inform policy making and for many other purposes.

e-Voucher System – MAF and SCADEP have commenced discussion on developing and implementing e-Voucher system in respect of inputs purchase and sale of products.

Private sector involvement - there are few ICT applications being used for EAS delivery in Sierra Leone developed by the private sector. These include (

- GoMakit developed through Innovation Axis. It links farm produce particularly vegetables and fruits to buyers.

- the Integrated Farmer Training (IFT) provided by GIZ and Welthungerhilfe's (WHH). It provides training to farmers in the areas of good agricultural practices (GAP) and Farmer Business School (FBS)
- Geopool (www.geopoll.com) on their website claim to provide E-extension SMS platform in Sierra Leone were farmers will be asked to select language, get tutorials and solutions about farming.

From the above, it is clear that Sierra Leone is already using ICT tools in delivery of EAS although on a low scale. Table 5 shows the summary of ICT tools used in delivering extension functions in Sierra Leone.

Table 5:Summary of available ICT tools in delivering Extension functions

No.	Extension functions	Type of Information	Current ICT Used
1	Connect people and information; Reporting farm incidents, and informing farmers of upcoming events, activities etc.	information on meetings, workshops, trainings, and reporting on farm incidents, diseases and pests	SMS using both basic and smart phone (used by MAF & NGOs) Voice calls using both basic and smart phone (used by MAF & NGOs) CUG (used by MAF & NGOs)
2	Raise general awareness of opportunities such as receiving agro-input, what/how to do through, or learning	Knowledge, training and education	Mobile, Megaphone, and Radio
3	Provide technical information, demonstrate or train	Knowledge, training and education	Megaphone, Video, and Mobile Projector
4	Diagnose problems and recommend a solution	Education Send and receive data on outbreaks.	Mobile, Tablets

No.	Extension functions	Type of Information	Current ICT Used
5	Respond to follow-up questions raised by clients	Knowledge, training and education	Mobile Radio discussion
6	Provide mass advisories	Information	Radio
7	Facilitate access to credit and inputs	Knowledge, training and education	Mobile
8	Conduct surveys, enumerations, M&E	Education	Mobile, Tablets
9	Communication between SMS and BES on Specific project, or between NGO staff	information on meetings, workshops, trainings, and reporting on farm incidents, diseases and pests	CUG Internet via Router Mobile
12	Taking farmers through the farming calendar	Information and knowledge	Radio Mobile
10	Linking farmers to markets	Information and knowledge	Mobile Radio

4.2 Recommended E-extension packages for EAS Delivery

In section 4.1, the current ICT approaches used in delivering extension activities in Sierra Leone although on a low scale were discussed. In scaling up, the design and development of a number of these approaches are recommended, together with the implementation plan, possible timeframe, and provisional costing (see Table 6).

Table 6: ICT tools recommended for scaling up for E-extension

No.	ICT enabled solution	Purpose	Design	Implementation plan	Time frame	Provisional costing
1	Weekly Radio discussion programme	Radio has high level of penetration in Sierra Leone. Aimed at targeting large groups of farmers. Farmers participation will participate through questions and answers through call-in. Used for mass broadcast as in the case of; 1) an outbreak of disease or pest, 2) informing farmers of agro-input acquisition. 3) dissemination of technical information, training or demonstration, 4) Raising general awareness of opportunities,	The cost of an hour radio discussion by each district is not effective and not sustainable at the moment due to the cost. Use of a radio discussion or training at national/regional level that benefits a number of districts should be considered and can be cost effective. However, in the event of a localised outbreak of a disease or pest, use of a district/community radio is by far the best option to use.	1) MAF to negotiate with SLBC for use of it for all radio discussions except in districts where SLBC does not reach. In that case, consider linking up with local community radio in those areas. 2) Radio discussions can be either at national, regional or district depending on the context, 3) MAF to agree a reasonable cost per hour per frequency with SLBC 4) Disseminate the timetable to all farmers in the country, region or district 5) At Freetown, decide on a pool of experts from MAF, SLARI, Njala University & key value chain actors for hosting the discussions	2 months	Le400,000 per hour per week is the current SLBC rate

		5) Linking farmers to market opportunities	The use of national languages for specific geographical areas will also be helpful			
2	Closed User Group (CUG)	Expand the existing CUGs of both MAF and NGOs to include other stakeholders including lead farmers, group leaders and secretaries of farmer groups. CUGs are most effective in; 1) informing farmers of agro-input availability 2) dissemination of technical information, training or demonstration, 3) Raising general awareness of opportunities, 4) Linking farmers to market opportunities,	Already exists within the HKI project. It is recommended for it to be expanded to include FEWs and the leaders and secretaries of each farmer organisation.	1) Negotiate with HKI for additional MAF staff and farmers added to the CUG 2) Deciding information that farmers need and what farmers can be reported to MAF 2) Provide training to leaders and secretaries of farmer organisation on how to use the CUG, what needs to reported using the CUG, reporting lines, gathering information from farmers and scaling to BES, and vice versa 3) Pilot the expanded CUG in one of the districts 4) Role out the expanded CUG to the 16 districts	1 Month	To consult HKI on current monthly cost

		5) Diagnose problems and recommending a solution, 6) Respond to follow-up questions raised by farmers, 7) Facilitate access to credit & inputs, 8) Mobile data collection; surveys, enumerations, & M&E				
3	WhatsApp	MAF to establish official WhatsApp accounts/forums that can be used for; 1) Informing farmers of agro-input availability 2) Dissemination of technical information, training or demonstration, 3) Raising general awareness of opportunities, 4) Linking farmers to market opportunities,	Some group leaders and secretaries of farmer organisations have smart phones. Promote the use of WhatsApp through formation of groups between farmers, FEWs and BES & use of it for extension related activities. MAF to buy 5 smart phones or	1) Provide Smart phones for all BES in the country 2) Provide training to all BES on how to use WhatsApp for official communication, what can and cannot be done 3) Provide training to BES on how to take photos, record audios and videos and sending over WhatsApp 4) Create a District BES WhatsApp group for all BES in the district which also includes the SMSs - issues relating to that	1 month	5 smart phones per district x 16 districts @ Le1,000,000 = Le80 million

		5) Diagnose problems and recommending a solution, 6) Respond to follow-up questions raised by farmers, 7) Facilitate access to credit & inputs, 8) Sharing video, audio, taking pictures and sharing,	tablets per district for the BES	district are discussed and shared here 5) Create a Regional BES WhatsApp group for all BES in the district which also includes the SMSs - issues relating to that region are discussed and shared here 6) Create a National BES WhatsApp group for all BES in the country which also includes all the SMSs. Issues relating to the entire country are discussed and shared here		
4	Video	Njala University can take the lead, and in collaboration with MAF donor funded projects and AICU, create both written and video information that can be delivered on demand through SMS, WhatsApp, DVDs, CDs, Memory sticks, mini Projectors,	Ideal on farm sites for small trainings through video players, mini projectors, or a computer. NU has trained its students to develop videos using fairly low-cost tools, and	1) Develop the training material or demonstration using both audio and video 2) Save video on Memory sticks and on smart phones 3) Send Memory stick to each district with each BES having one 4) BES to collaborate with FEWs to conduct trainings/demonstrations using	1 Month	5 memory sticks (32 Gb) per district x 16 districts @ Le120,000 = Le9.6 million

		projected on a screen, or Internet. Very useful for the following; 1) Diagnose problems and recommending a solution, 2) Collecting & diagnosing problems, 3) Raising general awareness of opportunities, 4) Linking farmers to market opportunities, 5) Respond to follow-up questions raised by farmers, 6) Training on good agricultural practices	hand-held devices with fair quality. Digital Green, www.digitalgreen.org, is the most successful video production and training organization dedicated to farmers.	the video on computer, projector, or via WhatsApp		5 Portable Video players per district x 16 districts @ Le200,000 = Le16 million
7	Mobile Projectors	Can be charged in the office and taken to the field to deliver trainings, demonstrations by connecting the video on Memory stick to the projector	The cost of a mobile Pico Projector ranges from US$60 to US$100. Buying few for each district, say 5 per district and	1) Acquire 5 Pico projectors per district, each for a block, 2) Ensure the projectors are kept at the district office and only requested by the respective BES, 3) Train BES on how to use and maintain the projectors,	1 Month	5 Pico projectors per district x 16 districts @ US$85(ave

			making it available to the BES.			rage cost) = US$1,360
8	Megaphone	Useful for conducting large meetings, trainings, demonstrations, and workshops.	Provide few to each district office that can be provided to BES when requested.	1) Acquire 2 Megaphones for each district 2) Train BES on how to use and maintain it, 3) Establish protocols on how to request it	1 month	To be provided
9	Mobile Data Collection	Collection of data, feedback, etc. from farmers, on farming activities, EAS, the environment, research, baseline surveys, enumerations, M&E, impact evaluation, etc. to inform policy and for many other purposes.	Open Data Kit (ODK) or KoboCollect can be used to collect, aggregate and visualize data. Both supports standard questions, voice, image, GPS and video recordings. It also has a library of questionnaire templates to select from.	PEMSD are already suing ODK for data collection. They have the expertise to design and implement field data collection. There is need to train the BES and FEWs on how to use it in addition to the Enumerators	6 months	At least I Tablet per Bock = 75 tablets Estimated cost?
11	Information Center in all district	This could be a partnership between a number of MDAs and the Local Councils	The Ministry of Information and Communication to take the lead	MAF to discuss with MIC to get their buy in, Conduct feasibility study	6 months	Not available at the moment

	headquarter towns	where farmers and the general public can walk in, ask questions and are provided with answers. The center will connect to the e-Agriculture & E-extension Data Center when queried	piloting in one or two districts bringing on board MAF, MoHS, MBSSE, & MLGRD for a start.	Develop design, timeframe, provisional cost, Share costs among participating MDAs Start with Freetown as pilot and another district headquarter town		
	SMS platform	Farmers' SMS Center/platform be developed to provide technical knowledge to farmers as well as agricultural extension workers.	Farmers may pay a minimum fee for a message or be provided with a Toll-Free Short Code to receive messages.	1) Develop partnership with NU and collaborate to roll out the SMS platform to be developed by Africell. 2) Register farmers on the system. FEWs can assist farmers in registering details 3) MAF to decide on farmer details to capture in the registration or if an existing database exists to migrate it 4) Pilot in one district before rolling out to other districts	1 month	
	Integrated Voice Response (IVR)	Overcomes illiteracy and language barriers. The IVR to developed and implemented	Farmers using mobile phones will call/dial and will		1 month	

		either as a standalone or integrated into Call center.	receive appropriate response			
10	Call Center	Very useful for the following; 1) Reporting problems and recommending solutions, 2) Clarifications given in real time, The Call center to developed and implemented within the proposed Farmer Platform.		1) Develop concept and share with telephone company 2) Hold discussion with the Commercial and Technical Unit of Orange 3) Conduct feasibility 4) Costing and approval 5) Hardware and software procurement 6) Commencement of development 7) Testing and piloting	1 month	Provisional cost to be provided by Orange

4.3 Farmer Platforms for EAS Delivery

From the KIIs and FGDs, the following platforms were identified as appropriate platforms to overcome the challenges faced by farmers and other agriculture value chain actors in accessing time critical extension information:

1. SMS Platform
2. Integrated Voice Response System
3. Call Center

In recommending the platforms, the following were considered;

- The institutional acceptability of the technology
- The degree of accessibility of the platform in various locations
- The level of education of the various users (literacy) and their appreciation of the technology
- The commonly used communication technology devices of the various stake holders (commonly acceptable means of communication)
- Affordability of the services to various users especially to farmers who will be the end user.
- User friendliness of it

SMS platform for Farmers

During interview with the Head of the Extension Department of NU, it was reported that NU has signed an MoU with Africell for the development of an E-extension platform that will benefit over 1000 farmers. Instead of MAF developing its own platform, MAF should partner with NU on operationalizing the platform to benefit more rural farmers.

The aim is to develop a toll-free SMS platform (figure 7) that links farmers with agricultural extension workers across the country. The platform can be linked to both MAF AMIS and MIS to provide market information and input supply information respectively. The platform will disseminate targeted agricultural information via SMS to registered smallholder farmers in Sierra Leone. Using a short code, farmers will able to get up to date information on price information on different products at different available markets and locations. This will give farmers the platform and negotiation power to bargain with.

The platform will also aggregate the needs of farmers needs and connect them with agricultural input suppliers. The platform will solve the challenges farmers faced in accessing both market and input information.

Bearing in mind our farmers are mostly illiterate, successful implementation of the SMS platform will be a challenge. To overcome the challenges, training both the farmers and the extension workers on how to use the system will be necessary.

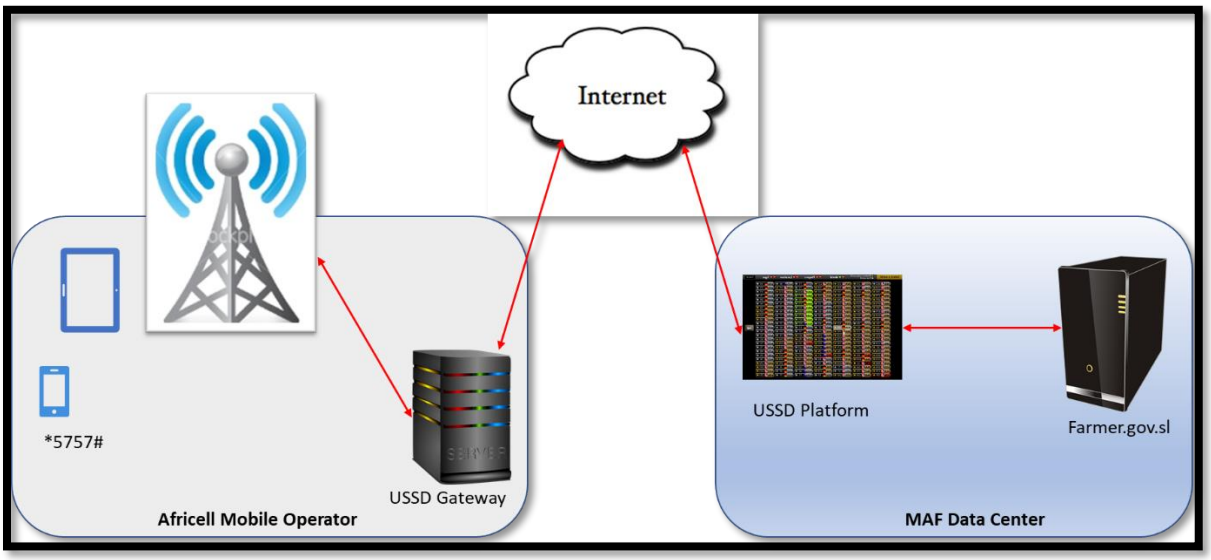


Figure 4: SMS platform

Integrated Voice Response System (IVR) - is a technology that allows humans to interact with a computer-operated phone system through the use of voice and input via a keypad. Farmers will use the system to access critical information on input, agricultural technology, market, and credit facilities.

IVR is increasingly being used by agricultural extension services in several countries in Africa and Asia. The IVR can be piloted focusing on a specific crop such as rice and cocoa crops. Sierra Leone with over 13 ethnic languages and around 71% of population being illiterate, the IVR system will be the right medium for delivering agricultural information to farmers as it overcomes language and literacy barriers. The ICT Unit of MAF has developed both concept and proposal to develop, pilot and scale up IVR to support Value Addition Services. The understanding is that SCADeP has expressed interest in its development.

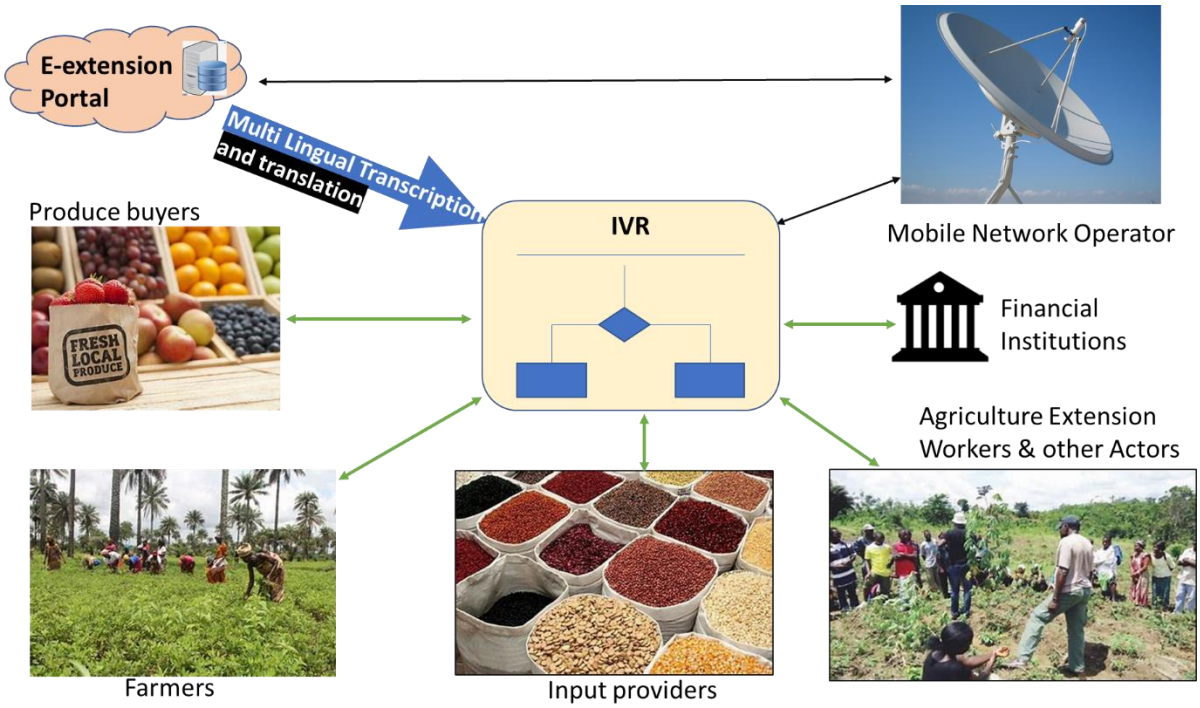


Figure 5: IVR system

Farmers Call Center - Agricultural call centres are emerging as a major channel for supporting large number of farmers across wider geographical locations and with fewer technical resources. The aim is to provide information to the farmers to bridge their knowledge gap. The main proposition of the call center is to provide expert advise by way of responding to queries of farmers on a telephone call and explain technical details of a farmer's query in a simplified manner that the farmer can understand and action. The call center is a suitable way of reaching farmers noting that the mobile telephone uptake in Sierra Leone has now reached 87% with 6.9 million population with Mobile Phone connection[15]. According to the field interviews carried out, about 80% of the small-scale farmers in rural Sierra Leone have access to a basic phone which is the basic tool required for the call center.

The Call center (Figure 5) will augment other information and advisory services such as the proposed SMS platform and the IVR system. The Call centre platform requires both IT hardware and software infrastructure to communicate between the telecommunication link and the call centre software (figure 5).

[15] DIGITAL 2020 Sierra Leone - https://datareportal.com/reports/digital-2020-sierra-leone

The Call center will advise farmers on agricultural technologies and techniques to improve productivity, link farmers to relevant services including input and output markets. It is proposed for the Call center to be established in three regions; Freetown for the Western Area, Makeni for the North/North West, and in Bo for the South East. Each of the regional call centers will reflect the major ethnic languages in the respective regions. For Western Area it will be Krio and Temne. In the North/North West it will be Temne, Limba, Kuranko, and Susu, and in the South East it will be Mende, Kissi, Kono, and Sherbro.

On the hardware infrastructure, a scalable solution is recommended to handle any incremental capacity needs in the future. Based on offer received from Orange, the Call center will be made up of an Ethernet (E1) link-based connection.

On the human resources of the center, it should be recognized that the key to a successful call center is having efficient human resources. The number of operators will depend on the call flow, the integration of the IVR in the Call center, the expected call volume, the number of ethnic languages, and the expertise required. It is advised at MAF HQ to integrate the IVR and the Call center (Figure 6) such that the IVR will focus on frequently asked questions whilst the Call centre will provide the much-needed human interaction required for complicated agricultural problems that require deeper and detailed analysis.

The size of each of the proposed regional call centers will determine the number of team leads and supporting roles. Support roles could be externally sourced but must enhance the operations call center. Key positions may include the Call Center Manager, Agricultural Team Lead, and Call center Agents (with agricultural background).

Content is the backbone for the call centre and good quality content will improve patronage, impact and repeat usage levels. Content will have impact on long term sustainability of the center. To provide relevant, useful, and accessible content, there is need to understand user needs. A well-designed call centre application (CCA) is key to making content more accessible to call center agents and for responding to queries. We propose the Call center to have factsheets for the major crops and livestock. The factsheets can be used to generate audio tips for the IVR system. The Call center will contain a customised photo pest and disease decision support tool. The Call center will also contain

an inbuilt Customer Relationship Management (CRM) tool and reporting facility for managing interactions with current and future callers of the Call centre. The CRM tracks calling history and synchronizes it with Call centre support.

Orange has provided a quotation and will provide the phones, phone lines, servers, and routers. Orange will run the physical phone line from the top floor of Youyi building in the case of the Western Area Call center into MAF office on the second floor. The Orange offer includes standard phone lines including the Integrated Services Digital Network (ISDN) lines that can receive up to 30 concurrent phone calls.

Farmers will require a short code which they will use to call the center. The disadvantage this will have is that, farmers and clients with Africell subscriber identity module (SIM) cards will not necessarily be able to call in to the call center. Further discussions will need to be held with Orange to determine the possibility of redirecting the short code without incurring further cost.

Although the Call centers may push out a number of SMSs for a reasonable cost, as noted earlier, most of the farmers in rural Sierra Leone are illiterate and do not do much of SMS. As revealed in the FGDs, farmers generally prefer actual voice calls or messages. To reduce the burden on farmers, the Call centers may provide SMS information callback systems where a farmer requests information through text.

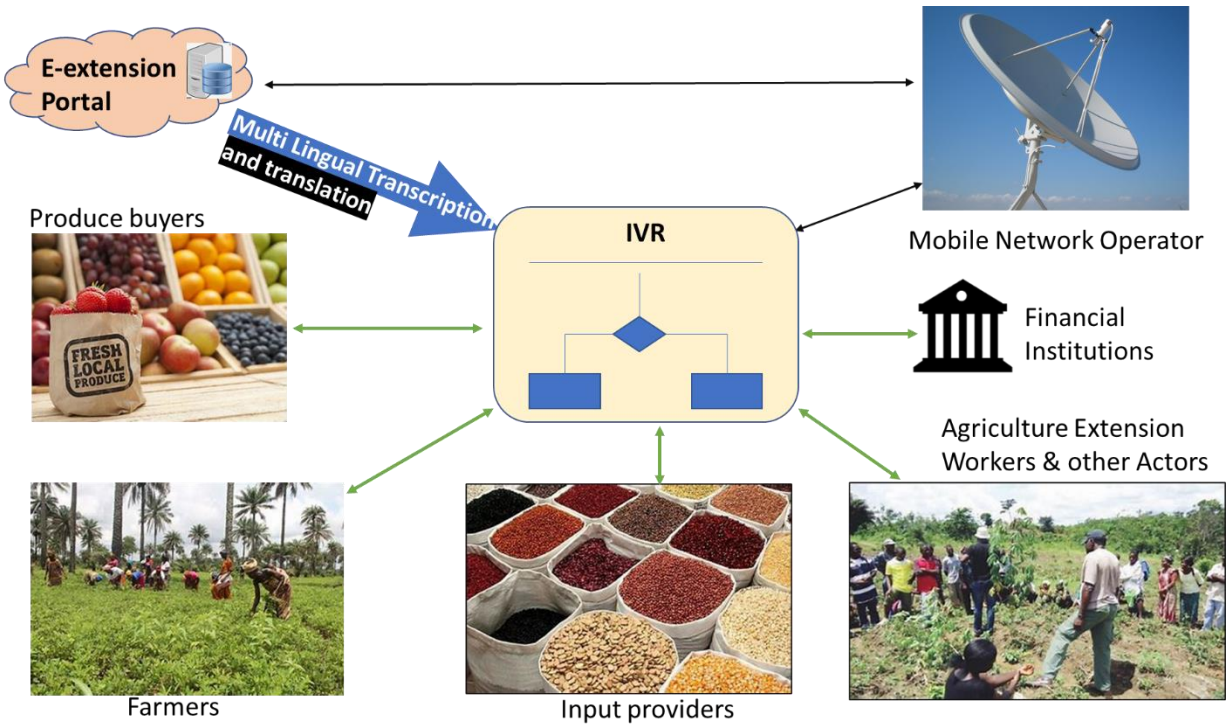


Figure 6: Call Center architecture

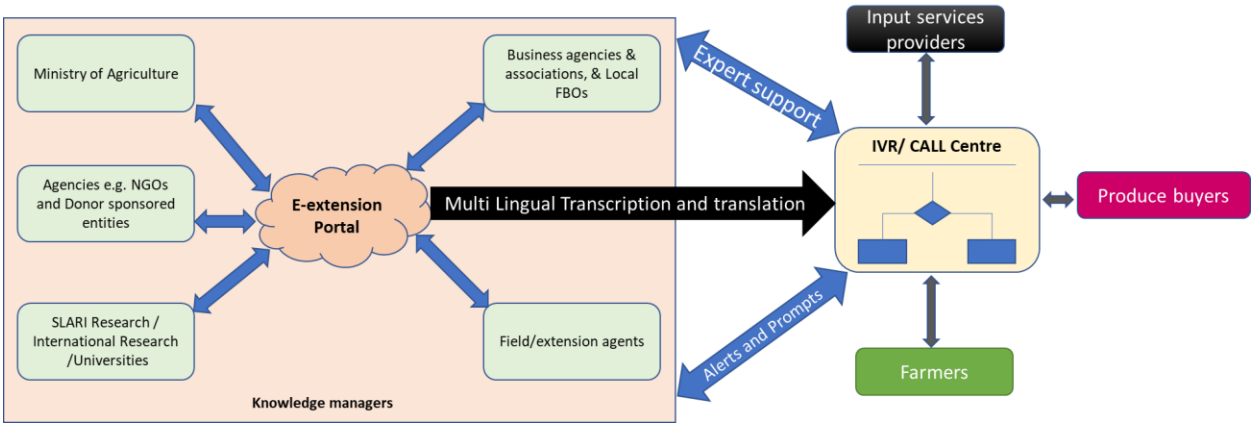


Figure 7: Integration of IVR and Call Center

4.4 Implementation

Implementation of the platform will involve the following stages;

Activity	Responsible Person/organisation	Expected Duration	Comments
Development of the Extension Knowledge Database	Head of the ICT Unit, MAF	6 weeks	Can be outsourced
Development of the Portal	Head of the ICT Unit, MAF	6 weeks	Can be outsourced
Comprehensive farmer & other users need assessment	MAF Extension Division to work with NGOs, FBOs & other Value Chain Actors	8 weeks	
Content Planning, Sourcing, Creation, Quality Assurance, Updating	MAF Extension Division to work with SLARI & NU	Once started, it will be ongoing	MoU between MAF and SLARI
Content management	MAF Extension Division	Once started, it will be ongoing	The Content manager of MAF website
SMS Platform	MAF Extension Division & NU	1 Month	MoU between MAF and SLARI
Developing the IVR system	Head of the ICT Unit, MAF and SCADEP	2 months	Understanding is that SCADeP will fund the development
Setting up the Call Center	ICT Head with support from MAF Extension Division	Will require 30 days according to Orange	Offer from Orange in the Annex
Sensitization	MAF Extension Division	2 to 3 weeks	Use the radio
Training of farmers and MAF extension staff on how to use the system	MAF Extension Division	Won't be a one-off training. Integrate it within the FFS training	Carry a Training of Trainers at district level
Testing the entire system	Head of the ICT Unit, MAF	2 weeks	

Piloting the platform	MAF Extension Division & ICT Head	2 weeks	
System rollout	MAF Extension Division & ICT Head		

CHAPTER 5 - E-EXTENSION FRAMEWORK FOR SIERRA LEONE

5.1 Considerations

In recommending an appropriate framework for a successful E-extension in Sierra Leone, a number of considerations were made, these include;

5.1.1 Types of ICT Facilities to Leverage on

Decisions on the types of ICT facilities and technologies to leverage on must reflect the situation that obtains on the ground rather than what is wished for. Farmers are the ultimate end users of any ICT applications. Over 80% of the farmers who are not only illiterate but still use basic phones for calls and little or no SMS. Similarly, only a small percent of MAF field extension workers have smart phones. In this regard, the study notes key features of the situation regarding ICT usage, that are particularly useful for consideration:

(i) the technology used by those who will be the principal beneficiaries,
(ii) the cost of usage of the platform to the farmers,
(iii) the cost of deployment and usage of the ICT platform to MAFs, and other EAS providers
(iv) the spread and reach of the ICT type, and
(v) simplicity of usage in the context of high levels of illiteracy in Sierra Leone.

The ICT framework needs to be carefully considered when planning for mobile phone use. Two case studies in Uganda indicate that it is important to consider the benefits from simple tools such as mobile phones in light of other barriers such as infrastructure, electricity, level of poverty, level of literacy, type of information to be transferred and sustainability (Donner, 2009)].

5.1.2 Types of EAS Activities ICT Incorporation

Most of the farmers in Sierra Leone are small scale farmers (Farmer Registration Database), and as shown through the FGDs and KIIs, the challenges of these farmers are multifaceted, with sub-divisions and small farm sizes, inadequate knowledge and skills in modern farming techniques and optimum methods of management; late arrival of inputs particularly seed input from both MAF and NGOs, poor quality seeds received from both MAF and NGOs, storage difficulties and inadequate farmer experience with

the marketing of produce; poor linkages between farmers, processors, markets, researchers and extension workers.

At the moment, EAS extended to farmers by government, in particular, are restricted to the traditional transfer of agricultural production skills to farmers. As gleaned from review of literature on smallholder agriculture and ICT in Africa, governments and NGOs operating in contexts similar to Sierra Leone, are providing many other non-traditional EAS on ICT platforms. This assignment finds out that some of these non-traditional EAS being extended to farmers elsewhere in Africa, are equally relevant to the context in Sierra Leone. The FGDs have revealed that farmers lack adequate information on inputs, markets, credit, improved technologies, commercial farming and other aspects of rural development. A critical information which is disseminated to farmers year in year out relates to the (i) farming calendar; when to, when not to, how long to do it, best practice, (ii) Diseases/Pest identification/detection, reporting, control, and management, (iii) introduction of new technologies, and (iv) several trainings. The use of ICT to deliver training and information is a critical ingredient for improving access to markets, production and productivity"[16].

5.1.3 Decision on Governance of the E-extension Programme

The e-Extensions programme envisaged is going to be government owned; and supported by the BAFS project for a period of time. Questions around the governance of the programme would still have to be answered because ICTs are hardly a stand-alone tool. They are often incorporated into systems that have the supportive policy environment, and appropriate governance structures, among other relevant things.[17] Questions around the governance of the programme would still have to be answered in two regards. Firstly, Sierra Leone has a decentralized system of public service delivery; thus, begging the question of the role of local government in the envisaged extension programme. Second, given their current high levels of participation in EAS in the

[16] Munyua, H., & Adera, E. (2009). Emerging ICTs and Their Potential in Revitalizing Small-Scale Agriculture.
Agricultural information worldwide, *2*(1), 3-9.

[17] Huber, Sarah. (In collaboration with Kristin Davis of IFPRI and Karin Lion of Digital Green) (March 2017).

country, the question is begged as to where NGOs would situate in the governance. Consequently, a critical input towards enhanced EAS via ICT would be the need for a coordinating mechanism to promote exchange of experiences and learning, and coordination to mitigate duplications, and maximize resource deployment.

5.1.4 Institutional and Human Resource Capacity Building

Strengthening the capacity of the human resources and institutions delivering EAS requires an increased commitment and investment in quality training and strengthening activities. The sources of funding for these efforts should come from both the public and private sectors.

EAS would need to be holistic; supporting not only higher productivity, but taking on board broader issues pertinent to strengthening livelihoods; in compliance with government's agricultural development objectives and strategies. Consequently, government extension training and qualifications which at the moment is mostly limited to agriculture, would need to take onboard broader issues like livelihoods strengthening, adult education, and communication. Again, this would be consistent with good practice gleaned from ICT-based EAS practices elsewhere in Africa.

The Extension Department of Njala University has made progress over the years in offering BSc in Agriculture and Extension, and has recently commenced the BSc in Agriculture, Communication and Media, and has extended it to the Masters programme. The department boasts that most of MAF Extension Division staff are graduates from the Extension Department. Despite the progress made, there is need to further expand the programme to include a BSc in Agriculture and e-Extension. Graduates with the E-extension degree can be deployed in each district to support the E-extension activities at the field level including building capacity of frontline extension staff.

5.1.5 Low ICT Skills of EAS workers

The study established that EAS workers, and MAF professionals recognise the potential for E-extension to transform agriculture in the country. It is realized however, that the ICT competencies of existing crop of EAS workers are grossly inadequate for any meaningful utility of EAS. Some amount of minimal training to enable them to use such ICT expertise in extension would have to be made. A useful starting point, therefore,

could be to introduce them to the simplest of ICT applications to deliver extension messages to farmers electronically.

5.2 Suggested Framework Approach to E-extension Services

5.2.1 Levels of ICT Penetration and Community Uptake

This study has established that there is no uniformity in the penetration levels of ICT, and usage across the country. For instance, the different districts have different levels of radio coverage, or cellphone coverage. The majority of the districts in the country and a good number of chiefdoms, sections, wards and villages have no TV coverage. Mindful of this reality, the E-extension approach should focus on optimizing the utility of the ICT type (platform) that is dominant in each community; rather doing a one-size-fit-all.

5.2.2 E-extension Service Support to Government's Agricultural Productivity

Government's agricultural productivity objectives emphasise thus:

- Increasing cocoa, coffee, and cashew as major exports
- Increase rice production to meet domestic consumption primarily

Consequently, E-extension Services should prioritise these crops and livestock in consonance with government's agricultural productivity.

5.2.3 Governance Framework for Extension Services

At the moment there is no governance framework for promoting synergy and coordination among the various providers of extension services in the country. Synergy and coordination matter for accountability for content, suitability of advisory messages, reduction of duplication of efforts, mitigation of fraudulent activities, ensuring that EAS activities largely support government's objectives, and monitoring and evaluation. The E-extension framework redresses this situation of lack of governance of EAS in Sierra Leone, by putting in place a new structure that brings together government, NGOs, and for-profit extension service providers.

5.2.4 Investment in Backend Information Systems

In traditional, non-ICT enhanced EAS, information mostly flowed from extension officials to the farmers. Information from farmers to extension workers often came in

trickles, as opportunities availed farmers to ask questions or explain issues. It means that the EAS system hardly had opportunities to have mass data, that could be used for scientific analysis and interpretation. When Sierra Leone deploys ICT-enhanced EAS, mass data is going to flow to the EAS system, from extension officers' interactions with large numbers of farmers. It would be useful therefore, that back-end investments are made to support scientific analysis and interpretation of such data. Ultimately, findings from scientific analysis and interpretation of big data from the field, helps to constantly improve EAS delivery.

Consideration should therefore be given to investment in ICT information systems that collect, store, and process data to give real time, useful and accurate information, that would increase the efficiency of the managerial activities around EAS.

5.2.5 The Local Government Act.2004

The Local Government Act of 2004 devolved agricultural extension to local councils. Therefore, there is need for collaboration between MAF and local councils in the prioritization of the extension and advisory services agenda and dissemination of technologies and knowledge. In this regard, establishment, maintenance and strengthening of linkages with local councils will be a key success factor.

5.2.6 Improving Research & Extension Service Delivery

Both MAF and the research institutions agree that the linkage between them is very weak and should be strengthened. There is call for the integration of the Extension Division of MAF into SLARI as done elsewhere. There is also weak linkage between research and the private sector and should be strengthened to enable the private sector to make demands on new technologies to be developed through feedback.

5.2.7 Technology Development, Packaging and Dissemination

The inclusion of farmers in the governance of extension programmes and providing spaces for dissemination of feedback from farmers to extension service providers and researchers will support farmer-led technology development, packaging and dissemination of key extension program areas. Extension messages and programs should

be developed with farmer input and feedback and in a collaborative process that involves all stakeholders; research, extension, farmers and other value chain actors.

5.3 Proposed Sierra Leone E-extension Framework

Based on the review, the proposed platforms, and the considerations advanced, we propose the following components as part of the framework for the successful implementation E-extension in Sierra Leone:

(1) Formation of Extension Advisory Board (EAB)

(2) Formation of a Knowledge Providers Group

(3) Developing and operationalising the E-extension Database and Portal, and

(4) Users;

(a) Farmers, and the

(b) Extension Service Providers.

(5) Social Media

5.3.1 Extension Advisory Board (EAB)

The establishment of an EAB will bring together MAF, University/Research Institutions, Farmer Organisations, Private Sector, NGOs, Value Chain Actors, Mobile Network Operators including ISPs, Development Partners, and Financial Service Organisations, (see Figure 8) The EAB regulates the entire extension service delivery in the country, defines roles and responsibilities, determines content, promotes stakeholder collaboration, networking and sharing, and provides the platform for farmers to be consulted. The board will be represented at the national and at the district level. It is recommended that MAF take the lead in the formation and chairing of the board. To set the board and make it fully operational, MAF will need support from EU/BAFS, the World Bank, and FAO.

6.2.2 Knowledge Providers

Demand driven and time critical information to increase agricultural productivity and farmer household will come several sources including research, MAF, private sector, input providers and buyers.

6.2.3 E-extension Database and Portal

Extension Data Database will serve as a repository for storing all EAS information. The entire agricultural sector will benefit from the data center as it will serve as the knowledge base for the entire E-extension across the country. The database incorporates all the information, data, and solutions from all the knowledge providers. The Call center, IVR, and all other users will query the knowledge bank. MAF in consultation with SLARI, NU, and other members of the Knowledge management to decide whether to use information created by a third party or create an in-house agriculture extension database. There are existing knowledge banks that can be bought off the shelves but advised creation of an in-house database. Information in the knowledge bank may come from several sources; MAF, SLARI, NU, NGOs, Input Providers, Produce Buyers, FBOs, ABCs, farmers, extension workers, the internet and other Value Chain Actors. As a beginning, the knowledge bank can focus on the top five crops; rice, cassava and the tree crops, cattle, goats and sheep.

6.2.4 Farmers

The Extension database will be accessed through the E-extension portal. Farmers and farmer organisations, can access it directly through mobile internet, the call centers, IVR, extension workers, and community radios.

6.2.5 Extension Workers

Extension workers can access content or proffer answers based on queries from farmers and disseminate such to farmers. It could also mean farmers through SMS or voice call to call centers or a community radio where subject matter specialists are seated to demand information. The IVR, call centers or community radios will also interrogate the data center to extract response and pass that to farmers.

6.2.6 Social Media

Through social media such as Facebook, Twitter, and WhatsApp, farmers and farmer organisations can communicate within and between themselves and with the extension workers, and value-added actors.

The E-extension framework (figure 9) can also be structured into four layers; Management Layer. Knowledge Layer, Data Layer, and Information Access Layer.

i. Management layer provides the overall oversight for the successful implementation of E-extension in Sierra Leone.
ii. Knowledge layer provides the knowledge; data, information, content, solutions, and applications needed by farmers to increase agricultural productivity.
iii. Data layer provides essential knowledge and interface to farmers and other actors.
iv. Information Access layer refers to end users like farmers, extension workers, input and produce buyers, and the IVR, Call center, and Portal to access the knowledge.

The four layers need to work together for the successful implementation of E-extension in Sierra Leone.

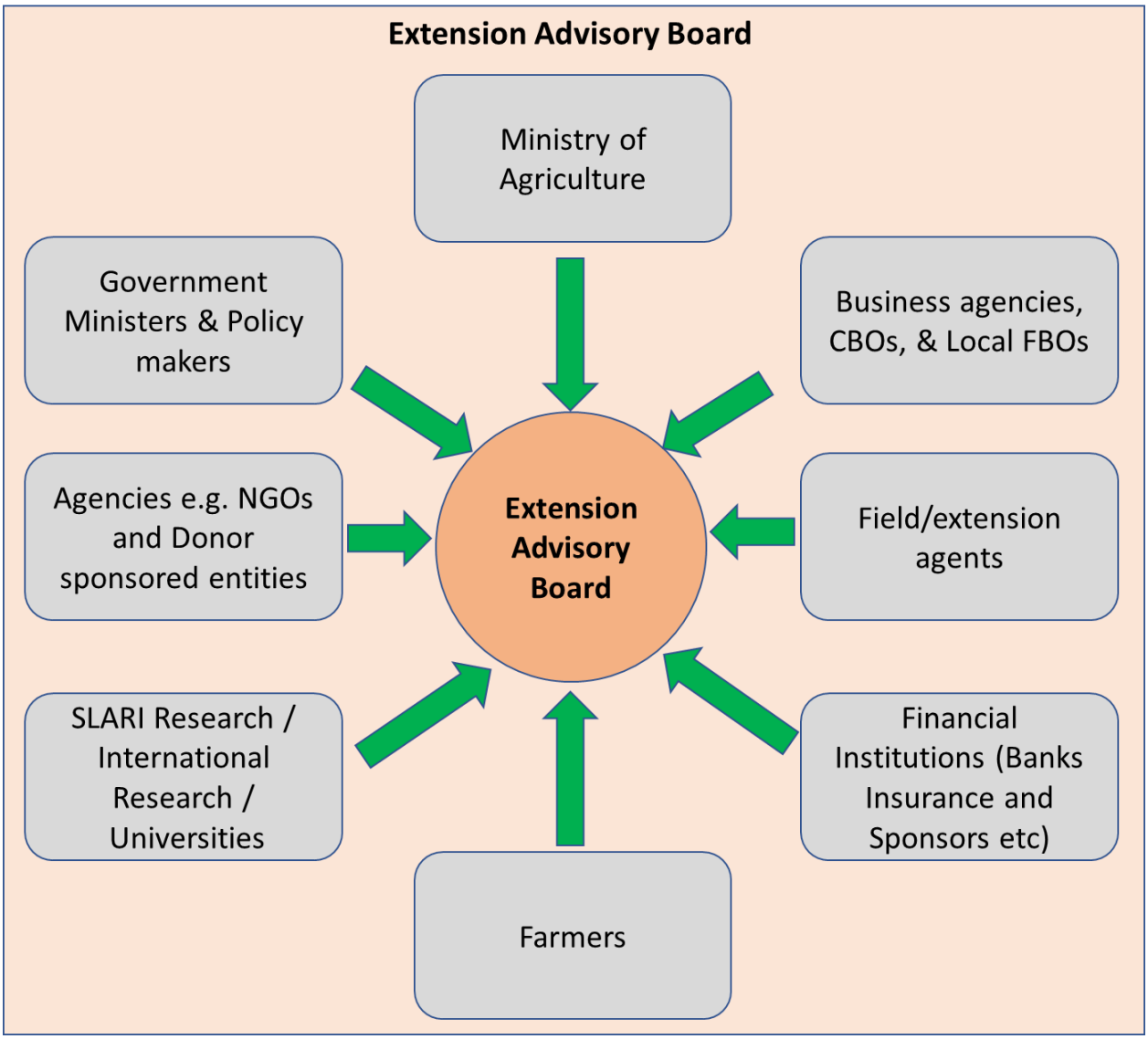


Figure 8: E-extension Advisory Board

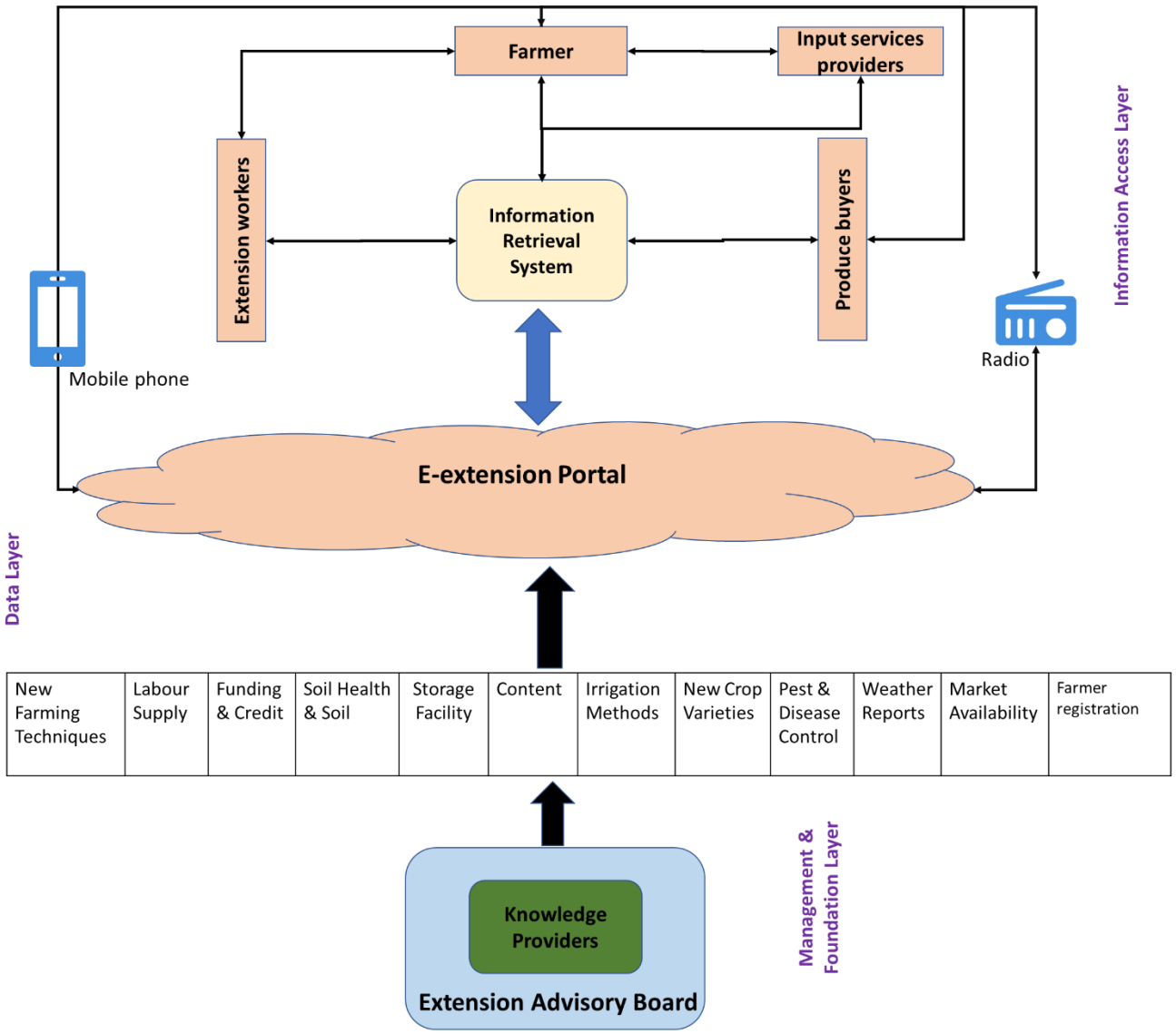


Figure 9: Framework E-extension Implementation

CHAPTER 6 – CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

This report has presented a comprehensive assessment of the various components required to develop and implement a successful E-extension in Sierra Leone. Based on a desk review interviews, and focus group discussions with a variety of EAS actors. The report gives the findings of the assessment, proposed a framework and appropriate E-extension packages for E-extension in Sierra Leone.

The assignment concludes that there are numerous, well established challenges with the current EAS delivery. The low ratio of extension workers to farmers, the limited technical knowledge of field extension workers, Lack of adequate logistics such as transportation and communication facilities, poor road network system, late acquisition of seed input, and lack of funds for extension and research operations and weak research-extension-farmers linkage. All these have adversely affected equitable distribution of information to farmers.

In light of the prevailing challenges that have constrained effective access of farmers to extension services in the country, the adoption of E-extension could open up new opportunities in service delivery. However, the study found out that Sierra Leone was already using ICT in EAS delivery although on a limited scale. Notable amongst the current ICT enabled solutions are, the radio, mobile phones for both SMS and voice, mobile payment system, CUGs, ICT applications that link farmers to buyers, farmer training, and mobile data collection.

The ICT approaches currently used are stand-alone tools that must be incorporated into an effective system with supportive policies, optimal roles for different actors, appropriate governance structures, human and organizational capacities and other relevant outreach methods. This has been elaborated in the proposed E-extension framework and recommended E-extension packages, and the Farmer Platform to successfully implement E-extension in Sierra Leone.

ICT enabled agricultural extension advisory service delivery has transformed agriculture in most countries in Africa, Asia and the rest of the world. Sierra Leone is trying to catch with the rest of others. The ICT, digitilisation, telecommunications, and agricultural policies together with the e-agriculture framework of MAF provides the enabling environment for E-extension in Sierra Leone. Based on the findings of the assessments, the proposed framework, packages recommended and Farmer Platform, this report makes the following recommendations for successful implementing E-extension in Sierra Leone.

6.2 Recommendations

Governance and Policy Environment

1. The Extension Division of MAF needs to review and update the 2013 extension strategy in the light of the introduction of E-extension. The 2013 policy though it had an Action Plan but implementation of it did not happen. MAF should ensure that the new policy is implemented.
2. Government should review and update both the 2017 National ICT policy and the 2006 National Telecommunications Act to provide necessary customer protection, and ensure that the requisite rural telecommunications infrastructure is provided at affordable cost.
3. The current sources of funding for extension delivery is limited to the Government of Sierra Leone. Budgetary allocation to the Extension Division should be increased. Donor financing for extension needs to be obtained.
4. Better coordination is needed between MAF, NGOs, research/universities, farmers and the private sector to increase efficiencies along value chains. To successfully implement E-extension in Sierra Leone, all major relevant stakeholders must collaborate. The monthly sectoral meetings should be more than sharing information, workplan and reports. MAF extension should work with NGOs from planning a project proposal to implementation.
5. The formation of the Extension Advisory board, in addition to the monthly sectoral coordination meetings will considerably improve coordination and delivery of EAS. NGOs and the private sector should as a matter of must support and collaborate within the advisory board.

Partnerships

6. MAF should establish innovative partnerships with the private sector to facilitate the development, piloting and scaling up of several ICT applications in agriculture but more particularly in agricultural extension.
7. Partnerships within the research, university, NGOs, Development projects, business and aid communities are important aspects for the success of the recommended platforms. There are several avenues available to MAF in forging relationships in the areas of; knowledge management, business and telecommunications.
8. In the area of telecommunications, MAF could get Orange or Africell to offer a better and cheaper call rate for the SMS, IVR, and Call center (such as offering a standard domestic rate for a premium short code.

Human and Logistical Capacity

9. The MAF field extension staff should be given the requisite capacity and logistics at district, block and cycle levels.
10. Government to review the salaries and conditions of service of its extension staff to attract and retain the best.
11. Strengthen MAF district offices to provide fit for purpose EAS and timely input to farmers at very minimal cost.
12. For Sierra Leone to realise the full potential of enhanced ICT EAS delivery, government must invest in rural/feeder roads, education, financial services in the rural areas.
13. MAF Extension Division needs to regularly educate its staff through short-term in-service training, as well as provide them with formal education at Njala University and the University of Makeni. In addition, NGOs and the private sector should also play a role by working with and involving MAF extension staff in their training of trainers.
14. Provide urgent ICT trainings for MAF Extension workers. The trainings will include but not limited to how to use smart phones, computers, surfing the internet, and social media particularly how to use WhatsApp, Facebook, and Twitter for EAS delivery. This will provide the foundation for the successful implementation of E-extension.
15. Expand the curriculum of the Extension Department of Njala University to offer BSc in Agriculture and E-extension. Government to recruit and place E-extension staff in each district.
16. For rural farmers to effectively use ICT in receiving EAS, Government should educate them on the use, modes of application and benefits associated with mobile phones. Government may liaise with NGOs, donor agencies like the World Bank, FAO, and USAID to fund such trainings,
17. Provide adult education programs for the rural farmers. Government to liaise with the FAO and NGOs to provide Adult Education programmes.

EAS Delivery by ICT

18. The use of the radio as a method of extension needs to be continued and expanded to include both national and district level.

19. Since almost all the farmers and extension providers use mobile phones to disseminate extension messages, all EAS providers should continue to use it to reach the largest number of farmers.
20. MAF Extension Division to take the lead in the packaging of extension messages and ensuring coordination of messaging by different providers. This can be done within the Knowledge Providers framework.
21. MAF Extension Division to commence use of WhatsApp for EAS delivery to farmers even if through Lead farmers, group leaders and secretaries of FBOs. MAF to develop a social media policy to guide its staff on its use.
22. Develop a Farmer Platform that integrates IVR, Call Center, and through voice and SMS, farmers can call for information on various agricultural extension and advisory services.
23. Integrate radio and mobile phone calls and SMSs into to the Farmer Platform.

Monitor and Evaluate the E-extension implementation

24. Develop a monitoring framework to monitor the implementation of E-extension
25. MAF to develop and put in place a methodology to monitor and evaluate the impacts of ICTs in agriculture to support agricultural extension and advisory services. Tablets and smartphones should be procured and made available to all BES to collect data from farmers to aid monitoring and evaluation.

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Annexes

for Non-key Expert for Development of a National E-extension Framework

Annex 1: Terms of Reference

Project Name	Boosting Agriculture and Food Security (BAFS)
Contract Number	FED/2016/382763
Donor	European Union / 11thEDF (European Development Fund)
Implementing Partners	GIZ (Deutsche Gesellschaftfür Internationale Zusammenarbeit) GmbH - International Services and WARC (West African Rice Company)
Mission Title	Development of a National E-extension Framework
Background of Tasks	BAFS is implemented through the Ministry of Agriculture and Forestry (MAF) and covers all rural districts in the country. BAFS is funded by the European Union with technical assistance being provided by GIZ International Services in partnership with the WARC. The overall objective of the BAFS project is "…reduction of poverty and food insecurity in Sierra Leone through better governance and household improved living conditions and higher incomes". An overview of the whole BAFS project is attached as Annex 1. This consultancy is to help MAF's Extension Division improve its outreach programme including the use of Information Communications Technology facilitated agricultural education platforms, primarily for supporting its front-line extensionists. The Extension Division is more cross-cutting than any other department, but has been understaffed, so having a limited capacity to deliver on its mandate, so is unable to reach farmers as frequently as would be required. Unfortunately, this situation that has been the norm for many years. The planned introduction of an E-extension system will augment the existing extension service delivery systems in the short to medium term. Given the importance of extension activities to encourage an increase in agricultural production and their limited number of staff, there is need to connect farmers across the country to receive extension services in real time and share knowledge and information that will increase productivity. With a view to introduce E-extension; the MAF Extension Division requires the support of a consultant with vast national and international experience on Eextension systems and methods to strengthen the capacity of MAF staff, identify key E-extension bottlenecks and design e-extension packages for the delivery of cost effective extension service to farmers and other private sectors players.

Description of Tasks	This consultancy is to develop a national e-extension framework that will help connect farmers across the country to receive extension services in real time and share knowledge and information that will increase agricultural productivity and facilitate trade. The consultant must work closely with the assigned staff from the MAF Extension Division and others involved in the e-extension development (e.g. MAF information and communications technology (ICT) staff) to ensure a comprehensive knowledge transfer of the proposed national e-extension framework to the assigned staff and ensure all standards and strategies are fully understood. Although the work is for MAF, the consults should liaise and coordinate with the government's Directorate of Science, Technology and Innovation (DSTI). It coordinates science, technology and innovation within ministries including looking for synergies for those undertaking similar tasks, helping to promote linkages and commonality so information and services can be exchanges. DSTI is the lead government body on all forms of digitalisation The key tasks of the consultancy are: 1. Assess the various components required for the development and implementation of a successful E-extension in Sierra Leone: I. Assess current MAF extension service delivery and E-extension needs of farmers and private sector players and to identify key challenges to E-extension in the agriculture sector in Sierra Leone, II. Assess the current capacity of the MAF extension staff on content development and the use of ICT technology for dissemination of extension messages; III. Assess the ICT platform and applications readiness of E-extension workers in data collection, reporting dissemination, and information sharing, IV. Assess private sector involvement and participation in ICT applications in E-extension in Sierra Leone, V. Assess current challenges facing private sectors that prevent them from participating in ICT applications in E-extension in Sierra Leone, VI. Assess the Telephone and Internet Service Providers in the country that can provide the most appropriate platform where farmers can call for information on various Agricultural extension and advisory services. 2. Based on the assessments, recommend the design and development of appropriate e-extension packages (each package option should include an implementation plan, timeframe and provisional costing for its implementation); 3. Develop the e-extension framework and tools indicating clearly specified institutional roles and responsibilities for implementing extension interventions and results in Sierra Leone.
Planned start date	As soon as possible

Start-up and Deliverables	Upon starting this consultancy, the consultants will be assigned a nominated person from the MAF Extension Division. The nominated person will be responsible for assisting the two consultants with their work to meet key people in MAF and other government bodies (e.g. DSTI) and other pertinent stakeholders (mobile network providers), arrange all logistics, organise workshop(s), and coordinate all feedback from any workshops and meetings. The consultant will undertake the following tasks: a) Present an inception report that includes a work plan for the whole consultancy (should be presented within 5 working days of starting the consultancy); b) Undertake consultations among all relevant stakeholders; c) Produce training reports and record and potential means to overcome challenges using the outline agreed with the MAF Extension Division and BAFS; d) Produce a comprehensive E-extension framework and tools report for effective implementation of E-extension activities; e) Present the main findings of the draft final report to stakeholders' workshop. The draft final report should be circulated to the MAF Extension Division, BAFS and other key stakeholders identified during the mission (e.g. DSTI) within this period of this consultancy; f) Submit a final report with all suggestions, observations and corrections within 5 working days of receiving comments from nominated person assigned by the MAF Extension Division.

Terms of Delivery of the Mission Report	1. Inception Report with work plan including any proposed travel outside 2. Freetown (*presented within 5 working days of starting the consultancy*) Workshop presentation of the draft Final Report 3. The Final Report must include: a. all consultations with stakeholders; b. any assessment/training report(s); c. feedback from the workshop; d. comprehensive E-extension Framework and tools (with options and costings). All reports are to be submitted to Dr John A C Steel (BAFS TAT Team Leader) and Ms Jemillatu I Lewally, (BAFS PCU IA) at 85 Regent Road Hill Station, Freetown and by email to john.steel@giz.de and jemilla20@gmail.com
Position Title	Senior Non-Key Expert – Development of a National E-extension Framework
Job Profile	Minimum qualification requirements:

	The NKE is expected to undertake this assignment should have a proven track record in carrying out similar types of work and should provide references that are not older than three (5) years. The following competencies and experience are required: 1. A minimum of a Master Degree or equivalent in computer science, ICT, or related fields. 2. At least 10 years' experience in developing and applying ICT applications and similar work. 3. Practical experience in working with government, development partners and other stakeholders in the public sector. 4. Proven practical experience in preparing e-extension or similar e-tools for government/donor/NGO bodies is required; preferably in an African environment. 5. Strong ability to communicate and relate complex ideas in a way that can be absorbed by adult staff with little background in modern ICT. 6. Applicable experience in information systems design, data collection, analysis and dissemination. 7. Good analytic, report writing skills. 8. Professional knowledge of the English language with good communication and presentation skills (both oral and written). 9. Knowledge of any local languages (e.g. Krio) would be an asset.

Number of Days for this assignment	The duration of this consultancy is a maximum of 30 working days. Key activities to be completed in this period include: • Inception report and work plan - must be ***submitted with 5 working days of starting the consultancy;*** • Training materials including a final training report that includes the challenges encountered as agreed with MAF's Extension Division/BAFS; • Report on the validation process of existing E-extension mapping needs; • Comprehensive plan of the E-extension framework and tools for effective implementation of E-extension activities; • List of all people met and consulted with for this work; • Final (draft) report – this will be subject to review, so may require corrections/modifications/additions for ultimate acceptance of the Final Report when final consultancy payment can be concluded.
Application Submission	CV (in standard EU format) and copies of supporting documentation, e.g. academic certificates, transcripts, references and testimonials, in hard copy, captioned "Development of E-Extension Framework**"** This should be submitted to Dr John A C Steel (BAFS TAT Team Leader) and Ms Jemillatu I Lewally, (BAFS PCU IA) at 85 Regent Road Hill Station, Freetown and by email to john.steel@giz.de and jemilla20@gmail.com

Annex 2: Participants of the FGD and KII at the National Level

No	NAME	INSTITUTION	OCCUPATION
1	Amara Idara Sheriff	Ministry of Agriculture and Forestry	Director General of MAF/ Chief Agriculture Officer
2	Aiah J. Thorlie	Ministry of Agriculture and Forestry	Director of Extension
3	Rashid Arun Kamara	Ministry of Agriculture and Forestry	Asst Director of Extension - responsible for research extension liaison
4	Yayah Mansaray	Ministry of Agriculture and Forestry	Asst Director of Extension - NGO Desk
5	Amadu Sesay	Ministry of Agriculture and Forestry	Asst Director of Extension - Field Operations
6	Mariama Turay	Ministry of Agriculture and Forestry	Asst Director of Extension- Women in Agriculture
7	Mr Sorie M Kamara	Ministry of Agriculture and Forestry	Deputy Chief Agriculture Officer
8	Dr Abdulai Jalloh	Ministry of Agriculture and Forestry	Acting Director of Livestock
9	Dr Mohamed Ajuba Sherif	Ministry of Agriculture and Forestry	Director of PEMSD
10	Mohamed Ahmad Conteh	Ministry of Agriculture and Forestry	Head of Unit, AICU
11	Abu Bakarr Tamu	Ministry of Agriculture and Forestry	ICT Head
12	Alimamy Turay	Ministry of Agriculture and Forestry	Head of Tree Crops
13	Mr Jack Jalloh	Ministry of Agriculture and Forestry	Head of the Technical and Resource Mobilisation Team (TARM), and former Director of Extension
14.	Michael Kalainkay	Ministry of Agriculture and Forestry	Deputy Director of Extension
15.	Abdul Rahman Kamara	Ministry of Agriculture and Forestry	Ag Director, Agric. Engineering, MAF
16.	Francis Turay	Ministry of Agriculture and Forestry	Asst. Director of Crops, Tree Crops Unit MAF
14	Josephine Orya Kargbo	SLEWOF	President

Annex 3: Participants of the FGD and KIIs in the selected districts

Name	Title	Organisation	Locations
Bernard Kamara	SMS	MAF	Moyamba
Osman Kamara	SMS	MAF	Moyamba
Brima B Conteh	SMS	MAF	Moyamba
Mary W Giba	SMS	MAF	Moyamba
Brainard Abu	SMS	MAF	Moyamba
Amadu Shaw	FEW	MAF	Moyamba
Edward Tokohina	BES	MAF	Moyamba
Henriatta Matthews	Admin	MAF	Moyamba
Mary Thomas	FEW	MAF	Moyamba
Margaret Momodu	FEW	MAF	Moyamba
Joseph Foday Mattia	BES	MAF	Moyamba
Safiatu Bangura	FINNIC NGO	NGO	Moyamba
Emmanuel D Kemoh		NGO	Moyamba
Andrew Manoh Kargbo		NGO	Moyamba
Morris Paul Stevens	FORUT	NGO	Moyamba
Alusine A Bangura	AIUDO	NGO	Kambia
Mamusu Sesay	CAWeC	NGO	Kambia
Beatrice B. Bangura	ABC-Development	NGO	Kambia
Adama M. Kanu	KADDRO	NGO	Kambia
Alimamy Rashid Sesay	DEO	MAF	Kambia
John Sankoh	M&E Officer	MAF	Kambia
Momoh B. Jah	BES	MAF	Kambia
Abu Bakarr Sesay	BES (Block 2)	MAF	Kambia
Daniel M. A. Kamara	BES (Block 3)	MAF	Kambia
Hassan M. Kamara	FEW (Block 2)	MAF	Kambia
Sheku Kamara	Crop Protection Officer	MAF	Kambia
Jigba Mariama Jabbie	FEW (Block 3)	MAF	Kambia
Lucinda Kamara	FEW (Block 3)	MAF	Kambia
John Francis Macarthy	District Forestry Officer	MAF	Kambia
Mohamed Jah	District Livestock Officer	MAF	Kambia

Name	Title	Organisation	Locations
Mohamed L. T. Sillah	BES (Block 1)	MAF	Kambia
Joseph M. Samai	FEW (Volunteer- Block 2)	MAF	Kambia
Fatmata Turay	Crop Protection Officer	MAF	Kambia
Mohamed Lamin Kargbo	FEW (Block 1)	MAF	Kambia
Kadiatu Kamara	FEW (Block 1)	MAF	Kambia
Isha S. Paine	FEW (Block 2)	MAF	Kambia
Gibril Sumah	FEW	MAF	Kambia
Abu Bakarr Kamara	FEW	MAF	Kambia
Bob Momoh	FEW	MAF	Kambia
Francis J. T. Squire	Crops	MAF	Kambia
Aruna Sam	FEW	MAF	Kambia
Sheku Conteh	FEW	MAF	Kambia
Mariama Eppie Conteh	FEW	MAF	Kambia
Christopher Samai	Agric Engineer	MAF	Kambia
Saidu Bamayange	DAO	MAF	Kambia
Osman Bangura	Assistant Agric Officer JICA Project	MAF	Kambia
Daniel F. Koroma	SMS Extesion	MAF	Kabala
Andrew Mansaray	Ag. DAO	MAF	Kabala
Thelma Turay	Ag. BES	MAF	Kabala
Martha Tarawalie	Field Enumerator	MAF	Kabala
Foday P. Koroma	Field Enumerator	MAF	Kabala
Abu Bakarr Sheriff	BES	MAF	Kabala
Daniel K Gibrilla	FEW	MAF	Kabala
Brima A Kabba	District Crop Officer	MAF	Kabala
Abu Thulla	FEW	MAF	Kabala
Molai Turay	FEW	MAF	Kabala
Abu Mansaray	FEW	MAF	Kabala
Ansumana Tarawalie	FEW	MAF	Kabala
Fatmata Koroma	BES	MAF	Kabala

Name	Title	Organisation	Locations
Alhaji H Sesay	M&E Officer	MAF	Kabala
Benedict A. Y. Sesay		MAF	Kabala
Rominus Gibson Seilenga	District Crop Officer	MAF	Kabala
Michael K Kanneh	District Forestry Officer	MAF	Kabala
Mohamed Lamin Koroma	FEW	MAF	Kabala
Momoh Kamara	Statistician	MAF	Kabala
Samuel J. Koroma	Crop Protection Officer	MAF	Kabala
Sulaiman Onana Jalloh	Oxfam (Livestock)	NGO	Kabala
Manso Mohamed Kamara	Sierra Leone Animal Welfare Society (SLAWS)	NGO	Kabala
Osman Koroma	Oxfam GB (Crop)	NGO	Kabala
Melvin Mattia	KADDRO	NGO	Kabala
Foday A. Sheriff	District Extension Officer	MAF	Kailahun
Wilson M. Sellu	M&E Officer	MAF	Kailahun
Michael Kayonga	Irrigation Engineer	MAF	Kailahun
Lydia Coroma	FEW	MAF	Kailahun
Morie S. Koroma	BES	MAF	Kailahun
Fritz B. Lahai	BES	MAF	Kailahun
Aminata Nyandebo	CAHW	MAF	Kailahun
Fayia M. Lamin	BES	MAF	Kailahun
Baimba Kamara	BES	MAF	Kailahun
Ibrahim U Sesay	FEW	MAF	Kailahun
Hassan S. Bangura	District Livestock Officer	MAF	Kailahun
Halima M. Kamoh	FEW	MAF	Kailahun
Musa Amara Sesay	CAHW	MAF	Kailahun
William Lansana	FEW	MAF	Kailahun
Ansu Karimu	Forestry Officer	MAF	Kailahun
Patrick N. Magona	Forestry Officer	MAF	Kailahun
Daniel G. B. Kamara	District Crop Officer	MAF	Kailahun

Name	Title	Organisation	Locations
Alex Saffa Vandi	District Forestry Officer	MAF	Kailahun
Patrick Sao Vandi	Forest Guard	MAF	Kailahun
Joseph F. Kallon	FEW	MAF	Kailahun
Fatmata Musa	CAHW	MAF	Kailahun
Lucia Brima	Fambul Tok	Farmer	Kailahun
Baimba Salia	CYC	Farmer	Kailahun
Gibson Foray	Diompillor	Farmer	Kailahun
Moses F. Fabbah	Casti-ABC	Farmer	Kailahun
Kadie James	Madina Women	Farmer	Kailahun
Kadiatu Kamara	Tewoh	Farmer	Kailahun
Baindu Vandy	Tewoh	Farmer	Kailahun
Adama Vandi	Tewoh	Farmer	Kailahun
John F. Saliue	FARMO	Farmer	Kailahun
Edward Musa	WHH	NGO	Kailahun
Tamba Murray	MOPADA-Sl	NGO	Kailahun
Haja Isatu Alieu	MOPADA-Sl	NGO	Kailahun
John H. Kobba	CEPA-SL	NGO	Kailahun
Mohamed A. Sama	Save the Children	NGO	Kailahun
Alieu S. Manyeh	Kailahun Women	Farmer	Kailahun
Jenneh Alusine	Peace Mothers	Farmer	Kailahun
Fatmata James	Women's Group	Farmer	Kailahun
Wurie Kuyateh	Kankelay	Farmer	Kabala
Dallo Sesay	Lamfama	Farmer	Kabala
Haja Sundu Marah	Women's Cooperative	Farmer	Kabala
Haja Adama Thor Conteh	Denkola II	Farmer	Kabala
Sera Baba Conteh	Women's Development	Farmer	Kabala
Haja Sheriff	Denkola I	Farmer	Kabala
Isatu Njail	Duyajabie	Farmer	Kabala
Fanta Jabbie	Munafa	Farmer	Kabala

Name	Title	Organisation	Locations
Mohamed K. T. Marah	Farmers's Federation Coordinator	Farmer	Kabala
Dr. Abdul R. Conteh	SLARI Njala Station Manager	Research	Njala
Dr. Adams Kanu	SLARI Rokupr Station Manager	Research	Rokupr
Alie Conteh	Extension Officer	Research	Rokupr
Dr. Adolpheus Johnson	Head of Extension Dept., Njala University	Research	Njala

Annex 4: Questionnaire for field extension workers

Assessment of Extension Needs of Farmers and e- Extension in Sierra Leone

QUESTIONNAIRE FOR FIELD EXTENSION WORKERS

INTRODUCTION AND CONSENT

JenMaa Data and Information Management Consultants is conducting this assignment on behalf of the Ministry of Agriculture and Forestry Extension Division, and the BAFS project with support from the European Union.

The purpose of this interview is to assess:

- Current extension service delivery,
- Needs and challenges of farmers,
- Capacity and challenges of Extension workers,
- Challenges and barriers that prevent the private sector from participating in e-Extension,
- ICT infrastructure and appropriate platform
- Recommend the design and development of appropriate e-Extension packages,
- Develop the e-extension framework and tools indicating clearly specified institutional roles and responsibilities for implementation.

This interview is voluntary and confidential. You have the right to participate or not, but you are encouraged to participate in it as the data collected will help the ministry, the European Union, the farmers, the Private Sectors, and NGOs to promote the development of Agriculture in Sierra Leone through the introduction of e-Extension.

The interview will approximately take an hour and half. All responses are acceptable.

Do you consent to participate in this interview? a) Yes, b) No

Date of Assessment____/____/_____

Section 1: IDENTIFICATION AND GENERAL CHARACTERISTICS OF LOCALITY

1. Name of Extension worker (Optional):

2. Date of Birth (Optional): Sex:

3. Title of Extension worker:……..

4. When did you enter MAF workforce : ____/____/_____

5. When did you enter MAF Extension workforce: ____/____/_____

6. Where is your Work Location:

District:		Town/Village:	
Chiefdom:		GPS coordinate of Extension staff location if currently at work location:	
Section:			

7. What is the highest education level attained:

a) OND in Agriculture/Certificate/Agro-technician
b) HND in Agriculture
c) BSc in Agriculture,
d) BSc/BA in Extension,
e) BSc in a Discipline in Agriculture besides Extension,
f) BSc/BA is other disciplines,
g) Secondary school/WASCE Cert.
h) Masters Degree

Section 2: FIELD PRESENCE AND NUMBER OF FARMERS & FARMER GROUPS WORKED WITH

8. How long have you worked with farmers in this community or communities? …….

9. Do you work with farmer groups? a) Yes b) No

9.1 If yes, which groups and what is their membership?

No	Farmer types		
		Number of group	Membership
a	Small-scale farmers		
b	Commercial farmers		
c	Agro-dealers		
d	Women specific group,		
e	Youth specific group,		
f	Others		

_____

10. Do you work with individual farmers? a) Yes b) No

10.1 If yes, which type of individual farmers and what is their total number?

No	Farmer types	Number
a	Small-scale farmers	

b	Commercial farmers	
c	Agro-dealers	
d	Women specific group,	
e	Youth specific group,	
f	Others	

11. How often are you in the field?

a) Daily b) Weekly c) Bi-weekly d) Monthly e) Quarterly f) As and when
g) We do not meet

12. In the past 3 months, what are the tasks that you have performed?

a) Establishment of Demonstration plot
b) Farm visit
c) Market survey
d) Provision of farm inputs
e) Record keeping
f) Group formation
g) Linkage to credit facilities
h) Formation of co-operative groups
i) Demonstration of improved technologies
j) Selection of contact farmers
k) Formation of women groups
l) Assist the subject matter specialist
m) Rendering of technical advise to farmers
n) Establishment of school programme
o) Food utilization demonstration
p) Agro-chemical skill training
q) Campaign on COVID-19
r) Campaign on HIV/AIDS
s) Others (Specify)

13. What means of transportation is used to reach farmers or farmer groups? (Tick as many)

a) Personal car b) Personal motorbike or motorcycle c) Office car or vehicle d) Office motorbike or motorcycle e) Public transportation (e.g., bus or van, Keke, Okada), f) By Boat g) By bicycle g) Others (please specify):

14. Are there any challenges in reaching farmers and Farmer groups? a) Yes b) No

14.1 If yes, what are the challenges?

a) Logistics b) Transportation c) Road network d) Others (please specify)

Section 3: CONTENT DEVELOPMENT

15. Who develops content for Extension messages **(***Tick as many as you can)*

a) SLARI b) Njala University c) IITA d) Other Research institution (state which), e) MAF at National level f) District/Field Extension staff g) Others (please specify)

16. Are the content in the local language of farmers? a) Yes b) No

16.1 If Yes, go to Question 18

16.2 If No, why?

a) It was not done

b) No translation services

c) Others (please specify)

17. What current methods do you use in providing extension services to farmers? (Tick as many)

a) Training & Visit model
b) Regular field visits to producer groups
c) On-farm demonstration plots, including Contact Farmer Approach
d) Training of trainers
e) Field days/Agricultural Shows/Cacao Shows
f) Farmer Field Schools
g) Exchange of experience
h) Training for Farmers' associations
i) Community Radio
j) Meeting with farmers at the field extension office
k) Others

18 Which of the above methods is predominantly used? (*Put them according to rank from the most used to the least used*).

19. As a Field Extension staff, have you ever developed messages for farmers you supervise? a) Yes b) No

19.1 If Yes, do you get approval from HQ? Yes No

19.2 If No, why?

a) It is developed at central level and shared with all

b) I lack the expertise to do so

c) I do not have the tools to do so

c) It is not my job

d) Others (please specify)

20. Does your extension services provide farmers with the following information? (Select as many)

a) Weather b) Market prices c) Directory of Agro-dealers d) Directory of Input dealers e) Correct timing for agric practices, f) Early warning for pest attack g) availability of new varieties h) Others (please specify)

Section 5: Information Communication and Technology

5A: Internet Access and Use

21. Do you have internet access at work? Yes…… No…….
21.1 If yes, who provides the internet? a) MAF b) NGO/Private Sector, c) Personal internet d) Cyber Cafe, e)Others
22. Do you have internet access in the field? a) Yes…… b) No…….
23. What type of phone do you have? a) Smart phone, b)Feature phone, c) Basic phone d) Others
24 Do you use internet on your phone? a) Yes b) No
25. If you have a personal internet, do you use it for work purposes? Yes…… No……
25.1 If yes, why? a) When Official internet is down b) When payment for the internet is not made, c) Official internet is not fast or reliable, d) Others
25.2 If yes, who is the internet service provider for your phone? a) Orange b) Africell, c) Qcell d) Onlime e) Afcom f) Others
25.3 If no to question 25, why?
a) Can't use my money to support government
b)If I use my money, I will not get refunds
C)others (specify)

26. Do you use a computer in your work place? a) Yes b) No
26.1 If yes, who owns it? a) Owned by MAF, b) Owned by NGO/Private Sector, c)Private ownership, d) Others
26.2 If yes to Q26, How comfortable are you using the computer? a) Very comfortable, b) Comfortable, c) Moderately comfortable, c) Less comfortable d) Not comfortable
26.3 If yes, what do you use the computer for in your work place?
a) Writing reports, b) data capture, storage, and analysis, c) Sending Emails d) Social Media - Sending messages to farmers e) e-learning, f) Browsing, g) Training, h) Others
27. Do you use the internet on your phone? a) Yes b) No
27.1 If yes, what is the internet used for? a) Sending Emails b) Social Media - Sending messages to farmers c) e-learning, d) Browsing, e) Training, f) Others
28. Have you used ICT to develop your personal skills in the last 3 years? Yes…….NO
28.1 If Yes, in what areas?
a) Developing leadership skills
b) Developing computer skills
c) Developing the ability to communicate effectively
d) Developing skills in institutional capacity building
e) Developing skills in marketing
f) Developing skills in group organization
g) Others
29. How do you communicate with farmers or farmer groups? a) WhatsApp, b) Facebook, c) Twitter, d) Email, e) SMS messages, f) Telephone, g) Meetings/trainings/workshops, h) Community Radio, e) TV & Video f) Computer & Internet, i) Others

5b: ICT READINESS

30. How do you collect data/information/feedback from farmers or producers? (Tick as many-multiple response)
a) Administering paper-based questionnaire

b) Administering questionnaire using mobile phones

c) Face to face discussion

d) SMS

d) a) WhatsApp, b) Facebook, c) Twitter, d) Email,;

e) Radio

f) TV & Video

g) Computer & Internet

h) Others (please specify)

31. How do you provide relevant agricultural information to farmers or producers? (Tick as many)

a) Face to face

b) SMS

c) Social Media: i) WhatsApp, ii) Facebook, iii) Twitter,

d) Email

e) Community Radio

f) TV & Video

g) Computer & Internet

h) Others (please specify)

32. What ICT methods have you used in delivering the following extension methods?

Agricultural Extension Methods	Mobile phones	Radio	Television/Video	Internet	Tablets
Training & Visit model (T&V):					
Lead/Contact Farmer					
Training of trainers					
Exchange of Experience					
Field Days/Agric/Cacao shows					
Community Radio					
Training for Farmers' associations					
Farmer Field school					
Meeting with farmers at the field extension office					
Others (please specify)					

33. Are you aware of any ICT applications (apps) used by farmers in your operational area? a) Yes b) No

33.1 If Yes, please name them

No	ICT application name	Description	Farmer group or farmers using it	Organization that introduced it
1				
2				
3				

CHALLENGES AND RECOMMENDATIONS

34. What are the current ICT challenges faced in delivering e-extension services to farmers in your area of responsibility? (Select as many as you can)

a) Most farmers do not have Smart phones,

b) Most farmers cannot afford the cost of data bundle,

c) High cost of Top up,

c) Lack of electricity to charge the phones,

d) Lack of or poor internet coverage,

e) High illiteracy in the area

f) Others (please specify)

35. What are your recommendations in addressing each of the challenges mentioned?

a) b) c) d)

36. Based on the readiness and challenges faced by farmers; the cost of data bundle, challenges of telephone network, electricity, and internet coverage, would you like to recommend any e-Extension package(s) (ICT apps) for farmers in your location? a) Yes b) No, c) No idea

If Yes, which ones do you recommend and why?

No	E-Extension package	Description	Why recommended
a)			
b)			
c)			

Annex 5: Offer from Orange

The Chief Executive Officer
JeenMaa Data and Information Management
Consultant
53 Pademba Road
Freetown
Sierra Leone

Attn: Joe Korsu Kandeh Ph.D

—
29th Septemebr, 2020.

Dear Dr. Kandeh,

QUOTATION FOR MOBILE VOICE AND FIXED DATA SERVICE

Thank you for taking an interest in our services. As per your request, we are pleased to submit our proposal for the provision of Mobile Voice and Fixed Data services as per your specifications.

Orange Sierra Leone, which is part of the global Orange Group is a global telecom giant providing voice and data communication solutions to many companies around the world, and has turned many businesses around to become market leaders in their respective industries.

Please find below information in relation to the details of prices for these services. We trust that we have developed a flexible and cost-effective solution that meets your specific needs.

We are hopeful you will consider Orange SL as a long-term partner and allow us to enter into a mutually beneficial business relationship.

Yours Sincerely,

Alfred Joseph Lavalie
(Account Manager), +23276824427

Orange (SL) Limited.
25 Regent Road, Hill Station
Freetown, Sierra Leone

www.orange.sl

Why Orange?

As a global brand, Orange is synonymous with total communication solutions and a quality of service that leads the way particularly in the provision of data services in Sierra Leone.

We are dedicated to the latest industry technology and keen in driving constant improvement of what is already herald as the most versatile and robust network in Sierra Leone. We go the extra mile to ensure that all services provided enables you to conduct your business in the most cost effective manner.

At Orange, our key focus is to add value to each and every one of our customers based on the following premises;

- Dedication to Driving Value through Innovation
- Scalability & Reliability of Service Offerings
- Ability to Support Strategic Initiatives
- Timely Service Delivery
- Driving Cost Efficiency
- Responsiveness to Market Intelligence

We believe we are best poised to be your telecom supplier of choice for the provision of scalable and reliable communications solutions; thus contributing significantly to your strategic development and continuous successes.

Our understanding of your needs:

JenMaa a Data and Information Management Consultants (SL) Ltd is contracted to provide ICT service for the EU/BAFS together with the Ministry of Agriculture and Forestry (MAF) wants the development of a framework to deploy ICT into agriculture and recommend specific ICT applications. Having talked to farmers and field Agric Extension workers of government and NGOs over the past 2 weeks across the country, it has become increasingly clear that the following are required:

- Establishment of a Call Center (see figure 1) - which could be national, regional or done at district level. Here farmers can call and an Agricultural expert will answer their questions and also provide vital information on cultivation techniques such as planting, irrigation, disease treatment agro input and on poultry, livestock, fisheries etc. Farmers can either call or send text messages to the Call Center. The key thing here is how can we make this reasonable for our farmers.
- SMS and voice message delivery (push and pull) – the Plan here is to see how Orange can partner with government particularly with the Ministry of Agriculture and Forestry (MAF) or an NGO in a joint venture. In this case, MAF or the NGO, provides information on market prices, farming techniques (including dairy and animal husbandry), weather forecasts, rural health initiatives and fertilizer availability, etc. Such information can be provided mainly through voice updates as most of the farmers are illiterate and do not use texts much.
- The SMS and Voice Message delivery can be part of the Call Center and not as a separate entity.
- Agriculture Knowledge Database – As shown in the schema, the Call Center Agent or Help Desk Officer will consult the Database to retrieve content and pass on to Farmers based on the questions asked. The Database will provide the content to support the Call Center. The Database can be developed by a separate firm and not necessarily Orange but if you can also develop this then we will factor it in.

With the above ICT solutions, we would like to know from Orange the following:

- What is required in setting each up in terms of;

- hardware, software,
- implementation plan,
- timeframe, and
- provisional costing for its implementation
- Between the above, which one can be quickly developed and used? And
- Is this something that Orange might be interested in getting involved

Our Offer - Orange Mobile Solution:

Orange can offer telephony services on the 900/1800 Mhz band in our 4G network for all GSM users. We are therefore pleased to offer you a specially designed Fixed Data solution with the unique proposition of immediately absorbing your internal mobile telephone communication for the entire staff at competitive rates.

Orange SL has the resources and capacity to provide JenMaa the required Mobile Voice and Fixed Data services. In meeting your exact requirements, Orange SL will provide to JenMaa a bespoke Mobile Voice and Fixed Data services to enhance daily operations.

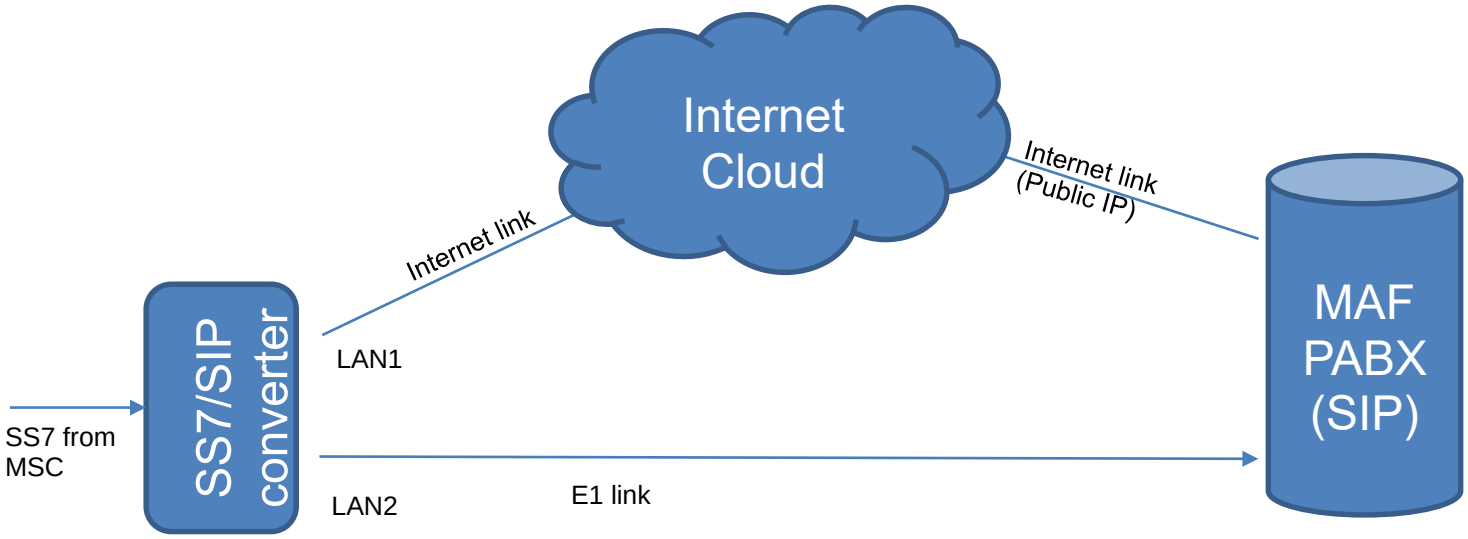
Our proposed offer will ensure the below benefits at very competitive costs:

- Allows for easy communication and cost effective Dedicated Customer Relationship Management (CRM).
- Increased Response Rates.

Service delivery timeline:

- 21 days commencing from signing of formal agreement and other requirements

SERVICE ARCHITECTURE



1- Direct E1 using microwave link with NEMS local IP
2- Internet connectivity using public IP

Confidentiality Statement:

All information contained in this proposal is provided in confidence for the sole purpose of adjudication of the proposal, and shall not be published or disclosed wholly or in part to any other party without Orange SL's prior permission in writing, and shall be held in safe custody. These obligations shall not apply to information that is published or becomes known legitimately from some source other than Orange SL. All transactions are subject to the appropriate Orange SL Standard Terms and Conditions.

Annex A:

Financial Consideration

Option 1: SIP service both Primary and redundancy link

Description	
Last Mile Set Up: Fiber Works (if applicable) Microwave Radios [FOC] Other Equipment/Enhancement (as necessary)	 Cost borne by Orange Provided by Orange (belongs to Orange) Cost borne by JenMaa

One-off cost

No	Description	UoM	Qty	Unit Price (Le)	Net Price price (Le)
1	E1 Installation cost	Line	1	2,500,000	2,500,000
2	Toll Free/Shortcode configuration cost	Line	1	1,000,000	1,000,000
Subtotal cost (A)					**3,500,000**

Monthly cost

No	Description	UoM	Qty	Unit Price (Le)	Net Price price (Le)
1	E1 monthly recurring cost	Line	1	1,750,000	3,500,000
4	Short code rental	Line	1	500,000	500,000
Subtotal cost (B)					**4,000,000**

Total setup cost (A+B)	**7,500,000**

NB:

- Price is exclusive of all taxes
- All charges are payable in Leones
- Quotation valid for thirty (30) days
- A contractual agreement to be signed on approval of proposal
- JenMaa is expected to make upfront payment before service activation, JenMaa will have to purchase SIP converter for service activation
- All charges are payable in Leones
- Quotation valid for thirty (30) days
- A contractual agreement to be signed on approval of proposal (if applicable)
- JenMaa is expected to make payment before service activation delivery
- Price is exclusive of all taxes

2. A2P service - Bulk SMS

One-off cost

No	Description	UoM	Qty	Unit price (SLL)	Net price (SLL)
1	SMPP access configuration	Line	1	1,000,000	1,000,000
2	API configuration	Line	1	1,000,000	1,000,000
3	Collateral deposit on SMS delivered	Line	1	6,154,000	6,154,000
Subtotal cost (A)					**8,154,000**

Monthly cost

No	Description	UoM	Qty	Unit price (SLL)	Net price (SLL)
1	SMPP access monthly rental cost	Line	1	500,000	500,000
2	API rental	Line	1	500,000	500,000
Subtotal cost (B)					**1,000,000**

Total Set up cost (A+B)	**9,154,000**

*In addition to monthly recurring cost, JenMaa will be bill based on SMS usage as per below pricing table:

Price per SMS

Number of SMS	On-net Rate per SMS - (incl. Admin Charges) (SLL)	On-net Rate per SMS - (incl. Admin Charges) (SLL)
<10,000 per month	100	169
> 10,000 - 20,000 SMS per month	98	165
>20,000 - 30,000 SMS per month	95	162
>30,000 - 40,000 SMS per month	92	156
>40,000 < 50,000 SMS per month	90	151
>50,000 SMS per month	88	147
>100,000 SMS per month	85	146