

# Extension and Advisory Services in 10 Developing Countries: A Cross-country Analysis

Developing Local Extension Capacity (DLEC) Project  
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## ACRONYMS

DICTA	Agricultural Science and Technology Board (Spanish acronym)
DLEC	Feed the Future Developing Local Extension Capacity Project
EAS	Extension and advisory services
FAO	Food and Agriculture Organization of the United Nations
FFS	Farmer field school
GFRAS	Global Forum for Rural Advisory Services
ICT	Information and communication technology
IFPRI	International Food Policy Research Institute
LUANAR	Lilongwe University of Agriculture and Natural Resources
M&E	Monitoring and evaluation
MFDP	Ministry of Finance and Development Planning of Liberia
NAERLS	National Agricultural Extension Research and Liaison Services
NGO	Nongovernmental organization
RRC	Rural Resource Center
USAID	United States Agency for International Development

## INTRODUCTION AND BACKGROUND

There are approximately 1.5 billion smallholder farmers in the world, a figure that includes 75 percent of the world's poorest people (Ferris et al., 2014). Most people living in extreme poverty depend on agriculture for their livelihoods. These smallholder and marginal farmers provide approximately 80 percent of the food in many developing countries, and even more in South Asia and Sub-Saharan Africa. Given their numbers, their importance to their local economies, and their vulnerability, support for smallholder farmers is essential to improving food and nutrition security, climate change resilience, and reducing poverty worldwide. Despite this fact, these farmers tend to be under-resourced and lacking access to improved inputs, rural services and markets, leading to low productivity and a lack of opportunity to break the cycle of poverty. Smallholders in many developing countries remain disadvantaged when it comes to accessing quality extension and advisory services (EAS) (Glendenning et al., 2010). Women smallholders face even greater challenges in accessing these services (FAO, 1995; Manfre et al., 2013).

Agricultural extension and advisory services can be a powerful tool to help smallholders break the cycle of low productivity, vulnerability and poverty. By providing farmers with knowledge and tools about modern agricultural practices, linking them to new technology, and providing them greater access to finance and market solutions, EAS can be a critical force for change. However, agricultural extension strategies in developing countries have been built on traditional, top-down approaches that rely on “transfer of technology” models, inflexible packages of recommended inputs and practices and learning methods that lack a nuanced understanding of how farmers learn and innovate. While these approaches may provide important technical support to some smallholders, they often lack a context-specific focus to solving problems that can only be addressed through empowerment, user participation, communication and demand-drive. Many EAS systems operate at a sub-par level due to inefficiencies, lack of capability, a poor enabling environment and an insufficient number of providers (Spielman et al., 2012). Often, linkages between formal extension services and farmers are tenuous, as are linkages between extension agents and knowledge providers, farmers and organizations that can capture and analyze data to improve EAS.

Given the diversity of extension systems in developing countries, there is no standardized answer to improving EAS. Indeed, improving EAS requires a holistic systems approach – framing EAS in the context of wider farming structures, policy environment and agricultural innovation system. We thus use the best-fit framework (Birner, et al., 2009), discussed below in the Conceptual Framework section, to analyze EAS in Feed the Future countries and synthesize the findings by the best-fit elements.

## THE FEED THE FUTURE DEVELOPING LOCAL EXTENSION CAPACITY PROJECT

The United States Agency for International Development (USAID) funded the Developing Local Extension Capacity (DLEC) project to target Feed the Future countries to measurably improve extension programs, policies and services by creating locally-tailored, partnership-based solutions and by mobilizing lasting communities of practice to advocate for scaling proven approaches. The

five-year (2016-2021) project is designed to diagnose, test and share best-fit solutions for agricultural extension systems and services across the Feed the Future countries.

Led by Digital Green in partnership with Care International, the International Food Policy Research Institute (IFPRI) and the Global Forum for Rural Advisory Services (GFRAS), DLEC is an action-oriented, evidence-based learning project that generates evidence through diagnostic studies and engagement activities, which in turn are used as a catalyst for mobilizing global and country-level communities of practice to advocate for improved EAS.

DLEC conducts diagnostics in Feed the Future countries to evaluate the EAS ecosystem using a combination of desk reviews, in-depth interviews, surveys and site visits. The diagnostics provide insight into the strengths and challenges faced by national extension systems (this includes public, private, and civil society) by evaluating the access, quality and sustainability of the governance structures and policy environment, organizational and management capacities and cultures of country EAS, and advisory methods used within each system. The diagnostics also review the extent to which the system is market-oriented, how the system engages different communities, including youth and women, and how it supports overall livelihood strategies of farmers. Recommendations on customized improvements and solutions are then provided.

The purpose of this report is to present results of a cross-country-analysis of ten published DLEC diagnostic reports to draw out lessons for extension globally. The country reports (in order of publication) include Honduras, Bangladesh, Nigeria, Malawi, Liberia, Guinea, Rwanda, Senegal, Mozambique and Mali. This report (as with the diagnostics) uses the best-fit framework (Birner et al., 2009) to guide analyses, and findings are presented according to the framework areas. This report is aimed at project implementers, policymakers and others interested in improving EAS in their countries and projects.

## CONCEPTUAL FRAMEWORK

Agricultural extension and rural advisory services play a central role in advancing technological, institutional and socioeconomic change in many developing countries (Davis et al., 2016). It is an important instrument to help farmers engage in development in a changing environment (Hoffman et al., 2009). While many governments use extension to meet national goals (van den Ban and Hawkins, 1996), the private sector and NGOs play a critical role in providing services today. We define extension and advisory services as all the activities that provide the information and services needed and demanded by farmers and other actors in rural settings to assist them in developing their own technical, organizational and managerial skills and practices so as to improve their well-being (Christoplos, 2010; GFRAS, 2011).

DLEC uses an adapted best-fit framework developed by Birner et al. (2009) for designing and analyzing agricultural advisory services. The framework, shown in Figure 1, guides the analysis of this report. The best-fit framework allows us to understand the state of various EAS systems, where the critical levers for change might be, and what to recommend for systems change. The framework also enables us to compare across countries and connect country-specific cases to broader learning on EAS.

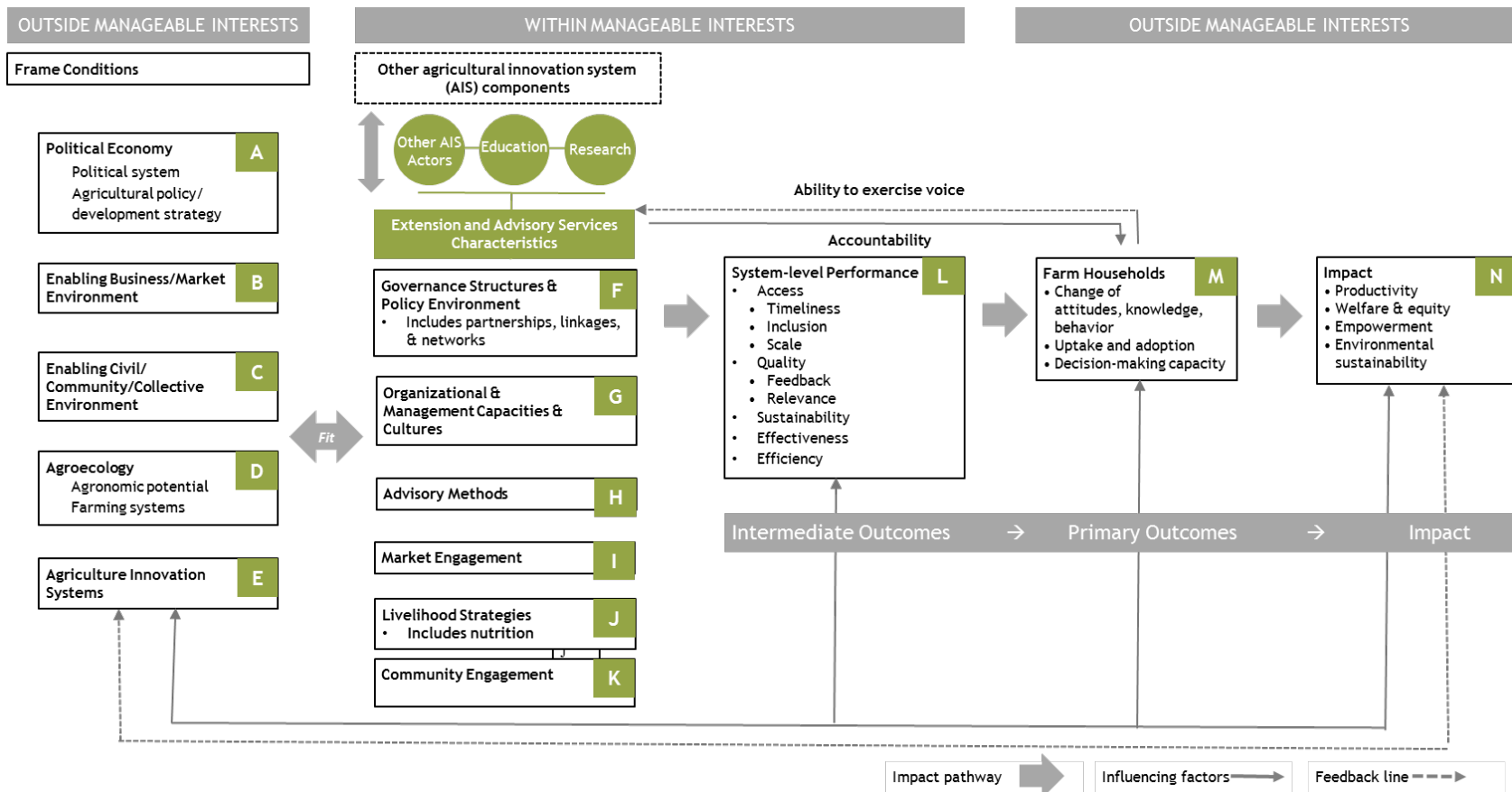
The framework identifies characteristics of EAS systems on which policy decisions should be made and the frame conditions to be considered when making decisions. The frame conditions (Figure 1, boxes A-E) include: the political economy, the business/market and civil society environments, agroecology, and the agricultural innovation system. The framework suggests an impact chain approach to analyze the performance and impact of EAS.

We start with the frame conditions. While the frame conditions (boxes A–E) are outside the manageable interests of EAS actors, the diagnostic reports provided an overview of relevant frame conditions that affect the EAS characteristics in each country. The EAS characteristics shown in boxes F-K of the framework are the extension system characteristics that can be modified or changed by interested parties. These characteristics lead to EAS performance (box L). The performance leads in turn to outcomes and ultimate impact at the farm household level (boxes M and N); these elements are typically not controlled by EAS but EAS can contribute to them.

The following EAS characteristics serve as the conceptual framework for this assessment:

- ◆ **Governance structures and policy environment** variables (box F) refer to the institutional set-up of EAS, or the “rules of the game.”
- ◆ The **organizational and management capacities and cultures** variables (box G) refer to the capacity for provision of advisory services and the way in which the services are managed within the respective governance structures. These are essentially the “players” of the game, their abilities, and the way they play.
- ◆ **Advisory methods** (box H) are those which EAS field staff use in interactions with farmers. Advisory methods can be classified according to various aspects, such as the number of clientele involved (individuals, groups); the types of decisions for which advice is provided (specific to the production of certain crops or livestock, managerial decisions, group activities, etc.); and the media used (radio, internet, etc.).
- ◆ **Market engagement** (box I) refers to the market elements that EAS can use to better serve farmers, such as aggregation, finance, price discovery and input and output markets.
- ◆ **Livelihood strategies** (box J) refers to how EAS develops content to meet the unique needs of farmers and includes how gender roles impact farming livelihood strategies.
- ◆ **Community engagement** (box K) refers to EAS services based on local social institutions, mechanisms to articulate demand, and community psychosocial characteristics.

Figure 1. Conceptual Framework for the Study



*Source: Adapted from Birner, et al., 2009.*



## RESEARCH METHODS

The overall research design consists of comparative case studies (Merriam and Tisdell, 2016). Comparative case studies involve collecting and analyzing data from several cases. Cross-case analysis can then lead to generalizations regarding extension services (Merriam and Tisdell, 2016). While we don't necessarily generalize the findings, we offer insights and innovative practices that can be applied in different countries and extension systems. The ten case studies that make up this cross-case analysis were in-depth descriptions and analyses of bounded systems (Merriam and Tisdell, 2016), that is, the extension system in the ten countries studied.

The ten case study reports on which this synthesis is based were compiled by local and international EAS experts, using a combination of literature review, key informant interviews, surveys, and in some cases, site visits. For interviews, semi-structured interviews were conducted by telephone, Skype, or in person with key informants. Over 200 key informants were interviewed. Member checks and debriefing with peers (and in some cases validation workshops) ensured validity of the results (Ary et al., 1996).

For the cross-case analysis, researchers used document (or content) analysis, a qualitative means of research in which the researcher interprets documents on the assessment topic (Bowen, 2009). Coding was used to organize, manage and analyze the data; this involves assigning short-hand designations to various data aspects so that they are easily retrievable (Merriam and Tisdell, 2016).

## FINDINGS

### Governance structures and policy environment

Except for Honduras, every case country had a Ministry of Agriculture that was responsible for EAS, often in a department. Agriculture often cuts across ministries, which means that often livestock, forestry or fisheries are in separate departments or ministries (each with separate extension services, such as in Bangladesh). The governance structures are also dependent upon the political system; for instance, Nigeria is a federal government and the states are mainly responsible for EAS. On the other hand, Rwanda has a relatively centralized government. This has implications for how EAS are organized and financed.

Honduras, the exception, has the Agricultural Science and Technology Board (DICTA, for its Spanish acronym), created to govern, monitor and develop capacities of actors in agriculture. After the EAS system in Honduras was created in the 1950s, the system underwent a series of institutional transformations driven both by internal processes and external factors, such as national politics and the economy (Valenzuela et al., 2017). In an effort to modernize the system, EAS were decentralized and DICTA was created. Under DICTA, the Agriculture and Livestock Secretariat coordinates, plans and executes public agricultural policies, fulfills state functions directed toward the agricultural production areas of the country, and represents the Honduran agricultural sector regionally and internationally.

The existence of policies on extension varied in the studied countries. Nigeria is in the process of developing an extension policy and Mozambique is planning to (EAS in Mozambique is currently guided by master plans). Bangladesh, Malawi and Rwanda have extension policies. The other countries studied had no formal extension policy. However, extension is often influenced by informal policies or overarching agricultural policies and strategies. For instance, Mali and Senegal have a number of strategies and laws in the agricultural sector that govern EAS.

Also, while policies are useful, they need to be accompanied by implementation frameworks and the funds to implement them. Malawi has had a policy since 2000, which was reviewed two years ago. Stakeholders concluded that the policy is still valid and relevant but needs better implementation. The Malawian EAS system has struggled to fulfill the processes and mechanisms outlined in their policy, mainly due to lack of resources. Malawi is now in the process of drafting a detailed strategy and implementation plan to accompany the policy.

All of the countries studied had pluralistic EAS systems. The private sector and nongovernmental organizations (NGO) played varying roles in the countries. In Honduras, NGOs provided the majority of services. The private sector role has been growing in countries like Guinea and Nigeria. Several of the countries (e.g. Bangladesh, Guinea and Rwanda) had a strong donor presence. The Francophone West African countries (Mali, Guinea and Senegal) tended to have stronger producer organizations, some of which managed their own extension services, relying on financial support from donors. Malawi also has strong producer organizations, six of which operated extension services (Cai and Davis, 2017).

There are different mechanisms for coordination and linkages between pluralistic extension providers in the countries studied. Many times, it is through a District Agricultural Extension Coordination Committee, as is the case with Malawi. However, none of them seemed to be working very well. They were often constrained by lack of resources (such as Malawi and Nigeria).

Mozambique, which has a high level of pluralism, had the most detailed EAS coordination plan but unfortunately, it did not work in reality. The Unified Extension Services was meant to encompass crop production, livestock and natural resource management, with all agricultural services operating through a single extension officer who contacts farmers in a particular area of operation (Cunguara et al., 2018). The plan also envisioned the development of an integrated National Agricultural Extension System with functional partnerships between public and private extension services, including the government contracting NGOs to provide extension services on their behalf. The plan also called for increased linkages with research, agricultural services and marketing institutions. These plans have not come to fruition. They are not functional because there are no incentives for cooperation among providers. The government, private sector and NGOs are not integrating their resources and programs and continuing to implement their own programs rather than trying to work together (Cunguara et al., 2018). A similar situation exists in Senegal where the National Agency for Rural Advisory Services has the mandate to coordinate extension actors but has not done so, partly because of a lack of resources and partly because of a lack of incentives (Franzel et al., 2018).

Linkages with research and education were weak in most countries (e.g. Bangladesh and Mozambique). In Nigeria, the Research-Extension-Farmer-Input-Linkage-System is intended to bring together research, extension, the private sector and farmers to make sure new research is used and to guide the course of future public research. It functioned well while financed by the World

Bank in the 1980s, but without external support does not do as well; attendance is spotty. In several west African countries, the World Bank's West African Productivity Project has a funding window in which research and extension agencies are required to jointly submit proposals for funding to develop and disseminate improved agricultural technologies. This joint proposal strategy has helped improve coordination between research and extension agencies on the topics funded.

## Financing

Financing for EAS has had highs and lows over the past decades. There was much government support and later support from the World Bank and other international financiers for extension programs after independence of many former colonial countries and into the 1970s and 1980s. The World Bank-supported training and visit system, which reached over 70 countries (Anderson, 2007), probably constituted the height of extension financing during the 1980s. During the 1980s and 1990s, with growing evidence that the training and visit system was not very effective and concern over bloated civil services, structural adjustment programs helped liberalize economies and drastically reduced outside funding to extension programs (Anderson, 2007). In an era of liberalization, some countries, especially in Latin America, withdrew public funding for EAS in hopes that the private sector would fill the gap, which it did to a certain extent. In Africa, many NGOs started filling the gap left by the public sector (Davis and Place, 2003).

Today extension is very pluralistic, with a variety of providers from all sectors including government, international and national NGOs, donor-financed projects, private companies and farmer organizations (Davis and Heemskerk, 2012). This pluralism makes it difficult to quantify amounts and even sources of financing. In a given geographic area, there could be many NGOs, private sector actors and even individual agro-dealers providing extension services, in addition to public extension. In addition, EAS are often part of other programs, such as research, education or even health, rather than a standalone project. Furthermore, decentralization of extension services means that tracing the different state or district-level funding is an arduous exercise, and it is not always known at national level what the various states or provinces are spending on extension.

The findings of the ten country cases show that bilateral donors and other international funding partners continue to support extension in a piecemeal fashion. While some mechanisms exist for overall support to the Ministry of Agriculture or government through multi-donor mechanisms (e.g., Mozambique), what we found is that many different projects are implemented by NGOs and others in pilot areas rather than country-wide. For these projects, funding data are more readily available than for the public or private sector. Donor projects often work together with government extension, but as mentioned earlier, EAS may be just one component of a larger project that focuses, for instance, on food security or market linkages. Donor-funded extension-related projects identified in the country studies are shown in Annex A, Table 1.

One exception to the problem of obtaining national-level funding data is the financing by the Government of Honduras. According to a study on Latin American extension (FAO-BID-RELASER, 2014), EAS system financing in Honduras originates from various sources. International cooperation agencies provided 48 percent of total funds; the national government provided 19 percent; private and research institutes contributed 14 percent; farmers provided nine percent; donations provided four percent; and two percent was provided by the local government.

According to Valenzuela and colleagues (2017), in 2015, the Honduran Agriculture and Livestock Secretariat budget was approximately USD 52 million. Of that amount, approximately USD 22 million, or 42 percent, was allocated to the Agriculture and Livestock Secretariat programs, services and projects. The remaining USD 30 million, or 58 percent, was transferred to other public and private sector institutions and organizations (Agricultural and Livestock Secretariat (SAG), 2015). The Agriculture and Livestock Secretariat funds for rural extension activities were reduced from USD 1.4 million in 2015 to USD 1.3 million in 2016. However, in the second quarter of 2016, the government allocated USD 2.1 million for the new National Extension Program.

The Liberian government also provided information on extension financing. For fiscal year 2016/2017, the Ministry of Agriculture budget was about USD 8.4 million; of this about USD 0.5 million (six percent) was allocated to extension (Ministry of Finance and Development Planning [MFDP], 2016, p. 367). However, the Ministry of Agriculture fiscal year 2016/17 total budget, including both Government of Liberia and donor funds, was USD 31.3 million (MFDP, 2016). This was around one to two percent of the total government budget (although donor funding to agriculture was 14 percent in the same time period). Information on the allocation to public extension of the total budget was not available. However, since there was no specific donor project to strengthen public extension and given the government's reports of resource constraints, it likely was minimal.

The Nigerian public spending occurs mainly at state level, and state support to agriculture and to extension varies greatly. Funds mainly go to salaries, with limited resources for operational expenses, resulting in lack of motivation and inadequate training and preparation with regard to modern agriculture extension. Some states have gone 30 years without training their state extension agents and 25-30 years without new recruitment (Huber et al., 2017). At the same time, there are cases of states investing in transportation and other support mechanisms for field agents.

However, the Nigerian Federal government has recently placed greater emphasis on extension, and the Federal Department of Agricultural Extension Services was established in December 2012. An extension policy is also being developed (Huber et al., 2017). And there is an ambitious government program to employ some 500,000 young people in the country in education and agriculture, with extension services receiving some 100,000 trained youth to act as volunteers (they will receive a small stipend paid through state coffers). There are also a number of donor-supported projects in Nigeria.

The Government of Rwanda spends significant amounts on agriculture and extension (see Box 3 on how they reach most of the country's farmers). A large number of donors support agriculture programs in Rwanda.

## Conclusions

In summary, regarding governance structures and policies, pluralism is the norm and EAS policies exist in several of the countries studied, while others are in the process of developing EAS policies. All the countries had a ministry or secretariat dealing with public extension. While the pluralistic environment allows governments to take advantage of the comparative strengths and resources of different private and NGO actors, coordination becomes the biggest problem. Without it,

duplication of effort and confusion of farmers due to the plethora of different actors, messages and methods negate the benefits gained.

With regard to EAS financing, both government and donor spending is fluctuating in the ten case countries. Rwanda spends significant amounts on EAS but also depends heavily on donors. Nigeria has started to put more focus on EAS at the federal level, and some states are also increasing their investment. While many countries such as Malawi and Mali recognize the importance of extension, they are not able to match the sentiment with funding. Thus, extension services in many of the countries remain weak and donor-dependent, with the limited funds available going mainly to pay salaries and leaving little for operational costs. Projectization is another problem, where donors, NGOs or the private sector focus on particular areas or topics, meaning that holistic services are not always provided, or are provided by a weak public service.

## Organizational and management capacities and cultures

This section covers the extension providers' human resources (staff numbers and gender), management systems including performance and incentives, monitoring and evaluation (M&E), and training of staff.

### Human resources

The country reports found that it was difficult to obtain field-level data on number and gender of extension agents. This is due to the lack of mechanisms for collecting such data, high turnover, and the fact that the nongovernmental players have no incentive to provide these data to the national government or to publicly publish them. Where data were available, Table 1 shows the number of agents or the ratio of extension agents to farm families in the ten case countries. It was sometimes unclear

- whether the data referred to only government extension staff or to staff from other types of organizations as well,
- whether the figures were for only field staff or for all extension staff, or
- for what year the data were collected.

In Honduras, formal extension services were provided by five actors: i) public sector; ii) international technical and financial support agencies and national and international NGOs (which constitutes 43 percent of the providers); iii) education and research institutions; iv) business unions and associations; and v) the private sector (Valenzuela et al., 2017). The actual numbers of extension staff were not reported in the case study.

The Malawian Department of Agricultural Extension Services reported that in 2012 there were a total of 2,415 field and office staff members (Simpson et al., 2012). Kaunda (2011) stated that there were about 1,900 government extension agents in Malawi in 2011, with 1,000 vacant positions unfilled (34 percent vacancy rate, varying by district) based on 2,900 established positions. There were more male extension workers (80 percent) than female extension workers.

The farmers per government extension officer ratio in Malawi was estimated to be between 1,800 (Kaunda, 2011) and 2,514 (Government of Malawi [GoM], 2015), a number much higher than those of other countries in the region, such as Ethiopia, the Democratic Republic of Congo and Kenya.

However, the number is much lower in comparison to Nigeria and India. There is a large imbalance worth noting in farmer-to-government extension officer ratio across regions of Malawi. For example, the farmer-to-extension officer ratio ranged from 811 in Karonga, a district in northern Malawi, to 2,005 in Balaka, a district in southern Malawi (IDAF, 2010). If other service providers are included, the ratio ranged between 642 in Rumphu, a northern Malawi district, and 1,279 in Balaka. Other estimates showed higher farmer-to-government extension worker ratios from 1,891 in Salima, a central region district, to 3,951 in Blantyre, a southern district (GoM 2015).

*Table 1. Extension Agent Numbers in Study Countries*

Country	# of extension agents (field-level unless otherwise noted)	Ratio of agents to farm families	Notes
Bangladesh	14,092 (Department of Agricultural Extension) 2,500 NGO agents	1:900 – 2,000	1,533 technical officers in Department of Fisheries
Guinea	800 public agents	1:10,000	Many close to retirement
Honduras	Numbers unknown		
Liberia		1:1,000 – 1:5,000	
Malawi	2,415 public field and office agents 12,000 lead farmers with government 4,000 lead farmers with NGOs and private companies	1:642 to 1:1279, depending on the district	34% vacancy; 20% female
Mali	839		
Mozambique	1,304 public agents 1,479 NGO agents	1:111 – 1:787	1:320 households on average
Nigeria	7,000 public agents	1:5,000 – 1:10,000	28% female; 60% over 40 years of age
Rwanda	2,500 farmer field school facilitators 14,200 farmer promoters		Number of regular extension agents unknown
Senegal	500 public, private, NGO agents 9,100 farmer-trainers (including community nutrition volunteers)		11% female (2007); 24% vacancy rate in national extension agency in 2017

*Source: Authors*

In Mali, government staff constituted the most prominent extension provider in terms of numbers and geographic and technical coverage (IFPRI/FAO/IICA, 2011). Overall, the number of public-sector extension agents and field support staff in the field was very low, despite recruitment efforts and support from international and local NGOs. It is becoming more common for extension services to use farmer extension agents<sup>1</sup> as part of the system to reduce cost and reach more farmers, although many do not have the requisite qualifications. The gender balance among extension agents

<sup>1</sup> often called lead farmers, farmer promoters, farmer trainers or other terms they were found in all of the countries studied. They usually serve as volunteers and may earn a periodic allowance to facilitate their work)



in Mali varied, but numbers of female agents in the public system and other programs tended to be low – typically between 10 and 25 percent.

In Mozambique, NGOs and the private sector provided substantial extension services. The geographical location of NGOs and private extension varied considerably, depending on their areas of intervention. Other than in Zambézia Province, NGOs outnumbered the private sector in all provinces. The average ratio for extension agents came to 320 rural households per extension worker. The Mozambique government's rule is that each extension agent should cover 200 farmers (Cunguara et al., 2018).

The total number of extension agents across sectors in Senegal was around 500, not counting managers. Senegal has a strong tradition of farmer-trainers, who tallied about 8,200 (including community nutrition volunteers) (Franzel et al., 2018). Given that there are other extension providers not counted in the case report, particularly NGOs, these numbers should be viewed as minimum estimates of total numbers of extension agents and farmer-trainers. Ngaide and Chambaz (2007) reported that 11 percent of Senegal's extension staff working at the local level were female.

A number of countries (Guinea, Malawi, Nigeria and Rwanda) have taken interesting steps to boost the extension presence and reach greater numbers of farmers.

In Guinea, the Extension Learning, Entrepreneurship, and Rural Innovation program was aiming to train a new cadre of young agriculture extension agent in a private-sector, entrepreneurial and business-oriented approach. The program targets and recruits youth between the ages of 18-35 who have graduated from the national agricultural schools to participate in a 10-month training program. After the training, graduates should be self-supporting or be hired by EAS providers. The training includes topics such as production, market facilitation, financial marketing and input supply. There will be no financial support from the project for trainees once they finish the 10-month course, except for those receiving a bonus for the best business plan. The program planned to start with 320 youth in 2017 (MacNairn and Davis, 2018b).

Malawi uses lead farmers to increase reach and sustainability (refer to methods section for further information). In Malawi, the lead farmer or farmer-to-farmer approach involves farmers helping to disseminate information that their fellow farmers can use to help increase agricultural productivity (Cai and Davis, 2017). Lead farmers are selected by local communities and organizations working in the region. Masangano and Mthinda (2012) found in a survey of 37 extension services that 78 percent used the farmer-to-farmer extension approach. Ragasa and Niu (2017) found that lead farmers' performance depends on how active and motivated the extension officers or NGO staff who work with them are.

In Nigeria, to improve youth employment opportunities and ensure peace in the country, the federal government launched the N-Power Programme to hire 500,000 young people, ages 18 to 35, to work in education, health and agriculture. N-Power Agro focuses on extension services and targeted 100,000 staff recruits. The recruits will receive basic training plus two years' practical experience on the job, while being paid a flat stipend by the federal government (NGN 33,000 or USD 100/month). The government is targeting a 50:50 ratio for men to women, but the response from women has not met this target (Huber et al., 2017).

Rwanda has managed to reach national scale in their blended Twigire Muhinzi extension approach that uses farmer field school (FFS) facilitators linked to farmer promoters (local volunteers who provide extension services). The FFS approach includes 2,500 FFS facilitators, 8,782 FFS groups and 8,000 experimental plots. The broader farmer promoter system includes 14,200 promoters and 75,000 Twigire Muhinzi farmer groups, which cover nearly the whole country (MacNairn and Davis, 2018a).

## Pre-service training and qualifications

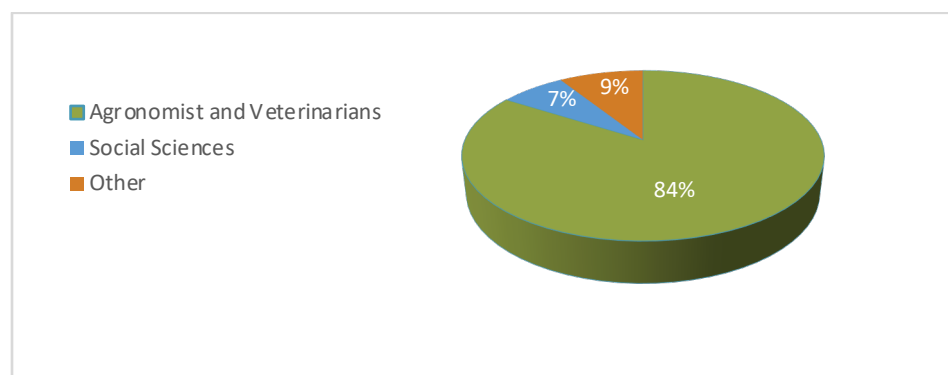
Education levels of extension staff vary across the countries. Many countries' extension workers hold a diploma or even lower qualifications, while a few countries' staff have a bachelor's degree or higher. Often times, master's or PhD holders are reclassified as research (DLEC, 2018).

Extension staff in Bangladesh typically hold diplomas from one of the 11 Agricultural Training Institutions, where the training tends to be mainly technical with a focus on cropping systems (Swanson, 2011). The government staff in Guinea typically hold either a university degree or an agricultural diploma from one of the national agricultural education and training centers, but some only have a secondary school education.

The existing extension providers in Honduras were generally university graduates. Agronomy and veterinary sciences were two specialist backgrounds that most prevailed in extension (Figure 2). To a minor degree, social scientists such as anthropologists, socio-economists and social workers also worked in the field. Despite the fact that the extension programs use information and communication technology (ICT) tools, the Honduran case survey did not find specialists with this background (Valenzuela et al., 2017).

Based on a survey conducted among EAS providers in Honduras, only ten percent of service providers have a master's degree (Valenzuela et al., 2017). The rest were university graduates or agricultural technicians. Typically, the most qualified and most experienced extension providers tended to work for NGOs, mainly because of the higher salaries provided (this was also the case in Mozambique).

*Figure 2. Specialist Educational Background of Extension Providers in Honduras*



*Source: Valenzuela et al., 2017*



In Liberia, limited extension capacity was confirmed in a recent survey of the training needs of government extension staff of the Ministry of Agriculture's Smallholder Agriculture Productivity Enhancement and Commercialization project (Oladele, 2016) (Box 1). Survey results supported the frequent call for increased training for EAS staff. The Department of Regional Development, Research and Extension would like to establish and institutionalize an annual extension staff competencies assessment, coupled with in-service training (Sigman, 2017).

The Lilongwe University of Agriculture and Natural Resources (LUANAR) and the Natural Resource College were two main institutes providing higher education for agricultural extension workers in Malawi. LUANAR offers a bachelor's and higher degrees in agricultural extension. Undergraduate education in extension at LUANAR provides both technical courses on agriculture (45 percent of coursework) and extension courses (55 percent of coursework). In total, 140 students specialized in extension in 2012: 112 bachelor's degree students, 26 master's degree students and two Ph.D. students.

### Box 1. Survey of Liberian Training Needs

A survey was conducted with 75 extension agents across 12 of Liberia's 15 counties. Respondents were asked to rate the level of importance of 125 competencies on a Likert scale (*not important, important, very important*) and then rate their level of competence relative to the competency on a Likert scale (*not competent, competent, very competent*). A summary analysis of the survey data showed:

- The majority gave either an *important* or *very important* response to the individual competencies. These results indicate respondents in general considered all competencies *important*.
- For 86 of the competencies studied, over one-half of those responding to the competency reported they were *not competent* in that area, suggesting a widespread need for capacity development in numerous subject areas.
- Only four competencies received both a high percentage of *very important* responses and a high percentage of *not competent* responses. These results were in value-addition and value-chain development; livestock production and disease control; operation and maintenance of agricultural machines; and irrigation techniques.

In general, respondents' technical skills were stronger than their functional skills (e.g., communication) and technical skills overall were considered more important than functional skills. Capacity to engage in market-led development appeared particularly weak. Developing understanding of and skills in market-led extension will be critical to reaching the aims laid out in current agriculture and EAS policy documents.

Noteworthy and positive were responses relative to monitoring and gender. These aspects of EAS work were considered *very important* and the majority of respondents indicated they have skills in these areas. Commonly-held beliefs were that EAS monitoring is limited, as was their outreach to women farmers.

*Source: Sigman, 2017*

The Natural Resource College in Malawi offered a certificate in extension and a diploma in agricultural extension, with around 500 students enrolled in the extension programs (Simpson et al., 2012). Extension professionals could also upgrade their certificates to diploma level at the college by enrolling in an 18-month upgrading program. Enrollments in the extension programs were increasing in both training institutions to cater to Department of Agricultural Extension Services and NGO demands for higher quality human resources in extension (Sigman et al., 2014).

Both quantity (sufficient numbers) and quality are lacking in extension's human resources in Mali, especially with regards to subject matter specialists (Table 2). Supervisors had low managerial capacity (Kassambara, 2012). Most public EAS staff in Mali receive their primary degree from the Rural Polytechnic Institute of Training and Applied Research, which also offered a four-year degree in agricultural extension through the Sasakawa Africa Fund for Extension Education (Box 2).

*Table 2. 2009 Education Levels of Human Resources in Mali's Public Extension Service*

Major Categories of Extension Staff	Secondary School diploma		2-3 yr. Agriculture diploma		B.Sc. degree		M.Sc./Ing. Agriculture degree		Ph.D. degree	
	F	M	F	M	F	M	F	M	F	M
Senior Management Staff						11				
Subject Matter Specialists						128				2
Field Level Extension Staff	41	295	7	303						
ICT Support Staff			1			11				
In-Service Training Staff		4		13		22				1
<b>Total Extension Staff: 839</b>	41	299	8	316		172				3

*Source: IFPRI/FAO/IICA Worldwide Extension Study, 2011*

Mali's extension system is constrained by an inadequate curriculum that lacks important pedagogical elements such as effective communication. There is also an imbalance in specialty areas of technical staff, with most having a background in agronomy or agroforestry (DLEC, 2018).

Mozambique has recently increased the education requirements for extension workers but was not able to enforce it (Cunguara et al., 2018). The new requirements were for extension workers to have training from an agriculture school (with the equivalent of a high school diploma) before being recruited as a public extension worker. The government could not enforce this because the Ministry of Agriculture and Food Security could not find staff with the required credentials at the salaries offered. Extensionists in government extension services should receive in-service training, but this has been a challenge for the Ministry of Agriculture. Lack of finances and high turnover of staff are key problems. The public sector is unable to compete with the private sector and NGOs for salaries, and extension workers and other public servants, after receiving in-service training, leave the government for better paid salaries in the private sector.

The majority of public extension agents in Nigeria undergo specialized training in agricultural extension. The first level includes an Ordinary National Diploma (an additional two years after High School) followed by a Higher National Diploma (an additional two years after the Ordinary Diploma). The next level is the Bachelor of Science (BSc) degree in Agricultural Extension, which entails five years of schooling following high school (Huber et al., 2017). Most of the extension agents at the interface with farmers have an Ordinary National Diploma in most states in the north,

and most in the southern states have a Higher National Diploma. The Nigerian Agricultural Extension Research and Liaison Services in Zaria provided training to the 36 state-level Agricultural Development Programs. However, state staff typically do not have funds to travel to Zaria for training.

Rwanda employs a unique model called *Twigire Muhinzi*, which uses a FFS approach coupled with volunteer farmer promoters. The FFS facilitators typically have a bachelor's degree, while farmer promoters are drawn from the local community and typically have much less formal education. Generally, FFS facilitators have both formal and practical agricultural training, whereas the promoters typically are trained by FFS facilitators or extension staff and have their own practical knowledge as rural farmers (MacNairn and Davis, 2018a).

In Senegal, among the public sector and NGO extension providers, most managerial staff and extension specialists have master's or bachelor's degrees in agriculture, whereas field agents generally have diplomas from agricultural training institutes (Franzel et al., 2018).

**Box 2. The Sasakawa Africa Fund for Extension Education (SAFE) Mid-career Training**

The Sasakawa Africa Fund for Extension Education (SAFE) enables mid-career extension professionals to strengthen their skills in extension and obtain university degrees. SAFE works in nine countries including Malawi, Mali and Nigeria.

In Mali, SAFE is affiliated with the Rural Polytechnic Institute of Training and Applied Research (IPR/IFRA), the Samanko Agricultural College and the University of Segou. In Mali, SAFE benefited more than 610 mid-career students since the program began at IPR/IFRA in 2003. Women comprise a rising portion of students in the SAFE Program in Mali. Of 482 total alumni since 2003, 22 percent were women. Of current enrolled students, 24 percent are female (SAFE, 2018). More than half the students in the Mali SAFE program come from either the Ministry of Agriculture or related ministries and offices. A number of students come from NGOs. Many of those who have graduated from this training now hold leading positions in Mali's national agricultural extension system (Simpson and Dembélé, 2011).

Malawi's LUANAR also participates in the SAFE education program. In 2012, 26 midcareer government extension professionals joined the program to receive bachelor's degree training (Simpson, Heinrich & Malindi, 2012).

SAFE started in 2003 at Ahmadu Bello University and now includes four universities in Nigeria. Some 379 extension professionals have completed the mid-career B.Sc. program (SAFE, 2017).

*Source: Authors*

In addition to technical skills, extension professionals need functional or “soft” skills to work effectively with clients such as group development, communication, facilitation, extension methods and informal adult education or entrepreneurship (Davis, 2015). In general, as in Guinea, Liberia and Honduras, there is limited focus on functional skills.

In Malawi, in contrast, there is more effort to train extension workers on functional skills. The extension courses in LUANAR, for example, intend to equip students with both technical knowledge of agricultural and functional skills that can be used to provide extension and advisory services, and to strategically communicate with stakeholders like farmers (Cai and Davis, 2017).

These functional skills include use of ICTs in extension (tele-centers, internet and text-based messages) and production and use of extension aids (slides, videos, radio messages and agri-tips, etc.). They also provide information on analyzing markets, linking farmers to the market, and farmer group development.

While most Senegalese extension staff have strong training in agriculture, there are no departments of agricultural extension at any of the universities and only a few have been trained in functional skills. This lack of training is partly because such courses are not available in universities and training institutes, and partly because of a general view that anyone knowledgeable about agriculture is capable of training farmers (Franzel et al., 2018). In contrast, the demand for training in soft skills of extension is high among extension staff. For example, Ndiaye (2015) found that 80 percent of extension staff felt that communication skills are necessary for development and that 84 percent felt that development facilitators need communication training. Bravo-Ureta et al. (2012) claimed that the post-secondary agricultural education system in Senegal does not produce graduates with adequate skills for becoming extension staff or for supporting the Senegalese agribusiness sector. They found that the system consists of different types of institutions, where each has specific mandates and governance schemes, and lacks the integration and interdisciplinary approach necessary to produce the professionals that are needed.

## Staff incentives

Extension staff are normally rewarded for their performance through their salaries, as well as other incentives and support such as transportation, mobile phones, continuing education, defined career paths and prizes. This is linked to the growing call for professionalism in extension.

Professionalization is only just now receiving attention in EAS, with countries thinking about how to professionalize the services through better capacities, certification and standards, regulation and good performance management systems (Terblanche, 2017). However, incentives are not well-resourced in most of the countries studied.

Although data on salaries were not always available in many of the case study countries, from the data collected, salaries of public EAS agents in most of the countries tended to be quite low. Extension agents working for NGOs or the private sector typically make more money. Bangladesh is one exception, and public EAS agents are relatively well-paid, receiving around USD 450-500 per month on joining and USD 630 with five years of service (Huber and Davis, 2017).

The Guinean government extension service is integrated into the Ministry of Agriculture and salaries are determined through the public system. Extension salaries are low (usually under USD 200 per month), and typical extension agents lack resources (e.g., transport, fuel, communication) to adequately support their areas of service. They also may collect 'informal' fees-for-service from clientele to supplement their government salaries (MacNairn and Davis, 2018b). Beyond salaries, there are almost no other incentives for extension agents in Guinea. There is also no regulation or certification system in place for the pluralistic providers. Extension staff working for NGOs often receive higher salaries than government extension staff; a local NGO with over 15 staff was paying monthly salaries between USD 270-540.

In Honduras, 66 percent of EAS organizations rewarded their personnel through bonuses, perks, salary increases and training (Valenzuela et al., 2017).

In Liberia, after salaries, funds are limited for the essentials needed to develop and deliver extension programs, such as transport (mobility is minimized due to inadequate funding for maintenance coupled with rough road conditions); communication tools, including ICT and office equipment, educational materials for use with farmers and other extension clients; M&E systems; and in-service training opportunities. The Department of Regional Development, Research and Extension is under-resourced by most measures, compromising its capacity to carry out its responsibilities, functions and mandate (Sigman, 2017).

Regular government extension agents in Rwanda and FFS facilitators are both paid by the government, but whereas agents receive regular salaries, the fees that field school facilitators vary depending on the growing season, how often they visit trainees, and other factors. FFS facilitators on average earn USD 24 per month of work. Both FFS facilitators and farmer promoters also have access to further educational opportunities from government/donor projects and donor-sponsored training, mostly due to similar levels of formal education.

Senegalese extension staff salaries are similar across the different public-sector agencies, but considerably lower than those in the public research sector (Franzel et al., 2018).

Continuing education is another important incentive and an element of professionalism within extension. Except for projects and programs that offer special training to extension agents, many extension agents do not receive regular continuing education (e.g., Bangladesh and Senegal).

Honduras, however, seems to have effective continuing education programs for extension staff. Continuing education programs were provided by 83 percent of the EAS organizations surveyed in the study to their employees (Valenzuela et al., 2017). Topics covered in continuing education in Honduras included crop management, pest management technologies, animal production and extension methodologies. Specialized trainings in cocoa and vegetables provided by the Honduran Foundation for Agricultural Investigation and supported by Zamorano University helped to strengthen farmer field schools, technical skills, postharvest management, and product transformation. Zamorano developed two capacity building models using hands-on learning methodologies focused on food security and commercial production. In coffee, the Honduran Coffee Institute worked in collaboration with universities to provide training on the complete coffee value chain.

Opportunities within Liberia's public extension services for in-service training most frequently occur on an ad hoc basis. Government extensionists were invited either to participate in project training or, in some cases, help deliver training. Generally, there is more training in technical aspects of extension work (e.g., production, processing) than in functional aspects of extension work (e.g., adult learning, extension program development). The government extension department did not have a systematic capacity development program for its staff. The current capacity of staff is considered insufficient given the range of competencies local extension officers need to demonstrate in a pluralistic system (Sigman, 2017).

In Malawi, in general, frontline extension workers lacked continuing education and reskilling, as well as sufficient operational resources to offer services to communities. NGOs in Malawi tend to provide either bicycles or motorcycles and a fuel allowance to the agents, and sometimes cell phones (Cai and Davis, 2017).

Mali's National Directorate of Agriculture's Agricultural and Rural Education Division organized short-, mid- and long-term training opportunities; however, these were not very regular (Simpson and Dembélé, 2011). Mali's extension agents typically had insufficient resources to perform EAS work (e.g. motorcycles, fuel money, laptops), and there was a limited career plan that did not encourage or motivate agents to improve performance (DLEC, 2018).

In Mozambique, public extension workers had few incentive structures at the district level, but at the national level, the best extension officer nationwide received a prize annually. The criteria for selecting the best extension officer includes the number of demonstration plots and farmers assisted, as well as the adoption rate of the technologies that were demonstrated. In-service training does not take place regularly. Lack of finances and high turnover of staff are key problems. This implies that the Ministry of Agriculture and Food Security must constantly train new staff. Incentive policies to retain staff in the public sector do not exist or are non-functional (Cunguara et al., 2018).

Some Nigerian states and other actors (such as rice mills or projects) have recently provided the following incentives for their extension agents: motorcycles, fuel allowance, special training and stipends to government agents for providing expertise to special projects (Huber et al., 2017). The international NGO Sasakawa Global 2000 trains thousands of government staff and provides them with small stipends beyond their regular state salaries to participate in projects. This was similar to Bangladesh where projects often provided special training to extension agents.

In Senegal's national public extension services, there were no opportunities for further education or paths for career development. Where extension staff worked in donor-financed projects, there were opportunities to participate in short-term courses on topics related to the project. However, Senegalese public extension field staff had motorcycles and managerial staff had access to four-wheel drive vehicles, as did NGO staff (Franzel et al., 2018). Other organizations only provided bicycles to field staff. Laptops were only available to government staff working with donor-funded projects and certain NGO field staff.

## **Performance, accountability and monitoring and evaluation**

Performance monitoring is typically seen as a good practice in organizational theory. However, many countries do not have a performance appraisal system that works, or they only practice performance monitoring on a limited basis. For instance, in Bangladesh, the government, under a donor-supported project, started joint monitoring and digital reporting within their target areas in July 2016 (Huber and Davis, 2017). This joint effort was the first time that the Department of Agricultural Extension reported through a digital system. Research in Mali has also identified weak points in M&E (Kouriba, 2015).

The Guinean public extension service is, in principle, accountable to farmers' organizations and farmers. Most Guinean organizations set up M&E systems to provide feedback on the effectiveness



of EAS provision, although this could be improved through increased standardization and professionalization (MacNairn and Davis, 2018b). However, the feedback depends on adequate funding, motivation and logistics, which were often lacking.

In Honduras, not all organizations monitored the quality of service delivery, its impact or effects, but 50 percent of organizations surveyed had performance management systems for their employees according to outputs, indicators and outcomes of the project. Some of the most important indicators included project completion, fulfillment of the action plan, capacity building, field visits, and increase in production and productivity. In general, these monitoring systems focused on products and results with limitations on their ability to measure effects and impacts.

The Liberian government extension service had a staff performance assessment and appraisal system that was carried out as part of the government's Civil Services reform process supported by USAID (Sigman, 2017). Along with the Ministry of Agriculture Human Resources Division and Civil Service Agency, assessment and appraisal of both headquarter and field extension staff has been carried out reportedly since 2014; however, details were unavailable.

In terms of monitoring and evaluation, the Department of Planning and Development of the Ministry of Agriculture in Liberia has a Division of Monitoring and Evaluation responsible for providing guidance in setting indicators and tracking performance. While the Ministry recognized the importance of M&E, demand for M&E far outstripped the capacity of the Ministry. The primary public extension monitoring method was monthly reports from the field. Headquarters staff periodically visited both the agricultural offices in the field and farmers to monitor activities (Sigman, 2017).

In Malawi, some examples of performance indicators from NGOs included punctuality, meeting targets, decision-making skills, initiative, work performance, behavioral conduct and management of resources. Some NGOs conduct self-evaluations and others used supervisor evaluations. These evaluations were often linked to incentives; one organization provided a three percent salary increment for good performance, while another gave cash prizes (DLEC, 2017).

In Mozambique, government employees were evaluated annually by the head of their department, based on performance indicators such as completion of all tasks, absenteeism, and dedication to work. The head of the department gave a total score to the employee, ranging from 0 to 20. The employee with the highest score received a prize as the best employee from each Ministry Directorate. The prize usually comprised a certificate of honor and a few gifts, depending on resource availability (Cunguara et al., 2018).

Rwanda used three-party performance contracts between appropriate district officials, the Rwanda Agricultural Board and FFS facilitators' cooperatives, ensuring accountability for all parties. The three-party contracts particularly served as a vehicle to monitor the progress of FFS facilitators. Parallel to the three-party contracts is the *imihigo* system for accountability – a traditional consultative process within Rwanda that supports collaboration vertically between mayors, farmers, and other stakeholders (MacNairn and Davis, 2018a).

Performance evaluation measures for public extension providers in Senegal focused on distribution of inputs, such as seed and fertilizer, rather than on the performance of particular extension

programs, uptake of technologies or other outcomes. This is partly because many view extension services' mandate as simply to distribute inputs and partly because it is so easy to measure the quantity of inputs distributed relative to other more difficult measures, such as the number of farmers adopting or area covered by a particular crop variety.

## Conclusions

In sum, regarding organizational and management capacities and cultures, the numbers of extension agents and the ratio to farmers are poor. There are relatively high vacancy rates and aging staff is another problem. Some countries like Mozambique have high turnover. However, countries are taking steps to deal with insufficient staff numbers through mechanisms that use farmer extension agents or programs that are engaging youth at relatively low cost and equipping them to advise farmers.

Training levels vary from secondary school to postgraduate degrees, although the majority of extension agents had a diploma or a bachelor's degree. Most of the training was technical and there were only a few countries that gave sufficient focus to functional skills.

With regard to incentives, EAS salaries vary quite a bit between countries, but in general, public salaries tend to be too low to be attractive. Coupled with lack of other types of incentives (transport, laptops and cellphones, or monetary rewards), this keeps motivation of extension agents, especially in the public services, at a low level. It is also a deterrent for the next generation of extension agents wanting to enter the extension system. Continuing education also occurs mainly through special projects or in programs such as SAFE. Performance is measured in many countries but should be better linked to career paths. Monitoring and evaluation of extension is ad hoc and often project-based, rather than being mainstreamed. As a result, extension services are not very professional in general.

## EAS methods

Extension and advisory service methods are critical components of EAS provision. Advisory methods are systematic ways of reaching objectives (Hoffmann et al., 2009) and are used by EAS field staff in interactions or communication with farmers. They can be classified according to various aspects, such as whether they focus on working with individuals or with groups; the types of decisions on which advice is provided (specific to the production of certain crops or livestock; managerial decisions; group activities, etc.); and media used (print, radio, internet, etc.) (Davis and Spielman, 2017). Methods are most easily classified by whether they are mainly face-to-face methods, or primarily "methods for a larger public" (Hoffmann et al., 2009), which include ICT tools.

Extension systems across the 10 countries used a wide variety of approaches, as shown in Table 3. Some of the most common and/or innovative approaches are discussed below.

*Table 3. Frequency of Use of Extension Methods across 10 Surveyed Countries*

Extension Method	Number of Countries Where Used
<b>Face-to-face approaches</b>	
Farmer-to-farmer extension	10



Farmer field schools	9
Management advice for family farms	2
Demonstrations	10
Agricultural extension centers	3
Exchange visits	7
Field days	6
Private input provision	3
Model villages	2
Fairs and shows	4
<b>Methods for a larger public</b>	
Mobile phones	10
Videos	9
Call centers	4
Farmer-owned digital information systems	3
Radio	10
Television	4
Extension campaigns	2

Source: Authors

## Face-to-face methods

Group approaches have been popular since the end of the training and visit era, when there were criticisms of the financial unsustainability of reaching farmers with the traditional individual approach (although training and visit was modified for groups after some time) (Anderson, 2007). Additionally, group approaches allow extension providers to facilitate greater adoption through the social capital and peer pressure that comes from a group approach (Darr, 2009; Duflo et al., 2016).

### *Farmer-to-farmer extension*

Given the high demand for agricultural information and the limited capacity of extension services, many organizations use farmer-to-farmer extension (FTFE), which is defined as the provision of training by farmers to farmers, often through the creation of a structure of farmer-trainers (Scarborough et al., 1997). Surveys reveal that most farmers rely on their fellow farmers as primary sources of information about agriculture. Therefore, the FTFE approach can be viewed as an extension of farmers' existing practices. In this section, we use "farmer-trainer" as a generic term, even though different names (e.g., lead farmer, farmer promoter, farmer extension worker) may imply somewhat different roles.

Farmer-to-farmer extension approaches were used in all ten surveyed countries and appeared to be a common approach in most of them. In Senegal for example, Franzel et al. (2018) identified ten extension services (including government services, donor-funded projects, NGOs and farmer organizations) with 9,100 farmer trainers. In Malawi, the Ministry of Agriculture worked with over 12,000 lead farmers, and three NGOs and one tobacco company each work with over 1,000 lead farmers (Cai and Davis, 2017). Most farmer-trainers in Malawi focus on particular crops (e.g., rice or millet), while others hone in on a particular subject area, (e.g., nutrition or marketing), depending on the focus of the lead extension program. In most cases, farmer-trainers were responsible for training fellow members of farmer groups they belonged to, but they also trained others outside the groups. For example, in Malawi, Kundhlande and colleagues (2014) reported that 22 of 25 organizations

surveyed reported that their farmer-trainers served farmer groups. The others served villages or some other defined locality. This was echoed by a study in Cameroon that was not part of the cross-country analysis, where Tsafack and colleagues (2015) reported that 84 percent of a sample of 160 farmer-trainers working for 20 organizations served farmer groups. In some countries, such as Malawi and Mozambique, most farmer-trainers worked without salary or allowances. In others, such as Senegal, most received a monthly allowance. In Nigeria, village-level entrepreneurs, recruited through a donor-funded project, hosted demonstrations and earned commissions from a fertilizer company, Notore, for selling fertilizer (Huber et al., 2017). Farmer-trainers' performance was reported to vary considerably from country to country and within countries. Whereas the performance of farmer-trainers was reported to be quite high in particular cases, Ragasa and Niu (2017) found that their performance in Malawi depended on the degree of activity and motivation among the extension staff with whom they worked. The amount of follow-on training the farmer-trainers receive is also critical, particularly after their initial training. In Liberia, some farmer-trainers reported that they did not share knowledge obtained through training because they felt the training they received was insufficient (IDG, 2017).

Integrating the FTFE approach with other approaches appears to improve performance. In Nigeria, for example, village-level entrepreneurs filmed their demonstration plots and showed the videos in the village square. In the Rwanda government's Twigire Muhinzi program, farmer promoters worked closely with farmer field schools (Box 3), as they did in the USAID Harande Food for Peace Program in Mali. While some FTFE approaches were stand-alone, many programs used FTFE as an add-on to existing approaches used by public or nonpublic trained (and paid) extension providers. Reasons for adding FTFE to regular EAS programs include increasing reach, reducing costs or providing trusted, local sources of knowledge (in local languages).

Some drawbacks of FTFE include the fact that the farmer-trainer is usually already a full-time farmer and might not have time, may lack incentives to provide advice, and is not highly trained so may not have the requisite technical background that formal extension agents have.

### ***Farmer field schools***

The farmer field school (FFS) approach is a participatory, group-based method of adult education that teaches farmers how to experiment and solve problems independently. FFS groups meet periodically, often in the field during a cropping season, to learn by doing. They work with a certified facilitator, who usually has undergone an intensive season-long residential training. Field activities include comparing the performance of experimental plots and conducting field studies to solve local problems. Though FFS usually target improving the performance of a particular enterprise, this is done in the context of agro-ecosystem analysis – a holistic analysis of an agricultural environment that considers aspects from ecology, agronomy, sociology and economics. The approach has also proven useful for promoting empowerment, building social capital and addressing the problems women farmers face such as illiteracy or difficulties in attending extension meetings far from home (Dhamankar and Wongtschowski 2014; Davis et al., 2012; Friis-Hansen et al., 2012).

Benefits of FFS include the fact that they are adaptable (they cover many topics in crops and livestock as well as incorporate other elements such as gender, health and nutrition, agribusiness, climate change, etc.) and that they help build social capital and empower farmers (Friis-Hansen et al.,

2012). Because of the intensive and regular meetings with farmers, FFS do require high amounts of human and financial capital. Rwanda, however, has shown that it is possible to scale an extension approach that includes FFS with their Twigire Muhinzi approach (Box 3).

### **Box 3. Twigire Muhinzi: Rwanda's plan for its extension services to serve all Rwandan farmers**

Unique among the ten countries surveyed, Rwanda has a policy that its extension services should serve all of its estimated 1.5 million rural households (Ministry of Agriculture, 2017). In 2013, the country began implementing the Twigire Muhinzi extension model to increase extension coverage and accelerate uptake of improved agricultural technologies. Housed in the Rwanda Agricultural Board, which in turn is under the Ministry of Agriculture and Animal Resources (MINAGRI), Twigire Muhinzi encompasses two complementary components: FFS and farmer promoters. In the FFS model, master farmer-trainers who have university degrees train FFS facilitators in a 6-month, season-long residential training to obtain certification. The facilitators then begin training FFS groups, receiving a fee from the government for doing so. Drawing on adult education, discovery learning and agro-ecosystem analysis, the facilitators help the group plant, manage and evaluate experimental plots. 53 percent of FFS group members are women and 71 percent of the groups have savings and loan components.

In the farmer promoter component, volunteer farmer promoters received training and supervision from FFS facilitators until the end of funding by the Belgian Development Agency in 2016, and subsequently from MINAGRI extension agents. Farmer promoters host a simple demonstration plot and train a Twigire Muhinzi farmer group of 15-20 farmers. Once such a group is established and linked to a farmer promoter with a demonstration plot, group members are permitted to purchase subsidized inputs at government-owned agro-dealer shops.

The two components are highly complementary; FFS are relatively intensive, reaching fewer farmers, whereas farmer promoters offer less intensive training and reach many more farmers. FFS facilitators train and backstop farmer promoters and together they select motivated farmers to participate in new FFS groups. The facilitators also invite the farmer promoters and their Twigire Muhinzi groups to visit their demonstration plots to learn about the practices tested there. Both components

- emphasize group formation and development for building social capital,
- make training more efficient because farmers are trained in groups, and
- offer group members services such as group savings and loans and subsidized prices for inputs.

By 2016, 2,500 FFS facilitators had trained 8,000 FFS groups comprising 200,000 farmers (25 farmers per group). Farmer promoters numbered 14,200 and were working with 75,800 Twigire Muhinzi groups comprising 1.1 million farmers. The Twigire Muhinzi model operates in 14,200 of Rwanda's 14,837 villages. The proportion of farmers receiving extension coverage has risen from 32 percent in 2012 to 75-80 percent in 2017 (Ministry of Agriculture, 2017).

The Belgian Development Agency was the Twigire Muhinzi model's biggest foreign donor until it ended funding in December 2016. Other donors, such as USAID, have stepped in to support the model. In 2017, FFS facilitators were shifting from being funded by the Rwanda Agricultural Board to being paid as professional service providers through FFS facilitator cooperatives. In 2016, 28 of these cooperatives signed performance contracts with their respective districts and the Rwanda Agricultural Board to provide training and backstopping for farmer promoters and their Twigire Muhinzi groups (Ministry of Agriculture, 2017).

As successful as the Twigire Muhinzi model has been thus far, the government faces several critical challenges in making it sustainable. First is the question of how to wean the program off donor funding. Second is the need for a monitoring and evaluation function that documents progress and impact as well as fosters a learning culture that incorporates feedback from the grassroots level. Third is the need to ensure the integration of the model at the local government level as the Rwanda Agricultural Board does not extend below the provincial level.

*Source: Authors*

### ***Management Advice for Family Farms***

Management Advice for Family Farms (MAFF) is an advisory approach based on learning and decision-making processes aimed at enhancing farm families' farm management and entrepreneurial skills. It is used by a wide number of EAS actors such as NGOs, producer organizations and governments (Faure et al., 2015). MAFF was used in two of the ten countries surveyed, Senegal and Mali, and enables farmers to effectively plan, implement and evaluate interventions to improve their farm. Typically, farmers receive both technical training (e.g., pest control) and management training (e.g., gross margin analysis). MAFF operates at both the farmer and group level. MAFF advisers assist individuals to develop plans for their own farms and facilitate groups to share results and learn from each other. In contrast to farmer field schools, MAFF deals with the whole farm, whereas farmer field schools typically focus on a single enterprise.

MAFF approaches are holistic and empower farmers. They also allow incorporation of farmer-trainers into the system. However, they do require specialized capacities and costs are high unless farmer-trainers are used (Faure et al., 2015).

### ***Demonstrations***

Demonstrations were used in all ten surveyed countries and implemented by all types of extension providers: governments, donor projects, NGOs, farmer organizations and private companies. Demonstrations usually involve comparing a plot or plots with an improved practice to the farmers' typical practice. Demonstrations are probably the most common extension approach in which public and NGO extension services partner with private companies. For example, in Bangladesh, the government's Access to Information Initiative partnered with Syngenta, Lal Teer Seed and Bayer Crop Science through the USAID-funded Agro-inputs Project to set up 321 demonstrations over a two-year period, 2014-2016 (CNFA, 2015; 2016).

Much variation was found in who hosts demonstrations. In most of the surveyed countries, farmer-trainers host demonstrations, but in the Naatal Mbay project in Senegal, local leaders (as opposed to farmer-trainers) host demonstrations. In Mozambique's Integrated Program for the Transfer of Technology, public-sector extension officers established demonstrations on their own farms. Outside of the program, farmers established demonstrations, using inputs supplied by public extension services. In Liberia, the Department of Regional Development, Research and Extension set up demonstrations at its county offices. In Mali, the Institute of Rural Economy showcased improved technologies in demonstrations on public land along major highways with explanatory signage.

An interesting addition to the demonstration model from Nigeria was that village-level entrepreneurs (VLEs) took videos of their demonstrations throughout the season and at the end of the season, showed the videos to fellow farmers in village squares. Many people watch televised soccer matches at commercial establishments and the VLEs showed their videos during intermission.

### ***Agricultural Extension Centers***

Agricultural extension centers are sites for training and demonstrations where farmers can go to learn about improved technologies and access training and services for improving their farm and

livelihoods. One of the largest models of such centers is in a non-study country, Ethiopia. Ethiopia's farmer training centers are based at nearly every local administrative area, totaling about 15,000 (Berhane, et al., in press). The centers, staffed by extension agents, are local-level focal points for farmers to receive information, training, demonstrations, and advice, and can include classrooms and demonstration fields.

In Bangladesh, several different models of such centers were in operation. As of 2016, the USAID Agricultural Extension Support Activity project established 129 Agricultural Extension Service Centers in partnership with the government's Department of Agricultural Extension and several agro-input suppliers. Practical Action helped establish 30 local knowledge centers, staffed by 12 extension workers each, that provided training to farmers. They also sold inputs and business services such as photocopying to help ensure financial sustainability. The Syngenta Foundation helped establish 45 farmers hubs in northwestern Bangladesh. These hubs were operated under private franchisors and sold agro-inputs, rented machinery, provided postharvest handling and linked buyers to sellers. They also provided advisory information to farmers via short message service (SMS) through a mobile app called E-hub as an embedded service. The Syngenta Foundation also helped establish 17 "Krishan Bazaars" as of 2016, which provided farmers with information, soil testing, quality seedlings and group training. They also provided equipment for renting and help farmers bulk their products and link to buyers.

In Africa, only two of the eight country reports cited agricultural extension centers. In Mali, the World Agroforestry Center and USAID helped community-based organizations to establish and manage 15 Rural Resource Centers (RRCs) focusing on tree product production and marketing. A typical RRC comprises a tree nursery, demonstration plots, a library, a training hall and an office. Some also have processing units. The centers work with networks of nursery operators and tree crop producers. The centers partially fund their activities through sales of seedlings and training services (DLEC, 2018; Degrande et al., 2015). In Nigeria, Sasakawa Global 2000 established three Community Resource Centers with support from the Alliance for a Green Revolution for Africa. The centers provided farmers with access to training, information, ICT services and buyers of produce.

In contrast to traditional government-run farmer training centers that focus on training on production methods, the case study centers described above cover the entire value chain and in many cases were managed by community institutions. Many operate profit-making enterprises and services, which help cover their costs but are not sufficient to make them financially viable. Financial viability is the key issue that these centers face, unless governments include them in their annual budget allocations.

## **Methods for a larger public**

Extension for a larger public – mainly mass media approaches – aims to address a large number of people at once who are not in close contact with one another (Hoffmann et al., 2009). While these methods used to be one-way, improvements have been made to make them more interactive.

## **Radio**

Farmers report in many surveys that radio is one of their main sources of information about agricultural practices (e.g., Mwambi et al. (2015) in Kenya and Kimaiyo et al. (2017) in Uganda). Moreover, research has confirmed the positive impact of radio on farmers' acquisition of knowledge and adoption of improved practices (Perkins et al., 2011). Radio was reported to be used as an agricultural extension method in all ten countries surveyed. Moreover, radio has evolved considerably in recent years to become more participatory, interactive and multidimensional (Box 4).

### **Box 4. Radio: A Multi-Dimensional Communication Platform**

Whereas radio has traditionally been associated with one-way communication, it has evolved considerably in recent years to become much more participatory, interactive and multi-dimensional. Broadcasters now produce phone-in shows, facilitate and broadcast community discussions and debates, document farmers' experiences and those of other value chain actors, facilitate farmers to pose questions and get answers from experts (including other farmers), and link buyers and sellers in real time. Broadcasters remind listeners via SMS about upcoming shows and provide them with summaries via SMS following the show. They also get feedback from farmers, either by having them vote through free SMS services for topics to include in programming or by telephone interviews about topics such as program format and clarity, timing, and relevance of messages. Some broadcasters also conduct needs assessments to understand listeners' preferences and to design programs suited for them. (FRI, 2011; Chapota et al. 2014).

*Source: Authors*

Malawi had more than 30 publicly- and privately-run radio stations and about three-quarters of these had farming-related programs (Sigman et al., 2014). About 70 percent of rural households had access to radio in 2014; among its advantages are that it is affordable, accessible to the illiterate and often uses local languages (Chapota et al., 2014). The Malawian NGO Farm Radio Trust trained broadcasters, offered farmer advisory services through radio programming, and promoted participatory radio campaigns to help spread the use of improved agricultural practices.

In Bangladesh, agricultural radio was also popular. Twelve radio stations broadcast 17 shows, most of which were daily.

In Mali, the Department of Rural Radio coordinated with the Office of Radio and Television of Mali to provide radio-based EAS activities for farmers. In its national rural radio show, farmers in a particular area discussed a specific problem with technicians, conducted a participatory diagnosis, and arrived at solutions. Community listener clubs discussed problems and practices they learned about over the radio in person, and members supported each other in testing new practices (DLEC, 2018). The Radio Market Place was another innovative radio approach promoted by Farm Radio International and implemented in Mali. The show facilitated linkages between entrepreneurial farmers and market institutions such as input suppliers, produce buyers, banks and financial institutions to show how farmers can access markets and services (DLEC, 2018).

In Mozambique, public extension services contracted radio stations to broadcast their messages. In 2015, community radio stations broadcast agricultural programs for 450 hours (over one hour per day) compared to 74 hours on the national radio station. The National Agricultural Research Institute and the Department of Training and Technology Transfer prepared some of the messages,



with support from the Mozambique Institute of Social Communication. In years when the budget was a limiting factor, as it was in 2016, no new messaging was produced (Cunguara et al., 2018). Farm Radio International, an international NGO, was starting to support agricultural radio programming in 2016 through a new extension project.

In Liberia, the Ministry of Agriculture had an agricultural radio program. The Food and Enterprise Development Project, a USAID Feed the Future project that ended in 2016, trained community radio journalists in agricultural programming and supported stations with equipment.

In only three countries did radio appear to be of little importance as a source of agricultural information for smallholders: Senegal, Nigeria and Honduras. Senegal's national broadcasting system lacks an agricultural radio program focused on assisting farmers to improve their agricultural productivity. That said, Senegalese radio stations did broadcast some agricultural programming on contract for international NGOs and donor projects. Women in Kaffrine Region identified community radio, which broadcasts in local languages, as a preferred source for information about agriculture (Poulsen, 2015). Nigeria reportedly had a considerable number of farm radio programs in the 1990s but most of these died out because of budget shortfalls or after the media was privatized. An exception is Kano State, which had an agricultural radio station that broadcasts four hours daily. The National Agricultural Extension Research and Liaison Services (NAERLS) and Sasakawa Global 2000 aired farm radio programs and the World Bank's Fadama project supported agricultural programming in community radio stations. Valenzuela and colleagues (2017) reported that extension services in Honduras do not commonly use radio for providing farmers with information.

Radio programs have lately been combining different information and communication technology (ICT) approaches to improve their effectiveness. For example, Land O'Lakes, an international NGO implementing the Malawi Dairy Development Alliance project from 2007 to 2012, created 10-minute radio sessions on dairy production and marketing aimed at helping listeners increase their milk yield. Transmitted weekly on the Zodiac Broadcasting System, the shows featured farmers discussing improved practices and how to implement them. The project collaborated with Esoko, a private information and communication service, to send text messages to farmers to inform them of the program's starting time. After the show, a summary text was sent to farmers.

### ***Television***

The rapid spread of television coverage offers opportunities for disseminating information about improved agricultural practices to millions of farmers at low cost. As of 2015, about 55 million households in sub-Saharan Africa had televisions and many more were able to watch at neighbors' houses or in public places (Statistica, 2018). In Tanzania, 41 percent of the population watches TV (Murthey, 2011). Many of the households with TVs are in urban areas but many urban households have farms (38 percent in Tanzania (Jayne et al. 2016)) and many also share information with friends and relatives in rural areas.

Bangladesh had the greatest number of TV channels and shows featuring agriculture. Jannat (2015) reported that five TV channels broadcast ten shows that promote adoption of agricultural technologies, some of which were broadcast daily. The most popular show on agriculture, *Soil and Humans*, was hosted by a media personality and the show was said to greatly improve the prestige of agriculture in Bangladesh. The concept has been copied by many other stations in the country (Wikipedia, 2018). This type of "edutainment", the integration of agricultural themes and messages

into an entertaining show featuring popular TV personalities, is also particularly attractive to youth. Edutainment shows appear to be rare in Africa, with the exception of Kenya's "*Shamba* (farm in Swahili) *Shape-up*," "*Seeds of Gold*," and "*Don't Lose the Plot*." *Shamba Shape-up* has 11 million viewers across the three countries in East Africa where it is broadcast (Kiptot et al., 2016).

Mozambique's national television station had a show, *Days of Farmers*, in which farmers exchanged information with agro-dealers, input suppliers, offtakers and other stakeholders. The station also showed training videos concerning improved agricultural practices. In Malawi, the Malawi Broadcasting Corporation also had an agricultural show, but no information was available about it.

Other countries, such as Senegal and Honduras, did not have TV shows aimed at teaching farmers about improved farming practices but did show training videos made by international organizations or NGOs. The Nigerian Agricultural Extension Research and Liaison Services reported using television as part of their information outreach. The government's use of TV for agricultural messaging was reported to be much greater during the 1990s, before privatization. Also, in Nigeria, village-level entrepreneurs selling seed and inputs make videos of their demonstration plots and sometimes showed these videos in commercial establishments broadcasting soccer matches, during intermission.

### ***Mobile phones***

Mobile phone uptake has been rapid in sub-Saharan Africa. By the end of 2016, the mobile phone penetration rate (proportion of adults with subscriptions) was 43 percent and one-quarter of mobile phones had internet connection (GSMA, 2017). However, it is important to note that women were 17% less likely to own a phone than men and that ownership rates are generally lower in rural areas than in urban ones. Penetration rates varied from 26 percent in Malawi to 62 percent in Mali among the eight African countries in our study (GSMA, 2017). Rates were higher in Honduras, where 85 percent of rural households own mobile phones. Other mobile phone innovations have also been expanding rapidly, such as use of phones for financial transactions or to pay bills.

In Honduras with its high rates of cell phone use, two-thirds of extension providers used phone calls to provide technical recommendations to farmers and 16 percent used SMS messaging or WhatsApp messages (Valenzuela et al., 2017).

Bangladesh also had many programs in which cell phones were used as extension tools. The Bangladesh Institute of Information and Communication Technology Development developed its own ICT applications such as 16250, a voice and SMS-based help line and e-learning program for extension officers. The Grameen Intel Social Business piloted four agriculture-related applications for farmers' use, including *mrirtika* for soil analysis and fertilizer recommendations; *ankur* for seed recommendations; *protikar* for managing diseases, pests, and weeds; and *vistar* for accessing market or buyer information. The Syngenta Foundation's Farmers Hubs provided several services to farmers, including advisory information via SMS through a mobile app called E-hub as an embedded service.

In Bangladesh, Agricultural Extension in South Asia (AESAs) and mPower created a number of mobile applications such as Farmer Query System, Crop Diagnostic, Seed Variety Recommendation and Fish Diagnostic. Two systems, Digital Diary and Work Scheduling, were for extension workers.



In 2015, AESA selected and trained 227 ICT champions from the elected ICT leaders of 227 farmer producer groups. Each ICT champion then provided training to approximately 20 peers from the groups. AESA also trained 185 extension agents on the use of these applications.

In Malawi, the country with the lowest rate of cell phone penetration, several cell phone applications were available. The Ministry of Agriculture and Airtel Malawi operated a system *Mchikumba 212* that farmers called to get information about crops and livestock production and marketing in dramatized and dialogue formats. There were also modules for calculating gross margins and determining profitability. The system also had an innovative pricing policy to attract farmers to use it — the first three calls to the platform each month were free, the fourth call costs USD 0.05, and all subsequent calls that month are free. Human Network International (HNI), partnering with Airtel, operated another mobile platform, *3-2-1*, which provided marketing information to callers, based on interactive voice response, which linked the callers to recordings on current price information. Information was also available on agriculture, health and gender. HNI and its partners use the Voto Mobile software program to monitor how users use the platform, so as to adjust content and how it is organized to better suit their needs (Payne, 2015). HNI and Airtel launched a system similar to *3-2-1* in Nigeria in late 2016, providing information in five languages.

In Mali, Orange Mali, a mobile phone network, operated a service called *Sandji* that provided callers with information on rain forecasts.

In Mozambique, several initiatives used SMS to deliver information on weather, market prices, directories of input suppliers and agro-dealers, and basic information on crop management.

In Nigeria, NAERLS started a system of SMS messaging of agricultural information that is no longer functioning. It has also operated a help line in Zaria since 2014 and has plans to expand to other locations.

In Rwanda, many organizations used cell phone apps and SMS messaging to provide information to farmers including (MacNairn and Davis, 2018a):

- M-Ahwi via its mobile platform AGRO FIBA, for providing access to agronomic, market and financial information,
- the One-Acre Fund for sharing agricultural and market price information via two-way SMS,
- the Rwanda Agricultural Board through its program Twigire Muhinzi, for information dissemination,
- the e-Soko Project for transmitting market prices, and
- the International Potato Center for promoting orange-flesh sweet potato.

In Liberia, the Firestone Rubber Company used text message to send information on rubber management to its outgrowers.

Surprisingly, we found very little information evaluating the use or performance of these mobile phone systems. Most of the information about the systems came from their websites, which tend to emphasize positive aspects and say little about problems or challenges. The lack of information on

evaluations means that either they have not been conducted or that the available ones are negative and thus not to be shared.

The main advantage of mobile phone systems for advisory services is the low cost per farmer of providing such information. The few available performance assessments highlight the prevalence of challenges such as the cost of accessing information, farmers' lack of trust in information providers, cultural barriers, difficulties in accessing information, and inappropriateness of message content particularly if the information provided is not suitable to the area the farmer is calling from (Valenzuela et al., 2017). Mobile phone systems are usually more useful as complements to face-to-face approaches than as primary sources of information (Payne et al. 2018).

### ***Call Centers***

Call centers, in which farmers telephone an expert to get agricultural information, have great promise as an extension method but have proven difficult to implement effectively and profitably. In describing the Ethiopian Agricultural Transformation Authority's successful call center, Bell (2015) noted three key factors (among others) influencing success: an effective promotion system through radio and travelling roadshows; simplified content suited to users; and gaining the trust of users through alignment with institutions that the users already trust. Only Bangladesh and Rwanda among the ten countries surveyed reported having call centers, whereas in Senegal a call center had just been terminated, and in Nigeria, one was just starting up.

In Bangladesh, Practical Action, an international NGO, launched the *Krishi* call center in 2014 through all of the country's main telephone services. Run jointly with the Ministry of Agriculture's Agricultural Information Service, farmers can call the center's help line for free. However, the center handled only around 60 calls per day, an extremely small number given that the country has over 100 million cell phone subscribers. The helpline offered advice on livestock, fisheries and agriculture. It is unique because it was the only call center in Bangladesh offering a free service across all mobile operators (Huber and Davis, 2017; Practical Action, 2018). The Bangladesh Institute of ICT Development also operated a call center, *e-Krishok*, which is in the process of transforming into a transactional service. In collaboration with Grameen Phone, the Institute has recently introduced an SMS/call back service. Rwanda has a toll-free number that serves as a call-in help desk for farmers, but no information was available about it.

Senegal's *Mlouma*, a mobile phone and web-based platform offering market price information, reported having tested a call center so that people could call in for price and market information. However, they eventually stopped the service, finding that it was too expensive to be profitable.

In Nigeria, NAERLS was, as of 2017, in the process of starting a call center with an interactive voice response system. They were working with Agro Novus, a private agricultural consulting firm, to establish an electronic database of NAERLS content for the call center. Their plan was to establish six zonal offices and offer content in five languages.

### ***Videos***

Videos were reported to be used in EAS in all of the surveyed countries except Honduras. However, most of the uses appeared to be ad hoc, that is, an organization would receive videos from another organization and show it to farmers but usually on a fairly limited basis, often due to lack of

equipment. There were several cases where videos were used on a fairly wide scale and in an innovative manner; these are detailed below.

In Bangladesh, the NGO Agricultural Advisory Society (AAS) reported that its video on improved agricultural machinery was viewed by 85,000 people in 332 communities during 2012 and 2013. AAS also distributed 1,149 DVDs to people who had seen the first screenings and encouraged them to show them to others. AAS surveys found that village tea stall owners/operators with televisions enthusiastically showed agricultural videos in the evenings but these were generally limited to men since women do not frequent the tea stalls. NGOs and women's savings and loans groups were found to be most effective at enabling women to view videos. Extension staff and agricultural shops and businesses did not show videos very frequently, probably because they lacked incentives to do so (Huber and Davis, 2017).

In Nigeria, as mentioned above, village-level entrepreneurs in a donor-funded project made videos of their fertilizer demonstration plots and show them in village squares or in commercial establishments during the intermission of soccer games. As incentive, they received commissions for fertilizer sales from a fertilizer company. The Centre for Agriculture and Bioscience International (CABI) has helped to provide technical support on video production (Huber et al., 2017). Videos were also an important extension method in the Agricultural Research Council's Adopted Village Program. A survey of farmers from the seven villages in the program found that videos were their most preferred information source, rated higher than extension agents (Sani et al., 2015).

Video has been utilized by John Snow International/Strengthening Partnerships, Results and Innovations in Nutrition Globally (SPRING) in several West African countries. For example, in Guinea, in collaboration with Digital Green, they established three hubs for video production for producing videos with local communities. In 2017, the videos were being tested in villages around Faranah. The videos combine agricultural and nutritional messages and promote consumption of such foods as sweet potato leaves and cowpeas (MacNairn and Davis, 2018b).

The international NGO Access Agriculture was acknowledged in several of the country reports for making and supplying agricultural videos free of charge.

### ***Farmer-owned digital information systems***

Various initiatives use ICT-based tools to help farmers improve their management skills and link them to markets. For example, the Bangladesh Institute of ICT in Development was promoting the Farmbook application under its *e-Krishok* service, an ICT-enabled extension and market linkage service for farmers and extension workers. Farmbook is an e-program developed by Catholic Relief Services which helps extension workers assist farmers to prepare farm business plans and analyze farm profitability. BIID (2015) reported that the program was being used to assist 1,882 farmers in 22 locations. One of the most comprehensive initiatives for developing digital information systems for farmers in Africa, Naatal Mbay in Senegal, is described in Box 5.

### **Box 5. Farmer-Owned, Digital Data Systems: A Key to Accessing Services, Better Prices and Integrating into Value Chains in Senegal**

USAID's Feed the Future Naatal Mbay project (2016-2019) aims to boost crop productivity and facilitate market integration and investment to benefit rural households participating in four value chains in Senegal: irrigated rice, rainfed rice, millet and maize. Project staff noted that farmers and producer organizations (POs) lacked basic financial and technical information about their farming operations, preventing them from accessing services such as credit and insurance or obtaining premium prices for their produce. In response, a central element of the project's extension strategy was to strengthen the capacity of the POs to develop farmer-owned digital data systems that provide them and their members with information about productivity and performance at both the PO and farm level.

Database managers at each PO use a basic set of digital technologies, mainly laptops using Microsoft Office, to develop the databases. The POs use the CommAgri app to extend the information from the databases to tablets and smart phones so PO staff in the field are able to access and share with farmers basic information on their farms such as management data, e.g., costs and returns, and physical measures, such as data on crop yields and farm sizes from Global Positioning Systems field surveying.

The system also provides POs and networks with important information on their performance (e.g., quantities produced and marketed and produce quality indicators). The project trains PO staff and farmers on how to use farm-specific data from the data system for improving enterprise performance. Such information empowers farmers in many ways: providing them with information to improve farm productivity; raising produce quality to obtain better prices; managing risk; accessing bank credit and crop insurance; and obtaining better prices from input suppliers and produce buyers. The data system is also an important supply chain management tool for establishing contract farming arrangements, through which farmers can pay back loans in kind at harvest time. The performance parameters are impressive. For example, 78,332 farmers attended trainings, 33,000 received bank loans, 18,000 received insurance with their loans and repayment rates were 95 percent. These achievements indicate that the POs meet the requirements for participating in commercial farming and benefitting their members. Underlying these achievements is the project's assistance to them in developing effective management information systems and how to make use of them.

*Source: Franzel et al., 2018*

## **Conclusions**

As seen above, there are many different EAS methods that can be used based on the topic, audience, intended reach, objectives such as reaching women farmers, and considerations such as cost. Many project implementers and policymakers are looking for the “silver bullet” – some method that is cheap to use, reaches many farmers and is effective in terms of inducing adoption. No one such perfect method exists: extension approaches must be adapted to local conditions and realities (the so-called “best-fit” approach (Birner et al., 2009)). Moreover, approaches are often complimentary, as when one approach is particularly strong in creating awareness and providing information at low-cost (e.g., radio) and another in skill development (e.g., farmer field schools). The Global Forum for Rural Advisory Services has set up the “Global Good Practices” website at [www.betterextension.org](http://www.betterextension.org) to help to guide users with regard to methods, and also other elements of EAS such as governance, structure and cross-cutting issues. The website explains a number of the extension methods listed above and includes different “best-fit” considerations such as capacities, sustainability and cost. Especially for the rapidly-evolving ICT methods, users are unsure about what

to use where, and there is a specific good practice note on that topic called “Navigating ICTs for Extension and Advisory Services” (Saravanan et al. 2015).

As we conclude, we would like to note several needs for improving the effectiveness of extension approaches. The first is the need for continued development, testing and evaluation of ICT methods. While more and more research on these methods is being documented (see, for example, Cole and Fernando, 2016; Fu and Akter, 2016; van Campenhout et al., in press), there is still a lot of hype surrounding ICT-based EAS methods and more information and research are needed.

Secondly, there is a need to integrate complementary methods (especially ICT with face-to-face methods). Communication experts note the need to reinforce messages, especially through various channels (Stuart and Achterberg, 1997). People learn in different ways. Reminders are also useful after having learned something. Thus, different methods can build on and complement each other.

Finally, there is great need for impact assessments of EAS methods highlighting the identification of ways to improve effectiveness of existing methods (see Box 6).

#### **Box 6. More Evidence is Needed on the Impact of Extension Approaches**

In spite of the large amounts of resources spent on implementing extension approaches, few studies are conducted on their impact. Studies are needed both to determine the impact of extension approaches (summative evaluations) as well as to improve the design and implementation of extension approaches (formative evaluations), i.e., whether large-plot demonstrations are more cost-effective than small-plot demonstrations (Davis et al., 2016).

The dearth of studies is in part because of the difficulty in attributing a change in some output variable, such as crop yields or farm income, to the provision of EAS. Davis et al. (2016) explain some of the challenges: the variation in endowments and constraints facing individuals and households who engage in an extension activity; variation in how they use the information provided; differences in their beliefs and expectations; and institutional factors (e.g. access to credit) that may affect their decisions and performance. Measurement challenges are also enormous, for example peers may be more important than extension in influencing adoption of technologies so how does one separate peer from extension effects?

Moreover, the available studies are sometimes flawed in their design, leading to biased estimates of impact. For example, proponents of farmer field schools in Rwanda claim that the approach increases farmers' yields by 45 percent (Ministry of Agriculture, 2016), based on a study showing that farmers who had attended an FFS had crop yields 45 percent higher than non-participants. However, what was not considered was that the participating farmers probably had higher yields than non-participants to start out with, since they were selected to attend FFS not randomly but on the basis of their “interest in and [being] committed to... improving agricultural production,” (Wennink and Mur, 2016, p. 24). Therefore, the 45 percent higher crop yields cannot be attributed to the FFS approach alone, but to the FFS approach plus other factors.

*Source: Authors*

## Cross-cutting issues

Extension and advisory services have evolved and reformed much in the past 15 years or so. This cross-cutting section addresses three recent developments in EAS:

- improved targeting (from male household heads alone to women and youth; this covers the framework areas on livelihoods and community engagement),
- expanded content (from production alone to postharvest operations, marketing, climate change adaptation and nutrition; this covers market engagement, community livelihoods and community engagement)
- expanded functions (from helping individuals to increase production to promoting the formation of groups and producer organizations, linking farmers to services and coordinating among EAS providers; this covers community engagement)

We cover these areas briefly or give a few examples from the previous sections.

### Improved targeting

Extension services are becoming more focused on the holistic livelihood needs of various clientele. This means that rather than simply providing agronomic knowledge to increase yields, EAS providers must be aware of the different needs of all types of farmers in the communities they serve (men, women, youth, elderly, laborers and pastoralists). These different needs could include topics such as markets, nutrition, climate resilience, mechanization and others, and also include providing complementary information (for example, on nutrition), focusing on the agricultural activities most common for different types of farmers (for example, poultry rearing or vegetable cultivation with women), or holding different types of events that are particularly engaging or accessible for that type of farmer (for example, women-only events).

Women are involved in many aspects of the agricultural value chain, but they have less access to EAS and agricultural inputs than men, reducing their overall productivity (Colverson, 2015; Meinzen-Dick et al., 2011). Evidence shows that there is gender bias in access to EAS and adoption of technologies (Meinzen-Dick et al., 2011). Even when services are provided, quality and appropriateness of the information provided may vary considerably between farmers and or farmer groups. Thus, it is important for extension to pay attention to gender.

Some good practices do exist to address gender issues within EAS. For example, Guinea and Senegal have gender focal persons in organizations and ministries. They lead activities on gender as well as try to ensure that gender is considered in all activities. In a similar vein, Malawi uses lead farmers, some of whom are women, to reach women farmers. In Malawi's Department of Agricultural Extension Services, 40 percent of the lead farmers are female whereas only 21 percent of extension field staff are women (Cai and Davis, 2017).

A number of projects target women, including Sasakawa's women-friendly value chains in Nigeria and CARE's Pathways out of Poverty, which used community trainers and village savings and loans groups to reach women in Malawi. In Senegal, a private company, Bana-Bana, worked with 800 women who supplied hibiscus leaves to the company for bottling and marketing locally and for



export. Bana-Bana advised them on growing, harvesting and postharvest practices to ensure high-quality products (Tafforeau, 2016).

Engaging youth is another important issue in many countries, especially in Africa where the youth bulge is so prominent. The Human Resources Section in this report talks about how countries like Guinea and Nigeria are taking steps to hire youth in EAS and otherwise equip them for entrepreneurial activities.

There are also other innovative programs for targeting youth. In Malawi, the Sustainable Agriculture Lead Farmer Program (2014-2019) funded by the Development Fund of Norway, has set quotas for young lead farmers: 40 percent of lead farmers in the initiatives it funds need to be youth and half of these need to be female. As of 2016, the program had trained 1,345 lead farmers, including 542 young lead farmers, 51 percent of whom were female. Their activities as lead farmers include establishing demonstrations and training farmers in soil and water conservation, tree planting, conservation agriculture, manure making and water harvesting. Recruitment of lead farmers ran into problems initially because local village development committees, not the project, chooses lead farmers. The project realized it needed to precede recruitment of lead farmers by a gender and youth sensitization session for committee leaders, which helps ensure that women and youth are given the opportunity to become lead farmers. (Franzel, 2016).

In Kenya, a new television show, *Don't Lose the Plot*, aims to encourage youth to become farmers and engage in agribusiness, by demonstrating that farming can be profitable and by elevating its social status. Made by Mediae Company Ltd., the same company that broadcasts *Shamba Shape up*, this reality show involves four young farmers (two men and two women from Kenya and Tanzania) living and farming side-by-side who compete over the course of a cropping season to win a prize worth USD 10,000. The show is also broadcast in Tanzania and Uganda. As its website states, the show aims to “demystify the social and emotional barriers of starting a small business, challenge the societal prejudices against farming-related careers, and arm potential youth entrepreneurs with basic knowledge on the entire value chain. This in turn will educate youth on the myriad of opportunities at their disposal to enter into and to grow agricultural economic activity” (Mediae Company Ltd. 2018).

## Expanded content

EAS providers are expanding content to address a greater number of issues important to the communities they serve. Content has moved from production alone to postharvest operations, marketing, climate change adaptation, and nutrition. Marketing and postharvest issues are covered in other sections of the paper.

Climate change is showing up more and more in EAS policies, strategies and programs, according to the case reports. According to Franzel and colleagues (2018), agricultural systems in Senegal will be significantly affected by climate change, with annual mean temperatures projected to increase by 1.1 to 1.8 degrees Celsius by 2035, depending on the region. Crop models predict reductions in groundnut yields by five to 25 percent in areas where they are currently grown but increases in yields of maize and rainfed rice (CIAT and BFS/USAID, 2016). Some estimates indicate that up to 80 percent of the population involved in agriculture and dependent on natural resources is seriously

impacted by increased drought and expanding risk of desertification (USAID Climatelinks, 2018). Climate change models for Guinea predict that some coastal zones of Guinea could have annual precipitation decreases of 50-100 millimeters per year (Jalloh et al., 2013). Bangladesh is also affected by climate change and experts predict that 10-15 percent of the land of the country will be inundated due to sea level rise of 45 cm by 2050 (Huber and Davis, 2017).

The attention to climate change was greater in the west African countries than the other regions where case studies were conducted, especially Senegal and Mali (Box 7), where arid- and semi-arid agricultural systems predominate. Senegal's National Agricultural Investment Plan emphasizes climate change, as does the Emerging Senegal Plan, which plans development through 2035. The country has also implemented a number of institutional and extension initiatives to address climate change (Box 8). To deal with climate change, Mali set up the Mali Climate Fund to support climate change projects, and the National Committee on Climate Change to lead stakeholders on policy and planning for climate change (DLEC, 2018). Mali also had a national policy on climate change, and Mozambique a national strategy. Liberia had a capacity development plan for climate change management in agriculture and planned to train extension staff.

#### **Box 7. Impact of Climate Change on Mali's Farmers**

Smallholder farmers will be hardest hit by the impacts of climate change (Ministry of Environment and Sanitation, 2011). According to a study by the National Center for Scientific and Technological Research, climate change will have the following impacts on agriculture in Mali:

- ◆ agricultural production gap of between 51 and 1,518 tons of maize by 2025.
- ◆ a decline in cotton yields, with losses ranging up to 3,500 tons by 2025.
- ◆ a decline in rice, millet and sorghum yields, with losses up to 2,524 tons by 2025.
- ◆ decreased rainfall will reduce river levels and fish availability.
- ◆ decreased rainfall and increased drought will present challenges for fodder production, having an impact on the livestock sector (Traoré et al., 2003).

*Source: DLEC, 2018*

Nutrition concepts were first introduced into extension staff training for rural development projects in the 1960s (Fanzo, 2015), but have made something of a comeback in recent years. In some countries such as the USA, they have been an important component of extension programs (although solely focused on women as wives of farmers). According to Fanzo, there is increased awareness globally of the need to better understand the links between agriculture (including extension) and nutrition, and to allow the agriculture sector to better contribute to improved nutrition. Extension is seen as a key vehicle for integrating nutrition into agriculture, because EAS agents are in the field with a significant reach into rural areas and have the trust of local communities (Fanzo et al., 2015). They often need topping up in terms of training, which can be a positive or a negative aspect: positive in that it is relatively easy to do, but negative in that the additional topics may put too much pressure on their workload.

Nutrition has been showing up in more and more government and organizational policies. For example, nutrition policies existed in Liberia, Mali, Rwanda and Senegal. Malawi had two policies addressing nutritional issues (Cai and Davis, 2017). Guinea, Malawi and Senegal showed examples of



nutrition-related projects (Table A-1), but these were not mainstreamed in the country; rather, they were championed by a few organizations only (Franzel et al., 2018).

#### **Box 8. Senegal's Extension Initiatives to Address Climate Change**

The National Science Policy Dialogue Platform for Adaptation to Climate Change brings together a network of national stakeholders, including researchers, extension staff and policy makers, who regularly exchange knowledge and experiences on implementing adaptation strategies and climate smart agriculture initiatives. In addition, there are 11 district- and commune-level platforms to ensure coordination and knowledge sharing at the local level.

A USAID Feed the Future project, Climate Information Services for Increased Resilience and Productivity in Senegal (CINSERE) (2016-2019), is strengthening the capacity of selected service providers to provide climate information services to farmers to support their decision making. The means of communication include SMS, voice calls, radio programs and multidisciplinary working groups. Farmers also receive training on how to use the information provided. Climate information is broadcast to farmers through 82 rural community radio stations, as well as through SMS messages, reaching 3.9 million rural people (CCAFS, 2015). There is evidence from an earlier project run by the Climate Change, Agriculture and Food Security Program (CCAFS, 2015) that farmers use climate forecasts to adjust their choice of crop varieties and planting dates (CCAFS, 2015).

The Senegalese National Meteorological Agency (ANACIM) has the primary responsibility for developing climate information services and is assisted by CINSERE. The USAID Feed the Future project Naatal Mbay introduced rain gauge technology to support appropriate planting times, and expanded the program to include automated rain data collection. Automated rain gauges now provide rainfall data for ANACIM's database and support rain-index insurance programs available to farmers.

Another project, Building Resilient Agro-Sylvo-Pastoral Systems in West Africa through Participatory Action Research (2015-2018) promoted climate smart agriculture in Keffrine Region, using such extension approaches as climate smart villages, innovation platforms, demonstration plots and farms, and farmer field schools. Financed by CCAFS, the project promoted climate smart practices such as windbreaks, planting grafted fruit trees that mature more quickly than local varieties, farmer-managed natural tree regeneration and the production, processing and marketing of tree products such as baobab powder (Sanogo et al. 2016a,b).

*Source: Authors*

A variety of methods were used to promote nutrition in the case countries including video, radio, and farmer field schools (in Guinea, Malawi and Rwanda). The SPRING project in Guinea and Senegal combined nutrition with agriculture for videos. SPRING delivered both nutrition-specific and nutrition-sensitive agricultural interventions. Nutritional messages have been successful in advocating sweet potato leaf and cowpea consumption in Senegal. Senegal also has a strong tradition of farmer-trainers (there were some 8,200 of them according to the case report), including community nutrition volunteers. In Mali, the National Agricultural Sector Investment Program included strengthening nutrition education for EAS.

## Expanded functions

EAS has expanded functions from helping individuals to increase production to promoting the formation of and strengthening groups and producer organizations, linking farmers to services and coordinating among EAS providers.

Naatal Mbaye may be the best-case example of engaging farmers through their organizations and linking them to services in Senegal; see Box 5. Other examples can be seen in Table A-1.

Coordination has been addressed in the Governance Structures and Policy Environment section.

## CONCLUSIONS AND LESSONS LEARNED

As can be seen from the case reports, overall, EAS are back on the development agenda and are being promoted by national and local governments, donors and projects, and the private sector (including producer organizations). However, they are back in a different form: more pluralistic, more decentralized, more focused on broader topics (nutrition, gender, climate change), often digitized, and with more involvement of the private sector.

The purpose of this report has been to synthesize lessons of ten published DLEC diagnostic reports to draw out lessons for extension globally. The country reports include Honduras, Bangladesh, Nigeria, Malawi, Liberia, Guinea, Rwanda, Senegal, Mozambique and Mali. The cases were analyzed using an adapted version of the best-fit framework (Birner et al., 2009). This report is aimed at project implementers, policymakers and others interested in improving EAS in their countries and projects.

Each of the ten DLEC country reports gives recommendations for improving extension services in the country studied. However, for this cross-country analysis, we make broader recommendations for global extension services based on the lessons learned. The lessons and take-home messages are organized according to the best-fit framework.

### Governance structures and policy environment

The ten country cases showed that pluralism is the norm, although all the countries studied had a ministry or secretariat dealing with public extension. While the pluralistic environment allows governments to take advantage of the comparative strengths and resources of different private and NGO actors, coordination becomes the biggest problem. Without it, duplication of effort and confusion of farmers due to the plethora of different actors, messages and methods negate the benefits gained. Furthermore, while extra resources for extension services in the form of projects and NGOs are good, the projectization of the services leads to fragmentation and limits sustainability. Thus, there is the need for EAS policies that give clear guidance as to roles and responsibilities of the pluralistic providers that provide coordination of the EAS systems. There are clearly continuing roles for the public sector in terms of ensuring public-goods extension services to meet national objectives such as natural resource management and maintaining food security. However, only through embracing nongovernmental services from farmer organizations, the private sector and civil society organizations can reach be increased and sustainability enhanced.

Some governments were enhancing the status and profile of EAS and spending significant amounts on EAS, but all were donor-dependent. Again, the issue of EAS policies is important but so are the implementation frameworks and funding strategies. Several countries recognized the importance of extension but were not able to match the sentiment with funding. Thus, there is a need for advocacy and evidence (Box 6). It is notoriously difficult to attribute impact to extension services, thus EAS proponents need to find ways to tell the story and show the impact.

## **Organizational and management capacities and cultures**

Human resources are a critical element of the extension system, but most countries do not achieve sufficient coverage, and many extension agents are unmotivated due to lack of career paths, low salaries and status, and little or no incentives such as transportation and rewards. High vacancy rates and an aging workforce are additional problems. However, countries are taking steps to deal with insufficient staff numbers through mechanisms that use farmer extension agents or programs that are engaging youth at relatively low cost and equipping them to advise farmers.

Training levels vary from secondary school to postgraduate degrees, although the majority of extension agents had a diploma or a bachelor's degree. Most of the training was technical and there were only a few countries that gave sufficient focus to functional skills such as adult learning and communication.

EAS salaries varied quite a bit between countries, but in general public salaries tended to be too low to be attractive. With a few exceptions, continuing education occurred mainly through special projects or programs. Performance was measured in many of the countries but was not always linked to career paths. Monitoring and evaluation of extension was quite ad hoc and often project-based, rather than being mainstreamed.

While performance was assessed, it was not always linked to rewards or other benefits. Monitoring and evaluation of the services tended to be under-resourced or resourced only for special (funded) projects.

All of these factors lead to the conclusion that EAS is not professionalized. Professionalization efforts such as better capacities, certification and standards, regulation and effective performance management systems would assist in attracting and maintaining staff and increasing their performance. A few countries such as Nigeria (and Uganda) are attempting to professionalize their services as has been done in South Africa and other countries.

## **Methods**

There are many different EAS methods used based on the topic, audience, intended reach, objectives such as reaching women farmers, and considerations such as cost. Moreover, approaches are often used in combination, and tend to be complementary, as when one approach is particularly strong in creating awareness and providing information at low-cost (e.g., radio) and another in skill development (e.g., farmer field schools).

There are several needs for improving the effectiveness of extension approaches. The first is the need for continued development, testing and evaluation of ICT methods. While more and more research on these methods is being documented (see, for example, Cole and Fernando, 2016; Fu and Akter, 2016; van Campenhout et al., in press), there is still a lot of hype surrounding ICT-based EAS methods and more information and research are needed. Setbacks and failures in implementing new approaches, such as ICT, are inevitable and a learning culture needs to be fostered in order to benefit from and share lessons from these experiences. Few such lessons are shared on the internet and in other forums, where complete success seems to be the norm.

Secondly, there is a need to integrate complementary methods (especially ICT with face-to-face methods). Communication experts note the need to reinforce messages, especially through various channels (Stuart and Achterberg, 1997). People learn in different ways. Reminders are also useful after having learned something. Thus, different methods can build on and complement each other.

Finally, there is great need for impact assessments of EAS methods to identify ways to improve the effectiveness of existing methods (see Box 6).

### Cross-cutting issues

Several elements stand out from the cross-cutting issues, where we looked at the expanded targeting, content and functions of EAS. These include the enabling environment, capacity, and local structures. Policies, strategies and programs are needed to ensure that the right audience is reached with the right content and functions.

Improved capacities are needed both for farmers and for extension personnel. Training material should be developed and shared that includes topics such as nutrition, women-focused issues, and climate resilience. Extension personnel need upskilling to deal with the expanded targeting, content and functions of EAS. Given the broad range of these new subject areas, careful prioritization, involving farmers and other stakeholders, is needed so as to focus on the most important needs for particular target groups in differing contexts.

Further, it is important to use community mechanisms and local community members to ensure sustainability and scale, as well as to better reach certain target groups. These examples were seen in Malawi, Rwanda and Senegal with farmer advisors and community nutrition volunteers. The initiatives to target youth in agricultural entrepreneurial activities in Guinea and Nigeria are also useful. Other mechanisms include women-only training or focusing on technologies appropriate for women, such as production of chickens and goats, vegetable cultivation and basic processing of foodstuffs – while including nutrition elements in training and outreach.

Finally, the cross-country analysis reveals that there is huge potential for improving EAS by sharing lessons and experiences within and among countries. For example, whereas radio has made huge strides in improving farmers' access to information and advisory services in many countries, often with the help of Farm Radio International, other countries are far behind. The same goes for edutainment in television, where there has been little uptake of “edutainment” approaches outside of Kenya and Bangladesh. A few organizations in Malawi and elsewhere have learned that farmer-to-farmer extension programs can vastly increase the numbers of women training other women but not

many organizations are using such programs for this purpose. National EAS forums, which exist in most of the countries, can greatly assist in facilitating the sharing of experiences within countries, just as regional forums, such as the African Forum for Agricultural Advisory Services, can help promote exchanges between countries. Both national EAS stakeholders and the donor community can help by supporting such exchanges.

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## ANNEX A. DONOR-FUNDED EAS-RELATED PROJECTS IN STUDY COUNTRIES

**Table 1. Donor-funded Extension-related Projects in Study Countries**

Country	Program/project	Implementer and Partners	Focus	Amount (in million USD) <sup>2</sup>
Bangladesh	Integrated Farm Management Farmer Field School	Danish International Development Agency, Government of Bangladesh	EAS on crops, livestock and fish culture	54.0
	Agricultural Extension Support Activity	United States Agency for International Development (USAID), Government of Bangladesh	Training in six agricultural value chains	19.0
	National Agricultural Technology Project: Phase II	Government of Bangladesh, International Fund for Agricultural Development (IFAD), USAID, World Bank	Capacity building, demonstrations	
	Agro Inputs Project	Cultivating New Frontiers in Agriculture (CNFA), private inputs company, CGIAR	Train and network agrodealers	14.2
Guinea	SMARTE Project (Feed the Future)	Winrock, USAID	Agricultural education and training, EAS and research	13.0
	SAVY Project (Feed the Future)	CNFA, USAID	Value-chain linkages and systems for market and input provision	11.0
	Agriculture Education and Market Improvement Program (Feed the Future)	Winrock, Purdue University, USAID	Capacity and management, curriculum	7.5
	SPRING	John Snow International, USAID	Nutrition-sensitive agricultural practices	1.2
Honduras	National Rural Extension Program	Zamorano, Texas Tech University, the National Autonomous University of	Capacity building, technical assistance, and innovation and technology transfer	2.1

<sup>2</sup> Includes project components not dealing with extension

Country	Program/project	Implementer and Partners	Focus	Amount (in million USD) <sup>2</sup>
		Honduras, Trust for the Reactivation of the Agri-food Sector, Dairy Consulting		
Liberia	Liberia Agribusiness Development Activity	CNFA	Value chains, agricultural inputs, postharvest processes, train agrodealers	19.3
	Cooperative Development Project	ACDI/VOCA	Training in good management and agricultural practices	4.6
	Smallholder Oil Palm Support II	ACDI/VOCA	Improve access to processing equipment and markets, train and support EAS providers	4.2
	Farmer to Farmer	ACDI/VOCA	Promote food security through volunteer program	7.9
	Smallholder Tree Crop Revitalization Support Project	Ministry of Agriculture, IFAD	Revitalize farms, rehabilitate rural roads, strengthen farmer organizations, EAS	24.9
	Agriculture Sector Rehabilitation Project II	Ministry of Agriculture, IFAD	Rehabilitate infrastructure, improve production and productivity, pilot EAS delivery	17.5
	Smallholder Tree Crop Revitalization Support Project	World Bank/Government of Liberia	Rehabilitate farms, promote outgrowers scheme, strengthen public technical services	23.1
	Smallholder Agriculture Productivity Enhancement and Commercialization	Global Agriculture and Food Security Program /World Bank	Intensify production, increase market access, strengthen institutions including extension	54.4
Malawi	Farmer Field Schools	Government of Malawi, Total Land Care, Evangelical Association of Malawi, Adventist Development and Relief Agency, Catholic Development Commission in Malawi, European Union, Food and	Teach farmers resilience practices to address issues such as climate change	6.2

Country	Program/project	Implementer and Partners	Focus	Amount (in million USD) <sup>2</sup>
		Agriculture Organization		
	Strengthening Agriculture and Nutrition Extension Services Activity	University of Illinois	Strengthen and coordinate EAS	15.0
	United in Building and Advancing Life Expectations	Catholic Relief Services, Digital Green	Food security, nutrition, risk management	63.0
	Scaling Seeds and Technologies Partnership in Africa	USAID and the Alliance for a Green Revolution in Africa	Accelerate farmer access to agricultural technologies	47.0
	Sustainable Agriculture Lead Farmer Program	Development Fund of Norway	Improve effectiveness of farmer-to-farmer extension in promoting sustainable agriculture and involve more women and youth as lead farmers	
Mali	Food for Peace Harande Program	CARE, USAID	Improve food, nutrition income security	45.0
	Adaptation for Smallholder Agriculture Programme	IFAD, World Bank, European Union, Global Environmental Facility, Government of Mali	Improve the climate resilience of farmers	173.0
	Scaling-up Climate-Smart Agroforestry Technologies for Improved Market Access, Food and Nutritional Security in Mali	World Agroforestry Center, Aga Khan Foundation, Catholic Relief Services, World Vision, ICCO-Cooperation, Mali Biocarburant SA	Enhance access to and use of tree-based climate-smart technologies	
	Livestock for Growth	AECOM, Farm Radio, CARE	Increase inclusive livestock value chain competitiveness	14.4
	Fostering Agricultural Productivity Project	World Bank, Government of Mali, International Development Association, IFAD	Increase the productivity of smallholder producers	152.0
Mozambique	Extension Multimedia Project	National Cooperative Business Association/The Cooperative League of the United States of	Food security and poverty reduction through information and communication	



Country	Program/project	Implementer and Partners	Focus	Amount (in million USD) <sup>2</sup>
		America (NCBA/CLUSA), Human Network International, Farm Radio International, Vodacom, Ministry of Agriculture and Food Security	technology extension services	
	Resilient Agricultural Market Activities	Winrock, Land O' Lakes, USAID	Test new extension systems and agro-dealers, link farmers to markets	16.0
	Mozambique Expansion of Rural Cattle and Dairy Opportunities Project	Land O'Lakes, Tillers International	Build capacity of dairy producers, cooperatives, processors to improve productivity and business practices	
Nigeria	Fadama III	Government, World Bank	Deliver extension services, subsidized inputs, various infrastructure projects	14% of 250m Component 3 (Advisory Services and Input Support budgeted for US \$39.5 million)
	Maximizing Agricultural Revenue and Key Enterprises in Targeted Sites program - Phase II	Sasakawa Global-2000, USAID	Comprehensive training	64.0
	Future Nigeria Agro-Inputs Project	USAID	Access quality and affordable agricultural inputs	3.0
	Promoting Pro-Poor Opportunities in Commodity and Service Markets	Palladium, Notore (fertilizer company), Department for International Development (DfID)	Set up network of village-level entrepreneurs	33.0
	Market Development for the Niger Delta	DfID	Identify retailers through input companies to provide EAS	17.0
Rwanda	Hinga Weze	Cultivating New Frontiers in	Build resilience for climate change; incomes; nutrition	32.6

Country	Program/project	Implementer and Partners	Focus	Amount (in million USD) <sup>2</sup>
		Agriculture (CNFA), USAID		
	Private-Sector Driven Agricultural Growth Project	RTI, USAID	Private sector investment and cooperatives	25.0
	Feed the Future Orange-fleshed Sweet Potato (OFSP) for Income and Nutrition	International Center for Tropical Agriculture (CIAT), Harvest Plus	Production and markets for OFSP, nutrition	3.0
	Rwanda High Iron Beans Scaling Up Activity (Feed the Future)	International Center for Tropical Agriculture, Harvest Plus	Production, marketing, consumption of beans	3.0
	Anchor Farm Project	Clinton Development Initiative, Hunter Foundation	Agribusiness development, good agricultural practices, agricultural value chains	
	THRIVE	World Vision	Income generation, natural resource management, disaster risk mitigation; via EAS structures	10.0
	Rwanda Dairy Development Project	IFAD, Government of Rwanda	Dairy production, market access, climate-smart dairy production, cooperatives and infrastructure	65.0
Senegal	Climate Information Services for Increased Resilience and Productivity in Senegal (Feed the Future)	International Crops Research Institute for the Semi-Arid Tropics, Climate Change, Agriculture and Food Security Program (CCAFS)	Strengthen capacity of EAS to provide climate information services to farmers to support decision making	3.4
	Agricultural Value Chains Support Project, International Fund for Agricultural Development	Ministry of Agriculture and Rural Equipment, IFAD	Access to services, inputs, technologies, markets	50.4
	Support to Agricultural Development and Rural Entrepreneurship	IFAD, Spanish Agency for International Development Co-operation	Rural roads, irrigation systems, small enterprise development, processing and vegetable production	82.5

Country	Program/project	Implementer and Partners	Focus	Amount (in million USD) <sup>2</sup>
	Smallholder Income and Nutrition Enhancement	Aid Map, Heifer International and ChildFund International	Improve livelihoods through improved sheep production	
	Building Resilient Agro-Sylvo-Pastoral Systems in West Africa through Participatory Action Research	CCAFS, World Agroforestry Centre	Developing and assessing climate-smart villages, innovation platforms, future farms, farmer field schools	
	Millet Business Services	NCBA-CLUSA, United States Department of Agriculture	Increase agricultural productivity of the millet value chain	9.6
	Promoting Family Farming in West Africa	Federation of Non-Governmental Organizations in Senegal, Foundation of France, French Committee for International Solidarity	Increase access to food through viable and sustainable family agriculture	
	Feed the Future Naatal Mbay	RTI, USAID	Productivity-enhancing technologies, facilitate market integration and investment	24.0
	Feed the Future Yaajeende project	NCBA/CLUSA	Improve food security and reduce malnutrition	40.0
	Strengthening Partnerships, Results and Innovations in Nutrition Globally	John Snow International Research and Training Institute, USAID	Scale up high-impact nutrition practices and policies and improve maternal and child nutrition outcomes	

Source: Authors