Transforming public agricultural extension and advisory service systems in smallholder farming

Status quo, gaps, way forward
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Status quo, gaps, way forward

Puyun Yang

Yapeng Ou
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## Abbreviations and acronyms

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ACEFA</td>
<td>Programme for the Improvement of Competitiveness of Family Agro-pastoral Farms</td>
</tr>
<tr>
<td>ADP</td>
<td>Agricultural development programme</td>
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<tr>
<td>AEC</td>
<td>Agricultural extension centre</td>
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<tr>
<td>AETA</td>
<td>Nigerian Agricultural Extension Transformation Agenda</td>
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<td>AFAAS</td>
<td>African Forum for Agricultural Advisory Services</td>
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<tr>
<td>AGOCA</td>
<td>Alliance of Mountain Communities of Central Asia</td>
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<tr>
<td>AIS</td>
<td>Agricultural innovation system</td>
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<td>AKIS</td>
<td>Agricultural knowledge and information system</td>
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<tr>
<td>ANES</td>
<td>Albanian National Extension System</td>
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<tr>
<td>ATE</td>
<td>Agricultural technology extension</td>
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<tr>
<td>ATI</td>
<td>Philippine Agricultural Training Institute</td>
</tr>
<tr>
<td>CAAEE</td>
<td>Egyptian Central Administration for Agricultural Extension and Environment</td>
</tr>
<tr>
<td>CAP</td>
<td>Common Agricultural Policy</td>
</tr>
<tr>
<td>COVID-19</td>
<td>Coronavirus disease 2019</td>
</tr>
<tr>
<td>CTA</td>
<td>Technical Centre for Agricultural and Rural Cooperation</td>
</tr>
<tr>
<td>DF</td>
<td>Demonstration farm</td>
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<tr>
<td>DLEC</td>
<td>Developing Local Extension Capacity Project</td>
</tr>
<tr>
<td>DSCC</td>
<td>Development support and communication centre</td>
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<tr>
<td>DVD</td>
<td>Digital video disc</td>
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<tr>
<td>F2F</td>
<td>Farmer to farmer</td>
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<tr>
<td>FAO</td>
<td>Food and Agriculture Organization of the United Nations</td>
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<tr>
<td>FFS</td>
<td>Farmer field school</td>
</tr>
<tr>
<td>FIRCA</td>
<td>Interprofessional Fund for Agricultural Research and Development (French: <em>Fonds interprofessionnel pour la recherche et le conseil agricoles</em>)</td>
</tr>
<tr>
<td>FMARD</td>
<td>Nigerian Federal Ministry of Agriculture and Rural Development</td>
</tr>
<tr>
<td>FTC</td>
<td>Farmer training centre</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross domestic product</td>
</tr>
<tr>
<td>IFPRI</td>
<td>International Food Policy Research Institute</td>
</tr>
<tr>
<td>IICA</td>
<td>Inter-American Institute for Cooperation on Agriculture</td>
</tr>
<tr>
<td>IMF</td>
<td>International Monetary Fund</td>
</tr>
<tr>
<td>INIAF</td>
<td>National Institute of Agricultural and Forestry Innovation (Spanish: <em>Instituto Nacional de Innovación Agropecuaria y Forestal</em>)</td>
</tr>
<tr>
<td>M&amp;E</td>
<td>Monitoring and evaluation</td>
</tr>
<tr>
<td>MAAIF</td>
<td>Ministry of Agriculture, Animal Industry and Fisheries</td>
</tr>
<tr>
<td>Acronym</td>
<td>Full Form</td>
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<td>---------</td>
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<tr>
<td>MoA</td>
<td>Ministry of Agriculture</td>
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<tr>
<td>MOANR</td>
<td>Ethiopian Ministry of Agriculture and Natural Resources</td>
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<tr>
<td>NAADS</td>
<td>Ugandan National Agricultural Advisory Services</td>
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<td>NAAS</td>
<td>Bulgarian National Agricultural Advisory Services</td>
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<tr>
<td>NAEC</td>
<td>Mongolian National Agricultural Extension Centre</td>
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<td>NAEP</td>
<td>Malawian National Agricultural Extension Policy</td>
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<td>NAP</td>
<td>Malawian National Agriculture Policy</td>
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<tr>
<td>NEP</td>
<td>Nigerian National Extension Policy</td>
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<tr>
<td>NGO</td>
<td>Non-governmental organization</td>
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<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
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<tr>
<td>OIN</td>
<td>Office of Innovation</td>
</tr>
<tr>
<td>PO</td>
<td>Producer organization</td>
</tr>
<tr>
<td>PPP</td>
<td>Public-private partnership</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and development</td>
</tr>
<tr>
<td>RAS</td>
<td>Rural Advisory Service</td>
</tr>
<tr>
<td>RDC</td>
<td>Rural development centre</td>
</tr>
<tr>
<td>RESCAR-AOC</td>
<td>West and Central Africa Network for Agricultural and Rural Advisory Services (French: Réseau des services de conseil agricole et rural d'Afrique de l'Ouest et du Centre)</td>
</tr>
<tr>
<td>ROPPA</td>
<td>Network of Peasant Organizations and Producers of West Africa (French: Réseau des organizations paysannes et de producteurs de l'Afrique de l'ouest)</td>
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<tr>
<td>SDC</td>
<td>Swiss Agency for Development and Cooperation</td>
</tr>
<tr>
<td>SSA</td>
<td>Sub-Saharan Africa</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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Executive summary

Public agricultural extension and advisory service (EAS) systems are critical to achieve national food security, improve rural livelihoods, and strengthen natural resource management. However, public EAS systems have been neglected by most national governments and the global development community alike for the last three decades (Place, 2020). The overall state of EAS – difficult to assess and document – is at a critical crossroads (Alex, 2020). Understaffing, poor accountability, inadequate infrastructure, financial constraints, lack of coherence, siloed approach, etc. are among the main challenges that prevent public EAS systems from contributing to the three above-mentioned goals. Meanwhile, pro-change factors, such as broadened EAS scope, governance failures, growing system complexity, increasing pluralism, and need for resilience of agri-food systems, are becoming drivers of multi-faceted change of agricultural EAS systems worldwide. To respond to the need for change and cope with the above-mentioned challenges, reforming public EAS systems is an inevitable task.

Since the end of the 1990s, countries worldwide have adopted a variety of reforms that were either market-oriented or non-market-oriented. These reforms generally have followed three models, including (1) decentralisation of services; (2) outsourcing of services to private, either not-for-profit or commercial organizations; and (3) partial or complete privatisation of services. The results have been largely varied in different countries, with failure of reform not being unusual. There are some deeply rooted reasons for unsuccessful reforms and inefficient public EAS. First, the education-research-extension linkage remains weak due to limited funding and weak coordination. Second, privatisation in many countries has deprived the majority of farmers (i.e. smallholder farmers) of the access to impartial EAS, while the government’s duty to provide essential public-good services has been largely minimised. Third, outsourcing approaches have led to the projectisation of EAS, fragmenting and undermining the sustainability of public EAS systems. Fourth, accountability towards farmers (downward accountability) remains a constraint. Fifth, the existing public EAS systems, like any other institutional arrangements, tend to be strongly resistant to change, which makes it difficult to achieve and sustain systemic change. Sixth, legal and policy frameworks related to EAS systems are often underdeveloped and even missing in most developing countries, which encourages inconsistent financial commitment of the government, siloed and poorly aligned policies, and poor implementation (Blum et al., 2020; Swanson & Davis, 2014). Under-funding and unwillingness to increase investments in public EAS systems have been becoming long-term problems. Besides, agricultural and EAS policies tend to generate negative consequences due to poor policy analysis (Farrington et al., 2002).

Public agricultural EAS systems are commonly facing challenges in terms of EAS accessibility, accountability, affordability, adaptability, sustainability, and coordination. These challenges impede farmers’ participation in technology adoption and upscaling while weakening both the efficiency of EAS and agricultural productivity as well as the whole value-chain development. To effectively address these challenges, it is fundamental to have a systemic review of current public agricultural EAS systems. On this basis, reforms addressing their institutional, resource, and environment aspects are to be designed and implemented. Currently, few studies are available to gain a regional and global perspective, and a review of the global status of EAS systems can be quite complicated even within national boundaries (Davis, 2020), with still less literature available on the institution, resource, and environment aspects of EAS system reforms. To fill this gap, this report is aimed to examine the status quo of global public EAS systems and provide a systematic framework to review them. It investigates public EAS systems under smallholder farming and
pathways to reform and strengthen them, based on a systematic and extended literature review of journal articles, books, government, organizational reports, etc. and references to the public EAS systems of 80 countries.

Most of the 80 reviewed countries have public EAS systems that are decentralised and pluralistic, although the public sector can be weak and inadequate in some. The public sector is the dominant EAS provider in northern Africa, southern Africa, the Caribbean, and many Asian countries (especially in eastern and southern Asia). The privatisation and pluralism in the EAS system in Africa is largely inadequate and incomplete in terms of service provided, coordination, and sustainability. Since the 1990s, EAS in Latin America have experienced deep transformations characterised by decentralisation, privatisation and reorganization of the public EAS systems. Healthy and high-quality human resources are vital to a healthy and sustainable development of agri-food systems and rural areas. Generally, one of the major challenges in the agriculture sector is a lack of effective human resource development system. In most of the countries studied, public agricultural EAS systems receive funding from the government, which is the principal source of funding. However, in many cases, public funds, occurring mainly at the national level, are far from sufficient to maintain the functionality and efficiency of the entire public EAS system.

The document is structured into five chapters. Chapter 1 gives an introduction to the background of the study. Chapter 2 reviews public agricultural EAS systems, focusing on the institutional change, typologies, and regional characteristics of public EAS systems worldwide, as well as the policy environment, mandates, human resources, financial resources, and infrastructure of the 80 countries. Chapter 3 analyses the major challenges faced by reform initiatives of public EAS systems, regarding EAS accessibility, accountability, affordability, adaptability, sustainability, and coordination. Chapter 4 summarises, based on the literature review, the experience and lessons learned from EAS reforms mainly of the 80 countries. Chapter 5 summarises the main lessons learned and proposes policy recommendations for improving EAS reforms.

All in all, reforming and strengthening public EAS for improving smallholder farmers’ access to technologies, innovations and markets requires a more contextualised, coherent and integrated approach. Efforts to reform public EAS should encompass strong institutional, resource, and environmental arrangements, reformulating institutional mandates, investing in human resources, strengthening financing mechanisms, enhancing collaboration and coordination with non-public EAS agencies, and optimising policy environment. Besides, such efforts should consider the need of functional capacity development, institutional coordination, digitalisation, infrastructure development, knowledge management, performance monitoring and evaluation (M&E), and strengthening policy supports at local, regional and national levels. Furthermore, embedding national priorities in line with changing complexity in agri-food systems and using more integrated and holistic approach to EAS are necessary to increase effectiveness and returns on investment.

It is recommended to take actions in the following areas to reform and strengthen public agricultural EAS systems:

- **Review and assess current public EAS systems to identify their gaps and pathways of reform and modernisation in alignment with national agricultural development goals**

Reforming and modernising public EAS systems are essentially about filling the multi-faceted gaps in the existing systems. This is meant to generate evidence and thereby ensure and strengthen the accessibility, affordability, accountability and adaptability of EAS targeted at smallholder farmers in particular. Therefore, public EAS systems first and foremost are to be
reviewed and assessed to identify their gaps which impede them from helping achieve national agricultural development goals and meet farmer's needs. The review process should adopt a coherent, integrated and system approach, and all the components of the EAS system in terms of institutional arrangements, mandates, funding mechanisms and human resources, infrastructural settings, operation and policy environments should be taken into consideration.

Reform public EAS institutions, with a focus on reformulating mandates and establishing collaboration and coordination with and among non-public EAS agencies

Reforming and rearranging public EAS institutions should consider the institutional structural stability to avoid creating a fragile system. It must be aligned with reformulating institutional mandates along with strengthened financing mechanisms, human resources development and policy support and establishing collaboration and coordination mechanisms with non-public EAS in accordance with national agricultural development goals and farmers' needs. Besides, it needs to be carefully planned and designed, by taking into consideration economic, social, politic and cultural environments.

Strengthen human resource development to foster adequate, competent, motivated, and adaptive public EAS agents

Governments should develop a sound legal framework for public EAS staffing, covering recruitment procedures, remuneration and welfare, and performance evaluation systems, so as to develop an effective human resource development system to foster adequate, competent, motivated, and adaptive public EAS agents. Especially, the recruitment eligibility of public EAS agents must be clearly stipulated with qualified academic backgrounds and corresponding technical experience. Sustainable hiring is to be secured with related policy, adequate financial resources, and a reformed recruitment mechanism, so as to cope with the problems of aging and technical backwardness of public EAS personnel systems. Policies and incentives should be put in place to continuously build up the multi-faceted capacities of EAS agents, especially from an agricultural innovation system (AIS) perspective. Governments must secure sustainable financial support to public EAS personnel system, so as to mitigate the risk of lack of operational resources and dependence on donor funding. It is necessary to ensure that the predominant majority of public EAS agents are only engaged in EAS-related activities and can dedicate enough time to EAS delivery.

Ensure financial sustainability, sustaining the adequacy of financial resources for supporting public EAS systems

Governments should secure adequate financial resources for public EAS systems, covering such aspects as, among others, volume, availability, timeliness, and sustainability while ensuring sufficient incentives to public EAS personnel. The funding for public EAS systems should be primarily provided by the public sector. A reasonable and adequate proportion of funding should be paid by the central government. Especially, adequate operational and programme funds must be made available at the sub-national (regional and local) levels. Salaries and welfare of the public EAS agents should be legalised and funded from regular governmental programmes. Central and regional governments need to ensure financial sustainability through a long-term political commitment from both government and legislation for supportive financial policy. In case where public funding is insufficient, new EAS funding models need to be considered while taking into account the principle of equity. Demand-side financing mechanisms through direct or indirect payments for services could be complementary.
Improve infrastructure, investing in a continued way to improve the infrastructural settings of public EAS agencies, especially grassroots ones

Improving infrastructure is one of the most important priorities to strengthen public EAS systems, especially at the grassroots level. Improving public infrastructure needs investments from both public and non-public sectors, to ensure that public EAS systems have the following basic infrastructural conditions: (1) office spaces that are adequately equipped; (2) basic travel vehicles (motorbikes, bicycles or cars); (3) fields for experiments and demonstration of new technologies and varieties; (4) farmer training venues and facilities (computers, projects or meeting rooms etc.); and (5) well-equipped labs for testing seeds, pesticide residue, fertiliser or soil at the regional level or national level as necessary.

Monitor and evaluate performance of the public EAS systems to ensure the quality and availability of public EAS

It is of great importance to develop and operate a holistic, multi-scalar, and easy-to-use framework of public EAS M&E. This will be important for public agencies to better monitor and evaluate their public EAS system by themselves. In doing so, evidences can be generated for identifying gaps and pathways to strengthen and reform public EAS systems. Such an M&E framework, on the one hand, should differentiate M&E activities according to the five major links throughout the EAS delivery process, namely, inputs, activities, outputs, outcomes, and impacts. For each link, different M&E-related activities, namely, either monitoring, evaluation or assessment are to be conducted with corresponding indicators, which are to be defined according to the realities and characteristics of four principal agriculture sectors, namely, agronomy, animal husbandry, aquaculture, and agro-machineries. On the other hand, it should differentiate the indicators of inputs, activities, outputs, outcomes, and impacts of the four agriculture sectors at the national, regional, and local levels, considering that the motivation and purpose of M&E activities differ at different levels. This is meant to offer more tailored indicator frameworks for each level and thereby help gain more accurate and meaningful evidence.

Promulgate enabling policies to ensure the sustainability of public EAS

Promulgating enabling policies is vital to ensure essential public EAS accessible to smallholder farmers. It is imperative that all countries formulate policies that guide the provision of EAS. In accordance with national agricultural development goals, it is necessary to determine whether regulation or polices for supporting public EAS systems needs to be legislated. The scope of enabling laws, regulations or polices should cover such aspects as institutional arrangement, human resource development, mandates and responsibilities, sustainable financial mechanisms, infrastructural setting and management, M&E and legal liabilities. It is equally important to put in place an implementation mechanism of policies. Policies are to be formulated within a cross-cutting framework that covers other pertinent sectoral policies. They should contribute to the development of an enabling environment for strengthening the capacity of the EAS system to meet such emerging challenges as climate change, precision agriculture, nutrition and health goals, youth and gender, and other challenges related to the transformation of agri-food systems and resilience building. Equally important, they should clearly define a framework for analysing EAS performance.
National agricultural development has three major goals: achieving national food security, improving rural livelihoods, and strengthening natural resource management. Agricultural extension and advisory service (EAS) systems play a vital role in helping achieve these goals (Swanson & Rajalahti, 2010). Effective EAS that are well-functioning, demand-driven and pluralistic play an essential role in modernising agriculture, which is indispensable for modernisation efforts of any developing countries where the majority of the population live in rural areas practicing agriculture (Naswem & Ejembi, 2017). They are also critical to foster agricultural innovation systems (AIS), facilitating the multi-stakeholder processes which unleash agricultural innovation (FAO, 2020). Besides agricultural research and development (R&D), they largely determine the capacity of AIS to contribute to sustainable agricultural productivity growth (OECD, 2018). The absence of effective agricultural EAS are prone to leading to negative impacts in economic, social, environmental and health areas (Rigourd & Dugue, 2022).
When public EAS systems were established in most developing countries during the twentieth century, most were organized under ministries of agriculture. As a result, the majority of these agencies became top-down, multifunctional, and resource-constrained systems that lacked adequate operational resources as well as competent technical specialists (Swanson & Rajalahti, 2010). Today, understaffing, non-adherence to set rules and procedures, lack of funds, lack of coherence, siloed approach, conflicting messages between technical staff and civil society partners, just to name a few, are among the main challenges faced by public EAS systems at sub-national levels (Buyinza et al., 2015; Davis, 2020; Singh et al., 2014; Wang et al., 2016).

These constraints have considerably impeded the functionality of EAS in meeting the need for a transformation in agri-food systems to address interconnected global challenges of food security and climate change and biodiversity loss (Fan et al., 2013; FAO, 2021; Tutundjian et al., 2021). Such a transformation proves urgent as agri-food systems are contributing to the anthropogenic perturbation of Earth systems that exceeds four planetary boundaries, i.e. climate change, biosphere integrity, biogeochemical flows, and land system change (Steffen et al., 2015). On the one hand, a holistic approach is needed to transform agri-food systems. On the other hand, in most countries, agricultural support should be redirected to ensure the availability of public services that benefit producers, consumers and society overall (OECD, 2018). This further calls for reforming agricultural EAS systems considering the persistent dissatisfaction with the public EAS systems, ever-increasing complexity of agriculture sector development, and the sector’s acknowledged role in poverty reduction (Singh et al., 2014). In this regard, worldwide the rural and agriculture sector sees a two-fold urgent need for a coalition of public, private and civil society groups to campaign for the revitalisation of agricultural EAS systems and for policy and institutional reforms, an increase in investment, and the creation of participatory, demand-driven, performance-oriented EAS (Pye-Smith, 2012). Indeed, organizational and institutional innovations are needed on a regular basis for improving the capacity of the EAS professionals, improving their focus on the farmers’ problems, reducing their overburden with multiple objectives, and increasing the reach of EAS in different agro-ecological zones (Davis, 2020). More importantly, this is crucial for giving full play to the potential of public EAS systems for ensuring effective human-animal-plant health systems, appropriate science-based biosecurity, well-functioning AIS, and adequate physical and “soft” infrastructure, amongst others (OECD, 2018).

Under this reform and transformation discourse, it is important to better understand how EAS connect to and are impacted by different transition pathways towards transformed agri-food systems (Klerkx, 2020). Besides, two main opportunities have emerged for developing policies that could improve the effectiveness of EAS based on empirical evidence (Davis & Heemskerk, 2012). The first opportunity is provided by the many pilot experiences emerging from structural reforms to develop pluralistic, demand-led, and market-oriented EAS systems. The second opportunity lies in the new requirements for EAS to meet the demands arising from climate change, food security programming, the new
aid-for-trade agenda, and reform in the agricultural research-for-development agenda (Christoplos, 2010).

No one agricultural EAS model fits in all contexts (Khwidzhili & Worth, 2019; Rigourd & Dugue, 2022). Country-specific reform solutions are to be developed depending on the challenges to be addressed and the institutional setting needed to respond to them (Blum et al., 2020). Reforms are therefore needed to address in a place-sensitive manner the multitude of problems faced by rural communities (Babu et al., 2020). They are also required to include broader actors within the whole agri-food value chain from the perspective of AIS that go far beyond agricultural productivity increase (ibid.). EAS systems worldwide have undergone or are undergoing reforms to adapt to changing contexts since the 1990s. The success of the reform efforts have varied greatly on a country-to-country basis, and a range of benefits and drawbacks have coexisted (Bitzer et al., 2016). Common reform models include (1) decentralisation of services; (2) outsourcing of services to private, either not-for-profit or commercial organizations; and (3) partial or complete privatisation of services (Bitzer et al., 2016). The FAO has long being a major promoter of institutional reforms thorough its Extension, Education and Communication Service (SDRE), which has explored institutional reforms involving pluralism, cost recovery, privatisation, decentralisation and subsidiarity, with an emphasis on participatory approaches to help reform EAS in the Philippines, the Islamic Republic of Iran, Zimbabwe, Nigeria, Pakistan, Indonesia, Eritrea, Mozambique, Uganda, Yemen, and other countries, some of them in collaboration with the FAO Investment Centre and the World Bank. The results of these efforts highlight the interest of policymakers in the developing countries to pursue extension institutional reform (Rivera et al., 2001).

Reforms have been accompanied by changing goals of EAS according to the state of national agricultural development. For example, after some Asian countries achieved national food security during the 1980s and 1990s, they began refocusing extension's attention on increasing the production and marketing of high-value crops and products (e.g. China) (Swanson & Rajalahti, 2010). Three paradigmatic shifts appear eminent in EAS reforms. The first is the move from solely public EAS to pluralistic EAS with greater roles for private, non-governmental, and community-based organizations. Concurrently, the role of public institutions is shifting away from a top-down bureaucratic decision-maker towards a facilitator and coordinator of demand-driven and market-oriented approaches (Heemskerk & Davis, 2012). As a result, demand-driven and participatory approaches are increasingly gaining popularity as an important aspect of improving EAS provision to increase accountability and transparency in agricultural value-chain performance (Joshi & Narayan, 2019). The emerging demand-driven approaches demand changes at both the demand (producer) level and the supply (service provider) level, which can only be effective when wider institutional arrangements, organizational procedures, behavioural change, financing mechanisms, collaboration and coordination are also adjusted or changed to accommodate demands for pluralistic EAS (Blum et al., 2020).
The second is the move from an agricultural production focus to a broader set of services focusing on income, market linkage, food and nutrition security, and improved well-being. The third is the move from transfer-of-technologies approach to a promotion of methods based on facilitation, learning processes, and increased capacity to innovate (Faure et al., 2016). This requires that existing EAS systems be adjusted or developed and adapted to EAS’ multiple roles ranging from advisor, technician, educator, middleman, facilitator, analyst, researcher to learning partner (Khwidzhili & Worth, 2019). Therefore, pluralism is deemed as central to the discussion on EAS reform (Bitzer et al., 2016; Blum et al., 2020; Nwafor & Nwafor, 2020; Singh et al., 2014). It is believed that pluralism can create space for change outside of existing public EAS systems, which may generate the conditions necessary for more fundamental changes to the overall governance of EAS systems (Bitzer et al., 2016).

Countries such as China, India and Indonesia have already demonstrated that public EAS systems can be successfully transformed to build human and social capital and thereby improve rural livelihoods by introducing high-value crop and livestock diversification (Swanson, 2008). However, despite various reform efforts, empirical evidence from different developing countries generally shows that EAS systems are still far from being effective. In fact, the reforms of the last two decades have largely failed, as for instance in sub-Saharan African (SSA) countries, there has not been a significant increase in accountability, efficiency, empowerment or impact (Pye-Smith, 2012). Furthermore, there has been an emerging “reform paradox”: whereas developing countries, due to shrinking government funding, has commonly adopted the privatisation approach to reform EAS systems (Naswem & Ejembi, 2017; Pye-Smith, 2012), the resource-poor smallholder farmers usually are too poor to afford privatised EAS and must be supported by public funding (Naswem & Ejembi, 2017). Such a prevailing reform approach has been to the detriment of smallholder farmers and public EAS agencies alike (Pye-Smith, 2012). Considering that smallholder farmers, fisherfolk and livestock keepers produce 50–80 percent of the staple foods consumed in developing countries, but many are inadequately served by research and EAS (ibid.), EAS reforms should prioritise the access of smallholder farmers to public EAS in particular and first and foremost guarantee that essential EAS are available for them as a public good. One of the ultimate goals should be one of enhancing the wellbeing of smallholder farmers (ibid.).

Issues concerning sustainable policy reforms in agricultural EAS to transform agri-food systems remain a global challenge, especially in SSA countries (Babu et al., 2020). For example, Uganda established through an Act of Parliament (NAADS Act 2001) in 2001 the National Agricultural Advisory Services (NAADS), one of the statutory semi-autonomous bodies in the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF). This marks a transition from a public-sector supply-driven approach to a private-sector demand-driven and public-funded and privately delivered EAS system. Although it is an innovative public-private EAS delivery approach aimed to increase market-oriented agricultural production by empowering farmers to demand and control agricultural EAS (Benin et al., 2007), the access to EAS has not significantly improved the crop productivity of farmers,
which may reflect the inefficiency of the current EAS system in improving farmers’ productivity (Sebaggala & Matovu, 2020). India, China, Cameroon, Nigeria and many other developing countries are also commonly challenged to reform their EAS systems so as to improve their effectiveness, better serve the smallholder and marginal farmers, and allocate sufficient funds and provide efficient human resource management (Blum et al., 2020; Nwafor & Nwafor, 2020; Fa, 2018; He & Dou, 2004; Huber et al., 2017; Singh et al., 2014; Wang et al., 2016).

BOX 1. Privatisation of agricultural EAS in Uganda

The establishment of the National Agricultural Advisory Services (NAADS) marks the start of privatisation of agricultural EAS in Uganda. As a semi-public agency, it decides which requests may be dealt with, allocates funding, ensures coordination in the field and monitors and evaluates EAS providers. Large upstream and downstream agricultural and telephony firms and large farms are asked to help fund EAS. By 2021, the State plans to directly fund only 50 percent of the cost of EAS, with the private sector and agricultural profession covering the rest (the State currently funds 75 percent, and the rest is covered by external aid). This in-depth reform of EAS was approved in 2016 through the publication of a new agricultural EAS policy. It is therefore a system where EAS are provided mainly by the private sector at the request of farmer organizations (FOs), but supervised, monitored, coordinated and funded mainly by the State, with the participation from the private sector expected to increase, including in funding.


There are some deeply rooted reasons for unsuccessful reforms and inefficient public EAS. First, agricultural research and extension institutions tend to fail to perform effectively as they are constantly weakened by limited funding and poor investments, as well as weak coordination in transfer of technology and innovations (Babu et al., 2020; Luo, 2019; Wang et al., 2016). In many developing countries, there persists a low-level integration of the research, extension and education systems at all levels (Babu et al., 2020; Fa, 2018; He & Dou, 2004; Huber, 2017; Huber et al., 2017; Singh et al., 2014). Failure in putting research and innovation outputs into effective use due to poor functioning agricultural EAS systems can result in continued stagnation in the agricultural and food system transformation (Babu et al., 2020). Second, privatisation alone is not the solution to all the problems from which government agencies may suffer (Blum et al., 2020). In an era of liberalisation, some countries, especially those in Latin America, withdrew public funding for EAS hoping that the private sector would fill the gap (Davis & Franzel, 2018). However, efforts to completely privatise EAS systems have largely failed (Bitzer et al., 2016). Privatisation has raised the controversial issue of depriving the majority of farmers of the access to impartial and independent EAS (Christoplos, 2010) as the private-sector services as currently constituted function to serve the needs of better-placed farmers.
It is increasingly recognised that the public role cannot be underestimated for reaching remote areas and marginal groups (Davis, 2020). Plus, even where the private sector or non-governmental organizations (NGOs) are involved in EAS, they all need to work with and rely on public EAS (Davis, 2020). Third, while the pluralistic approach allows governments to take advantage of the comparative strengths and resources of different private and NGO actors, coordination and the resulting projectisation of the services that leads to fragmentation and limits sustainability have become the biggest problem (Davis & Franzel, 2018). Fourth, accountability towards farmers (downward accountability) still remains one of the main challenges in EAS systems, despite the pluralistic environment and it is crucial to match the demand with the supply of services, while ensuring relevance, service quality and demand orientation of any services required (Bitzer et al., 2016). Fifth, the predominant culture of public EAS systems (e.g. bureaucracy, political influence, patronage, etc.) can be strongly resistant to change and cannot be easily altered through reforms in governance structures (Bitzer et al., 2016; Swanson, 2008).

Currently, there are few studies available to gain a regional and global perspective and a view of the global status of EAS (Davis, 2020), with still less literature available on the institution, resource and environment aspects of EAS reforms. To fill this gap, this document investigates public EAS systems under smallholder farming and pathways to reform and strengthen them, based on a systematic and extended literature review of journal articles, books, government, organizational reports, etc. and references to the public EAS systems of 80
countries. The majority of the literature collected cover the time frame of 2010–2022 so as to ensure the state of the art of this study. To begin with, it reviews the status quo of global EAS systems in terms of institutional change and typologies and regional characteristics of EAS systems based on the analysis of the 80 countries, using both literature review and governmental websites. This is followed by discussions on issues related to human resources, mandates, financial resources, infrastructure, and policy environment based on the general literature review. The discussions are illustrated with six country case studies selected according to geographic balance and representativeness. Then, the document analyses the major challenges faced by reform initiatives of public EAS systems regarding accessibility, accountability, affordability, adaptability, sustainability, and coordination. Next, the document summarises the experience and lessons learned from EAS reforms, shedding light on (1) ensuring essential public EAS accessible to smallholder farmers; (2) strengthening accountability; (3) strengthening multi-stakeholder coordination; (4) reforming staffing system; (5) strengthening support and incentives; and (6) neo-institutionalism in EAS reform. The discussions are illustrated with mini cases from different countries. Finally, the study discusses and summarises the main lessons learned and proposes policy recommendations for improving EAS reforms in future initiatives.

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1 The geographical scope of the studied literature does not necessarily cover all of the 80 countries due to data limitation and unavailability. The same applies to all the following sections.
2 Overview of public agricultural extension and advisory service systems

2.1 Overview of institutional change

Worldwide, several factors are driving multi-faceted change of agricultural EAS systems. First, it is widely acknowledged that the role of EAS today includes issues on rural development that go beyond agriculture and dissemination of technologies (Blum et al., 2020; Sebaggala & Matovu, 2020). Service providers do not only focus on increasing productivity but provide a range of services, including production, farm management, post-harvest handling, credit access, and marketing (Wongtschowski et al., 2016). Playing this wider role requires large-scale restructuring and institutional change (Sulaiman & Hall, 2005 cit in Blum et al., 2020). Second, the widespread governance failures in public agricultural EAS systems have led to mounting pressure, notably by international donors, to undertake radical reforms in EAS systems (Bitzer et al., 2016). Third, growing
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System complexity is driving strong demands for “more extension” that have been emerging from cross-cutting areas and unexpected sources. For example, there is an increasing need to provide more climate information, increasing food security programming, the changing aid-for-trade agenda, value chain development programmes, and comprehensive reform in global agricultural research for development (Davis & Heemskerk, 2012). These demands imply a need to both apply existing knowledge and explore the relevance of changing EAS structures within new development agendas, aid architectures, and institutional structures (Christoplos, 2010). Fourth, pluralism has been transforming EAS systems worldwide to count increasingly on multi-stakeholder platforms and multi-institutional linkages of knowledge and information support through an AIS perspective for improving the livelihoods of rural people (Faure et al., 2012; Mukherjee & Maity, 2015; Knierim, 2017 cit in Babu et al., 2020). Innovation is increasingly considered as more than “adopting new technologies” but rather (from an AIS perspective) a societally-embedded change process (Crescenzi et al., 2020) and a co-evolution of technologies, societies, economics and institutions (Fielke et al., 2018). Fifth, the issue of enhancing resilience of agri-food systems is becoming increasingly topical and urgent facing multiple mega-crises like climate change and more recently the ongoing COVID-19 pandemic. Reforming EAS systems will be even more eminent to make agri-food systems resilient to shocks, so as to contribute to ensure both present and future socio-economic stability, competitiveness, and quality of life (Bruneckiene et al., 2019), especially in rural areas.

Since the end of the 1990s, countries worldwide have adopted a variety of institutional reforms, which are either market-oriented or non-market-oriented (Rivera et al., 2001). Market reforms encompass four major reform strategies: (1) revision of public-sector EAS systems via downsizing and some cost recovery (e.g. Canada, Israel, USA), (2) pluralism (e.g. Chile, Estonia, Hungary, Venezuela, South Korea), (3) cost recovery (OECD countries, previously in Mexico), and (4) total privatisation (e.g. The Netherlands, New Zealand, England and Wales) (ibid.). Non-market reforms comprise two main reform strategies: (1) decentralisation, transferring central government authority to lower tiers of government (e.g. Colombia, Indonesia, Mexico, The Philippines, Uganda, etc.) and (2) subsidiarity, transferring or delegating responsibility, to “the lowest level of society as is practical and consistent with the overall public good” (Porter, 2001 cit in Rivera et al., 2001), sometimes by abolishing authority over EAS (e.g. the Plurinational State of Bolivia, to farmer organizations; Ecuador, mixed with farmer-led NGO programmes; Peru, EAS devolved to NGOs) (Rivera et al., 2001). According to Birner and others (2009), depending on the scope and content, reform may be undertaken in three areas, namely, reform of governance structure, reform of capacity and management, and reform of advisory methods (Table 1). For the purpose of this document, we focus on the structural reform and functional and capacity strengthening of public EAS systems.
### TABLE 1. Approaches for developing effective EAS

<table>
<thead>
<tr>
<th>Approach</th>
<th>Definition</th>
<th>What is needed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reform of governance structures</strong></td>
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<tr>
<td>Decentralisation and deconcentration</td>
<td>Based on the subsidiarity principle, the planning, financing, and administration of extension services occur at the lowest possible state administrative level.</td>
<td>General decentralisation policies that are effectively implemented; demand-driven services for diverse farming systems; limited public goods character and non-local externalities of the extension messages; earmarking of funding in case of fiscal decentralisation of extension to local governments; political will to build and maintain capacity for extension at the local level.</td>
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<tr>
<td>Strengthening of pluralism through outsourcing between public and private sectors</td>
<td>Local extension systems that are based on coordination between public and private service delivery, complemented by contracting for services based on needs.</td>
<td>Capable service providers from private and third sector, or sufficient resources to build this capacity; competition among service providers; recognition of the governance and procurement problems involved in outsourcing and adequate steps to overcome them, including building the extension agency's capacity to manage contracts.</td>
</tr>
<tr>
<td>Involving farmer organizations</td>
<td>Farmer involvement in extension service provision, from participatory planning to procurement to farmer-to-farmer extension and paying for services.</td>
<td>Existing social organizations (social capital); absence of strong social hierarchies; availability of sufficient resources to invest in social mobilisation and group formation, especially if previous conditions are not met.</td>
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<tr>
<td>Privatisation and public-private partnerships</td>
<td>Services (partially) paid by farmers themselves, directly or indirectly.</td>
<td>Commercialised farming systems with adequate market infrastructure; suitable business climate for the agribusiness sector; required market-oriented extension services. An example is the marketing extension approach, based on farmer training and market information.</td>
</tr>
<tr>
<td>Cost-recovery</td>
<td>Part of the operating costs of services paid by farmers in cash or kind to ensure that they get what they want and that the system is more financially sustainable.</td>
<td>Commercialised systems; possibility to embed in contract farming or link to the sale of inputs; possibilities to raise levies on commodities (such as export crops).</td>
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### Approach Definition What is needed

<table>
<thead>
<tr>
<th><strong>Reform of capacity and management</strong></th>
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<tr>
<td><strong>New public management</strong></td>
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<td><strong>Business process reengineering</strong></td>
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<table>
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<tr>
<th><strong>Reform of advisory methods</strong></th>
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<tr>
<td><strong>Farmer Field Schools</strong></td>
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<tr>
<td><strong>Use of information and communication technologies (ICTs)</strong></td>
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</table>

*Source: Birner et al. 2009*
In many developing countries, governance has been identified as one of the critical weaknesses of public agricultural EAS systems (Bitzer et al., 2016). Governance in EAS refers to the administrative, institutional and organizational structures and processes within which agricultural EAS are embedded. At the heart of governance lie complex questions of how EAS are steered, at what level decisions for budget, design and implementation of extension services are made, and how authority is exercised (Bitzer et al., 2016). The issue hidden behind governance schemes or systems of agricultural EAS is actually the broader issue of the governance of agricultural policies and joint development (and subsequently joint management) of public policies (Rigourd & Dugue, 2022).

Governance in EAS is two-fold. On the one hand, it refers to the institutional design of EAS, such as the level of decentralisation, privatisation and pluralism of extension services, as well as monitoring and accountability mechanisms. On the other hand, governance focuses on the roles and responsibilities of the public, private and civil society sectors in providing and financing EAS as well as the linkages and coordination across these different actors (ibid.). As a result, inevitably, (re)shaping the governance of agricultural EAS may therefore be a source of tension (Rigourd & Dugue, 2022). To enhance the governance in EAS, even though bureaucracies by and large have been reluctant to undertake institutional reforms (Blum et al., 2020), the present EAS systems in developing countries are commonly shaped and still being reshaped during broader agricultural and rural reforms.

Three practices are considered particularly promising in advancing the governance of pluralistic EAS systems: public coordination, public-private
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It is recommended to adopt “best fit” rather than “best practice” approaches (Birner et al., 2009) to EAS system reforms, as previous reform efforts have demonstrated that there is no single prescribed governance model that can address all prevailing governance failures (Bitzer et al., 2016). Public EAS systems generally follow three common institutional reform models, including (1) decentralisation of services; (2) outsourcing of services to the private sector, either non-profit or commercial organizations; and (3) partial or complete privatisation of services (ibid.).

BOX 2. Successful collaboration and joint management

There are notable examples showing that farmers organizations can have their voices heard and help define EAS policies. That was the case with “regards paysans (farmers’ views)” in Madagascar, collaboration with farmers organizations in Benin and Guinea, etc. There are also moves towards greater joint management of agricultural EAS: joint management of FIRCA in Ivory Coast, mixed boards of directors at agricultural EAS agencies such as National Agency for Rural Development Support (ANADER) in Ivory Coast, National Agency for Agricultural and Rural Consulting (ANCAR) in Senegal and (soon) regional agencies in Benin; joint management in projects to distribute subsidies (Programme for the Improvement of Competitiveness of Family Agro-pastoral Farms - ACEFA) in Cameroon and funds from the agricultural development fund in Madagascar.

The ACEFA programme in Cameroon has been operated through four levels of joint management (between the State and the profession):

- **national level** with a steering committee that monitors compliance with strategic orientations;
- **regional and departmental level** with regional and departmental project-selection committees that study their relevance and rant funding;
- **departmental level** with departmental support and advisory-services committees that select group projects and assess the service provided by the advisors; and
- **local level** with local committees of producers that represent service beneficiaries and that serve as platforms for exchange between producers.


Almost all of the studied 80 countries in this document have decentralised their EAS systems over the past three decades. Decentralisation, considered as the most difficult yet important challenge facing public agricultural EAS systems, is often narrowly defined to signify shifting authority for EAS (e.g. programme planning and specific management functions) to lower tiers of government (Rivera et al., 2001; Swanson, 2008; Swanson & Rajalahti, 2010). Therefore, as an anti-poverty strategy, it seeks to shift responsibility for EAS
planning and decision making from the centrally-managed, supply-driven and expert-controlled emphasis towards more demand-driven, beneficiary-focused/farmer-led approaches (Bitzer et al., 2016; Fa, 2018). Realistic decentralisation can nurture and promote real participation and allow farmers to develop a sense of ownership toward EAS initiatives (Leta Dufera, 2018). The term “decentralisation” has been used in the literature to describe four alternative institutional arrangements: deconcentration, delegation, devolution and transfer to private firms and NGOs (Cohen & Peterson, 1999; Parker, 1995; Smith, 2001 cit in Swanson & Samy, 2002; Swanson, 2008). There are undoubtedly efficiency improvements that could be realized through a more decentralised approach to the delivery of agricultural EAS (Poulton, 2010).

To clearly define the proper role of different levels of government in a decentralised EAS system, the functions of providing and producing public goods and services are to be differentiated (Silverman, 1995 cit in Swanson & Samy, 2002). This differentiation is aimed to identify the provision functions (such as national priority-setting, strategic planning, management and coordination, budgeting) to be maintained at the central level, and the production functions (such as formulation and delivery of tailored and place-sensitive services and EAS methods to meet the diverse needs of local farmers) to be delegated to and produced by local EAS agencies (e.g. at the district, township, or county level). Some functions and tasks are to be shared at the central, provincial/regional and sub-provincial/sub-regional levels within an EAS system, including the provision of technical support, extension materials and communication activities. According to Bitzer and others (2016), decentralisation often:

♦ lacks the specific implementation and the willingness of national bureaucratic politics to empower local government, resulting in financial instability, elite capture, corruption and misappropriation of extension agents for political purposes;
♦ suffers from a lack of political support by the central government (Benson & Jafry, 2013; Chisinga & Cabral, 2010); and
♦ tries to improve the efficiency of governance and respond to differing agro-ecological conditions within countries.

In contrast to traditional supply-driven EAS wherein “need” is defined by policies, research or donors, the “demand-driven approach” is one of the key elements of EAS decentralisation. Decentralised EAS are considered more effective in enhancing responsiveness and accountability of EAS to farmers (Bitzer et al., 2016; Masangano et al., 2017). However, despite all its advantages, decentralisation is also flawed. The legal transfer of responsibilities for agricultural EAS to decentralised levels is often not matched by sufficient fiscal decentralisation, and the autonomy of local governments is undermined by continuing dependence on the transfer of funds from the central government (Davis, 2020).

Outsourcing refers to the contracting-out of public EAS to private-sector organizations, mostly non-profit organizations (NPOs), with a view to reduce
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government expenditure, enhance the efficiency of service delivery and improve the quality of services through greater demand orientation and accountability to clients (Heemskerk et al., 2008). While outsourcing only addresses the delivery of public-funded EAS, privatisation has been widely discussed as an alternative to the reliance on public funding for EAS (Rivera et al., 2001; Bitzer et al., 2016). The privatisation of agricultural EAS systems in many countries was driven by a radical shift in development ideology towards privatisation which gained prominence in the 1980s and 1990s following the surging neoliberalist ideology (Blum et al., 2020). It has often been undertaken by the mere withdrawal of funding for public EAS agencies (ibid.). This led to the collapse of EAS institutions in many countries, making unavailable the essential services that farmers needed and resulting in government failures in agricultural development. Especially, low-income smallholder and marginal farmers tend to be unable or unwilling to pay for private EAS themselves (Swanson & Rajalahti, 2010). As a result, privatisation may bring about a further bias in EAS towards middle- and high-income farmers, as evidenced by early experiences in many Latin American countries in the 1990s (Bitzer et al., 2016). Besides, privatisation may cause a series of negative consequences (Kidd et al., 2000; Labarthe, 2005; Klerkx et al., 2006 cit in Faure et al., 2016), including (1) limiting the dissemination of innovations that address the complexity of the production system; (2) prioritising the most profitable EAS activities; (3) emphasising technology transfer over the capacity building of producers; (4) reducing exchanges between farmers who refuse to share information they bought; and (5) favouring only those farmers able to afford EAS (Faure et al., 2016).

The emerging pluralism has created conditions for and thereby stimulated public EAS system reforms. It is worth noting that institutional pluralism promoted by central government should not be confused with the fact that in most countries there exists an institutional “complex” of public, private, and NGOs (Rivera et al., 2001). In the case of institutionalised pluralism, the public sector funds the EAS while the private sector delivers them (Rivera et al., 2001). Since the 1990s, most developing countries are moving from sole dependency on public EAS systems to pluralistic ones which are characterised by diverse players, funding sources, various types of services, and use of multiple sources of knowledge, technologies, know-how and information (Bitzer et al., 2016; Blum et al., 2020; Davis & Frantzel, 2018; Davis, 2020). Pluralistic EAS systems are also based on the premise that the private sector (whether private companies, NGOs, rural producer organizations (POs), or specialised consulting firms) can provide EAS more efficiently and effectively than public agencies, and that these advantages increase the likelihood of service sustainability in the long run. Furthermore, the transfer of funding for extension to end-users (farmers and their organizations, other actors in the value chain) provides them with greater ownership and thereby enhances demand-driven services (Blum et al., 2020). Indeed, the promise of pluralistic EAS systems lies in two aspects: first, their potential to provide the necessary flexibility to make services more demand-driven, context-specific, scalable, and based upon multiple knowledge sources by overcoming the constraints and failures of previous approaches to agricultural EAS such as state-led public EAS focused on a linear transfer of technologies and
Overview of public agricultural extension and advisory service systems

CHAPTER 2

17

market-based solutions through privatisation efforts; and second, their ability to overcome different constraints related to funding, staffing, and expertise (Birner et al., 2009; Bitzer et al., 2016). In a cross-country study, Davis and Franzel (2018) found that pluralism is the norm in the countries studied. As essentially a multi-actor EAS paradigm, the emerging pluralism in EAS has seen an increasing participation of the private sector (dealing with agro-inputs, agribusiness, and financial services), NGOs (international as well as local); producer groups, cooperatives and associations; consultants (independent and those associated with or employed by agribusinesses/producer associations) and digital services (Blum et al., 2020). Having a diversity of service providers has the potential to make services more inclusive, responsive to demand, context-specific and based on multiple knowledge sources (Birner et al., 2009). This multi-actor involvement in the agricultural EAS systems in many African, Asian and Latin American countries is evident (Nwafor & Nwafor, 2020; Davis, 2020), although the extent and coherence of the involvement vary greatly both within the countries and across the regions.

Despite all the benefits that pluralism may bring about, its capability to enhance EAS systems remains questionable. For example, under pluralistic EAS systems, EAS tend to be provided through donor-funded projects, most of which have a limited lifetime with little long-term financial sustainability (Huber, 2017). Plus, pluralistic EAS are able to increase the number of service providers thereby increasing farmer access, but do not necessarily influence the quality of EAS (Masangano et al., 2017). Last but not the least, currently, pluralism of service delivery is far from complete, as service providers are dominated by international NGOs, often with limited human resources and relying heavily on government EAS agents (Davis, 2020). As a result of this limited pluralism, there is little competition among service providers and hardly any expansion of options or choices for farmers (ibid.).

According to Bitzer and others (2016), reforms based on outsourcing or (partial) privatisation may have limited ability to enhance inadequate and inefficient public EAS systems, due to the fact that:

♦ limited public funding or changes in national policies tend to put an end to the contracting-out of public services to NGOs, private and other non-governmental service providers in various countries;
♦ the partial or complete privatisation, often promoted by multilateral donor agencies, tend to offer few incentives for non-state providers to develop due to the withdrawal of public services which frequently leaves a void in institutional and financial support. As a result, the transition to private and other non-state services tends not to be properly planned or supported through adequate frameworks;
♦ even if private actors fill the gap resulting from the decline in public services, they have seen little profit in delivering EAS to subsistence and semi-commercial smallholder farmers, unless governments, donors or farmers pay for the services;
private EAS rarely reach poor and marginal farming communities, simply because these farmers do not purchase (many) inputs and are characterised by diseconomies of scale (Ferris et al., 2014), making the cost-recovery approaches fail to work.

2.2 Typologies and regional characteristics

This document studied literature on agricultural EAS systems of 80 countries in Asia (30 countries), Africa (29 countries), Europe (11 countries), and Latin America (10 countries) (Table 2). Of the 80 countries, 36 percent are upper-middle income economies, 35 percent lower-middle income economies, 19 percent low-income economies, and 10 percent high-income economies according to the World Bank classification2 (Table 3). Most of the low-income economies (13 out of 15 countries) are located in Africa (Table 3, FIGURE 1).

Most of the 80 studied countries have public EAS systems that are decentralised and pluralistic, although the public sector can be weak and inadequate in some (e.g. notably Central Asian countries). The public-sector services play a dominant role in

2 The World Bank currently classifies economies into four income groupings: low (USD 1 035 or less), lower-middle (USD 1 036 to USD 4 045), upper-middle (USD 4 046 to USD 12 535), and high (USD 12 536 or more) (see:https://datahelpdesk.worldbank.org/knowledgebase/articles/378834-how-does-the-world-bank-classify-countries).
Belize, China, Ethiopia, Republic of Korea, Japan, Türkiye and some others. Privatisation is particularly strong in Pakistan, India, Uganda, Colombia, Peru, Honduras, Brazil and the Plurinational State of Bolivia. In countries where pluralistic EAS prevail such as India and Bangladesh, different non-governmental actors complement the public-sector services in different countries. For example, in Honduras and Madagascar, farmers’ organizations and NGOs are important EAS providers; in Thailand, Nigeria, Rwanda, the Plurinational State of Bolivia and many others, private-sector actors’ involvement in EAS is common but mostly limited to contract farming and cash crops, taking advantage of market opportunities present in these countries to provide required services in tandem with large agri-businesses (Nwafor & Nwafor, 2020). In Central Asian countries, the role of non-governmental actors is even more eminent, to the extent that PPPs have become the principal channel to provide EAS, like in Turkmenistan, Kazakhstan, and Kyrgyzstan. In Rwanda, the private sector generally focuses on cash crops and income (MacNairn, 2018).

The public sector is the dominant EAS provider in northern Africa, southern Africa, the Caribbean, and many Asian countries (especially in eastern Asia and southern Asia) (Swanson & Davis, 2014). The involvement of private-sector actors in EAS normally depends on the degree and underlying economic interests of marketisation and commercialisation of a certain country’s agriculture sector. For example, the private sector in Brazil, the Plurinational State of Bolivia and Indonesia is indeed active due to commercial farming, exports, and agri-food industries. In Kenya, the United Republic of Tanzania and many other countries, the private-sector EAS providers currently are going beyond production to support value-adding activities and link farmers with output markets. However, generally little information is available on EAS activities undertaken by private companies. Normally, there are few private companies that provide regular EAS at affordable costs. The involvement of private agribusinesses in EAS-related activities generally show the following characteristics (Bitzer et al., 2016; Feder et al., 2011; Heemskerk et al., 2008; Kazbekov & Qureshi, 2011; Sylla et al., 2019):

♦ companies which are involved in trading, agro-processing and provision of farm inputs tend to deliver EAS in the form of training, demonstrations and field days to the buyer or producer farmers in line with their own commercial interests;
♦ the involvement of private companies often comes through contract farming and PPPs;
♦ almost all private agribusiness firms are more concerned with making profits (through market-oriented agriculture) rather than addressing the highest priorities (e.g. subsistence/food farming) and empowering farmers and their communities;
♦ as profit-making institutions, private agribusinesses are often located in areas with high demand for their products (and better developed infrastructure), that is to say, in urban centres rather than in rural areas;
♦ most of locally-based agribusinesses are small in terms of capital and capacity and often do not have their own EAS methodology or human resources to provide services that fall in the domain of public goods. Instead, they tend to
be dependent on public funding and public-sector EAS agents whom they pay and provide training on specific technical or business messages to take to their clients (in some countries, NGOs work in a similar way, namely, using public EAS staff at the local level like in Malawi (Swanson & Davis, 2014));

big multinational/international agri-food companies with large capital may not be interested in directly financing EAS.

<table>
<thead>
<tr>
<th>Continent</th>
<th>Region</th>
<th>Country count</th>
<th>Region count</th>
<th>Countries</th>
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<tbody>
<tr>
<td>Asia</td>
<td>Eastern Asia</td>
<td>4</td>
<td></td>
<td>China, Republic of Korea, Japan, Mongolia</td>
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<tr>
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<td></td>
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<tr>
<td></td>
<td>Central Asia</td>
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<td></td>
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<td></td>
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</tr>
<tr>
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<td>Algeria, Egypt, Tunisia, Libya, Morocco</td>
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<td></td>
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</tr>
<tr>
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<td>11</td>
<td>Belarus, Romania, Bulgaria, Czechia, Hungary, Poland, Slovakia</td>
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<tr>
<td></td>
<td>Southern Europe</td>
<td>4</td>
<td></td>
<td>Bosnia and Herzegovina, Serbia, Albania, Montenegro</td>
</tr>
</tbody>
</table>

**Table 2. Regional distribution of the 80 countries studied**

Source: Authors’ own elaboration
Countries in eastern, southeastern, and southern Asia have the largest EAS systems in the world (Swanson & Davis, 2014). The public sector is still the dominant provider of agricultural EAS in eastern Asia, southern Asia, southeastern Asia, and nearly half of the countries in western Asia (ibid.). In most central Asian countries, institutionally sound and state-run agricultural EAS system is still missing or at least weak (Kazbekov & Qureshi, 2011; Mirzabaev et al., 2011; Mogilevskii et al., 2017). This gap is filled by non-governmental actors, especially NGOs funded by international donors and farmers-based associations and cooperatives. In Tajikistan, for example, although having agricultural administrative personnel at the national, oblast (province) and rayon (district)
levels, the Ministry of Agriculture (MoA) has not invested in the creation of EAS in the country, providing few if any EAS to Dehkan farms. Farmer’s associations at rayon level like the National Associations of Dehkan Farms (NADF) are essential for dissemination of information to farmers. They however tend to be weakened by a lack of financial support and poor leadership. NGOs and other private EAS providers also assist the government in providing agricultural information and innovative technologies to farmers. Agricultural EAS are delivered mostly through independent initiatives/projects funded by different international donors, which are often small and duplicate the work of each other. A unified national-level initiative remains absent to consolidate all the relevant EAS by different providers (Kazbekov & Qureshi, 2011).

Public-private/donor partnerships prove critical to establish alternative solutions. For example, in Kyrgyzstan where the state has fully withdrawn from agricultural EAS (Crewett, 2015), a semi-autonomous, non-governmental, multidonor-financed, and participatory Rural Advisory Service (RAS) has been running small offices in all seven regions of Kyrgyzstan since 1999. The RAS merged different donor programmes for agricultural training and advice. However, it does not appear to be sustainable due to its insecure long-term financing (Mogilevskii et al., 2017), as the donors’ long-term perspective is to fully withdraw and leave agricultural advisory services to private providers (Crewett, 2015). Plus, it was also criticised for its insufficient coverage, being too expensive, lack of participatory governance, and weak demand orientation (Schmidt, 2012).

The setting for rural development in SSA countries is rapidly changing due to increased democratisation, liberalisation, decentralisation, privatisation, urbanisation and the “feminisation” of agriculture, which altogether have paved the way for a pluralistic approach to EAS (Heemskerk et al., 2008). The agriculture sector in SSA countries is divided between commercial and resource-poor farmers, which respectively receive assistance from corporate private sector and farmer organizations, NGOs and farmer field school (FFS) programmes (Swanson & Davis, 2014). The EAS systems are weak in most African countries mainly due to many years of public negligence, regardless of significant organizational improvement of farmers and institutional innovation that has integrated a multitude of NGOs and private-sector actors into the EAS systems (Babu et al., 2020; Masangano et al., 2017; Sigman, 2017). Governments of African countries, in alignment with the Comprehensive Africa Agriculture Development Programme (CAADP), have adopted the Maputo Declaration with the objective of: (1) achieving an annual agricultural growth rate of at least six percent, and (2) allocating at least ten percent of the national budget to agricultural development (Fa, 2018). However,

3 In Tajikistan, “dehkan farms” are mid-sized peasant farms that are legally and physically distinct from household plots (less than two hectares in household plots). They cultivate more than 60 percent of agricultural land in Tajikistan, averaging about 20 hectares in size. Dehkan farms concentrate in crop production (cotton, wheat, and vegetables) and their share of livestock is minimal.

4 The RAS was co-created by the World Bank, the International Fund for Agricultural Development (IFAD), and the Swiss Agency for Development and Cooperation (SDC), as a part of the Kyrgyz-Swiss Agricultural Project (KSAP). It was funded by SDC and implemented by HELVETAS (Swiss Inter-cooperation Kyrgyzstan) from 1995 to 2010.
the public budgets for agricultural EAS remain under pressure (Heemskerk et al., 2008). Indeed, there is an urgent need for Africa to invest in developing an effective EAS system accountable to its clients and able to provide a range of services, ranging from production to value-chain development and agribusiness cluster formation, and from simple advice to market information and capacity building in negotiation and marketing, reaching a much larger number of farmers and agriculturally linked entrepreneurs (Maatman et al., 2011). In central African countries, a notable trend is the increased provision of EAS through more commercialised farmer organizations, most of which have employed the FFS model in advancing a “demand-driven” agricultural EAS system (Swanson & Davis, 2014), which however is essentially an EAS methodology rather than an institutional arrangement affecting the government structure (Rivera et al., 2001). For example, a notable trend in the institutional innovations being experimented in Cameroon is the increased provision of EAS through participatory projects and increased channeling of EAS through commercialised farmers’ organizations, which tend to be less inclusive of smallholder farmers (Fa, 2018). In southern African countries like Botswana, Lesotho, and South Africa, the public sector is the dominant supplier of EAS, while there is a move toward a more pluralistic approach. In eastern Africa, there is a general lack of clear and legal policies adopted by nation states, which has impeded efforts for EAS system development and reform (Swanson & Davis, 2014).

The privatisation and pluralism in the EAS system in Africa is largely inadequate and incomplete in terms of service provided, coordination, and sustainability. In Cameroon, apart from agricultural input supply companies that provide some technical advice on improved production of commercial crops with the objective of promoting the sale of their products and/or buying quality produce from contracted farmers, there is no established private company that provides EAS to farmers on a regular basis (GFRAS). Neither are NGOs present in Cameroon that provide EAS to farmers on a regular basis; however, a number of them are active in extension or extension-related activities. In Nigeria, pluralism, especially private-sector involvement in EAS, has been growing (Huber et al., 2017). In the Democratic Republic of the Congo, there are numerous NGOs, church-based organizations, or POs that are trying to fill the gaps following decentralisation, mostly with ad hoc and project-based funding and a largely uncoordinated system (Davis, 2020).

Since the 1990s, EAS in Latin America have experienced deep transformations characterised by decentralisation and reorganization of the public EAS systems, transferring EAS into private hands in most cases (Briones Valenzuela & Saavedra, 2017; Patricio Molina, 2010). These attempts of decentralisation and privatisation of EAS systems with government financing have generated mixed results and more successful reforms in Chile and Costa Rica. Although this has resulted in that public EAS systems have been largely downsized or phased out altogether, most alternative extension approaches are weak or ineffective (Roseboom, 2006 cit in Swanson & Rajalahti, 2010). Pluralistic providers, such as NGOs, companies and private individuals, were asked to step into the role of providing EAS (Briones Valenzuela & Saavedra, 2017; Patricio Molina, 2010), often using a “co-production”
approach through which government co-finances agricultural EAS with one or more non-governmental providers (Polar et al., 2012). However, little information is available on any NGO that is specifically engaged in agricultural EAS on a regular basis, like in Brazil and Cameroon. Nevertheless, it has been observed that NGOs’ work in the area of agricultural and rural development, including rural youth development, EAS, natural resources management, climate change, rural poverty, women empowerment, etc., is usually done under contracts with the donor-funded projects. Two important exceptions in Latin America would be Chile, where the extension system is still government-funded and privately operated; and Costa Rica, which has a ministry-based, government-funded extension system, with adequate numbers of well-trained field staff and adequate financial resources and that implements a more market-driven extension strategy (Swanson & Rajalahti, 2010).

The Central and South American countries largely got out of public extension system in the early 1990s. However, many of them are now resuming public extension, including Brazil, Argentina, the Plurinational State of Bolivia, Chile, and Uruguay, especially in an effort to help smallholder farmers (Swanson & Rajalahti, 2010; Swanson & Davis, 2014). Most of these countries still maintain a ministry in charge of national agricultural and rural development covering research, technology transfer and extension and devolve the EAS provision to a government public institute, with the involvement of non-public and civil society institutions such as private sector, universities and NGOs. In the Plurinational State of Bolivia, for example, the Ministry of Land and Rural Development has delegated the EAS provision to the National Institute of Agricultural and Forestry Innovation (INIAF – Instituto Nacional de Innovación Agropecuaria y Forestal in Spanish). However, public EAS in general are weak both in institutional and operative terms. Consequently, agricultural EAS in many parts of the Plurinational State of Bolivia have been provided mainly by the private sector, fostering input-intensive, export-oriented monocultures (Jacobi et al., 2017).

In eastern and southern European countries, the EAS system, called Farm Advisory System (FAS), is commonly an integral element of the Agricultural Knowledge and Information System (AKIS). Within the AKIS, interested agents form different types (sectoral, regional, national, transnational) systems for co-creating and sharing knowledge and innovation to address the diverse needs of farmers, rural communities and food-chain actors (Todorova, 2021). The most important provider of agricultural EAS is the public sector (Nikolić et al., 2020). The FAS underwent continued adjustments following major political economic restructuring. The most significant one occurred in the 1990s, when the centrally controlled economy system shifted to a market one, implementing the assumption of the European Union integration and adopting the Common Agricultural Policy (CAP) solutions

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5 Agricultural Advisory Services (AAS) are part of the AKIS, and are recognised as being an important and integral aspect of knowledge-transfer flows, facilitating the adoption of innovative practices to equip farmers as they respond to ever more complex challenges including climate change adaptation, and making food and agriculture systems more sustainable, resilient and inclusive (FAO & MoA, 2021). The European Union recognises the importance of an effective AKIS in delivering its policy goals, and has mandated its member States to map how AKIS contributes to delivering European Union Common Agricultural Policy (CAP) goals (https://i2connect-h2020.eu/resources/akis-country-reports/).
(some joined the European Union in the first decade of the 21st century) (Boczek et al., 2020). There are basically two different types of institutional setup for public EAS in the Western Balkan countries: national structures with direct field branches at the regional level (Bulgaria, Montenegro, Serbia, Republika Srpska and North Macedonia) and national structures without direct field branches (Jankovic et al., 2015). Field advisors are part of the municipal or district-level administration (e.g. in Albania, Kosovo, Bosnia and Herzegovina) (FAO, 2011).

Rural development in eastern and southern European countries is not systematically supported by the public EAS (Jankovic et al., 2015). Despite that the agriculture sector in the Western Balkan countries is characterised by the prevalence of small family farms (Jankovic et al., 2015), public EAS are not always accessible to them. For example, Serbian public agricultural extension is mainly addressed to commercial family farms and lesser attention is paid to small producers (ibid.). Albania lacks effective public advisory services to provide the range and quality of advice that farmers (and micro- and small- and medium-sized rural businesses) need in the competitive agri-food sphere (Sejersen et al., 2020). Public EAS are also not responding to the shift toward market-oriented farming. In the Western Balkan countries for example, they in general are strongly focused on production techniques, while farm management, markets and marketing, regional rural development and the promotion of POs are only partially served (Jankovic et al., 2015).

**BOX 3. Provision of agricultural advisory services in Bulgaria, Czechia, Hungary and Poland**

In **Bulgaria**, the EAS system is quite pluralistic. The National Agricultural Advisory Services (NAAS), with headquarters in Sofia and 27 regional offices, is the secondary administrator at the Ministry of Agriculture, Food and Forestry (MAFF). NAAS is and will continue to be a major provider of advisory and consulting services at the district and municipal level with strong and lasting ties with the MAFF, as well as with scientific and academic organizations and farmers. EAS providers are mainly public and private. Since the last five years, farmers’ organizations have started to play an active role. Private advisory services also emerged due to increasing need of the farms to gain support from them through rural development measures.

*Source: Todorova, I. 2021. AKIS and advisory services in Bulgaria: report for the AKIS inventory (Task 1.2) of the i2connect project. https://i2connect-h2020.eu/resources/akis-country-reports/*

In **Czechia**, the official bodies of the advisory system of the Ministry of Agriculture are the National Council for Advisory and Education for Agriculture and Rural Development and the Institute of Agricultural Economics and Information. The Ministry of Agriculture does not provide extension and advisory services per se to the farmers, but it does have overall responsibility for the advisory services. The National Advisory Council for Agriculture and Rural Development is an advisory body to the Deputy Minister to look after, among other responsibilities, the advisory services sector. There is no information readily available suggesting that private, commercial agricultural companies are playing any significant role in the advisory system of Czechia. NGOs are now included in the National
Rural Network and, as such, are involved in advisory system of Czechia. As the government has included farmers in the National Rural Network, farmers’ associations will be playing more active role in seeking the state aid opportunities and consulting support at all levels.

Source: Konečná, M.M. 2020. AKIS and advisory services in Czech Republic: Report for the AKIS inventory (Task 1.2) of the i2connect project. https://i2connect-h2020.eu/resources/akis-country-reports/

In Hungary, the transformation of the system of agricultural advisory services began in the autumn of 2005 after it joined the European Union in 2004, taking into account the measures announced by the Hungarian Government and the provisions of the European Union regulations that entered into force in the autumn of 2003. This is in line with the requirements set out in European Union Regulations (EC) No 1782/2003, (EC) No 1698/2005 and (EC) No 1974/2006 for the Farm Advisory System (MSZR), which is mandatory for all Member States from 1 January 2007. Actors of the Hungarian MSZR: National Advisory Centre (OSzK), Regional Advisory Centre (RSzK, 7 in total with regional geographical coverage), Territorial Advisory Centre (TSzK), Vocational Advisory Centre (SZSzK), and the National Advisory Committee, later the National Agricultural Advisory Committee (NATaB).


In Poland, the Agricultural Advisory Center in Brwinów with its branches in Kraków, Poznań, Radom, and Warsaw, together with sixteen Voivodship (regional) Agricultural Advisory Centers, constitutes its public advisory system. The public system is based on the system defined in the relevant legal provisions. In addition, it operates within the framework of detailed legal solutions specified in the RDP (Rural Development Programme 2014–2020). Agricultural advisory services are also provided by the national network of Agricultural Chambers, private agricultural advisors operating in the scope of the publicly funded measures under RDP and other national programmes, and private agricultural advisors employed as sales representatives of commercial firms supplying farmers in agricultural related inputs.

Source: Boczek, K., Ambryszewska, K., Dabrowski, J. & Ulicka, A. 2020. AKIS and advisory services in Poland: Report for the AKIS inventory (Task 1.2) of the i2connect project. https://i2connect-h2020.eu/resources/akis-country-reports/

2.3 Policy environment

Well-developed legal and policy frameworks are crucial for strengthening the performance of agricultural EAS. Explicit policy or strategy for EAS is a key step for better governance, funding, coordination, decentralisation, and for overall effective design and implementation of EAS (Davis, 2020). The 80 countries have varied legal and policy frameworks of EAS (Table 4). Many of them do not have a specific policy for EAS while only a few have EAS laws, such as China, Uganda,
Mali, Japan, and Indonesia; rather, they are usually rooted in broader agriculture sector development policies (Davis, 2020). The absence of EAS policies or laws has been identified as a major obstacle that undermines the effectiveness of public EAS systems. Although the Government of Azerbaijan implicitly supports the creation of an effective Agricultural Advisory Services (AAS) system, it lacks a clear policy and legal framework to underpin public EAS provision (FAO & MoA, 2021). Central Asian countries have no national policy framework for the development of agricultural EAS, which could ensure the political and financial commitment of the government and other stakeholders (Kazbekov & Qureshi, 2011).

It can be assumed that worldwide EAS are mostly not made legally binding. For example, just three out of 27 SSA countries have introduced legally binding extension policies (Pye-Smith, 2012). Nevertheless, EAS are often influenced by informal policies or overarching agricultural policies and strategies (Davis & Franzel, 2018). For instance, Mali (Agricultural Orientation Law, 2006), Senegal (National Strategy for Economic and Social Development, 2013–2017; National Agricultural Investment Plan (2011)), and Niger (Rural Development Strategy (Stratégie de développement rural), 2006) have strategies and laws in the agriculture sector that govern EAS. EAS in Mozambique have been guided by a series of master plans and programmes (Cunguara & Thompson, 2018). South African Constitution in 1994 stipulated that broad extension policy (as an element of national aspects of agriculture) would be a national competency, while the delivery and management of extension to farmers would be done through the provincial governments, with substantial latitude regarding modes of operation, operational focus and developmental priorities (Khwidzhili & Worth, 2019). In some cases, national EAS policies may be given a legal status. For example, in Brazil, the upgrade of the National Policy for Technical Assistance and Rural Extension (2004), which was given the status of law (informally known as the Rural Extension Law) in 2010 by the Congress, represented a major political breakthrough in terms of ensuring public rural extension services for family farming with some independence from changes in government (Davis, 2020).

Some countries have multiple policy instruments to guide their EAS systems. For example, Malawi has the National Agricultural Extension Policy (NAEP, 2000) and National Agriculture Policy (NAP, 2016). Uganda has a well-developed legal and policy framework. Its National Agricultural Advisory Services (NAADS) Act is a statutory semi-autonomous body in the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) enacted in 2001. This marked a transition from a public-sector supply-driven approach to a private-sector demand-driven and public-funded and privately delivered EAS delivery system with the goal of increasing market-oriented agricultural production (Benin et al., 2007). It also has a National Agricultural Extension Strategy (NAES) which was derived from the National Agricultural Extension Policy 2016 and aligned with the Five-Year National Development Plan (NDP II) 2015–2020 (MAAIF, 2016).

Countries have revised over time their EAS policies in response to changing policy context and environment. In Bangladesh, the New Agricultural Extension Policy (NAEP, 1996) was updated as the National Agricultural Extension Policy (2012) with a specific focus on decentralised and demand-driven extension (Davis
In Nigeria, the 2001 National Policy on Agriculture (an improvement of the 1991 Policy) explicitly mentioned extension for the first time. This revised policy indicated that states had primary responsibility for extension and that this should gradually devolve to local governments, while the federal government should collaborate with them. A more recent agricultural extension policy is the Agricultural Extension Transformation Agenda (AETA), which was part of the Agricultural Transformation Agenda (ATA) developed in 2012. AETA aimed to transform Nigerian extension system into a participatory, demand-responsive, market-oriented and information and communication technology (ICT) driven service that provides the extension needs of all the actors along the agricultural commodity value chains of interest. In 2017, the Federal Ministry of Agriculture and Rural Development (FMARD) through the Federal Department of Agricultural Extension (FDAE) has developed a National Extension Policy (NEP) (Davis & Franzel, 2018).

There lacks a favourable policy environment that enables effective EAS provision in many developing countries. To begin with, in many cases, policies have been finalised but not implemented or failed to be implemented in the long run due to a lack of funding and political will (Rigourd & Dugue, 2022). While EAS policies are useful, they need to be accompanied by implementation frameworks and the funds to implement them (Davis & Franzel, 2018). Although there was no national extension policy and strategy in the Democratic Republic of the Congo, there was the National Agricultural Investment Plan (2013–2020), which required to allocate about 12.9 percent of the budget to research and extension. However, the government failed to mobilise required resources for the plan, which has led to a piecemeal implementation (Davis, 2020). The same
situation exists in Malawi, which has a National Agricultural Extension Policy (NAEP) since 2000. The NAEP needs better implementation as it has struggled to fulfill the outlined processes and mechanisms, mainly due to lack of resources (Davis & Franzel, 2018). Besides, there prevails a siloed, sector-specific approach to policy-making. In SSA, a major hurdle to EAS is that many farmers lack basic literary skills, especially women. To make sure that EAS are effective and relevant, supporting functional literacy should be considered as the cornerstone in EAS policies (Rigourd & Dugue, 2022). But that issue is often neglected in EAS policies under the pretext that it is something for other sector-focused policies and other ministries to address (ibid.).

**BOX 5. Enabling policies for promoting agricultural innovation systems**

Policies and associated implementation schemes should be put in place to directly support and guide the development of agricultural innovation systems for improving the management, and the production, processing and marketing of agri-food products. These include policies that contribute to agricultural knowledge generation, such as direct investments in public and private research and development (R&D) and R&D institutions, as well as indirect support to private R&D through tax rebates, credit guarantees, competitive grants and funding of public-private partnerships. They also include measures that facilitate agricultural knowledge transfer, such as agricultural education, extension and advisory services, in addition to data collection and dissemination networks related to agricultural production and marketing. Robust governance of agricultural innovation systems is also important to ensure optimal use of resources for the provision and adoption of needed information.

Colombia approved a law to create a National Agricultural Innovation System. Costa Rica is reforming its extension services to better link them with the Innovation and Transfer of Agricultural Technology (INTA), the country's agricultural R&D institution.

### TABLE 4. Legal and policy framework of EAS in some of the 80 countries

<table>
<thead>
<tr>
<th>Country</th>
<th>EAS law/act</th>
<th>EAS policy</th>
<th>EAS programme</th>
<th>Notes/related law or policy</th>
</tr>
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<tbody>
<tr>
<td>Albania</td>
<td></td>
<td></td>
<td></td>
<td>Law on Agriculture and Rural Development</td>
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<tr>
<td>Bangladesh</td>
<td></td>
<td>National Agricultural Extension Policy (2012)</td>
<td></td>
<td>- defined principles and strategies of enhancing agricultural innovation;</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- highlighted multi-stakeholder partnerships and collaboration as the cornerstone of service delivery</td>
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<tr>
<td>Belize</td>
<td></td>
<td>National Agriculture and Food Policy (NAFP) 2015–2030</td>
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<td></td>
<td>- Law of the People's Republic of China on Promotion of Agricultural Mechanization</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- No existing national extension policy and strategy</td>
</tr>
<tr>
<td>Guinea</td>
<td></td>
<td>Extension Learning, Entrepreneurship, and Rural Innovation programme</td>
<td></td>
<td>No regulation or certification system in place for the pluralistic providers</td>
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<tr>
<td>Honduras</td>
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<td>Decreto Nº 69/70 - Ley de Fomento Agropecuario</td>
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<tr>
<td>Country</td>
<td>EAS law/act</td>
<td>EAS policy</td>
<td>EAS programme</td>
<td>Notes/related law or policy</td>
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<tr>
<td>Indonesia</td>
<td>Law No. 16/2006 on Agricultural, Fishery and Forestry Extension System</td>
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<td>Law of the Republic of Indonesia No. 19 of 2013 on the Protection and Empowerment of Farmers</td>
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<tr>
<td>Japan</td>
<td>Act on Promotion of Agricultural Improvement (Final Amendment 2011, Law No. 105)</td>
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<td>Kenya</td>
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<tr>
<td>Mali</td>
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<td></td>
<td>Agricultural Orientation Law (LOA) (2006)</td>
</tr>
<tr>
<td>Country</td>
<td>EAS law/act</td>
<td>EAS policy</td>
<td>EAS programme</td>
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<tr>
<td>Mongolia</td>
<td></td>
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<td></td>
<td>Law of Science and Technology (28/12/2006); Law of Technology Transfer (07/05/1998); and Law of Innovation (22/05/2012) (1)</td>
</tr>
<tr>
<td>Mozambique</td>
<td></td>
<td></td>
<td>Extension Master Plan 2018–2027</td>
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<td>Niger</td>
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<td>Rural Development Strategy (Stratégie de Développement Rural, 2006)</td>
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<tr>
<td>Nigeria</td>
<td>National Extension Policy (NEP)</td>
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<td>Senegal</td>
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<td>Loi d’orientation agro-sylvo-pastorale (LOASP, 2004)</td>
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<tr>
<td>South Africa</td>
<td>National policy on extension and advisory services</td>
<td></td>
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<tr>
<td>United Republic of Tanzania</td>
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<tr>
<td>Tunisia</td>
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<td></td>
<td>Loi n° 90–73 portant création de l’agence de la vulgarisation et de la formation agricoles</td>
</tr>
</tbody>
</table>

(1) The common focus of these laws is to emphasise the importance of information and technology transfer and dissemination of new research to agricultural production systems in order to intensify production and improve competitiveness in national and international markets. Under the framework of these laws, the Government develops the National Policy on Food and Agriculture every four to six years. This policy was the main foundation of extension services (Chuluunbaatar et al., 2017).
2.4. Mandates

The mandates of public EAS should be defined by the agricultural development goals of national governments and requirements of smallholder farmers, and stipulated by national laws, regulations or EAS policies. The mandates of public EAS should be set up in two dimensions: (1) mandates in the key agriculture sectors, including agronomy, animal husbandry, aquaculture and agro-machinery; and (2) key functions and responsibilities of public EAS institutions in terms of:

♦ **public services**, including crop pest monitoring and forecasting, animal disease detection and diagnostics, soil testing and monitoring, soil moisture monitoring, crop development monitoring, seed quality testing, inputs quality testing, appraisal and release of new varieties of crops, fish and animals, agro-machinery quality and safety testing, meteorological service, risk and disaster early warning, etc.;

♦ **law enforcement**, including plant and animal quarantine, seed quality control, quality control of inputs such as fertilisers and pesticides, crop and fish and animal varieties management, etc.; and

♦ **normative extension and advisory services**, including transfer of knowledge generated by agricultural research, market linkages, farmer and EAS agent training, field trials, and experiments and policy advocacy, etc.

Based on the available literature and government websites, the following indicators in terms of agronomy, animal husbandry, aquaculture, and agro-machinery are developed to help analyse and identify gaps in the existing mandates of public EAS systems.

**Agronomy sector**

✔ **Technical evaluation and demonstration including introduction, field trial and field demonstrations of new agronomic technologies:**
  - new crop varieties;
  - new inputs;
  - new cultivation technologies;
  - balanced fertilisation;
  - water saving and rain-fed agriculture;
  - integrated pest control;
  - agro-ecological management;
  - safe use of chemicals.
✓ Monitoring and forecasting:
  • crop pests;
  • soil moisture and quality;
  • drought and flooding.

✓ Law enforcement:
  • plant quarantine;
  • registration and management of new crop varieties;
  • inputs quality testing and market supervision;
  • crop seeds quality;
  • fertiliser quality;
  • pesticide quality;
  • implementing national EAS laws and policies.

✓ Farmer training and education:
  • farmer agronomic technical training;
  • farmer vocational education;
  • farmer digital literacy training.

Animal husbandry sector

✓ Resources management:
  • investigation, protection and management of livestock, poultry, pasture, and feed varieties;
  • verification, registration, introduction, breeding, and promotion of related varieties.

✓ Animal production and development:
  • quality certification of animal and husbandry products;
  • pasture improvements;
  • pasture and grassland pest control;
  • animal product processing;
  • livestock industry statistics and economic operation analysis;
  • antimicrobial resistance management;
  • animal husbandry technical;
✓ Monitoring and forecasting:
  • pasture and grassland monitoring;
  • monitoring animal breeding environment.

✓ Law enforcement:
  • animal quarantine;
  • registration and management of new livestock varieties;
  • livestock feed quality testing and market supervision;
  • implementing one health laws or policies;
  • emergent responses to emerging animal diseases.

✓ Farmer training and education:
  • herder technical training;
  • herder vocational education.

Aquaculture sector

✓ Resources management:
  • protection and management of fishery resources;
  • verification, registration, introduction, breeding, and promotion of related fish varieties.

✓ Technical evaluation and demonstration including introduction, trial and demonstrations of new fishery technologies:
  • polyculture pond such as fish-rice, fish-crab, etc. systems;
  • aquaponics technologies;
  • smart aquaculture;
  • fish disease control technologies;
  • fishery product processing technologies;
  • fishery product traceability technologies.

✓ Monitoring and forecasting:
  • natural fishery resources monitoring;
  • fishery industry statistics.
 ✔ **Law enforcement:**
  - conservation and protection of natural scarce fishery resources;
  - registration and management of new fish varieties;
  - fish feed quality testing and market supervision.

✔ **Farmer training and education:**
  - fish farming technical training;
  - fish farming vocational education;
  - fish farmer digital literacy training.

**Agro-machinery sector**

✔ **Technical evaluation and demonstration including introduction, trial and demonstrations of new agro-machinery:**
  - agro-machineries including land preparing, harvesting and processing, etc.;
  - smart agriculture;
  - agricultural drones and robotics.

✔ **Law enforcement:**
  - quality testing and market supervision of agro-machinery;
  - judicial detection and arbitration of agro-machinery accidents;
  - management and licence of safe use of agro-machineries.

✔ **Farmer training and education:**
  - farmer agro-machinery operation training;
  - farmer agro-machinery education;
  - farmer smart agriculture training.

Based on the available literature and government websites, the above-listed 64 indicators were developed to help identify gaps in the existing mandates of public EAS systems from the 80 countries. However the existing literature and documents failed to allow identifying the gap due to the unavailability or inadequacy of data. But generally, it is not uncommon that the public EAS system in the studied countries lacks clear definitions of mandates, neither aligned with national agricultural development goals nor legalised with institutional arrangements based on the existing documents. It is envisaged that the mandates of public EAS systems in the 80 countries can be reviewed and systematically analysed if their respective national competent authorities would like to get engaged and provide relevant data in the future.
CHAPTER 2

Overview of public agricultural extension and advisory service systems

BOX 6. Improving the public extension structure in Albania

In Albania, to be effective in delivering the required quality extension services, there is a great need to improve the public extension structure and operational system, and most importantly the competences of extensionists to meet the advisory needs of farmers as Albania moves closer towards European Union integration. Public EAS agents mostly sit in their offices and wait for the farmer to appear and ask for help. Without being able to receive or send an email, make a call and visit farms, it is impossible to organize advisory work. By contrast, investors in agriculture are well educated and informed, they discuss on web forums, Facebook and learn from the YouTube. To improve the effectiveness and efficiency of Albanian National Extension Service (ANES), a more streamlined management and governance structure should be put in place and made operational. Main steps include: agree a new organogram and reorganize the system of governance including clear definition and roles of line management, accountability systems, involvement of stakeholders in defining service priorities, etc.


2.5 Human resources

Healthy and high-quality human resources are vital to healthy and sustainable development of public EAS systems. The agriculture sector must be led by agricultural professionals who have adequate knowledge and skill, experience, vision, ability to coordinate and organize, understand policy environment and real situation, make appropriate decision and can transform the agriculture sector by mobilising staff in the entire agricultural system (MOANR, 2017). Generally speaking, one of the major challenges in the agriculture sector is a lack of effective human resource development system. Adequate staffing of the public EAS system and agent capabilities to deal with emerging issues, such as digitalisation, marketing and climate change, have presented challenges in many countries (Huber et al., 2017). Data, especially updated data on the human resources of public agricultural EAS systems of the 80 studied countries are scare, regardless of search sources (published sources, websites of central ministries and research institutes). The following table shows the number of public EAS agents in 55 countries as reported in the literature available and estimated EAS agent to farmer ratio (Table 5). FIGURE 2 shows that Belarus has the largest agent to farmer ratio of about 1:287520, and China has the lowest ratio of about 1:511. Ethiopia has an agent to farmer ratio of about 1:1582, which confirms that it has the largest EAS system in Africa (Swanson & Davis, 2014).
In the Western Balkan countries, there is the problem of scarce manpower (FAO, 2011). The number of farmers per EAS agent in many developing countries is about 3,000, which used to be close to 300 (Pye-Smith, 2012). All public EAS systems that aim to address rural farm households (at least the semi-commercial ones) have a ratio between farming households and public advisors of between 1,000 and 5,000; more in the case of smallholder farming and less in case of larger farms (FAO, 2011). In Africa, there are high vacancy rates of government EAS agents’ positions. In Senegal, a high vacancy rate (24 percent in 2017) has been a chronic problem due to a lack of funds to pay salaries of new staff (Franzel et al., 2018 cit in Davis, 2020). In Latin America, extension coverage ranged from 100 to 831 farmers per extension worker in the public sector and between 42 and 642 small producers per extension worker in private EAS programmes (Preissing et al., 2018 cit in Davis, 2020). In Central America, the public sector had the largest number of technicians and extension professionals as well as support staff (Guatemala had a 75:25 ratio and Nicaragua 70:30) (Preissing et al., 2018 cit in Davis, 2020). In Myanmar, the morale of otherwise sufficient number of EAS staff is lowered due to a multitude of factors, such as low salaries and benefits, lack of mobility, inadequate operational budgets, too many layers of bureaucracy in the public EAS, etc. (Qamar, 2012).

**TABLE 5. Number of public EAS agents by country as reported in literature**

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of public EAS agents</th>
<th>Extension agent to farmer ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Algeria</td>
<td>835</td>
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</tr>
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<tr>
<td>India</td>
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<td>9472</td>
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<tr>
<td>Islamic Republic of Iran</td>
<td>6497</td>
<td>3335</td>
</tr>
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</table>
### Chapter 2: Overview of public agricultural extension and advisory service systems

#### Table: Country No. of public EAS agents Extension agent to farmer ratio

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of public EAS agents</th>
<th>Extension agent to farmer ratio</th>
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<tr>
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<td>Thailand</td>
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<td>Türkiye</td>
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<td>United Republic of Tanzania</td>
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<tr>
<td>Viet Nam</td>
<td>13185</td>
<td>4648</td>
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</table>

**Note:** The data were retrieved from GFRAS (2012) unless otherwise specified. For the following countries, the data are retrieved from other secondary sources: Guinea as of 2015 (MacNairn, 2017); Nigeria as of 2017 (Huber et al., 2017); Belize as of 2020 (website of the Ministry of Agriculture, Food Security, and Enterprises); and China as of 2017 (China Agricultural Statistical Yearbook, 2017). The extension agent to farmer ration was estimated using the number of public EAS agents and estimated rural population (due to unavailability of data on farmer population) as of 2012 (data retrieved from indexmundi.com and macrotrends.net).
According to the literature, public EAS systems of the 80 countries generally face at least one of the following challenges in terms of human resources:

- lack of financial resources is a key problem (Davis & Franzel, 2018). A 2010 survey shows that out of the 22 Nigerian Agricultural Development Programmes (ADPs) surveyed, 68 percent were ranked as having weak or very weak funding sources (Auta & Dafwang, 2010 cit in Huber et al., 2017). Due to financial constraints, incentives for staff to engage in capacity strengthening activities are not well-developed and this has a negative effect on staff motivation and morale (FAO, 2021a). As a result, agents in government EAS systems tend to not receive in-service training. For example, in Nigeria, some states have gone 30 years without training their Agricultural Development Programme (ADP) EAS agents (Huber et al., 2017). Continued education of EAS agents is absent in Bosnia and Herzegovia (Rokvić & Vaško, 2016). An exception, Chile has a well-supported process for continuous training of service providers, and in Colombia, 25 percent to 35 percent of the Municipal Units of Agricultural Technical Assistance technical staff had access to continuous training activities, while 60 percent to 75 percent of consulting firms and NGO staff had access to training programmes in universities and other courses promoted by the
training does not always cover all the relevant EAS-related areas. EAS staff may have adequate foundational, technical backgrounds (albeit with limited hands-on applications during training) (Davis, 2020). Such a technical-oriented training tends to miss the functional skills or “soft” skills needed for effective and market-oriented EAS, such as group development, communication, or entrepreneurship. For example, in Tajikistan, agricultural advisers were often technically trained and well-oriented, but they needed commercial expertise, namely, skills and attitudes that are necessary in a market economy (Dosov, 2018 cit in Davis, 2020);

the public-sector EAS systems tend to suffer from a high turnover rate due to a lack of attractiveness to competent EAS professionals or a strong leadership. 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 (Davis & Franzel, 2018). In Mongolia, the National Agricultural Extension Centre (NAEC) is often seen as a steppingstone to a career in the Government. As a result, the reputation and quality of the services provided by the NAEC are diminishing. In addition, the NAEC lacks stable leadership with vision and knowledge in agricultural extension and innovation systems. This instability creates confusion and a lack of commitment within the organization (Chuluunbaatar et al., 2017);

due to a lack of attractiveness and funding, public EAS systems tend to have difficulty recruiting new staff. In Mozambique, the new requirements for recruiting EAS workers are to have training from an agriculture school (with the equivalent of a high school diploma). However, staff are hard to find with the required credentials at the salaries offered (Davis & Franzel, 2018). In India, as of 2017 of the 27 937 vacancies, only about 49 percent (13 672 positions) were filled (Naik & Shilpa, 2020);

gender imbalance is a common issue with the EAS team. Across the world, only 15 percent of EAS agents are female, which is even lower in West Africa (Rigourd & Dugue, 2022). In most of the 80 countries, public EAS agents are predominantly male (e.g. 12 percent female in Ethiopia, 28 percent female in Nigeria, and respectively less than 30 percent and 8 percent field-level EAS agents are female in Rwanda and Nepal). A higher proportion of female agents in agricultural EAS teams is necessary for equitable access to EAS. However, the opposite situation exists as well. For example, in Mongolia, most (67 percent) of the public EAS agents are female (Chuluunbaatar et al., 2017). Also in Bulgaria, the predominant agricultural advisors are female (Todorova, 2021);

aging of the public EAS personnel is a common issue. In Nigeria, 60 percent of public EAS agents are over the age of 40. The aging extension workforce does mirror the aging farmer population, which may help farmers relate better to their agents but pose a potential problem (Huber et al., 2017). In Guinea and
Liberia, many public EAS agents are also close to retirement age (MacNairn, 2017; Sigman, 2017). Limited hiring in public EAS systems commonly exists in some countries. This has worsened the aging problem. In Nigeria, some states have gone 25–30 years without new recruitment (Davis & Franzel, 2018). In India, most state departments function with limited levels of capacity in terms of human resources, with no new recruitment since 1998 (Babu & Shishodia, 2018). There has been limited hiring in Guinea over the past 30 years or so (MacNairn, 2017). However, the opposite situation exists as well. For example, in Mongolia, most of the staff of the NAEC are new university graduates. 46 percent of the staff are under 30 years of age, and 33 percent between 31 and 40 years. Only eight percent of the staff (three people) are over 50 (Chuluunbaatar et al., 2017). This gap between young and old age cohorts can be problematic, in that young agents usually do not have senior mentors who can pass onto them real-world experience and knowledge;

♦ both the quality and quantity of EAS agents are a challenge in many countries.

In Viet Nam, on average, about 20 percent of EAS agents retire or resign each year, equivalent to a loss of 5 600 staff per year. Therefore, the new training needs for the extension system are 5 000 people per year. However, Viet Nam is experiencing a shortage of additional human resources as the number of students enrolled in agricultural extension schools declines (Ngan & Babu, 2018). In Mongolia, at the provincial level, the capacity to provide EAS is very low, and in many cases non-existent, due to a lack of specialised agents. There is only one officer in each of the 21 provincial extension centres. At the soum (county) level, there are no full-time EAS staff (Chuluunbaatar et al., 2017);

♦ due to poor quality of EAS agents, transferring emerging technologies to the poor and illiterate farmers at the village level is a very challenging task (Naik & Shilpa, 2020);

♦ EAS agents may not dedicate enough time to EAS delivery due to administrative and other work, although it is recognised that it is necessary to ensure that EAS agents are only engaged in EAS-related activities (MOANR, 2017). In India, 25 percent of public extension workers are administrators/ supervisors not directly related to farmers. With the rest of the extension workers, at least 50 percent of their work time goes to administrative work, official correspondence, reports and travel to reach villages (Naik & Shilpa, 2020). In Montenegro, the municipal EAS agencies are more focused on office work than delivering services directly to farmers (Jankovic et al., 2015). In Mongolia, most staff members (54 percent) of the NAEC work in administration, management, accounting, general services and maintenance. The remainder (46 percent) are agricultural specialists who provide EAS (Chuluunbaatar et al., 2017);

♦ personnel displacement may not be place-sensitive. In Ethiopia, whereas official staffing policy indicates that EAS agents ought to be staffed in home woredas (districts), they are sometimes transferred to regions where they have

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7 The NAEC has 26 full-time staff and over 60 part-time scientific advisers in different agricultural disciplines, including administration and managerial staff as well as service staff, such as drivers and caretakers.
no connection after a short period of time. This is detrimental to their impact, as experience shows that it takes at least two to three years before an agent can earn the trust, respect, relationships, and location-specific expertise to add real value to local farmer communities (MOANR, 2017);

♦ the EAS personnel system, when largely dependent on donor funding and without strategies and actions to self-sustain and transform, may not be resilient to changing external conditions. The experience of Nigeria shows that, following the withdrawal of donor funding, massive attrition of both permanent and contract EAS staff occurred. The deterioration in the quantity and quality of staff led to a deterioration of quality of services, which caused the entire EAS system to decline (Huber et al., 2017);

♦ the recruitment mechanism may pose a challenge of unity-of-command principle in management between the central technical departments and decentralised services, including extension, as staff recruitment, training, performance management, and promotions are all centralised in the technical department (in Malawi for example) (Chiweza, 2010 cit in Davis & Franzel, 2018).

In terms of education qualifications, there is an evident variance both across and within regions. In Senegal, 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 (Davis & Franzel, 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 cit in Davis & Franzel, 2018). In Guinea, public EAS agents typically hold either a university degree or an agricultural diploma from one of the national agricultural education and training (AET) centres, but some only have a secondary school education (MacNairn, 2017). In Rwanda, field-level extension workers constitute the bulk of staff (78 percent), with 87 percent of them holding a two- to three-year agricultural diploma or lower. In Mongolia, among the agricultural specialists who are staff members of the NAEC, 90 percent have a master’s degree and ten percent have a bachelor’s degree. Most staff at the provincial extension offices have an agricultural/technical background (out of the 21 officers in 21 provinces, ten have agronomy backgrounds and five have livestock backgrounds) (Chuluunbaatar et al., 2017).

Regarding the recruitment mechanism of public EAS agents, little information is available in the existing literature. Public EAS agents are civil servants in some countries. The public agricultural EAS personnel in Japan are local civil servants. They enjoy the same salary and treatment as civil servants. The Japanese agricultural EAS system not only strictly controls entry through the qualification examination, but clearly stipulates that candidates with different academic backgrounds must have the corresponding years of practical work experience to be eligible to take the examination (Huang, 2005). Besides, through an effective in-service training system, the professional level of the extension staff gets continuously improved. Therefore, the overall quality of the staff is relatively high in Japan (ibid.). The agricultural EAS agents in Thailand are generally included in the ranks of civil servants and enjoy the same treatment as civil servants of the same level in other sectors (Chen, 2009). All public extension agents are civil servants in Belize.

2.6 Financial resources

An effective public EAS system needs a sufficient medium-term budget for ongoing operations (day-to-day functionality) and capital investment (e.g. in computers/printers, mobile phones, digital infrastructure such as Wi-Fi, website and social media platforms), and this financial support needs coherent state commitment. Generally speaking, government expenditure on agriculture has been increasing in Africa, Asia, and Latin America (Table 6). There has, however, persisted a regional gap, with Africa remaining far behind Asia and Latin America. The share of total government expenditures on the agriculture sector in the GDP can indicate how much of a priority the government regards the sector (Fan & Saurkar, N/A). In this sense, it can be said that much more and constant priority has been given in Asian countries, followed by in Latin American countries, while in African countries, especially in SSA ones, a lower priority has been noted (ibid.). On the whole, funding for EAS in SSA countries is insufficient, non-sustainable and non-virtuous (Rigourd & Dugue, 2022).
The term AKIS is a concept that describes the exchange of knowledge and innovation in rural areas. AKIS represents a system that links people and organizations to promote mutual learning, to generate, share, and utilize agriculture-related technology, knowledge, and information. In optimal form, the system should include actors such as farm advisors, agricultural educators, researchers, non-academic experts, public and independent private advisors, supply chain actors, other agriculture sector actors. In most European Union countries the AKIS system is very diverse and it reflects national or regional needs. In countries with stronger regional structure there is typically a bigger variety of solutions that correspond with local specifics. The main features of AKIS in any country should be:
- active cooperation and exchange between involved entities;
- constant adaptation to the needs of rural communities;
- production of concrete, measurable results to improve production, resilience and sustainability of the agri-food sector.

The core part of the AKIS in most of the countries is the functional connection between farm advisory services and other actors in the sector. One of the most important links is the one with “sources of the knowledge” – faculties and research institutes. By establishing that link, the farm advisors can be regularly trained and informed on the latest available knowledge, technologies and tools in farming. Another important relationship is with farmers as main beneficiaries and those who should be also engaged in designing the way of work of the farm extension/advisory service.


### Table 6. Agriculture expenditure and percentage of GDP

<table>
<thead>
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<td>Total</td>
<td>109.9</td>
<td>123.0</td>
<td>157.6</td>
<td>241.8</td>
<td>10.4</td>
<td>7.9</td>
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**Source:** - Calculated using data from International Monetary Fund’s (IMF) Government Financial Statistics Yearbook (various issues)
- Fan & Saurkar (unknown date)

While the data on government expenditure on agricultural EAS and total agricultural GDP were unavailable, the document referred to the data on government expenditure (functional expenditure (COFOG)) on agriculture, fishing,
forestry and hunting (percentage of GDP)\(^8\) of the Government Finance Statistics (GFS) database of the International Monetary Fund (IMF). This allows understanding approximately the ratio between government expenditure on agricultural EAS and total agricultural GDP. As data are not complete for all the 80 countries\(^9\), the table below shows the government expenditure on agriculture, fishing, forestry and hunting as a percentage of GDP of 27 countries between 2011 and 2015 (Table 7).

**Table 7. Government expenditure on agriculture as a percentage of GDP**

<table>
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<td>1.11</td>
<td>1.07</td>
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</tr>
</tbody>
</table>

*Source: International Monetary Fund*


\(^9\) No data or insufficient data for the rest of the 80 countries.
It can be seen that in terms of percentage of GDP, there have been fluctuations in most of the countries listed in the table (FIGURE 3). Relatively Belarus, Nepal, Thailand, and Uzbekistan have a higher percentage of GDP than the other countries (more than one percent of GDP in five consecutive years), while China, Chile, Brazil, El Salvador, Kazakhstan, and South Africa have a lower percentage of GDP (less than 0.5 percent of GDP in five consecutive years).

Under-funding and unwillingness to increase investments on public EAS systems have become a persisting problem in most of the 80 countries. For example, an estimated EUR 40 billion annually are needed to harness the power of agriculture to transform Africa, whereas only approximately EUR 6.25 billion are invested annually today (Tsan et al., 2019). Even with recent significant increases of investments in agriculture research and development sectors in China, the portion of public funds for EAS account for only about 0.07–0.10 percent of agricultural GDP, which are about 1/4–1/3 of public agricultural research funds. In Western Balkan countries, lack of resources is a key constraint for strengthening public EAS systems. Often times, after deducting fixed costs such as salaries, cars and office facilities, there is not very much left for the working costs (materials, fuel, and telephone), not to mention regular training programmes for the advisors (FAO, 2011). In Mongolia, the main public organization for agricultural EAS is the NAEC\textsuperscript{10}. Over 80 percent of the budget

\textsuperscript{10} The NAEC was established in 1996 under the MoFA and located in Ulaanbaatar. Its legal status is defined in the Laws on Science and Technology (Chuluunbaatar et al., 2017).
that the NAEC receives from the state is spent on salary and insurance, which leaves little money for the NAEC to run its activities. The budget allocation for training and meetings accounts for barely two percent (about MNT six million = roughly USD 3,000) of the total NAEC budget in 2013–2015. This budget was only for the NAEC’s central office at the MoFA in Ulaanbaatar. The sub-national aimag (provincial) and soum (county) extension centres do not receive public funding for their EAS activities from neither the national nor provincial governments. As a result, extension officers in the decentralised offices are often taken away from their EAS duties and given other responsibilities (Chuluunbaatar et al., 2017).

In Ghana, analysis of district budgets over time indicated that total average agricultural expenditures at the sub-national level decreased from 11 percent to six percent of spending between the introduction of decentralisation in 2012 and 2015 (Resnick, 2018 cit in Davis, 2020).

Public agricultural EAS systems in most of the countries studied receive funding from the government, the principal source of funding. However, in many cases, public funds, occurring mainly at the national level, are far from sufficient to maintain the functionality and efficiency of the entire public EAS system. In Nigeria, agriculture represents two percent of the national budget, despite Nigeria’s participation in the Maputo Declaration where they were committed to funding agriculture at ten percent (FMARD, 2016a). Funding for extension was intended to be shared among the federal, the 36 plus Federal Capital Territory (FCT) states, and the 774 local governments (CTA, 2011). Practically,
the federal government provides the majority of funding for extension today, and state governments do most of the execution (Huber et al., 2017). Most of Nigerian Agricultural Development Programmes (ADPs) are donor-driven with no tangible budget allocations from their state governments. Public funds are largely put toward salaries with limited resources for operational expenses, resulting in a lack of motivation and inadequate training and preparation with regard to modern agriculture EAS (Huber et al., 2017). Quite similarly, in Bangladesh, many public-sector actors do not always have sufficient operational funds to effectively implement programmes, as the majority of public funding goes toward salaries and capital costs (Huber, 2017).

Due to government financial constraints, many countries are forced to resort to a variety of financial sources to lessen their dependence on public funding for EAS. With pluralistic approaches, financial constraints have been addressed to a certain degree. In Africa, Central Asia and the Caucasus, financing was donor-dependent and public sector-led, with some slight variations (Davis, 2020). Funding of EAS in Uganda is based on partnerships, government agencies and farmer organizations (Buyinza et al., 2015). In Bulgaria, the budget of National Agricultural Advisory Services (NAAS) includes subsidy, own revenues, donations, grants, revenue of training and information activities, consulting services and funds received by international projects and programmes. Nevertheless, for public agencies, the national budget remains a significant part and is supplemented by funds for programmes and projects (Todorova, 2021). In Poland, the system of public agricultural advisory network is funded directly from the state budget at level of 60–70 percent of total costs of activities (the remaining balance are earned by, inter alia, service provisions for farmers) (Boczek et al., 2020). The costs of advisory services provided by Agricultural Chambers and sectoral farming organizations are covered through their members (farmers) fees (ibid.). The private agricultural advisors operate on a commercial basis (ibid.). In Colombia, the sources of financing were diverse: 29 percent of the organizations received resources from the national government; 19 percent from departmental governments; 35 percent from municipal governments; 14 percent from producer payments; 11 percent from local donations; and 14 percent from development aid (Preissing et al., 2018 cit in Davis, 2020). Funding in the form of subsidies/co-financing (up to 80 percent of the total cost) for direct technical assistance (extension) for the producers comes from the government. The EAS system of Honduras is jointly funded by international cooperation agencies, national government, private and research institutes, farmers, donations, and local governments. In Cameroon, the funding comes mainly from the government and external research institutes such as the Consultative Group on International Agricultural Research (CGIAR), International Potato Center (CIP), and French Agricultural Research Centre for International Development (CIRAD). Similarly, in Viet Nam, while the central government is the principal funder of local (provincial and district) EAS, other sources of funding like international donors and the private sector are also included (Ngan & Babul, 2018).
BOX 8. Business models for EAS in sub-Saharan Africa

There are several different business models for EAS in sub-Saharan Africa, with strong dominance for free agricultural EAS.

**Free EAS:** The dominant business model for EAS is the free-service model funded by the State (salaries of public agents) and international donors. However, those EAS are often times weak and ineffective because they are under-funded. With the exception of a few specific cases (Morocco, Cameroon), this business model is more like an obstacle, because resources are insufficient and because no feeling of accountability vis-à-vis the EAS has been created (leading to a lower EAS quality and lower user satisfaction).

**Subsidised EAS:** A few farmers organizations or EAS centres (rural management centre in Senegal, Fédération Faranfasi so in Mali, Tillabéri service centre in Niger) have developed lasting EAS based on the subsidised-service business model with financial contributions from producers or farmers organizations of up to 70 percent of the cost of the service. In these cases, accountability and quality of services are seen favourably by EAS agents and users. Still too rare, this type of business model for EAS actually reflects the economic model of farmers organizations.

**Services paid for entirely by the beneficiaries:** This idea of EAS in exchange for payment of a fee has not really caught on yet for family farms. These are therefore, for the most part, private EAS schemes which concern only producers who are already sufficiently integrated into the value chains.


2.7 Infrastructure

In terms of the infrastructural settings of grassroots public EAS agencies, there exists an evident disparity among different geographical areas both within and across different regions (also within the same country). It is often highly recommended to ensure at the grassroots level: (1) office spaces that are adequately equipped; (2) basic travel vehicles (motorbikes, bicycles or cars); (3) fields for experiments and demonstration of new technologies and varieties; (4) farmer training venues and facilities (computers, projects or meeting rooms etc.); and (5) well-equipped labs for testing seeds, pesticide residue, fertiliser or soil at the regional level or national level as necessary. It is hard to know whether the infrastructure setting of all the 80 countries meets the five aspects due to limited information on this regard in the existing literature. Nevertheless, available information from Egypt, Ethiopia, China, Kyrgyzstan and Sri Lanka shows that, in most developing countries, grassroots-level EAS agencies tend to have poor infrastructure in one of the five aspects, either with lagging office facilities and poor office conditions or even with no formal office space and minimum level of equipment and furniture.
Often times, backward technology-supported service methods and facilities and equipment make it difficult to experiment and demonstrate new technologies and new achievements as well as training the personnel and farmers (Liu et al., 2014). Inadequate basic infrastructural equipment often amplifies the negative impact of a lack of financial resources (especially for covering working costs) for public EAS (FAO, 2011). For example, in Western Balkan countries, municipal EAS staff working at the field level are especially in need of basic infrastructural equipment like secured mobility, telephones and computer and Internet facilities. This, together with scarce operative funds, makes it difficult for them to deliver EAS effectively. The major investments in infrastructure and equipment are not enough to spur agricultural development (Rigourd & Dugue, 2022). Infrastructure and equipment and EAS are both essential for agricultural and rural development. However, without a sound infrastructure and equipment especially at the field level, only investments in EAS are unlikely to promise a satisfactory return, which will barely be profitable and sustainable (ibid.).

In Egypt, transport facilities for the field extension staff are inadequate to enable them to move from village to village to contact farmers (Abdel-Ghany & Diab, 2013). Each of the Development Support and Communication Centres (DSCCs) is equipped with audiovisual studio, a printing house, an auditorium, and training halls. Some of the centres can provide full board accommodation to the trainees, visitors, and the staff participating in EAS campaigns and rural development programmes. Agricultural Extension Centres (AECs) are equipped with furnished training halls for extension meetings, facilities of audio-video aids, computers, and a library of pamphlets, magazines, books, videos, and compact discs (CDs) (CAAEE, 2019 cit in Diab et al., 2020). The Rural Development Centres (RDCs) are equipped with machinery for dairy production, bakery and agro-processing facilities and for manufacturing of handcraft (CAAEE, 2018a).

In Ethiopia, over the past years, the central government has invested substantially in the infrastructure and resources required to create a strong agricultural field extension system. The plan is to ultimately establish a Farmer Training Centre (FTC) in each kebele, which possesses an office/classroom building, housing for the EAS staff, livestock buildings, wells, fencing, etc.), and other needed facilities. The kebele will typically allocate 1.0 to 2.5 ha of community land to the FTC, which can be used to demonstrate and train farmers about new technologies, farming systems, new crops, livestock, or other enterprises. According to Davis and others (2009), however, constraints exist in terms of actual infrastructure and resources in most FTCs, even those supported by donor programmes. The sustainability and effectiveness of the FTCs are considerably undermined due to a lack of seed financing and operating funds to invest in basic training infrastructure and to turn the demonstration farms (DFs) into teaching-learning plots that are at least partially economically sustainable. Some FTC buildings were poorly constructed and requires continued maintenance to keep them functional. Others were built as permanent structures that are already being used as community centres, and EAS activities have to compete with other community activities for space. Most FTCs are not timely maintained or repaired (MOANR, 2017). Most FTCs do not have access to electricity, therefore, only a
few have TVs with digital video discs (DVDs) players and almost none have any other type of advanced teaching equipment (e.g. overhead projectors, screens, computers). In fact, some do not have any teaching material at all. FTCs also have few independent learning materials (e.g. training materials/manuals) that farmers can use for independent learning and support. Most FTC DFs have not been developed or used. Almost all FTCs (except for those supported by projects or NGOs) have inadequate funds and lands for practical training, establishment of demonstration plots, and other basic infrastructure and facilities such as basic furniture, farm implements, ICT and training materials (MOANR, 2017).

In Kyrgyzstan, some of the Rural Advisory Services (RAS) centres do not have their own working space (Karasartov et al., 2015). Profits that some RAS centres were able to generate over the period of result-based payment system introduction have been economised or invested in infrastructure (Vöglti, 2008). In the Chinese EAS setting, the infrastructure can be divided into five categories, i.e. office space, training room, laboratory, information consultation room, and experiment and demonstration base. Taken a county in Hunan Province for example (Liu et al., 2014), each township-level agricultural technology extension (ATE) station is offered infrastructure construction funds of RMB 150 000 to 200 000 through the provincial finance. These funds are mainly used for the construction and expansion of office spaces of the township-level ATE station, technical training of ATE personnel, and purchase of the instruments and facilities necessary for the township-level ATE station, etc. However, most township-level ATE agencies have lagging office facilities and poor office conditions.

In Mongolia, the NAEC is currently not well-suited to provide services at the Centre. The location is difficult to find, there is no meeting room to meet with clients and there is only one vehicle, which is for the director’s use. All of the aimag (provincial) extension centre (AECs) were equipped with phones, faxes, vehicles and email connections (Chuluunbaatar et al., 2017). In Nigeria, most of the EAS offices, established with World Bank funding but have since suffered from a severe lack of funding and coordination (Ugochukwu & Chinyelu, 2020). In Chad, insufficient infrastructure and other vital means are identified as one of the major constraints of rural services at the decentralised level (AGIR, 2016).

2.8 Case studies

This document carried out case studies of the public agricultural EAS systems of six countries, namely, China, Costa Rica, Egypt, Ethiopia, Kyrgyzstan, and Sri Lanka. Cases were selected according to three criteria, i.e. (1) geographical representativeness, (2) lessons can be learnt from reform practices, and (3) the availability of literature. The content of the case studies is listed in ANNEX - Case studies. The case studies took into consideration the following facts:

♦ governance is commonly identified as one of the critical weaknesses of public agricultural EAS systems in many developing countries (Bitzer et al., 2016);
♦ despite somewhat similar agricultural EAS systems in most countries, most systems differ in terms of their respective management structure, including how extension priorities are set, how EAS programmes are planned and actually organized and implemented (Swanson & Rajalahti, 2010);
♦ staffing is one of the critical areas of organizational management (Huber et al., 2017); and
♦ one of the key problems of public EAS in developing countries is the well-known “incentive failure” by EAS to respond to clients’ needs and be accountable to them (World Bank and IFPRI, 2010 cit in Bitzer, 2016).

To gain insights in the above realities, the cases are analysed by looking at five key aspects of the institutional reform of public EAS systems:

♦ institutional setting and function, focusing on the functions of public agencies in charge of EAS provision at the grassroots level;
♦ institutional management, focusing on aspects of operation, participation, coordination, and regulatory or legal framework;
♦ funding, focusing on the sources of funds for public EAS provision and innovative financing methods;
♦ staffing and personnel management, focusing on the issues related to human resources, such as number of public EAS agents, education qualification, recruitment, assessment, etc.;
♦ support and incentives, focusing on sources of funding and incentives for public EAS agents; and
♦ infrastructural setting, focusing on the work space, facilities, and equipment of EAS agencies at the grassroots level.
Public EAS systems worldwide face some common major challenges in terms of accessibility, accountability, affordability, adaptability, sustainability, and coordination. All these challenges are prone to causing failures identified as inherent in public-sector EAS systems that include (Anderson & Feder, 2004; Birner & Anderson, 2007; World Bank & IFPRI, 2010; Bawa et al., 2010 cit in Bitzer et al., 2016):

- low adoption rates of new technologies;
- unable to cover the vast number of farmers in need of services;
- low political priority and support for extension;
- dominance of bureaucratic procedures;
- top-heavy decision-making and lack of farmer participation in EAS planning and implementation;
Transforming public agricultural extension and advisory service systems in smallholder farming: Status quo, gaps, way forward

Strong upward accountability toward bureaucratic hierarchies and donors, but weak downward accountability to EAS users (farmers);

- poor performance incentives for public extension officers;
- weak interaction and linkage with agricultural research;
- misuse of extension officers for political purposes (such as campaigning for the ruling party);
- extension officers’ involvement in non-EAS activities; and
- patronage by local agencies along ethnic or religious lines.

These problems impede farmers’ participation in technology adoption and upscaling while weakening both the efficiency of EAS and agricultural productivity as well as the whole value chain development. As a result, the majority of the farmers tend to resort to social learning and local networks for interactions and knowledge acquisition (Leta Dufera, 2018). The increasingly pluralistic EAS providers have the potential to address these challenges. However, it also brings new challenges such as competition for resources, reluctance to share information and participate in learning, duplication of efforts and contradictory messages (Djamen, 2013 cit in Djamen et al., 2020). In the following section, the document looks into the scope and dimensions of these challenges, while highlighting their implications for the reform pathway of public agricultural EAS systems.

3.1 Accessibility

The accessibility of public EAS is a major indicator of the functionality of public EAS systems and their relevance and responsiveness to the various needs of service users. It can be considered as a performance criterion for governments, reflecting their capacities to accurately recognise the diversity and nature of different needs, create and tailor delivery and communication channels accordingly, and ensure equity and fairness in delivery and distribution (OECD, 2013). From the demand side, accessibility of EAS becomes an issue because of the attributes of the principal recipients of public EAS: smallholder farmers. In most developing countries, the majority of the rural population are smallholder farmers involved in the agricultural industry, especially in a subsistence farming mode (Gollin, 2014; Mariyono, 2019; Rapsomanikis, 2015). These farmers are the largest and most difficult group for agricultural EAS to reach (Swanson & Rajalahti, 2010), due to various reasons such as remoteness, lack of organization, lack of functional literacy, etc. The supply-side inefficiency in many cases is also accountable for poor accessibility of public EAS. Public EAS are the chief source of EAS for these farmers; however, it has remained deficient due to its being heavily under-resourced, costly, over-stretched, unaccountable, and often beset by bureaucratic processes (Mapiye et al., 2021). Consequently, the ability of the public-sector EAS agencies to provide EAS is largely weakened. Besides, an indirect reason that accounts for low accessibility is that literacy, the precondition for both access to
and uptake of EAS, is rarely included in agricultural EAS programmes or policies (because it often falls within the remit of another ministry) (Rigourd & Dugue, 2022). Ideally, it would be interesting to use the indicator framework as in Section 2.4 to review what services are supposed to be but not provided by the public sector in the 80 countries. This would allow identifying the existing gaps in the supply-side accessibility. However, due to the unavailability of related data, this document has failed to do so at this stage.

Smallholder farmers’ access to public EAS remains low in many developing countries (FIGURE 4). For example, in Colombia 12.3 percent of the farmers had access to EAS, followed by Peru with 7.1 percent and the Plurinational State of Bolivia with 5.2 percent (Neves et al., 2021). In a survey conducted across 38 of the 47 counties in Kenya, only 21 percent of sampled households accessed EAS (Birch, 2018). Other sources suggest that on average five to ten percent of farmers have access to public EAS, and in some cases up to 25 percent (FAO, 2014). Accessibility may be undermined due to failed institutional reforms. For example, following the removal of public EAS systems in several Latin American countries in the 1990s, most smallholder and indigenous farmers lack any type of agricultural EAS that could help them increase their agricultural productivity and farm incomes (Swanson & Rajalahti, 2010). It can be quite challenging to enhance accessibility. The reform efforts in Peru have not managed to improve the accessibility issue, particularly for small-scale producers (Barrantes-Bravo et al., 2017).

**FIGURE 5. Shares of farmers accessing public EAS**

Source: Adaptation by the Authors according to FAO (2014) and Neves et al. (2021)
“Accessibility” refers not only to the physical proximity of services, but to their affordability, sociocultural appropriateness and context-specific relevance (from the demand side) as well as to their availability (from the supply side), namely, there is a public provision. EAS are considered accessible and inclusive if they are: responsive to resource-poor and vulnerable farmers, especially women; tailored to the multiple capacities, needs and demands of farmers; characterised by continuous dialogue and learning between farmers and service providers; and based on complementary services by different actors (Bitzer et al., 2016). Various studies indicate that the dominant top-down approach of public service delivery has largely failed to benefit resource-poor farmers (Benson & Jafry, 2013; Chapman & Tripp, 2003; Feder et al., 2010 cit in Bitzer et al., 2016). As a result, farmers rely to a large degree on other sources of information and knowledge (ibid.).

BOX 9. Gender-sensitive advisory services in Niger

Milk-collection centres in Niger developed a strategy to secure women in the value chain with specific advisory activities taking into account the concerns of women and combining: literacy skills for women, awareness-raising among men and women (with videos and conversations/discussion groups), empowerment of women, support for women in negotiating milk prices, support for the management of income-generating activities for women (which aim to offset any losses in revenue that occur when a husband takes control of milk), banking intermediation for women's groups, organization of meetings at times that are more convenient for women (or at times of the year when women are more available), or at times when it is easier for men and women to gather together.


The accessibility to public EAS proves to be a major challenge in many developing countries for the following reasons:

♦ there commonly exists a gap between the demand of smallholder and marginalised farmers from the public EAS and the services supplied to them (Joshi & Narayan, 2019). For example, worldwide, only five percent of EAS target women in rural areas, despite that studies show that one euro invested in agriculture for the benefit of women has a greater impact than one euro invested for the benefit of men (Rigourd & Dugue, 2022);

♦ there is a broad recognition that EAS tend to benefit productive agricultural areas over marginalised regions, relatively resource-rich over resource-poor farmers, and male over female farmers (Bitzer et al., 2016). Generally, there is a high likelihood of elite capture and misappropriation of devolved funds as local decision making can be captured by local elites (e.g. larger farms) (Poulton, 2010);

♦ funding for agriculture is below what is needed to support agricultural transformation in Africa, Asia and Latin America (FAO, 2021a). The limited government funding for agricultural research and extension is a primary cause
of the under-performance of national agricultural research and innovation systems, which has been magnified as a result of the COVID-19 pandemic (ibid.). Financial and staffing constraints render most public EAS systems unable to provide the majority of smallholder farmers with adequate EAS (Tsafack et al., 2015). As the case of Bangladesh and Nigeria shows, many public EAS actors have inadequate operational funds to effectively implement programmes, since the majority of public funding is used to pay for staff salaries and capital costs (Huber, 2017; Huber et al., 2017). The limited resources result in farmers in harder-to-reach areas not having the same level of access to EAS as in other parts of the country (Huber, 2017);

♦ smallholder farmers’ lack of functional literacy is still a major obstacle to strengthen their access to and uptake of EAS. Due to low literacy, certain training programmes are not accessible to them, learning is more difficult, and managerial and legal advice is difficult for them to grasp (Rigourd & Dugue, 2022). In addition, smallholder farmers (largely illiterate in many parts of SSA) (Fa, 2018), usually with little digital literacy, are challenged to access increasingly digitalised EAS which are often delivered through digital tools. This requires them to be familiar with smartphone and social media which is barely the case;

♦ accessibility is constrained by poor infrastructure and connectivity in many developing countries, especially in inner and remote rural areas. Often times, the proportion of farmers who have access to EAS is higher in regions where the road network is more extensive, compared to regions where roads are scarce (Neves et al., 2021). The fact that EAS agents tend to be poorly equipped
with means of transport worsens this situation. Without adequate mobility for the EAS agents, there will not be social equity among the farmers (Fa, 2018). Plus, without sufficient funds to support mobility and operations, additional staffing would be expensive and counterproductive (Davis, 2020). The cost of reaching large numbers of smallholder farmers who are often geographically dispersed (Fa, 2018) therefore remains too high to guarantee inclusive EAS;

♦ low capacity of public EAS agents, especially those at decentralised levels, is a major constraint of accessibility. For example, in Mongolia, despite the many interventions and trainings provided to the NAEC and its staff, its capacity and competence remain low, especially at the aimag (provincial) and soum (county) levels, where the demand for agricultural EAS is highest (Chuluunbaatar et al., 2017).

As a broadened institutional landscape of service provision, pluralistic EAS systems should result in more relevant and inclusive services for smallholder producers and thereby contribute to rural transformation and poverty reduction (Blum et al., 2020). However, the potential of pluralistic approaches to improve accessibility in the real world remains largely questionable. Under a pluralistic EAS system, the following factors that are prone to limiting accessibility are identified from the literature review:

♦ in Uganda, farmers who cannot pay for the annual fees are not likely to benefit from the farmer organizations extension programmes (Saliu et al., 2009 cit in Buyinza et al., 2015);

♦ in Cameroon, while private-sector participation can overcome some of the deficiencies of public EAS systems, there are also challenges that have been faced, including misuse of public funds, insufficient accountability to farmers, inequitable provision of service, inadequate quality, and limited coverage of the wide range of farmers’ needs (Feder et al., 2011). Using NGOs and private-sector service providers as implementation agencies for agricultural EAS appears promising in theory, but in practice, those capable of carrying out EAS are few (Fa, 2018);

♦ according to the experience from Africa, markets are often unable to promote interactive learning, at least at the scale required. Transaction costs to establish networks and develop trust among actors are prohibitive, particularly for the poorer participants (Maatman et al., 2011). In addition, the coordination of action and learning among different types of actors with different mindsets and worldviews is especially challenging (and at times costly) (Maatman et al., 2011);

♦ global experience shows that transferring responsibility for “public good” advisory services to private-sector firms (or NGOs) does not appear to be sustainable over the long term unless government funding continues (Swanson, 2008);

♦ it is generally recognised that the majority of family farms—and not only those in developing countries—are unable to bear EAS costs on their own (Faure et al., 2016).
3.2 Accountability

Accountability refers to the responsibility and the relationships that a service provider has towards its users (downward accountability) and its donors or bureaucratic hierarchies (upward accountability) (Blum et al., 2020). Accountability is intrinsically linked to governance, and the extent to which clients have a say at higher levels of planning and monitoring of the system (Wongtschowski et al., 2016). It is crucial to ensure relevance, service quality and demand orientation of services, as well as the effectiveness of services in response to demands of service users in the long run (Christoplos et al., 2012 cit in Wongtschowski et al., 2016). A common feature of successful EAS systems around the world is that they are driven by, and accountable to, farmers, which is reflected in the management structures of the field extension units (Davis et al., 2009). Lack of downward accountability remains one of the main challenges faced by public EAS systems, despite the pluralistic environment (Blum et al., 2020). In a pluralistic EAS system, service providers may have very different objectives, goals, and motivations (Davis, 2020). This diversity in service providers can contribute to an enhanced efficiency of EAS systems only if all providers, be they NGOs, POs, public agencies or private enterprises, account for their activities to their primary stakeholders (Blum et al., 2020). Pluralistic EAS systems, by allowing for participatory mechanisms in decision making and implementation, promise an enhanced downward accountability. NGOs and private-sector providers are considered to have a stronger record in terms of downward accountability (Bitzer et al., 2016). In response to an increasing demand for downward accountability, public- and private-sector organizations have increasingly adopted results-based management which attempts to link inputs, outputs, outcomes and impacts (Klingebiel et al., 2019). Experience, however, clearly shows that using participatory approaches does not automatically lead to downward accountability (Christoplos et al., 2012 cit in Wongtschowski et al., 2016). An evidence is the participatory district-level forums in Kenya, which has shown limited effectiveness in making the decision making and EAS performance more accountable (Poulton, 2010). The following factors have limited the effectiveness of efforts to strengthen downward accountability:

♦ there has been some progress in bringing EAS closer to farmers and enhancing accountability through decentralisation, but overall these efforts largely remain inconsistent (Benson & Jafry, 2013; Farrington et al., 2002 cit in Bitzer et al., 2016);

♦ there is a lack of common framework and comparison of assessments on national or regional EAS systems, and a lack of impact assessment of the EAS policy reforms from the perspective of smallholder farmers and extensionists (Davis, 2020). Effective and participatory monitoring and evaluation (M&E) mechanism is critical to the accountability of EAS to farmers. However, when decision-makers (normally not EAS providers and framers’ organizations) with control over resources are irresponsible to corrective feedback from EAS users, M&E as a tool to strengthen accountability tends to become dysfunctional, as the cases of the Plurinational State of Bolivia and Colombia have demonstrated (Polar et al., 2012). This function of M&E is further weakened as EAS systems can
be quite complicated even within national boundaries. This is because countries have different agro-ecological zones with varying production systems, natural resource endowments, and EAS needs. Moreover, most developing countries are moving from sole dependency on public EAS systems to pluralistic ones with multiple actors and segmented activities which are difficult to track and document (Davis, 2020);

- unscientific performance evaluation may also undermine accountability. In Ethiopia, the performance of EAS agents is evaluated against the number of farmers adopting a specified technology package. This often creates disincentives for local responsiveness that is detrimental to downward accountability. Firstly, it leads to agents focusing on the relatively rich and middle-income farmers who are more likely to adopt new technologies so that they can meet their quotas. Secondly, this reinforces upward accountability of EAS agents as promotion and reward opportunities depend on meeting the said quotas (World Bank & IFPRI, 2010);

- accountability measurements (e.g. the number of field visits or training sessions rather than accountability to clients) and a focus on delivery of specific and well-defined messages (rather than quality of information) put in place adverse incentives and detract attention from the needs of actual recipients (Bitzer, 2016);

- often times, EAS institutional arrangement lacks a well-defined structure and clear chain of command that ensure accountability and clear line of reporting and feedback system at various levels (MOANR, 2017).
3.3 Affordability

Affordability of EAS is essentially about inclusiveness and equity, especially for smallholder farmers and other vulnerable farmer groups. Many tasks of public EAS have a public-good nature, including tasks related to regulation, quality control in the produce supply chain, the coordination of service provision, and natural resource management, as well as the provision of services to marginal or poor groups that are not likely to access or afford private EAS (Blum et al., 2020). The main challenge to guarantee this public-good nature that public agricultural EAS systems face is how to develop low-cost, sustainable approaches to providing information and services (Tsafack et al., 2015). Indeed, smallholder farmers are usually quite price-elastic and tend to be uninterested in paying for EAS. Estimates indicate that smallholder farmers in developing countries are likely to drop out of EAS if their share of costs exceeds 10–20 percent of the total service costs (World Bank, 2005 cit in Bitzer et al., 2016). As the agriculture sector becomes more commercialised, there is a worldwide trend towards shifting more of the cost of EAS to the farmers themselves or, in effect, to private EAS (Swanson, 2008). Unless farmers are able to receive an immediate financial return (FAO, 2011), this may negatively affect the affordability of EAS of smallholder farmers in particular for the following reasons:

♦ while commercial farmers can and will pay for these technical and management advisory services, it is much more difficult to shift these costs to small-scale, poor farmers (Swanson, 2008). Regardless of whether EAS for poor farm households will be organized and delivered by public-sector providers, private-sector firms, NGOs or FBOs (farmer-based organizations), much of the cost of these services will still need to be publicly financed over the foreseeable future (ibid.);

♦ in SSA countries, the core purpose for the establishment of private agricultural EAS is to seek market profits. Rather than addressing the highest priorities (e.g. subsistence/food farming) and empowering farmers and their communities, they try to meet specific commodity or value-chain opportunities, support the outreach programme of agribusinesses or assist commercial (medium and large scale) farmers to meet market or contract obligations (Nwafor & Nwafor, 2020). Smallholder farmers tend to be unable to pay for the services;

♦ it is unlikely that private companies will provide EAS to resource-poor farmers (Christoplos, 2010). To make this happen, they must be subsidised with adequate public funds, which still proves to be a major constraint in many developing countries;

♦ as a matter of fact, the commercialisation of smallholder farming still remains a big challenge in most developing countries. Although it is suggested that cost-recovery (fee-for-service) approaches be implemented or service costs embedded in contract farming arrangements (Christoplos, 2010), according to the experience from China and India, cost recovery still seems unrealistic until the majority of smallholder farmers become at least partially commercial farm operators and have the capacity and willingness to pay directly for these services (Swanson & Rajalahti, 2010);
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In Bangladesh, EAS staff of NGOs and donor projects often include public-sector agents hoping to earn more and gain access to operational funds for transport, demonstrations and so forth (Huber, 2017). Many of these projects have shifted to a market focus from an earlier focus on production (ibid.). This shift is quite likely to render EAS less affordable to smallholder farmers.

3.4 Adaptability

The socioeconomic and policy environment in which EAS are formulated and operated is ever changing. This tends to bring about shocks to EAS systems which will affect their relevance, efficiency, and responsiveness. Consequently, the scope and goals of EAS systems are constantly changing. There is now an increasing understanding that productivity-oriented EAS must be linked to market demand and be embedded within the context of the whole supply chain and the linkages or business relations (Blum et al., 2020). Accordingly, the focus of EAS needs to shift from increasing production to enhancing income and rural employment, thus contributing to the broad objectives of improved livelihood and increased food security (ibid.). Such a need for (continued) change in existing EAS systems requires simultaneously adapt their institutional arrangements to changing context and environment. This is nothing easy, as agricultural development in most developing countries is challenged by the complexity and uncertainty related to the following macro factors (Maatman et al., 2011):

- **Globalisation and regionalisation** as a result of the increasing interconnectedness of agri-food industries, finances, and trade within regions (economic blocs) and all over the world.

- **Marginalisation**, as a result of exclusive market and business dynamics given that established value chains mainly benefit a relatively small group of entrepreneurs, including farmers and for-profit service providers, and often target either the export markets or the richer consumers segments; the majority of farmers in Africa are still locked into a system of *ad hoc*, small volume sales on highly volatile spot markets.

- **Climate change**, given that, even though our understanding of how climate will affect agriculture, most studies agree that there will be negative effects over the next century, with extreme events, such as floods and droughts, likely to become much more severe and frequent in most areas.

To cope with the above-mentioned complexity and uncertainty, public EAS systems worldwide are increasingly expected to be sufficiently flexible and adaptive to respond to a broad set of local, national and global pressures that concern multiple sectors across value chains (Khwidzhili & Worth, 2019). EAS approaches should be able to accommodate a certain degree of flexibility and respond to different demands (Klerkx et al., 2016). Adaptive needs and pathways vary on a place-to-place basis. For example, experience from Peru and Mexico...
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shows that EAS need to be adapted to combine collective action with networking amongst heterogeneous value-chain actors while fostering the emergence of AIS (Hellin, 2012). The need to enhance the responsiveness and adaptability of EAS systems justifies the relevance of institutional reforms. For example, policy reforms in agricultural EAS systems are needed now in SSA countries due to the massive pressure mounting on public EAS to adapt to new funding constraints (Babu et al., 2020). In the process of any reform initiative, adaptability to changing socioeconomic demands and frame conditions (e.g. demography, income, education) remains a key issue. This always requires upgraded capacities at multiple levels in place to accommodate the structural readjustment due to changing socioeconomic demands and context conditions. Currently, such capacities are still lacking. For example, many developing countries have been striving to transform the smallholder agriculture sector from subsistence to commercial agriculture, facilitated by service provision through PPPs (Fan et al., 2013; Mapiye et al., 2021). However, the capacity to engage in market-led development appears particularly weak in many developing countries (Sigman, 2017), and there exists a dire gap among different social groups and both within and between regions. Invariably, most of the smallholders are less productive than commercial farmers and continue lagging in commercialisation (Mapiye et al., 2021). A variety of factors may limit the adaptability of public EAS:

♦ Latin American experience in privatising EAS systems shows that, a critical assumption in making EAS systems more demand-driven has been that farmers are well-organized and prepared to assume these new responsibilities; however, the level of farmer organization, particularly among poor farmers in marginal areas, continues to be low (Swanson & Rajalahti, 2010);

♦ in the Plurinational State of Bolivia, the integration of local and external knowledge has enabled farmers to better cope with new challenges due to climate change, fluctuating market prices for cash crops, and surrounding destructive land-use strategies. However, many EAS projects still tend to prioritise external knowledge and undervalue local knowledge, a tendency that has long been institutionalised in the formal educational and EAS systems (Jacobi et al., 2017);

♦ the existing M&E systems have limited ability to offer empirical evidence to strengthen adaptability. The application of the EAS M&E should ideally contribute to appraising the level of responsiveness of the system, its capacity to renew itself through the integration of ongoing developments and innovations in EAS, in the fields of methods and tools, extensionist capacities and governance and regulation (Sulaiman V et al., 2022). However, this is seldom the case in reality;

♦ lack of agricultural EAS tailored to all the different situations and their different potentials is slowing the economic development of SSA countries. Overall agricultural yields remain low, the number of poor people in rural areas is increasing, natural resources are being degraded or are becoming increasingly rare and malnutrition remains very high (Rigourd & Dugue, 2022);

♦ in Mali, supportive research is essential to assess, adapt and develop approaches that meet the needs of farmers (Kéïta et al., 2017). In Islamic Republic of Iran, the interaction between research, extension and farmer and the direction of
research towards producers and their needs and the participation of farmers in relevant decisions is necessary to achieve a farmer-centred (and thereby more adaptive) EAS approach (Salehi et al., 2021). However, due to the weak relationship between research and extension, the EAS formulated and delivered may be “out of the context” and fail to respond to farmers’ actual needs (ibid.);

- user demands tend to be simplified and predetermined, ignoring the fact that the demands and needs of the EAS users can be influenced by several factors: (1) the capacity of users to express themselves, (2) capacities of EAS providers, and (3) the governance and organization of the system (Sulaiman V et al., 2022). A poor and inaccurate understanding of “demand” often times undermines the responsiveness of EAS;

- experience from Kenya shows that, EAS can only become more responsive when citizens are organized, eloquent, vigilant or well-connected, which can count against the poor (Poulton, 2010). Introducing pro-poor strategies is vital to involve the disadvantaged groups of the society. However, a more inclusive and unbiased involvement remains largely lacking;

- the regulatory and legal framework to facilitate and guide adaptive EAS reforms is weak in many developing countries. Indeed, a major problem in organising EAS in these countries is the absence of legal and policy frameworks for providing EAS (Blum et al., 2020). Even if in some countries, laws to modernise and develop the agriculture sector and decentralise EAS were created, the necessary resources were not provided for implementation, and public and private institutions remain fragmented, as is the case of Honduras (Briones Valenzuela & Saavedra, 2017);

- in Kyrgyzstan, the digital gap in the existing EAS is constraining their adaptability. The fast growing ICT sector in most developing countries is demanding more and more trained people who are competent in digital EAS. Empirical evidence shows that public-sector EAS agencies suffer mostly from the lack of competence in using ICT-based equipment, while NGOs and donor-funded projects are able to attract skilled staff (Mirzabaev et al., 2011);

- EAS tend to be formulated in a siloed, fragmented approach. This reduces their adaptability to complex real-world situations which require a “systems thinking”. In Cameroon, participation within rural communities tends to be limited to poverty alleviation. It needs to go beyond poverty alleviation and target the empowerment of people to become less dependent on relations of patronage for daily subsistence (Fa, 2018). As the evidence from Colombia shows, the demand-driven approach to EAS has been characterised by the fragmentation of services, whose emphasis has been specialised agricultural EAS to solve specific problems, without considering the broader view of the territory and with poor access for small producers (Patricio Molina, 2010);

- adaptive management where priorities are regularly reviewed and action is taken to address emerging needs is needed to ensure flexibility in project design and implementation (FAO, 2021a).
3.5 Sustainability

Sustainability of public agricultural EAS has two dimensions. On the one hand, EAS systems balance the need to reduce costs with alternatives that recover operating expenses, and in some cases, generate revenue. On the other hand, EAS systems are measured by their continuous ability to enhance the productive capacities and livelihoods of their clients, primarily small farm households, and contribute to broader agricultural growth (Davis et al., 2009). An EAS institution might be deemed sustainable if it has the strength to survive and develop to fulfil its functions on a permanent basis with decreasing levels of external support. This requires the ability to network and innovate continuously in an endogenous way. More specifically, an EAS institution or a long-term programme could be considered sustainable where it is likely (Blum et al., 2020):

♦ to be able to secure necessary inputs and support; and
♦ to provide, efficiently and effectively, a continuing stream of activities and outputs that are valued by its stakeholders (members, clients, and/or superiors) for as long as the institution is needed (NORAD, 2000).

Introducing or strengthening demand-driven EAS must include appropriate sustainability arrangements in its design. Drawing on experience of demand-led community services from Pakistan, Qamar (2011) observed that:

♦ the sustainability of a new concept like demand-driven EAS is assured only if a long-term programme rather than short-term projects are prepared, in line with government policy and fully integrated into development programmes institutionally, financially and operationally;
♦ active involvement of government departments must be included from the very beginning in any programme designed for introducing demand-driven community services;
♦ in terms of forming community organizations, it is better to start with simple, informal groups of farmers and then gradually develop them over time into formal and more sophisticated organizations through capacity building and legalisation.

It can be seen that coherence/continuity at institutional, financial and operative levels, government involvement and partnerships, and an incrementalist approach are all key factors accounting for sustainability. The sustainability of public agricultural EAS systems in developing countries is commonly threatened by the following factors:

♦ in Kyrgyzstan, government funding that the agricultural research institutes receive is barely sufficient to cover the operational needs of the organizations and staff salaries, with little money left for research and knowledge dissemination (Mirzabaev et al., 2011);
♦ in Cameroon, sporadic expansions of EAS systems that are spurred by external donor-funded programmes tend to be short-lived (Fa, 2018). EAS systems generally suffer from weak political commitment and support, because that
it is difficult to attribute agricultural performance to extension efforts and extension activities are not as visible as other investments such as irrigation and road projects. Thus, in a context of limited fiscal resources, decision-makers tend to assign low priority to EAS (ibid.);

♦ an aging EAS agent system together with the absence of effective recruitment initiatives is also weakening the sustainability of the public EAS system in many developing countries, like Azerbaijan, Liberia and Guinea (FAO & MoA, 2021; MacNairn, 2017; Sigman, 2017). Lacking incentives for human resource development is commonly regarded as detrimental to the sustainability of EAS. For example, in Senegal, there is an absence of performance management systems for public-sector staff, few or no incentives to perform well, and lack of opportunities for continuing education or career development (Franzel et al., 2018). Similarly in Guinea, there are few to no official financial incentives for improved coordination and overall performance (MacNairn, 2017). Salaries of public EAS agents in most of developing countries tend to be low while extension agents working for NGOs or the private sector typically make more money, which may lead agents to carry out non-extension activities or simply leave the public system. Bangladesh is one exception, and public EAS agents are relatively well-paid (Davis & Franzel, 2018);

♦ creating a functional market of services is increasingly seen as an effective way to increase sustainability of services. This implies a need to shift from funding to sustainable financing mechanisms, including co-financing
mechanisms with diverse public (e.g. levies) and private sources (POs, private enterprises, etc.) to empower clients and allow them to choose the services they need in a market of services (Blum et al., 2020). Also, enabling policies for private-sector involvement in service provision including both POs and for-profit companies should be implemented for enhancing a market for services. Such financing mechanisms and policy frameworks, unfortunately, are largely underdeveloped and inadequate in many developing countries;

♦ experience from Mali shows that, sustainability implies a stronger contribution and coordination of EAS actors (Kéïta et al., 2017). However, in current pluralistic EAS systems, there seems to be a divergence in terms of contribution among multiple actors whose activities are often times poorly coordinated;

♦ lack of regulatory and legal framework often undermines the sustainability and coherence of public EAS. Public EAS are often subject to changes of policies of different governments because provision of EAS is not institutionalised through legislation (Davis, 2020).

3.6 Coordination

Coordination is the unification, integration, and synchronisation of the efforts of actors so as to provide unity of action in the pursuit of common goals (Blum et al., 2020). Given that EAS have become more pluralistic in developing countries, the need for coordination, quality control, and avoiding duplication of efforts becomes a key policy and programmatic challenge for the public sector (Davis, 2020). As EAS systems become increasingly pluralistic, governments must address the issue of coordination and regulation of the many providers. There is a growing need for improved coordination of EAS, which can help address increasing pluralism in providers, decentralisation of services, and the current disconnect between research and extension (Place, 2020).

There commonly exists a poor coordination of different levels of decision making under the decentralised management system (Chuluunbaatar et al., 2017; Rokvić & Vaško, 2016). Currently, there is a sectoral approach to coordination within the overall EAS system. For example, in Slovakia, agricultural advisory services are coordinated by Agroinstitut located in Nitra. Forestry advisory services are coordinated by the National Forest Centre in Zvolen and in the field of veterinarian activities the responsibility is undertaken by the Veterinarian Education Institute in Košice (Kasdorferová et al., 2020). Due to a lack of coordination, an effective EAS delivery is barely possible even when a country has a high extension agent-to-farmer ratio and a pluralistic extension system, as is the case of the Democratic Republic of Congo (Ragasa et al., 2016). Without a budget for coordinating EAS activities at the decentralised level,
collaboration and coordination between the national and sub-national levels tend to be based on personal relations or through a hierarchical request from the ministry (Chuluunbaatar et al., 2017). Public EAS agencies often are also struggling to coordinate with policies for innovation and research developed by other ministries, which nevertheless affect rural development (Rigourd & Dugue, 2022).

The growing pluralism in EAS systems worldwide has further challenged the coordination issue. Pluralistic EAS are praised for their ability to overcome different constraints related to funding, staffing and expertise as well as providing the necessary flexibility to make extension services more demand-driven, context-specific and based upon multiple knowledge sources (Birner et al., 2009). However, there is a need to coordinate, scale and make sustainable these services as well as to better reach farmers, especially vulnerable and marginalised people like women and youth (Huber, 2017). Especially under pluralistic EAS systems, coordination is becoming crucial to take advantage of different types of EAS providers and deal with the emerging challenges today such as climate change and malnutrition (Davis, 2020). According to Bitzer and others (2016), coordination is important in pluralistic EAS systems also because it is:

- critical to make different types of services available to different categories, thus serving the diverse needs and demands of farmers;
- essential to improve the cost efficiency of services, both on the supply side (by avoiding overlaps and gaps in service provision) and the demand side (by promoting group approaches and the use of ICTs); and
- necessary to improve the transparency of service delivery for farmers.

Blum and others (2020) maintain that in a pluralistic EAS system, effective coordination has a crucial role to play in enabling:

- learning between providers;
- joint planning and decision making based on consensus building;
- improvement of efficiency and effectiveness of EAS; and
- enhancement of impact while increasing possibility to scale up.

Indeed, the increasing number of stakeholders in EAS systems makes the issue of coordination crucial. Without coordination, pluralistic EAS systems would only be the coexistence of different service providers with no functional linkages among them (Bitzer et al., 2016), ultimately not providing any benefits to farmers. However, despite all its importance, one of the key challenges and greatest problems in pluralistic EAS systems lies in the low coordination and collaboration by various service providers that have vastly different ways of working (Bitzer et al., 2016; Heemskerk & Davis, 2012). While the diversity embedded in pluralism provides dynamism and richness in terms of learning and institutional innovations, it has led to fragmented EAS delivery systems with little coordination among actors and weak leadership (Briones Valenzuela & Saavedra, 2017). “Plurality” often times merely indicates the presence of different
service providers within a particular country, whereas it is implicit whether there is plurality of providers at village or farm level, and whether there are any functional linkages between these providers (Bitzer et al., 2016). Experience from different countries shows that this has been the greatest problem up to now, and coordination and collaboration between the various service providers is generally low, particularly at the local level (Simpson et al., 2012; McNamara et al., 2011 cit in Bitzer et al., 2016; Franzel et al., 2018) and capacities to do this are limited (Blum et al., 2020). In Nigeria, while EAS are becoming increasingly pluralistic, coordination among actors continues to be a challenge (Huber et al., 2017). In Bangladesh, public EAS providers and content creators at research institutes and universities do not coordinate often, so much that the content of public-sector EAS is outdated (Huber, 2017). In Colombia, for example, 38 percent of the organizations surveyed had weak links with other organizations; 30 percent had moderate links; and 20 percent had close links (Preissing et al., 2018 cit in Davis, 2020).

The following factors were identified as main constraints leading to poor coordination of a pluralistic EAS system:

- There is commonly a lack of a comprehensive national extension policy in many developing countries, which has contributed to the lack of coordination among extension providers and low funding and profile of public EAS, as is the case of Senegal (Franzel et al., 2018). In Azerbaijan, there are no formal or informal mechanisms, platforms, laws or decrees or any other normative acts for linkage, coordination and harmonisation between public and private EAS providers. Even within the public EAS sector, there is a poor coordination (FAO & MoA, 2021);
- Coordination and regulation is generally considered to be the role of the public sector (at district, regional and national levels) (Heemskerk & Davis, 2012), with the state has a key role to play (Pye-Smith, 2012). However, experiences from different countries show that the poor capacity of the public sector and inter-ministerial competition for resources tend to result in poor coordination among pluralistic actors (McNamara et al., 2011; Simpson et al., 2012 cit in Bitzer et al., 2016). For example, according to the experience from Africa, there exists the relative absence of public institutions capable of promoting or enforcing coordination between global participants, let alone ensuring the inclusiveness of global markets (Maatman et al., 2011);
- In a pluralistic EAS system, coordination requires that the activities, scope and scale of the different service providers be aligned in such a way that service providers are accountable, quality assured, farmers able to influence extension services, and lessons learned shared among service providers (Heemskerk & Davis, 2012). Therefore, all the providers present should play different and complementary roles in coordination (Blum et al., 2020). However, this is still poorly performed due to the absence of an effective coordination mechanism among these providers.
BOX 10. Inter-bureau collaboration in the Philippines

The Agricultural Training Institute (ATI), as the extension and training arm of the Department of Agriculture of the Philippines. It performs its mandate as an apex agency for a unified and efficient agriculture and fisheries extension services. The vision of the ATI is leadership excellence in agricultural technology and knowledge management for a more proactive and responsive extension service. Its mission is to coordinate diversified agricultural extension delivery systems for the local government sector and other stakeholders to facilitate the flow of information on technology and other services such as fund management, network establishment and systems for standardization and certification of extension providers that can empower the farmers and fisherfolk to become more globally competitive. The ATI does not directly deliver extension services to the farmers but assists the Local Government Units (LGUs) in carrying out this function.

Itself being one of the bureaus under the Department of Agriculture, the ATI collaborates with several bureaus and agencies of the Department of Agriculture that need extension support for their individual programmes. Some of these bodies have significant extension mandates. Besides ATI, the names of other bureaus are as follows:

- Agricultural and Fisheries Product Standards
- Agricultural Research
- Agricultural Statistics
- Fisheries and Aquatic Resources
- Plant Industries
- Post-harvest Research and Extension
- Soils and Water Management

The ATI also collaborates with several autonomous agencies attached to the Department of Agriculture, which have their own programmes and need extension support. The names of those agencies are as follows:

- Agricultural Credit and Policy Council
- Cotton Development Administration
- Fertilizer and Pesticide Authority
- Fiber Industry Development Authority
- Livestock Development Council
- National Dairy Authority
- National Food Authority
- National Meat Inspection Authority
- Philippines Coconut Authority
- Sugar Regulatory Commission

Agricultural extension and advisory services (EAS) and related goals are subject to change following changing state of national agricultural development. As a result, reforms, at the institutional level in particular, are needed to keep the relevance and efficiency of any type of EAS systems. Three paradigmatic shifts appear eminent in driving EAS reforms. The first is the move from solely public EAS to pluralistic EAS with greater roles for private, non-governmental, and community-based organizations, leading to demand-driven and participatory approaches. The second is the move from a conventional focus on agricultural production to a broader set of services focusing on income, market linkage, food and nutrition security, and improved well-being. The third is the move from the prevailing transfer-of-technologies approach to living-lab and endogenous approaches based on participation, facilitation, co-learning and co-creation processes, and increased capacity to innovate. This requires that existing EAS systems be adjusted or developed and adapted to EAS’ multiple roles that go
beyond advisor and technician to include educator, middleman, facilitator, analyst, researcher and learning partner. Besides, technological progress and simultaneous behavioural change are also driving institutional change of EAS systems. For example, with the rapid growth of ICT and high-tech supported services, emerging service providers and adaptive users will jointly reshape the institutional landscape of EAS in the future (Blum et al., 2020). In view of challenges ahead, the priorities should be revised and reprioritised focusing more on transferring new technologies and issues like climate change vulnerability, environmental safeguards, farm management and food safety (Sejersen et al., 2020).

Reforming and strengthening public EAS for improved access to technologies, innovations and markets of smallholder farmers requires a more contextualised, coherent and integrated approach. Efforts to reform public EAS should encompass strong institutional arrangements, reformulating institutional mandates, investing in human resources, strengthening financing mechanisms and legal and regulatory frameworks, strengthening collaboration and coordination with non-public EAS agencies, and optimising policy environment. This is crucial for adjusting or changing the existing institutional structure of public EAS systems to accommodate growing demands for more pluralistic approaches. Besides, such efforts should consider the needs for functional capacity development, institutional coordination, digitalisation, infrastructure development, knowledge management, indicators for performance M&E, and strengthening of science-policy-practice interface at national, regional and global levels. Furthermore, embedding national priorities in line with changing complexity in agri-food systems and using more integrated and holistic approach to R&D are necessary to increase effectiveness and return on investment.

4.1 Ensuring essential public EAS accessible to smallholder farmers

Policy and institutional changes are urgently needed to create realistic and remunerative opportunities for smallholder farmers (Pye-Smith, 2012). It is strongly recommended that government, taking the agronomic sector for example, guarantees the provision of some essential public EAS to smallholder farmers, including (1) introduction, field trial, demonstration and extension of new crop varieties, new inputs, and new technologies in the field of crop cultivation, scientific fertilisation, water saving and rain-fed agriculture, integrated pest control, and safe use of chemicals; and (2) monitoring and forecasting of crop pests, soil moisture, extreme weather events, and drought and flooding. Some services can be provided by the non-public sector, such as agri-food enterprises and NGOs, including but not limited to, high-technologies like aquaponics, automation, digitalisation and so on (these services are mainly aimed at big
agri-businesses), input delivery, market linkages, capacity building and so on. This means that, it is the responsibility of the public sector to provide general, essential EAS on crop production to smallholder farmers, whereas private EAS are particularly important for the provision of specialised services for farmers that have such needs (Bitzer et al., 2016). While those services demanded by better-off farmers can be offered on a partial or full payment basis, fundamental services related to food security, poverty reduction and ecological sustainability are to be provided by the public sector with continued financial support, no matter who will actually deliver such services (Blum et al., 2020).

A healthy pluralistic EAS system should have complementary functions enabled by both public EAS and non-public EAS providers. It is argued that only by integrating non-governmental services from farmer organizations, the private sector and civil society organizations can public EAS reach be increased and sustainability enhanced (Davis & Franzel, 2018). Promoting this integration will concern a trade-off issue in public agricultural EAS systems in many countries: the need to maintain the public-good nature of public EAS and the need to privatise the EAS so as to strengthen their efficiency. On the one hand, public EAS systems are still highly relevant to agricultural and rural development, despite that most of them are inadequate and inefficient due to the number of farm households to be served, the “top-down” structural problems, a lack of well-trained staff, and the inadequate programme resources at the field level. This relevance lies in that like any socioeconomic systems, EAS systems should aim at two concurrent goals, namely, efficiency and equity. Equity means that resource-poor farmers and neglected groups can access public EAS (Bitzer et al., 2016). Smallholder farmers in developing countries, often resource-poor and disadvantaged, play a key role in meeting the future food demands of a growing and increasingly urbanised population (Fan et al., 2013). Despite their importance to agri-food systems, based on the experience in Latin America and elsewhere, replacing these public EAS systems with private-sector firms and/or NGOs has excluded smallholder farmers from essential EAS to a certain extent and resulted in another set of problems and constraints that may further limit the success of these alternative approaches (Swanson, 2008). There are clearly continuing roles for the public sector in terms of ensuring public-good EAS to meet national objectives such as environmental protection, natural resource management and food security. For example, the promotion of sustainable agricultural practices should remain the domain of public EAS (Khwizdhili & Worth, 2019). To address both farmers and public needs, the public sector should use new intervention mechanisms (pull measures to help farmers ask for EAS and push measures to help EAS agencies adapt their service provision), which are not yet fully understood and for which no best practice has been established (Klerkx & Jansen, 2010 cit in Faure et al., 2016).

On the other hand, privatisation remains a global trend driven by the shift from subsistence farming to commercial farming in numerous developing countries. Although public EAS systems tend to be staff-intensive (up to a degree where high levels of staff remuneration took almost the entire national budget for extension), they still have difficulty in covering the vast number of
farmers in need of services (Kidd et al., 2000 cit in Bitzer et al., 2016). It has been increasingly recognised that public EAS by themselves cannot meet the various actual demands of different regions and different types of farms and farmers (Blum et al., 2020). Involving private EAS providers, civil society and farmers’ organizations is therefore needed to complement the public sector’s role. This trade-off is essentially about the long and still ongoing debate about whether EAS systems should be public or private, and there is as yet no clear evidence based on experience to favour one side or the other, but there is one point of consensus in favour of a mixed pattern (Hoffman, 2011 cit in Blum et al., 2020). For example, Huber and others (2017) recommend the development of a sustainable, ICT-enabled public-private EAS model enabling training for agro-dealers and other private providers; bundling of EAS with other market services, like inputs, outputs, finance, transport and storage; and the use of ICTs, such as Interactive Voice Response (IVR), to enable farmers to authenticate the quality of the inputs they purchase. Therefore, to address this trade-off issue, both public-sector and private-sector EAS are to be developed. In this regard, the following lessons are drawn from the literature review which can be useful for reformulating pluralistic EAS systems that are in accordance with national frame conditions and able to balance efficiency and equity needs:

♦ government plays and will still play an important role in agricultural and rural development, although its relationship to extension funding and delivery is changing fundamentally in pluralistic EAS systems and become much more multi-faceted (Bitzer et al., 2016; Rivera et al., 2001), serving as a coordinator, overseer and regulator of the entire pluralistic EAS systems (Blum et al., 2020). Its role becomes crucial in terms of governance, national policy direction, quality control and accreditation of service providers, including the private sector, to safeguard the interests of farming communities (Davis & Franzel, 2018);

♦ according to the experience from central Asia, to develop an effective EAS systems, a national policy framework should be in place to indicate national agricultural development priorities, outline the organizational structures necessary to implement these priorities and the corresponding institutional linkages, and the extent and nature of the commitment required to encourage farmers (Kazbekov & Qureshi, 2011);

♦ in a pluralistic setting, government will need to organize national and regional multi-stakeholder platforms and exchange meetings to discuss and determine with major stakeholders the value and importance of EAS, and how best to organize the varied EAS activities in a systematic fashion (Blum et al., 2020);

♦ appropriate roles for public-sector agencies will differ from place to place and over time, depending on to what extent the private and civil society services are developed. This has led to a shift of focus from blanket statements about who should provide EAS to a search for better ways to guarantee that all service providers are genuinely accountable to the clients that they serve (ibid.).
in most countries, dependence on public funds (mostly from donors) is still dominant even if EAS are provided by private-sector organizations due to the difficulties in implementing cost-recovery approaches (Bitzer et al., 2016). Although more and more services can be delivered by pluralistic actors to address different demands of farmers, gaps in EAS provision tend to remain. This demands the public sector, besides its coordination role, to play a role in addressing market failure by providing incentives for private service delivery (e.g. risk sharing) or by offering the required services (ibid.);

in Burkina Faso, farmers under private EAS systems rated the quality of services they received better than farmers under public EAS did (Sylla et al., 2019). Therefore, government can promote private participation in EAS delivery by creating a good business environment for the private systems to operate (ibid.);

privatisation of EAS systems needs to be made part of a wider reform process which promotes pluralism while recognising the need for public financial support (Blum et al., 2020). The privatisation of EAS implies that the government should develop new functions to regulate relationships among actors, and should guarantee that the public interests are considered (Klerkx et al., 2006; Labarthe, 2005; Rivera & Alex, 2004 cit in Faure et al., 2016). Faure and others (2017) also highlight the importance of both improving and regulating the private EAS and strengthening the coordination of EAS between public and private actors for an efficient agricultural EAS system.
Establishing appropriate national EAS systems in Central Asia through institutional reforms, backed by national policies outlined within the context of comparative agricultural advantage of different countries within the region, is critical to exploit their full potential in agriculture (Kazbekov & Qureshi, 2011). In Tajikistan, private sector organizations include input supply dealers and EAS providers and have always partnered with the government institutions (ibid.). These institutions work with local financial institutions to provide credit to farmers and sometime contract with NGOs to provide technical services to farmers, farmer groups, farmer associations and cooperatives; organize farmers groups to facilitate export of commercial crops.

In Plurinational State of Bolivia, the Ministry of Land and Rural Development (Ministerio de Desarrollo Rural y Tierras) has been developing a new public system for basic and applied research, technology transfer, and broader free technical assistance through the National Institute of Agricultural and Forestry Innovation (INIAF – Instituto Nacional de Innovación Agropecuaria y Forestal, a public, decentralised, autonomous institution) and the National Service of Agricultural Health and Food Safety (SENASAG – Servicio Nacional de Sanidad Agropecuaria e Inocuidad Alimentaria), the target beneficiaries of the National Institute of Agricultural and Forestry Innovation (INIAF). Small- and medium-scale producers and subsistence and marginal farmers are provided with free of charge EAS.

In Colombia, although the Ministry of Agriculture and Rural Development does not directly provide EAS, yet it becomes an important institution for EAS purposes. Funding in the form of subsidies/co-financing (up to 80 percent of the total cost) for direct technical assistance (extension) for the producers comes from the government coffers. It is suggested that Colombia should recover an approach of agricultural EAS that integrates the productive dimension with a territorial perspective (Patricio Molina, 2010).

Although the State has always recognised its obligation regarding agricultural EAS, its leading role has been waning by limiting its responsibilities to supplying monetary subsidies within a scenario in which power groups stake claims of said resources, against an incipient organization of small producers to generate a demand for these services. In effect, the IAT (Incentive to Productivity to Strengthen Agricultural Extension) results are precarious in terms of placements to small producers, due to the lack of institutional accompaniment to encourage that demand. Furthermore, there is evidence of increasing fragmentation and dispersal of the players and programmes, with growing importance of the privately paid, added to progressive deinstitutionalisation of agricultural EAS, which in many instances are not part of a private or public institutional structure (ibid.).
4.2 Enhancing downward accountability

Ensuring holistic and collaborative operation using a systemic approach while making EAS more accountable at the field level is critical to ensure the sustainability of extension (Khwidzhili & Worth, 2019). From the perspective of farmer empowerment, accountability is no less important as it affects both economic empowerment through relevant services and social empowerment through involvement in service planning (Heemskerk & Davis, 2012). To promote demand-driven EAS, it is very important to make EAS provision accountable to users and enhance transparency and empowerment as essential conditions for increasing the relevance and effectiveness of EAS provision (Blum et al., 2020). Downward accountability of EAS vis-à-vis the users, i.e. farmers, needs to be strengthened by giving farmers a direct say before, during and after services through demand articulation and participatory needs assessment, influence in service design and participation in M&E (Bitzer et al., 2016). The voice of farmers has been strengthened through the involvement of farmers’ organizations and small-scale rural enterprises in EAS delivery. Indeed, participation is a principal contributing factor to accountability. Once effective farmers’ participation is ensured, accountability of EAS providers to users becomes more feasible (ibid.). Having farmers participate in EAS design and implementation, and holding service providers accountable is difficult without some form of farmer organizations (ibid.). This has led EAS providers to emphasise client-oriented approaches in order to increase customer ownership. The accountability of public and private services is thus shifting from upward accountability (as under the Training and Visit (T&V) system) to more downward accountability, looking directly to client beneficiaries (Heemskerk et al., 2008).

Three main factors would enhance downward accountability (Blum et al., 2020), including:

♦ first, a multi-stakeholder governance structure where producers are included and can influence the planning, design, implementation and M&E of the services;
♦ second, but most crucially, the promotion of demand-side financing mechanisms where producers and their organizations are enabled to articulate and negotiate their demands as well as to pay for the services, thus leading to more relevant and effective services; and
♦ third, the use of participatory methods involving clients as partners and not merely beneficiaries of services.

Other practices that are conducive to enhancing downward accountability of public EAS systems include:

♦ a shift from a technocratic perception to EAS users’ empowerment to demand services so as to better understand users’ real-world needs. However, in many cases, due to capacity and lack of information, they may not have a clear understanding of their needs or where to communicate their needs. While farmers need to be empowered to take up their role in a proactive way, service
providers need to have the capacity and flexibility to respond to these demands in an environment of increasing specialisation and differentiation among farms (Blum et al., 2020);

- effective M&E will be crucial for improving the accountability of public agricultural EAS. This demands assessing farmers' satisfaction with the quality of agricultural EAS, which is essential for developing EAS programmes that comply with farmers' needs and agro-ecological conditions, as is evidenced by the experience from Egypt and Islamic Republic of Iran (Kassem et al., 2021; Salehi et al., 2021). Therefore, an increased involvement of farmers in M&E at a systemic level is needed, for instance, by means of integrating farmers into EAS planning and involving farmer organizations in service procurement. Mechanisms to promote quality assurance and transparency also need to be put in place through clear M&E procedures supported by the use of related ICT (Blum et al., 2020);

- providing EAS based on performance contracts, e.g. between the providers and the clients or between EAS agents and their employers, offers an opportunity to include farmers' feedback into performance reviews and thus serves to increase downward accountability (Bitzer et al., 2016);

- regular reporting of monitoring data, case studies and transversal analysis across programmes or systems can generate accountability and comprehensive evidence to support national and global learning and facilitate the design of more effective EAS in the future (Sulaiman V et al., 2022);

- the potential role of POs in enhancing accountability is to be leveraged. POs, including village-level self-help groups, cooperatives, associations and their
federations at the regional or national level, can showcase various success stories in providing EAS to their members. Studies have shown that EAS provided by POs are often more relevant and tailored to farmer demands than services from other providers (Bitzer et al., 2016). Accountability also increases, as the organizations are, in principle, directly accountable to their members (Feder et al., 2010);

- experience from Colombia shows that it would be convenient to draw a policy on agricultural EAS differentiated by the type of producers, i.e. basic or induction to change, for subsistence farmers and with State leadership; intermediate or of technical business formation, for farmers in the process of business transformation; specialised or of strictly technical solutions, for entrepreneurially consolidated farmers and without State leadership (Perfetti et al., 2009 cit in Patricio Molina, 2010);
- new platforms and spaces are needed to facilitate participation of users. For example, in some African countries, district-level stakeholder forums have been engaged in consultation and collaboration for a number of years. As for now, varying functionality and capability to promote participatory approach to EAS delivery have been noticed. In the United Republic of Tanzania, farmers have had a say in resource allocation and service provision, whether public or private, through district-level farmer forums (Maatman et al., 2011). Whereas in Kenya, district-level forums have no power to influence budgets or to hold service providers to account for their performance (Poulton, 2010);
- digital tools have been increasingly deployed to improve the accountability of EAS. The application scope of digital tools are to be broadened both as EAS delivery tools and as mechanisms for demand articulation, monitoring, and greater transparency and accountability (Davis, 2020);
- participatory approaches, by enabling demand-driven EAS, are a promising way to guarantee downward accountability. In Cameroon, participation is perceived as a particularly important strategy to overcome both state failures and market failures in EAS, which can facilitate the transfer of knowledge, not just from researchers/practitioners to the locals but also from locals to the researchers/practitioners and between locals (Fa, 2018). This is conducive to enabling farmers to gain ownership of EAS, thereby making services more accountable to them. Moreover, this overcomes what is deemed to be legitimate knowledge being solely derived from privileged experts that has the effect of obscuring other forms of knowledge (ibid.), helping promote sustainable agricultural practices by tapping into local knowledge of farmers, as is the case of South Africa (Nagel, 1997 cit in Khwizhili & Worth, 2019). In Ethiopia, promoting effective farmer participation in EAS formulation marks an apardigmatic shift in focus from targeting spatial coverage to effective outcomes, which are essential for agricultural EAS systems to succeed (Leta Dufera, 2018). However, a participatory, demand-driven approach to EAS does not mean that the supply side (EAS agents) do not have a say in the services delivered, but it is rather about a meaningful dialogue between demand and supply (Klerkx et al., 2016). Therefore, brokers between demand and supply seem to be essential to navigate pluralistic extension systems, and more broadly AIS (ibid.).
BOX 12. Participatory EAS in Africa

Most African countries including Benin, Malawi, Nigeria, Uganda, and Zambia have adopted, and some, such as South Africa, are developing suitable participatory extension systems to suit local conditions. The main participatory extension approaches used in Africa and some parts of Asia include Farmer Field Schools, the project approach, and farming systems research-extension approach. For example, the Farmer Field School approach has been implemented in many countries in Africa including the Democratic Republic of Congo, Gambia, Niger, Cameron, Togo, Uganda, Namibia, the United Republic of Tanzania, Nigeria, and Zimbabwe. FFS has contributed to changes in attitudes and perceptions of participants and facilitated the development of new relationships between farmers, researchers, extension workers, and community development personnel. However, its implementation in most of these countries was largely hampered by the inadequate exposure of research and extension staff to the concepts and procedures of the approach. All in all, effective participation by farmers in these countries seems elusive due to a lack of time, uneven political will, and budgetary constraints. This often leads to extension projects that are just nominally participatory but lacking effective empowerment to the farmers and stakeholders.


BOX 13. Community Score Cards

A good example of promoting accountability is the Community Score Cards (Wongtschowski et al., 2016; FAO & KIT, 2016). The basic idea of the Community Score Cards, pioneered by Care International, is to establish a dialogue between providers and users, starting from the early phases of service provision and culminating in joint monitoring and evaluation (M&E). This implies a fundamentally different relationship between EAS providers and farmers, based on joint activities and transparency, as compared with the “traditional” top-down approach to EAS. Community Score Cards is a concrete example of a monitoring and evaluation (M&E) system that leads to downward accountability, as well as learning and action.


4.3 Fostering multi-actor coordination

The three most important emerging practices considered particularly promising in advancing the governance of pluralistic EAS systems revolve around (1) public coordination of pluralistic systems, (2) public-private partnerships, and (3) bottom-up extension services through farmer organizations (Bitzer et al., 2016). Coordination is
a process where all these three dynamics are embedded, especially under a pluralistic and professional EAS system. Such an EAS system requires innovative coordination mechanisms to achieve synergy and increase the quality and reach of the EAS provided (Maatman et al., 2011). Coordination proves increasingly important for enhancing the efficiency, responsiveness, accountability, and sustainability of public EAS for multiple reasons. First, there is a growing interest in territorial approaches to EAS and rural development processes. The territorial approach emphasises the importance of multi-actor and inter-institutional processes in development (that is sometimes associated with a focus on agro-ecological approaches to farming) and thereby facilitates the emergence of innovation platforms at the local level (FAO, 2021a). Second, as decentralisation incorporates sustainability as a central principle, what is required are new ways of motivating collective action and learning, in addition to skills and tools for working with individuals (Fa, 2018). This suggests the necessity of adopting multi-actor and collaborative approaches, especially from the perspective of AIS. It also requires a shift from a teaching paradigm towards a learning paradigm that demands highly participatory interaction and knowledge sharing among all stakeholders (Fa, 2018). It is believed that interactive learning is critical to the development of AIS (ibid.). Third, the scale of innovation required to face up with various challenges, more than ever, will involve multiple actors within and beyond the agriculture sector to coordinate their collaborative learning and action (Maatman et al., 2011).

Different coordination roles can be played by the various actors (Bitzer et al., 2016). The public sector, usually ministries of agriculture, is responsible for the overall coordination and regulation of extension (Davis, 2020). The available evidence indicates that the state should act more as a promoter of a decentralised system (e.g. structuring ways to understand and meet the demands of other stakeholders) rather than assuming the role of its chief coordinator (ibid.). However, awareness needs to be raised at a sufficiently high level, because that reforming EAS systems will necessarily affect multiple sectors and multiple stakeholders, and will be a long and complex process (affecting roles within public services, tools for funding the sector, etc.) (Rigourd & Dugue, 2022). Local government can play a critical role as intermediaries in coordination efforts. This underlines the need for the government to remain involved in EAS (Fa, 2018), in spite of the privatisation of EAS systems. Where strong farmer organizations exist, they may also be able to coordinate relevant services to their members (Bitzer et al., 2016). This is done mainly by hiring their own advisers and by bringing in external advisers. Innovation platforms have also been identified as mechanisms for coordinating agricultural development (Mur & Wongtschowski, 2013 cit in Bitzer et al., 2016). Newer forms of innovation platforms that focus on market access and centre on specific value chains are showing some promise towards enhancing linkages among EAS, research, education, and market actors. The increasing use of multi-stakeholder networks, innovation platforms, and other demand strategies has contributed to efforts of making EAS more participatory and demand-driven (Davis, 2020). POs, if financially supported and equipped with the right capacities, are increasingly assuming a coordination function for their members, given their potential in articulating producer demands and providing relevant services (Blum et al., 2020).
Some good practices for achieving innovative coordination include: (1) strengthening access to and client-orientation of EAS through vouchers for targeted client groups and innovation clusters; (2) collecting and disseminating client feedback on EAS suppliers (such a system does not need to be costly, for example, when clients themselves are invited to “publish” their feedback and in return receive access to the feedback of other clients on other relevant EAS suppliers); (3) providing training and capacity building to EAS suppliers towards some level of specialisation in specific domains (negotiation, loan applications, market analysis, among others), coupled with adequate certification; (4) establishing a repertoire of EAS accessible to all agricultural and rural stakeholders; (5) co-funding meetings to nurture professionalism and specialisation in the EAS sector; (6) establishing an ombudsman to protect and advocate the interests of EAS users; and (7) regional organizations such as the African Forum for Agricultural Advisory Services (AFAAS) are also well-placed to put POs, as well as business associations of agriculturally linked enterprises, at the centre of a strategy to build the capacities of EAS to create spaces for interaction and advocacy and to promote coordination mechanisms (Maatman et al., 2011). Other practices that are considered as relevant to the enhancement of multi-actor coordination include:

♦ the formulation and implementation of policies that shape the EAS provision and in particular the question whether an agricultural EAS policy exists and is implemented are key to determining the governance and overall coordination of the EAS system;

♦ a strengthened coordination requires that pluralism in service providers go hand-in-hand with complementarity in EAS provision (Bitzer et al., 2016);

♦ experience from South Africa shows that, information relevant to coordinating EAS should flow in all directions within the EAS system, not merely top-down. This underscores the importance of a collaborative approach to coordinating extension (Khwidzhili & Worth, 2019);

♦ to better coordinate pluralistic EAS systems, the public sector should further develop its role of a regulator, facilitator and enabler in the increasingly pluralistic EAS systems (Blum et al., 2020);

♦ investment in coordination capacity in pluralistic EAS systems needs immediate attention in the public extension system (Davis, 2020);

♦ the most promoted institutional governance framework for enabling coordination in a pluralistic system is multi-stakeholder platforms, such as the country forums promoted by AFAAS (Blum et al., 2020). Such forums should be established at the relevant administrative levels where decision making on EAS takes place in order to strengthen the interaction and learning between different service providers (Bitzer et al., 2016). To ensure that such forums become an effective multi-stakeholder coordination platform, it is critical to put in place sufficient resources, capacity building and effective facilitation;
decentralising the coordination process and promoting greater social participation throughout the process are critical to strengthen coordination. Past research has shown that the higher the level of central coordination of the system, the more it moves away from the demands of the stakeholders. Moreover, when the coordination processes are shared, stakeholders tend to engage more with the policy, assuming responsibilities and commitments, and strengthening the policy (Davis, 2020).

Various efforts have been made in different countries to improve coordination. In 2016, the federal government of Nigeria launched a follow-up policy to the Agriculture Transformation Agenda called the Agricultural Promotion Policy, or the Green Alternative, which highlights the need to fund, coordinate and improve quality of EAS across the country. In June 2008, key donors working in Tajikistan initiated the development of a Joint Country Support Strategy to improve the coordination of farmer services (legal, business and agricultural extension services) (Kazbekov & Qureshi, 2011). The Brazilian case shows that it is difficult for the state to coordinate a plural and complex EAS system. It highlights the importance of decentralising the coordination process and promoting greater social participation, which has the central role in breaking the path-dependence of the state and introducing innovations in agricultural EAS systems (Davis, 2020).
BOX 14. Coordination of a pluralistic extension system in Malawi

In Malawi, the government adopted a policy to promote a pluralistic and demand-driven EAS system in 2001, officially allowing for NGOs and private sector involvement in the provision of agricultural EAS. Service providers exhibit significant diversity, pursuing different objectives and approaches to extension delivery. While this diversity potentially offers scope for complementarity and collaboration, it presents a formidable coordination challenge. In recognition of this challenge, the government of Malawi has created different organizational structures. At the district level, the District Agricultural Extension Services System (DAESS) is the main framework for organising farmer demand through Stakeholder Panels and coordinating service delivery through Extension Coordination Committees. At the national level, coordinating structures were largely absent until stakeholders established the Malawi Forum of Agricultural Advisory Services (MFAAS) in 2011 to serve as an information sharing body concerned with coordination, standardisation, quality, and capacity building (Blum et al., 2020). Both district and national levels are considered critical for coordinating activities (Masango & Mthinda, 2012). Particularly the district structure, as set up in Malawi, is viewed as innovative and vital for a demand-driven system, even encompassing attempts to coordinate with related projects on nutrition and gender (Sigman et al., 2014). However, neither the DAESS nor the MFAAS are fully functional. The DAESS, in particular, includes different administrative structures which are either not working well or are non-existent (ibid.). There is a general concern that too much is being attempted with too few resources, leading to weak local structures, insufficient integration of smallholder farmers into demand articulation and prioritisation, and a lack of coordination among the different EAS providers (Simpson et al., 2012). Overall assessments of the pluralistic EAS system in Malawi, however, agree that the foundation for a strong and effective demand-led extension system has been put in place (Masangano & Mthinda, 2012).

To address the challenge of coordination, several structures were created at District and national level. At the district level, the District Agricultural Extension Services System was created as the main framework for organising farmer demands through Stakeholder Panels and coordinating service delivery through Extension Coordination Committees. At the national level, coordinating structures were largely absent until stakeholders themselves established the MFAAS in 2011.


In Costa Rica, the Ministry of Agriculture and Livestock (MAG) has overall responsibility for providing public agricultural extension services to the farmers. This responsibility is carried out by the following two public institutions under the Ministry: National Agricultural Extension Service (Servicio Nacional de Extension Agropecuaria) and National Institute for Agricultural Innovation and Technology Transfer (INTA - Instituto de Innovación y Transferencia de Tecnología Agropecuaria). The Ministry has eight Regional Directorates of Agriculture, and 86 Agricultural
Service Agencies, that perform various agricultural extension functions in the field. The responsibility for coordinating the activities of the regional directorates and agencies rests with the Higher Directorate of Regional Operations and Agricultural Extension (DSOREA - Dirección Superior de Operaciones Regionales y Extension Agropecuaria). The DSOREA comprises the following four departments to cover agricultural extension matters:

- The Department of Organization and Business Management.
- Department of Sustainable Production.
- Department of Monitoring and Evaluation.
- Department of Information and Communication for Development.


4.4 Reforming human resource system

Human resources are a critical element of EAS systems, but most countries do not achieve sufficient coverage, and many EAS agents are unmotivated due to a lack of career paths, low salaries and status, and few or no incentives such as transportation and rewards (Davis & Franzel, 2018). It is therefore recommended to reform and expand public and private extension agents’ basic training, and ensuring continuing education to increase skills, reach and job motivation. A performance-based management system for EAS staff linked to salaries and promotions is also recommended (Huber et al., 2017). According to the theory of change, EAS can only generate the expected results if the capacities of the providers (at individual and organizational levels) are renewed whenever necessary to adapt to or even anticipate changes not only on the demand side, but also in the enabling environment and support services. For the purpose of renewing human resources, on the one hand, it is desirable that the framework for analysing EAS performance includes not only indicators on capacities of EAS agents, but also on the existence of opportunities to acquire and renew these capacities (Sulaiman V et al., 2022). On the other hand, policies and incentives should be put in place to continuously build up the multi-faceted capacities of EAS agents, especially from an AIS perspective. The AIS approach requires that two key processes be functional concurrently: knowledge generation (agricultural research and development) and knowledge transfer (agricultural extension, training and agricultural education) (OECD, 2018). The importance of human resource development and social capital building among the rural poor makes it essential to reorganize and strengthen public EAS systems within an agricultural innovations framework, so that these institutions can develop PPPs, based on comparative advantage, with private-sector firms and CSOs (civil society organizations) (Swanson, 2008). There is a call for increased training of public EAS staff, as non-public providers are often considered to
have greater capacity to deliver EAS than public agents, though this is not necessarily the case (Sigman, 2017). Therefore, the public sector can use a variety of managerial approaches to address the problem of weak motivation and incentives for enhancing the performance of EAS agents (Bitzer, 2016). Indeed, the contribution of the State to the training of EAS agents is a prerequisite for developing effective EAS systems (Kéïta et al., 2017). Besides, professionalisation of EAS agents is also topical. For example, in South Africa, discussions have been going on for more than a decade on introducing professional standards (through professional registration) for EAS agents and thereby turning EAS into an accredited profession (Bitzer, 2016). It is also recognised that exempting EAS agents' and model farmers' involvement in non-extension activities, while improving their skill sets, is vital for improving the agricultural EAS systems (Leta Dufera, 2018). In addition, continuous development and associated investment in the technical, managerial, and leadership capacities of EAS professionals that go beyond foundational, technical training should be a key part of the national EAS strategy (Davis, 2020).

Capacity development of EAS agents is highly relevant to human resource development. According to the FAO Common Framework on Capacity Development for Agricultural Innovation Systems, capacity development for AIS is to be built at individual, organizational and enabling environment levels and around four specific functional capacities essential for effective AIS (FAO, 2021a):

- capacity to navigate complexity;
- capacity to collaborate;
- capacity to reflect and learn; and
- capacity to engage in strategic and political processes.

The overarching capacity is the capacity to adapt and respond, shifting focus from reactive problem-solving to the co-creation of the future (ibid.) and to reduce multiple risks and rebuild, improve, and regenerate agri-food systems (Tutundjian et al., 2021). Capacity building should be approached from an “innovation systems” perspective (Pye-Smith, 2012), aimed at strengthening the overall capacity of EAS systems which includes the staff numbers, training level, skills, infrastructure, and financial resources (Davis, 2020). Capacity building can be broken down differently depending on the actors within the different service schemes: designers, decision-makers and managers of such schemes; salaried advisors, trainers and extension workers; and local instructors and farmer relays (Rigourd & Dugue, 2022). Capacity building can also be broken down into different approaches: basic training of agents, professional training, continuing education, recycling of agents, monitoring of agents in the field of dialogue between actors (ibid.).
BOX 15. Pathways of enhancing capacity building

- Strengthen a few national initiatives to improve programmes offering initial training (engineer, technician) and continuing training (manager, advisor, input seller) for EAS and in support of rural areas, particularly by making digital resources available and encouraging the use.

- Strengthen ties between training for producers (training of young people in rural areas, functional literacy, etc.) and EAS schemes.

- Develop training programmes on management for “expert” or experienced advisors (coordination, steering, human resource management, leading a team of advisors, M&E).

- Significantly develop the use of new information and communication technologies in continuing training for EAS agents and peasant-farmer instructors with tailored products while facilitating the creation of networks.

- Support the creation of public or private bodies that specialise in engineering agricultural EAS by using human resources that are already available by thinking about their economic model from the start.

- Experiment with the creation of networks of EAS agents and peasant-farmer instructors at local level.

- Focus on training and supporting peasant-farmer instructors and input sellers as they are more and more present in EAS schemes in the field.

- Pay attention to the professionalisation of EAS agents. In Poland, in order to improve the quality of agricultural services and support the implementation of the CAP, certification of agricultural advisors is carried out. Persons who meet the criteria of education, work experience in counseling and who have completed training and passed exams may be placed on the lists of advisors. In this way they are authorised to advise on the CAP and RDP (Rural Development Program). Two-thirds of the people on these lists are public advisors and the rest of them are private advisors (Boczek et al., 2020).


In countries with advanced public agricultural EAS systems, governments reform the staffing system mainly by adjusting legal framework, examination system, and human resource development and incentives. Japan proves to be a good example in this regard. Regarding the legal framework, Japan formally promulgated and implemented the new “Agricultural Improvement Promotion Law” (農業改良助長法 in Japanese) in 2004. Considerable changes were made to the establishment of agricultural EAS agencies and the management of agricultural EAS personnel. With the advancement of institutional reforms in various regions since the 2000s, the total number of agricultural EAS personnel...
throughout Japan has continued to decrease. The new law abolished the titles of “specialised technician” (専門技術員 in Japanese) and “improvement extensionist” (改良普及員 in Japanese), which were unified as “extension instructor” (普及指導員 in Japanese). Relevant departments re-formulated the extension instructor qualification examination plan, which has become more difficult. It clearly stipulates that people with different academic backgrounds must have corresponding years of practical work experience to be eligible to take the exam. Regarding the management of human resources, in-service training of extension instructors has been further strengthened. Besides, the incentive policies for extension instructors have also been adjusted. Although Japan’s public agricultural extension workers enjoy the same status and salary as civil servants, they have received the “extension allowance” since 1963 considering the complicatedness and difficulty of their work. The amount of the allowance used to be 12 percent of the monthly salary for “improvement extensionist” and eight percent of the monthly salary for “specialised technician”, while regional variance existed. The new law, apart from continuing to strengthen the supervision and management of the daily work of personnel and comprehensive evaluation of their work performance, removed the upper limit of the allowance for extension instructors. This allows localities to independently determine the subsidy ratio according to local conditions to encourage agricultural EAS personnel to go to the grassroots level and work at ease.¹¹

¹¹ This paragraph referred to Huang (2005).
In response to high food import costs (USD three billion annually), low production and lack of food self-sufficiency, the Nigerian National Food Security Programme set the goal in 2008–2011 of increasing the ratio of extension agents to farm families from 1:25000 to 1:350, to be reached by hiring 10 000 agents each year for three years (FMAWR, 2008). In 2012, the Agricultural Extension Transformation Agenda set the goal for the states to increase staffing to one agent per 800 to 1 000 farm families (FMARD, 2012).

To improve youth employment opportunities and ensure peace in the country, the federal government has 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 (which focuses on extension services) was slated to hire 300 000 of the total, but now is targeted for 100 000. 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 program refers to them as “paid volunteers” (FGN, 2016). Because this program is under the current administration, it is not clear whether it will be continued when the next administration takes office in 2019.

The federal government used a private agency for the recruitment and selection of candidates for each state, while the states were responsible to select the recruits for their own states. The employment scheme will use a phased approach with 30 000 hired in Phase I (year one), 30 000 in Phase II, and 40 000 in Phase III, all by the end of 2017. To date, 57 000 have applied for agriculture or extension positions. The government is targeting a 50:50 ratio for men to women, but the response from women has not met this target. The programme will target women-specific recruiting advertisements in early 2017.

The federal government wants the private sector and state governments to employ the young people after their two-year period, though few companies have shown an interest in this and state governments are barely able to pay their existing staff with the recession. Such a massive hiring and training program is ambitious and can only be judged over time. Past experience in Nigeria and in the extension literature shows that hiring and paying salaries is only the beginning of an extension service, as operational funds, continuing education and strong links with knowledge actors are all critical elements that must also be provided.


In Azerbaijan, it is believed that a strategy for staff development across all levels of its Agricultural Advisory Services (AAS) system should be designed, which defines explicit roles for advisers, management and administrative staff and identifies the necessary competencies at the basic, senior and expert levels. In addition to technical expertise, advisers should acquire various soft skills (e.g. to facilitate, mediate and negotiate), and adviser development should be based on a GFRAS-type model, including exposure to the European Union’s LEADER model and RDN operations. Its AAS system also needs to become more gender-sensitive, and more women advisors are needed to interact with women farmers who are the backbone of food production system of Azerbaijan.

4.5 Strengthening financial support and incentives

Governance of EAS from an AIS perspective is not only about executing research and delivering EAS, but about guiding diverse actors involved in complex innovation processes through the rules, supports, and incentives that foster the creation, application, and diffusion of knowledge and technologies (Hartwich et al., 2007). Funding and incentives tend to be lacking in most EAS systems in developing countries. For example, in Guinea, currently there are limited and even no incentives for EAS agents and no regulation or certification system in place for the pluralistic providers. As far as incentives go, salaries of ANPROCA (National Agency Promoting Rural and Agricultural Consulting) agents are low (usually under USD 200/month), and typical extension agents lack resources (e.g. transport, fuel, communication) to adequately support their sub-prefecture/commune-level catchment areas (MacNairn, 2017). In many developing countries, due to a lack of public investment, public agricultural EAS are disadvantaged compared to non-public ones as the latter often times are (Sigman, 2017):

- better resourced (with the issue of sustainability under question though) than public EAS and able to hire and sustain (during the life of the project) well-trained staff due to their capacity to pay higher salaries than public EAS;
- able to provide other incentives to their staff, such as training, communication equipment and transportation, whereas this is limited in the public sector; and
- able to move around in the field and reach farmers more readily than public EAS staff, and, in an area covered by a particular project, there are more extension workers working for NGOs or donor projects than those working for the public sector.

The adequacy of financial resources, which covers such aspects as, among others, volume, availability, timeliness and sustainability, is critical to guarantee the efficiency, responsiveness and sustainability of public agricultural EAS while ensuring motivated and sustainable human resources. However, public funding for EAS has been declining, current funding remains unstable, and most of the poorer countries continue to depend on donor funding to run their EAS systems (Davis, 2020). This situation persists even though within currently predominant pluralistic EAS systems, non-governmental EAS providers such as private sector, NGOs, and FBOs play an increasingly important role in EAS delivery. If the poor are to attain and retain access to EAS, it is recognised that public finance is essential. This is of particular importance with regard to implementing policies aimed at reforming EAS systems. Making reform policies operational requires that they be linked to ambitious funding policies (Rigourd & Dugue, 2022).
BOX 18. Innovative funding schemes of EAS reform policies

Several countries are setting up dedicated funds (Interprofessional Fund for Agricultural Research and Development (FIRCA)\textsuperscript{12} in Ivory Coast, Investment Fund for Food and Nutrition Security (FISAN)\textsuperscript{13} in Niger) or tapping into the State's budget (Green Morocco Plan in Morocco, debt-reduction and development contract (C2D)\textsuperscript{14} funds/State in Cameroon), which requires strong commitment from the State and donors (and therefore trust over the long term). The private sector and agricultural profession may be asked to contribute through a levy on value chains (e.g. FIRCA in Ivory Coast) or if the firms and FOs fund the EAS themselves. But the political commitment of the different economic stakeholders with regard to EAS is still weak. In several cases, it is linked to policies that support agriculture by subsidising investment and facilitating access to credit (Tunisia, Morocco and Niger).


It is recognised that there is a clear link between the motivation and wellbeing of EAS agents and the clients' view of their performance (Antholt, 1992 cit in Bitzer, 2016). In this sense, incentives are indispensable to keep EAS agents motivated and contribute to the efficiency of EAS systems. Generally speaking, there are two common incentives: monetary incentives (e.g. performance is rewarded through bonus payments, cash awards, promotion, etc.) and non-monetary incentives (e.g. operational resources, employee recognition or training opportunities linked to career development opportunities) (Bitzer, 2016). However, incentives to promote professionalisation of EAS providers are often not well-resourced in many countries (Davis & Franzel, 2018). Lack of incentives not only leads to poor and inadequate public EAS, but also increases the cost of services due to high staff turnover (depletion of competent officers, gender bias) and increased costs of hiring and training new EAS agents (Bitzer, 2016). Key factors lowering the motivation and hence performance of EAS providers generally fall into two desincentive categories, namely, \textit{extrinsic disincentives} which increase job demotivation, such as low remuneration, lack of rewards and promotion opportunities, low status and recognition, top-down structures, and lack of operational funds; and \textit{intrinsic disincentives} which reduce job motivation, such as lack of professional advancement, lack of encouragement from supervisors or management, and performance measurement (ibid.). The so-called “incentive failure” is mainly caused by the bureaucratic structure of extension administration, offering only few rewards, poor facilities, meagre prospects of promotion based on performance, and low recognition for EAS agents, leading to a general lack of motivation and morale (ibid.).

\textsuperscript{12} French: Fonds interprofessionnel pour la recherche et le conseil agricoles.
\textsuperscript{13} French: Fonds d’investissement pour la sécurité alimentaire et nutritionnelle.
\textsuperscript{14} French: Contrat de désendettement et de développement.
To address the above-mentioned issues of financial constraints and “incentive failures”, the following points are important for formulating policies aimed at strengthening financial support and incentives:

♦ according to the lessons learned from ten developing countries, although pluralism makes it difficult to quantify amounts and even sources of financing (Davis & Franzel, 2018), a reasonable and adequate proportion of funding should be paid by the central government. A global review also evidences that adequate operational and programme funds must be made available at the district and sub-district levels so that the field staff can implement extension programmes suitable for farmer groups (Swanson, 2008);

♦ there is a growing recognition that public funding tends to be inadequate. The leading role of the central government in funding, however, does not mean returning to the free public EAS approaches of the past but combining publicly funded but privately delivered EAS with measures to place resources at the disposal of poor farmers and their organizations (Blum et al., 2020). In so doing, not only can EAS be made accessible to smallholder farmers, but the accountability of EAS to farmers can be enhanced. Therefore, a new EAS funding model including direct or indirect participation of service users, needs to be considered while taking into account the principle of equity. Indeed, a combination of funding sources and mixing innovative modern approaches with traditional mechanisms can increase the sustainability of EAS (Davis, 2020). There were promising moves toward co-financing and farmer contributions in some Latin American countries and in Senegal (ibid.);

♦ it is worth noting that, creating a level playing field for private providers is very important, but this needs to be part of a wider reform process which promotes pluralism while recognising the need for public financial support (Christoplos, 2010);

♦ unconventional approaches to cost recovery are potentially useful, for example: paying by result; offering services on credit (e.g. with the help of micro-credit providers through collective liability loan agreements); working with groups to make advisory services affordable for smallholders (reduced costs per farmer and reduced transaction costs); and accepting contributions in kind (e.g. labour) as payment (Wongtschowski et al., 2013 cit in Bitzer et al., 2016);

♦ demand-side financing mechanisms can also play a role in helping smallholder farmers access EAS, including vouchers (entitling farmers to access specified services from a particular provider), innovation grants (giving farmers or POs the financial resources to pursue innovative projects/activities), and grants to cover the POs’ costs during identification, formulation and negotiation of demand for services (Bitzer et al., 2016);

♦ whereas some smallholder farmers have the potential to shift from subsistence farming to commercially-oriented and profitable farming, others have more opportunities to improve their livelihood strategies outside of the agriculture sector. Therefore, differentiated support strategies are crucial to harness the productivity potential of “different” smallholders. That is to say, smallholder farmers who have the potential to become profitable need access to the right
set of productivity-enhancing tools. Meanwhile, conditions should be created for other smallholder farmers to exit agriculture either altogether or as their primary activity, so that the remaining efficient smallholder farmers can increase the size of their operational holdings (Fan et al., 2013);

- experience from Cameroon evidences that, financial and non-financial incentives are crucial for the farmer-to-farmer (F2F) or “lead farmer” approach sustainable. F2F approach has been commonly used to address the accessibility problem caused by financial and staffing constraints, by providing EAS that reach large numbers of smallholder farmers at low cost through the multiplier effect of F2F communication. Financial and non-financial incentives are to be ensured to cover transportation and communication costs and raise the awareness of government EAS managers and NGOs of the importance and complementarity of F2F approach (Tsafack et al., 2015);

- a dedicated tax fund can be set up that is derived from agricultural commodity imports into the country and to be channeled to EAS;

- in SSA countries, incentives to EAS providers need to be seen in the context of good governance and institutional reform (Heemskerk et al., 2008). Incentive options vary widely, from result-based payment, larger operational budgets and increased recognition of individual achievements, to institutional changes offering greater individual autonomy or alternative, downward accountability mechanisms (Bitzer, 2016);

- in Kyrgyzstan, it is suggested that the research institutes develop an incentive system, whereby promising young scientists are encouraged, if not salarywise, then at least through rapid merit-based promotions and more work flexibility and participation in the decision-making processes at the institute (Mirzabaev et al., 2011);

- not only are individual incentives recognised as crucial in this regard, but the entire work environment, particularly as perceived by employees, is considered to impact their motivation, satisfaction, and task performance (Bitzer, 2016). Since this is not only an organizational and institutional but also a cultural issue, changing the incentives for EAS agents in isolation from the rest of the bureaucracy is likely to be difficult (Birner & Anderson, 2007 cit in Bitzer, 2016);

- the gender dimension and its impact on EAS efficiency need to be considered when formulating incentives for EAS agents. Specific incentives need to be provided to EAS agents to increase the access of women farmers to agricultural EAS (Bitzer, 2016). In Kyrgyzstan, quotas for female extension staff have been introduced, resulting in around 30 percent of extension agents being women by the end of 200915 (Kaegi, 2015). This confirms the need to introduce separate incentives to increase the number of female EAS agents and to increase the number of female farmers reached (Bitzer, 2016).

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15 Female agents have tended cope better with performance expectations than their male colleagues and as a result, their salaries were even slightly higher than those of male agents (Helvetas, 2005). Furthermore, this led to an increased focus on women farmers as the recipients of extension services who constituted around 60 percent of clients (Kaegi, 2015).
BOX 19. Improving financial support and incentives in the United Republic of Tanzania, Nigeria, Uganda and Kyrgyzstan

In the United Republic of Tanzania, public funding for research and EAS has been decoupled from actual implementation, allowing control of resources by beneficiaries. This is partly achieved through Zonal Agricultural Innovation Funds managed by multi-stakeholder committees. Privatised research and EAS provision on commercial commodities (coffee, cashews, cotton, and so on) is managed and funded by the corresponding sector based on export levies (Maatman et al., 2011).

In Nigeria, it is suggested to establish performance-based management system for Agricultural Development programmes (ADPs) staff linked to salaries and promotions, including: a small number of tangible Key Performance Indicators (KPIs) linked to goals of extension (i.e. farmer satisfaction, adoption, productivity, welfare); and rewards based on achieving certain targets (Huber et al., 2017).

In Uganda, privatisation was used to ensure higher performance incentives and accountability. The Ugandan experience demonstrated how the reorganization of a system can be used to introduce two systemic (rather than add-on) motivators: first, incentivising good performance through privatisation (hence, private sector employment and performance conditions for all EAS agents apply); and second, through increasing the influence of farmers on the EAS delivered (thus, creating a link between the quality of the services and the relationship between the farmer and EAS agents). This seemed like a step in the right direction, but ultimately fell prey to political capture and was discontinued (Bitzer, 2016).

In Kyrgyzstan, a result-based payment system was put in place to increase EAS efficiency. However, the lack of accountability to farmers, increased occurrences of manipulating the result-based payment system, and declining efficiency over time have led to attempts to introduce cost recovery to increase the influence of farmers on extension activities, but without much success so far (Kaegi, 2015).
4.6 Improving the roles of cross-regional EAS-related agencies

The emerging innovation-led economies based on “innovation systems” have driven the development of neo-institutionalism at territorial and regional levels. This neo-institutionalism is characterised by a major shift towards a network-based organizational design and a collaborative organizational culture (Smorodinskaya et al., 2017; Russell & Smorodinskaya, 2018). Promoting such a shift, AIS has been developed to more inclusively take into account the range of actors and networks contributing to innovation beyond the usual “knowledge infrastructure” (research, education, and extension) (Faure et al., 2016). Value co-creation through collaboration among networked actors (Smorodinskaya et al., 2017) and formation of innovation-supportive milieu (Wessner, 2005) are two interrelated goals of AIS. In view of this, the impact of agricultural EAS on both territorial and regional development should be amplified by building professional networks at territorial, national and regional levels.

It is already recognised that (1) agricultural EAS should become part of the dynamics of territorial management, so that the specialisation process accompanying development has a strategic vision that includes agricultural EAS as a driving element; and (2) commitment with territorial development must be expressed through identifying regional priorities for agricultural EAS (Patricio Molina, 2010). Regarding the management and coordinated development of territorial and regional agri-food systems, neo-institutionalism fueled by territorial and regional networks has an important role to play in promoting exchange, mutual learning, and collaboration among multiple territorial and regional EAS stakeholders. This will contribute to both value co-creation and the development of innovation-supportive platforms. Within the global agricultural EAS landscape, a variety of cross-regional networks dealing with or related to EAS have emerged over the past decades. Some are within the national boundary and have a territorial outreach, such as the Rwanda Forum for Agricultural Advisory Services (FAAS-R), an umbrella organization for EAS providers within Rwanda, including private- and public-sector entities. The forum was established in 2012 and serves to coordinate EAS learning through agricultural information, technologies and innovation networks, among other activities (MacNairn, 2018). Typical cross-sectoral networks, just to name a few, include:

♦ the Network of Peasant Organizations and Producers of West Africa (ROPPA: Réseau des organisations paysannes et de producteurs de l’Afrique de l’ouest), created in 2000, brings together 12 farmer organizations from 12 of the 16 countries in West Africa. ROPPA aims to strengthen the capacity of national farmer organizations in preparing their national policies and implementing their agricultural programmes;
♦ the West and Central Africa Network for Agricultural and Rural Advisory Services (RESCAR-AOC: Réseau des services de conseil agricole et rural d’Afrique de l’Ouest et du Centre) was formally launched during a workshop held in Abidjan, Côte d’Ivoire in February 2015. RESCAR-AOC stems from the need to provide a regional response
to these challenges in view of: (1) the similarity of rural development policies and issues in the majority of West and Central African countries; (2) increased regionalisation of the economy, development policies and actions; and (3) the need to develop fruitful exchanges of experiences and strategic partnerships for better coordination, efficiency and greater impact of the various interventions. Therefore, it is aimed to provide a space for discussion, monitoring, guidance, consultation, capacity building and knowledge sharing to actors and stakeholders in agricultural and rural EAS in West and Central Africa;

♦ the African Forum for Agricultural Advisory Services (AFAAS) (initially formed as the Sub-Saharan African Network on Agricultural Advisory Services), is a continental organization for strengthening agricultural EAS in Africa. It operates within the framework of the CAADP, a venture of the African Union in the New Partnership for Africa’s Development (NEPAD). AFAAS is an autonomous subsidiary of the Forum for Agricultural Research in Africa (FARA). It represents a good example of multi-stakeholder country platforms for EAS that govern the pluralistic system and enable EAS actors to relate to each other within a framework of a set of agreed principles, rules and well-defined roles and responsibilities. AFAAS supports the emergence of associations of EAS stakeholders under a common umbrella where they can identify, from among the issues that AFAAS has to address, priority areas of concern that can be addressed through collaborative information sharing, joint activities and partnerships. AFAAS’ Country Forums are established in 13 of the 40 member countries;
countries in the Southern Cone, namely, Argentina, the Plurinational State of Bolivia, Brazil, Chile, Paraguay, and Uruguay, are part of the Cooperative Programme for the Development of Agricultural Technology in the Southern Cone (PROCISUR: Programa cooperativo para el desarrollo tecnológico agroalimentario y agroindustrial del Cono Sur), which promotes collaboration among the national agricultural research institutes of each country and the Inter-American Institute for Cooperation on Agriculture (IICA) (Swanson & Davis, 2014);

the Inter-American Institute for Cooperation on Agriculture (IICA) is the international organization specialised in agriculture within the Inter-American System that supports the efforts of Member States to achieve agricultural development and rural wellbeing. It provides cooperation services through close and permanent work with its 34 Member States, counting on its broad experience in areas such as technology and innovation for agriculture, agricultural health, food safety and quality, international agricultural trade, family farming, rural development, natural resource management and the bio-economy;

the Alliance of Mountain Communities of Central Asia (AGOCA), a non-profit association of public and territorial self-governance organizations of mountain communities in Central Asia. AGOCA was established in 2003 with its secretariat located in Bishkek, Kyrgyzstan and with branches in Dushanbe, Tajikistan, and Astana, Kazakhstan. It unites 17 mountain villages in Kyrgyzstan, 11 in Tajikistan, and 5 in Kazakhstan. AGOCA’s central focus is on providing a platform for exchange of experiences and knowledge among mountain communities through exchange programmes, trainings, seminars, and conferences, its quarterly publication in Russian, Kyrgyz, Tajik, and Kazakh languages. Activities related to agriculture are sustainable use of pastures, seeds, mechanisation, micro-crediting, water and soil conservation techniques. (Mirzabaev et al., 2011);

Australasia-Pacific Extension Network (APEN) promotes the value and advances the theory and practice of EAS through advocacy, promoting best practices and building partnerships.
Agri-food systems worldwide are now located at a crossroads: to adapt to complex changes and transform towards sustainability. Crises like the COVID-19 pandemic require now more than ever change and innovation in agri-food systems that will become the “new normal” (Davis et al., 2021). Reforming EAS systems proves eminent to make agri-food systems sustainable, resilient to shocks, and responsive to various needs. Several factors are driving multi-faceted change of public agricultural EAS systems worldwide, such as broadened EAS scope, governance failures, growing system complexity, increasing pluralism, and need for resilience of agri-food systems. To effectively cope with change, harnessing new technologies, strengthening human resources, and fostering multi-stakeholder collaboration will be the crux. Public EAS systems are recommended to (1) embrace technology for the many benefits in terms of reach and cost-savings, but do so cautiously to prevent exclusion; (2) provide EAS agents with the necessary job skills, also ensuring that they have critical thinking skills and
empowerment to act; and (3) ensure an organizational structure that is flexible, collaborative, and able to form strong partnerships (Davis et al., 2021).

Agricultural public education, research and extension systems are the three pillars for supporting sustainable agricultural development in any countries. Reforming and strengthening public EAS systems for improving smallholder farmers’ access to technologies, innovations and markets requires a more contextualised, coherent and integrated approach. Efforts to reform public EAS should encompass strong institutional arrangements, reformulating institutional mandates, investing in human resources, strengthening financing mechanisms and legal and regulatory frameworks, strengthening collaboration and coordination with non-public EAS agencies, and optimising policy environment. This is crucial for adjusting or changing the existing institutional structure of public EAS systems to accommodate growing demands for more pluralistic approaches. Besides, such efforts should consider the need of functional capacity development, institutional coordination, digitalisation, infrastructure development, knowledge management, indicators for performance M&E, and strengthening of science-policy-practice interface at sub-national, national, regional and global levels. Furthermore, embedding national priorities in line with changing complexity in agri-food systems and using more integrated and holistic approach to R&D are necessary to increase effectiveness and return on investment. This document recommends developing countries to take actions in the following areas to reform and strengthen their public agricultural EAS systems:

5.1 Reviewing and assessing current public EAS systems

Reforming public EAS systems is essentially about filling the multi-faceted gaps in the existing systems. Therefore, public EAS systems first and foremost are to be reviewed and assessed to identify their gaps which impede them from helping achieve national agricultural development goals and meet farmers’ needs. The review process should adopt a coherent, integrated and systemic approach. All the components of the EAS system in terms of institutional arrangement, mandates, funding mechanism, human resources, infrastructural setting, operation and policy environment should be taken into considerations.

To identify gaps, two dimensional cross-checking processes are recommended. The first is to check whether the existing public EAS systems cover the services that farmers need in the broad agricultural sectors of agronomy, animal husbandry, aquaculture, agro-machinery, market access, and farm management in accordance with national agricultural development goals. The second is to check the availability of essential public EAS that can be provided by existing systems against the listed 64 indicators (refer to section 2.4) to identify gaps.
Reforming public EAS systems through filling existing gaps aims to ensure and strengthen the accessibility, affordability, accountability, adaptability and inclusiveness of EAS targeted at smallholder farmers in particular. Current pluralistic service systems demonstrate a growing diversity of service providers as farmers need more diverse knowledge and information from a variety of sources. Therefore, reforming public EAS systems should focus on strengthening the public-good nature of public EAS, namely, providing at zero cost essential agricultural EAS to smallholder farmers. Furthermore, coordination mechanism and linkages among the public, non-public EAS, and research actors must be established with innovative approaches that enable smallholder farmers to obtain economic, environmental and social gains sustainably from advancements in agricultural science and technology.

**BOX 20. Ensuring essential public EAS accessible to smallholder and vulnerable farmers**

Public EAS need to be made responsive to smallholder and vulnerable farmers, tailored to their various conditions, capacities, and demands, characterised by continuous dialogue and learning between farmers and service providers, and complemented with services provided by non-public actors. It is the responsibility of the public sector to provide general, essential EAS on crop production to smallholder farmers, whereas private EAS are particularly important for the provision of specialised services for farmers that have such needs. It is strongly recommended that government, taking the agronomic sector for example, guarantees the provision of the following essential public EAS to smallholder farmers that shall not be privatised in any case, including:

- introduction, field trial, demonstration and extension of new crop varieties, new inputs, and new technologies in the field of crop cultivation, scientific fertilisation, water saving and rain-fed agriculture, integrated pest control, and safe use of chemicals; and
- monitoring and forecasting of crop pests, soil moisture, extreme weather events, and drought and flooding.

Meanwhile, some services can be provided by the non-public sector, such as agri-food enterprises and NGOs, including, but not limited to, high-technologies like aquaponics, automation, digitalisation and so on (these services are mainly aimed at big agribusinesses), input delivery, market linkages, capacity building and so on.


### 5.2 Reforming public EAS institutions

Deficiencies in the institutional setup of public agricultural EAS system and institutional policy and strategy often account for the deficiencies in the public EAS systems (FAO, 2011). Although there is no one-fits-all model, reforming the institutional structure of public EAS systems aims to make them the most constant provider of agricultural EAS in the long term.
Reforming and rearranging public EAS institutions should consider the institutional structural stability to avoid creating a fragile system. It must be aligned with reformulating institutional mandates along with strengthened financing mechanisms, human resources development and policy support and establishing collaboration and coordination mechanisms with non-public EAS in accordance with national agricultural development goals and farmers’ needs. Besides, it needs to be carefully planned and designed, by taking into consideration economic, social, politic and cultural environments. Public EAS institutional reforms cannot be undertaken separately, but rather should be accompanied with the reformulation of public EAS mandates along with the legislation of staffing, funding, and M&E mechanisms, and supportive policies. For institutional reforms to be sustainable in the long run, there is both a justification and an urgent need for increased public investment and incentives in public EAS, with a special focus on human resource development at the local and field levels. Adequate investment is to be secured also to nurture the expansion and inclusiveness of interactive learning in public, private, and public-private domains.

Establishing collaboration and coordination mechanisms between public and non-public EAS is often important when reforming public EAS systems. It often needs to consider the roles of the public EAS sector at local, regional and national levels to ensure that the activities, scope and scale of the public services are complemented by the other different service providers, and the quality of public EAS is assured.

**BOX 21. Reforming institutional mandates**

The mandates of public EAS are set up in two dimensions: (1) mandates in different agriculture sectors, namely, agronomy, animal husbandry, aquaculture, agro-machinery, and agro-economics; and (2) key functions of public EAS institutions in terms of:

- **public technical services**, including crop pest monitoring and forecasting, animal disease detection and diagnostics, soil testing and monitoring, soil moisture monitoring, crop development monitoring, seed quality testing, inputs quality testing, appraisal and releasing of new varieties of crops, fish and animals, agro-machinery quality and safety testing, meteorological service, risk and disaster early warning, etc.;

- **law enforcement**, including plant and animal quarantine, seed quality control, quality control of inputs such as fertilisers and pesticides, crop and fish and animal varieties management, etc.; and

- **normative EAS**, including transfer of knowledge generated by agricultural research, market linkages, farmer and EAS agent training, field trials, and experiments and promotion and advocacy, etc.

*Source: FAO. 2021b. Reforming and strengthening public agricultural extension and advisory service systems in smallholder farming. Rome, FAO. https://doi.org/10.4060/cb7908enn*


**BOX 22. Institutional setting based on geoclimatic zones in Morocco**

Morocco features a public decentralised and pluralistic EAS system. The local-level EAS agencies are established according to the geoclimatic zones where they are located. In rain-fed areas: There are in total 122 front-line Extension Centres (CT), administratively under the DPA. The CTs are responsible for executing the development programmes, earlier identified with the participation of farmers and launched by the Ministry of Agriculture, Rural Development and Maritime Fisheries. Each CT is divided into sections for agricultural extension; cooperatives, credit and agricultural investment; benefits; and administration and management. In irrigated areas, there are in total 185 Development Centres (CMV) and Centres of Agricultural Development (CDA), which are front-line institutions under the ORMVA for providing agricultural extension support to various development activities. The geographical area covered by the CMV and CDA is far less than that covered by the CT. There also exists a sub-division that supervises several CMV and/or CDA located in each irrigation district.


**BOX 23. Institutional reforms in the Plurinational State of Bolivia and Colombia**

In the Plurinational State of Bolivia, the Ministry of Land and Rural Development (Ministerio de Desarrollo Rural y Tierras) has been developing a new public system for basic and applied research, technology transfer, and broader free technical assistance through the National Institute of Agricultural and Forestry Innovation (INIAF - Instituto Nacional de Innovación Agropecuaria y Forestal, a public, decentralised, autonomous institution) and the National Service of Agricultural Health and Food Safety (SENASAG - Servicio Nacional de Sanidad Agropecuaria e Inocuidad Alimentaria), the target beneficiaries of the National Institute of Agricultural and Forestry Innovation (INIAF). Small- and medium-scale producers and subsistence and marginal farmers are provided with free of charge EAS.

In Colombia, although the Ministry of Agriculture and Rural Development does not directly provide EAS, yet it becomes an important institution for EAS purposes. Funding in the form of subsidies/co-financing (up to 80 percent of the total cost) for direct technical assistance (extension) for the producers comes from the government coffers. It is suggested that Colombia should recover an approach of agricultural EAS that integrates the productive dimension with a territorial perspective (Patricio Molina, 2010).

Although the State has always recognised its obligation regarding agricultural EAS, its leading role has been waning by limiting its responsibilities to supplying monetary subsidies within a scenario in which power groups stake claims of said resources, against an incipient organization of small producers to generate a demand for these services. In effect, the IAT (Incentive to Productivity to Strengthen Agricultural Extension) results are precarious in terms of placements to small producers, due to the lack of institutional accompaniment to encourage that demand. Furthermore, there is evidence of increasing fragmentation and dispersal of the players and programmes, with growing importance of the privately paid, added to progressive deinstitutionalisation of agricultural EAS, which in many instances are not part of a private or public institutional structure (ibid.).

5.3 Strengthening human resource development

Both quantity and quality are critical for a healthy and functioning public EAS personnel system that guarantees a sufficient coverage (accessibility), responsiveness to emerging demands of farmers (adaptability), and high performance of EAS (efficiency).

Public EAS agents are professionals who provide public services to farmers; therefore, they should be legalised and treated as civil servants in terms of remunerations and welfare. Governments should develop a sound legal framework for public EAS staffing, covering recruitment procedures, remuneration and welfare, and performance evaluation systems, so as to develop an effective human resource development system to foster adequate, competent, motivated, and adaptive public EAS agents. Especially, the recruitment eligibility of public EAS agents must be clearly stipulated with qualified academic backgrounds and corresponding technical experience. Sustainable hiring is to be secured with related policy, adequate financial resources, and a reformed recruitment mechanism, so as to cope with the aging and technical backwardness problem of public EAS personnel systems.

Policies and incentives should be put in place to continuously build up multi-faceted capacities of EAS agents, especially from an AIS perspective. It is therefore recommended to reform and expand public EAS agents’ basic training, and establish an effective in-service training system to ensure that their professional skills get continuously improved and updated while increasing their job motivation.

Governments must secure sustainable financial support to public EAS personnel system, so as to mitigate the risk of lack of operational resources and dependence on donor funding. Meanwhile, public EAS agencies should work out strategies and take necessary actions to self-sustain and transform so as to become resilient to changing external conditions. A performance-based management system for EAS staff linked to salaries and promotions is recommended (Huber et al., 2017). Public EAS agents are to be motivated with competitive salaries, decent social status, and incentives such as transportation, welfare, promising career paths, rewards, in-service training opportunities and other measures.

It is necessary to ensure that the predominant majority of public EAS agents are only engaged in EAS-related activities and can dedicate enough time to EAS delivery. The proportion between administrators/supervisors and EAS technicians must be balanced. Personnel displacement should be done in a place-sensitive and continuity-oriented way, so that public EAS agents can easily establish social bonds and trust with local communities and develop them in the long run.
5.4 Ensuring financial sustainability

Governments should secure adequate financial resources for the public EAS system, covering such aspects as, among others, volume, availability, timeliness, and sustainability while ensuring sufficient incentives to public EAS personnel. This is critical to guarantee the efficiency, responsiveness and sustainability of public agricultural EAS while making public EAS agents motivated and committed to EAS delivery. Strengthening governance and funding mechanisms is also important to get the agricultural profession and value chains (interprofessional bodies, private sector) more involved (Rigourd & Dugue, 2022).

The funding for public EAS systems should be primarily provided by the public sector. A reasonable and adequate proportion of funding should be paid by the central government. The leading role of the central government in funding should combine publicly funded but privately delivered EAS with measures to place resources at the disposal of poor farmers and their organizations (Blum et al., 2020). Especially, adequate operational and programme funds must be made available at the sub-national (regional and local) levels so that the field-level staff can implement extension programmes suitable to farmer groups (Swanson, 2008). Salaries and welfare of the public EAS agents should be legalised and funded from regular governmental programmes. Central and regional governments need to ensure financial sustainability through a long-term political commitment from both government and legislation for supportive financial policy.

In case where public funding is insufficient, new EAS funding models need to be considered while taking into account the principle of equity. Unconventional approaches to cost recovery are potentially useful, such as paying by result, offering services on credit (e.g. with the help of micro-credit providers through collective liability loan agreements), working with groups to make EAS affordable for smallholders (reduced costs per farmer and reduced transaction costs), and accepting contributions in kind (e.g. labour) as payment (Wongtschowski et al., 2013 cit in Bitzer et al., 2016). A dedicated tax fund can be set up that is derived from agricultural commodity imports into the country and to be channeled to EAS.

Demand-side financing mechanisms through direct or indirect payments for services could be complementary. This can play a role in helping smallholder and vulnerable farmers access EAS, including vouchers (entitling farmers to access specified services from a particular provider), innovation grants (giving farmers or farmer-based organizations the financial resources to pursue innovative projects/activities), and grants to cover the farmer-based organizations’ costs during identification, formulation and negotiation of demand for services (Bitzer et al., 2016).
In the United Republic of Tanzania, public funding for research and EAS has been decoupled from actual implementation, allowing control of resources by beneficiaries. This is partly achieved through Zonal Agricultural Innovation Funds managed by multi-stakeholder committees. Privatised research and EAS provision on commercial commodities (coffee, cashews, cotton, and so on) is managed and funded by the corresponding sector based on export levies (Maatman et al., 2011).

In Nigeria, it is suggested to establish a performance-based management system for Agricultural Development programmes (ADPs) staff linked to salaries and promotions, including: a small number of tangible Key Performance Indicators (KPIs) linked to goals of extension (i.e. farmer satisfaction, adoption, productivity, welfare); and rewards based on achieving certain targets (ADPs) (Huber et al., 2017).

There is strong rationale for the Albanian Government to support further development of Albanian National Extension System (ANES) and overall advisory/extension activities in the country:

- agriculture provides 40 percent of total employment, half the jobs in rural areas, 19 percent of GDP, 40 percent of export value, is high priority in the strategy for integration with European Union, and nearly 50 percent of the population is rural;

- there is good potential for expansion – the agri-food sector is under-performing and not yet technologically advanced, good agro-climatic conditions exist, there are great opportunities for increasing food exports and for import substitution as integration with the European Union single market proceeds and initiatives such as the Food Safety Project advance food compliance standards in the country.

The Albanian National Extension Service has potential to greatly improve technological advancement on farms, but its expertise and services have been allowed to decline due to lack of financial resources for professional development of advisers, modern information and communication technologies, lack of strategic direction and inadequate leadership and management. According to the proposed draft ANES SAP, there is immediate need for additional 419 000 EUR of investments. From that amount the biggest part is related to long term expenses as investment in equipment etc.

On the other hand, from the estimated 70 000 potential target farmers, and 22 257 belonging to actual focus group, in case of a 10 percent increase of the gross value added per year the direct monetary benefits to ANES client farmers could be as high as 5 225 000 EUR/year, plus indirect monetary benefits to processing/marketing businesses during 2020–2021 from better quality/quantity approximately 1 400 000 EUR. That shows that the monetary benefits could be 16 times the investment costs, plus other non-monetary benefits.

Over a five-year period, the results would improve even more as farmers and other entrepreneurial clients of ANES appreciate the benefits of quality advice. These will also leverage further gains in GDP from follow-on investments in agricultural holdings, e.g. through the IPARD programme and national investment schemes.

There would also be improvements in compliance with agri-environment standards on farms. Estimates indicate modest increases in seasonal employment, as the improved value will come mostly from increased productivity from existing labour. Returns from advisory to diversification and rural business expansion are more uncertain, as building capacity requires a longer-term approach before positive outcomes are visible.

5.5 Improving infrastructure

A functional public EAS system consists of necessary infrastructural settings, i.e. offices, meeting and residential places (physical spaces), farmer training facilities (e.g. computers, projectors, vehicles), experimental and demonstration plots, and technical promotion, communication and advocacy facilities (videos, camera, and ICT facilities), and detection and testing labs, etc.

Improving infrastructure is one of the most important priorities to strengthen public EAS systems, especially at grassroots levels. Improving public infrastructure needs investments from both government and non-government sectors, to ensure that public EAS systems have the following basic infrastructural conditions: (1) office spaces that are adequately equipped; (2) basic travel vehicles (motorbikes, bicycles or cars); (3) fields for experiments and demonstration of new technologies and varieties; (4) farmer training venues and facilities (computers, projects or meeting rooms etc.); and (5) well-equipped labs for testing seeds, pesticide residue, fertiliser or soil at the regional level or national level as necessary.

5.6 Monitoring and evaluating performance of public EAS systems

Rigorous, effective monitoring and evaluation (M&E) is crucial for ensuring the service quality and the accountability (downward in particular) of public EAS systems. It will strengthen the case for further investments in EAS as well as identifying systems in need of reform and their effective management (Alex, 2020). It is of great importance to develop and operate a holistic, multi-scalar, and easy-to-use framework of EAS M&E. This will be important for public agencies to better monitor and evaluate their public EAS system by themselves. In doing so, evidences can be generated for identifying gaps and pathways to strengthen and reform public EAS systems.

Such an M&E framework, on the one hand, should differentiate M&E activities according to the five major links throughout the EAS delivery process, namely, inputs, activities, outputs, outcomes, and impacts. For each link, different M&E-related activities, namely, either monitoring, evaluation or assessment are to be conducted with corresponding indicators, which are to be defined according to the realities and characteristics of four principal agriculture sectors, namely, agronomy, animal husbandry, aquaculture, and agro-machineries. Monitoring activities focus on inputs and activities. Evaluation activities look into the outputs and the outcomes of EAS. Assessment activities concern the long-term socioeconomic and environmental impacts that EAS have generated, directly or indirectly (impacts).
On the other hand, it should differentiate the indicators of inputs, activities, outputs, outcomes, and impacts of the four agriculture sectors at the national, regional, and local levels, considering that the motivation and purpose of M&E activities differ at different levels. This means that the improved M&E framework should adopt a multi-scalar and multi-dimensional approach to the M&E of public EAS systems at the macro, meso and micro levels, offering more tailored indicator frameworks for each level and thereby help gain more accurate and meaningful evidence. By using this framework, at the national level, policy-makers and investment decision-makers can plan the transformative reform process, realign priorities and better target investments, policy and capacity development efforts. At the regional level, policy-makers, public EAS managers, and investment decision-makers can achieve impact investing and make strategic policies aimed at strengthening public EAS systems at the local level. At the local level, public EAS agents can identify capacity needs and gaps in service delivery in order to strengthen service provision and increase impact.

Farmers and farmers organizations should be empowered to participate in the M&E processes of public EAS systems to enhance accountability, especially downward accountability of public EAS to farmers. M&E results are to be used in a meaningful and timely way so as to make necessary adjustment of EAS provision.

5.7 Creating an enabling policy environment

Promulgating enabling policies is vital to ensure essential public services accessible to smallholder farmers. It is imperative that all countries formulate policies that guide the provision of EAS (Pye-Smith, 2012). A national policy is needed to develop a public agricultural EAS system that gives space for pluralistic EAS while still nurturing the efficiency, effectiveness and inclusiveness of the public agricultural EAS (Leta Dufera et al., 2017). It is important also because that privatisation and pluralism policies alone, no matter how worthy, cannot be translated into effective practice without well-conceived and designed systemic change processes (recognising and fostering holism and interdependence among all actors) and contingent programmes for local human capacity development (Connolly, 2004).

In accordance with national agricultural development goals, it is necessary to identify whether regulation or polices for supporting public EAS systems needs to be legislated in accordance with the gaps identified. The contexts of relevant enabling laws or regulations or polices under the framework of supporting public EAS systems should include institutional arrangement, human resource developments, mandates and responsibilities, sustainable financial mechanisms, infrastructure settings and management, M&E and legal liabilities. It is equally important to put in place an implementation mechanism of policies. To facilitate the implementation of policies aimed at strengthening or reforming public EAS
systems, some trigger events, whether internal or external, are needed to raise awareness about the need of an array of strong EAS. Once that awareness is raised, there needs to be a joint mobilisation of the State and the agricultural profession, and agreement on how to go about designing a stronger EAS system from existing elements (Rigourd & Dugue, 2022).

For pluralistic EAS to work, policies first must provide a holistic framework in which multiple actors can operate in synergy (Davis, 2020). This means that public EAS policies should at best be aimed at structuring a public agricultural EAS system related with other pertinent systems, such as education, information, research and territorial organization (Patricio Molina, 2010). Therefore, policies are to be formulated within a cross-cutting framework that covers other pertinent sectoral policies. This is because that public EAS policies alone cannot successfully be reoriented towards helping smallholder farmers increase productivity and reduce poverty without a supportive reorientation of agriculture, rural development and, increasingly, urban development policies (Farrington et al., 2002). The right blend of policies can help improve the livelihoods of smallholder farmers, which requires a policy framework that encourages pluralism, cooperation and competition (Pye-Smith, 2012). Second, developing a policy environment to strengthen the capacity of the EAS system to meet such emerging challenges as climate change, precision agriculture, nutrition and health goals, youth and gender, and other challenges related to the transformation of agri-food systems and to resilience building remains the most important development concern (Davis, 2020). This requires that policies be aimed at continuously enhancing the multi-faceted capacities of
EAS agents, multi-actor partnerships, and farmer empowerment, especially from an AIS perspective. Third, policies should clearly define a framework for analysing EAS performance that includes not only indicators on capacities of EAS agents, but also on the existence of opportunities to acquire and renew these capacities (FAO, 2021).

**BOX 26. Fome Zero Campaign in Brazil**

During recent years, many of Brazil’s 4.5 million family farmers have improved their output and income. Brazil’s Zero Hunger Campaign, known locally as *Fome Zero*, together with an extension programme that focuses on family farmers, have been at the heart of this success story. “During the 1970s, we had an extension system which was very effective in promoting the agro-industrial sector”, says Ben Corrêa da Silva, President of the Brazilian Rural Extension Academy. However, family farmers, who produce 87 percent of Brazil’s cassava, 70 percent of its beans and 58 percent of its milk, the staple foods consumed by most Brazilians, received little or no assistance, despite their contribution to food and nutrition security and the economy. All this changed when a government led by Inácio Lula da Silva introduced an extension policy that specifically targeted family farmers. The 2004 policy, which defines extension as a non-formal and continuous education service, has encouraged a pluralistic approach, with NGOs, farmers’ organizations, government departments and others being involved in the delivery of services, which are free of charge to farmers. The government has put its money where its mouth is: between 2004 and 2009, the extension budget increased from less than 50 million reais (USD 100 million) to over 250 million reais (USD 250 million). The Brazilian approach to extension is the antithesis of the old top-down, under-resourced model: services are tailored to suit the needs and demands of the farmers themselves. Evidence suggests that the more participatory and well-resourced the extension services are, the greater the benefits for their clients.

*Source: Pye-Smith, C. 2012. Agricultural extension: A time for change: Linking knowledge to policy and action for food and livelihoods. Wageningen, The Netherlands, Technical Centre for Agricultural and Rural Cooperation*


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Transforming public agricultural extension and advisory service systems in smallholder farming: Status quo, gaps, way forward


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Transforming public agricultural extension and advisory service systems in smallholder farming: Status quo, gaps, way forward


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### Websites


Introduction

Agriculture sector is of great importance in China, employing more than 300 million farmers. Following the establishment of the household responsibility system in 1982, agricultural lands were decollectivised and cultivable lands were allocated to rural households with the objective of enhancing productivity. While China’s agricultural output is the highest in the world, only about 15 percent of its total land area is arable. Its cultivable land, which is only ten percent of the total arable land in the world, supports over 20 percent of the world’s population. An efficient public agricultural extension and advisory (EAS) system together with strong research and education systems is crucial for achieving this agricultural miracle (Table 1).

TABLE 1. Three systems contributing to agricultural and rural development in China

<table>
<thead>
<tr>
<th>System</th>
<th>Components</th>
</tr>
</thead>
</table>
| Research system| - No. of public research institutions in total: 993, among which 52 belong to MARA, 436 to provincial governments and 505 belong to prefecture or county governments. For example: public research institutions under CAAS, CATAS, and CAFS  
- No. of private research institutions: over 300, which belong to big agribusiness such as seed, fertilizer, pesticide, agro-machinery and plastic films corporations |
| Education system| - No. of agricultural universities and colleges: 634, such as China Agricultural University, Nanjing AU, Huazhong AU, etc.  
- Agricultural colleges of Universities, such as AC of Beijing university, Zhejiang University, Yangzhou University, etc.).  
- Agro-vocational colleges, such as CABTS of MARA, provincial and counties. |
| Extension system| - No. of government public extension agencies: ca 117 000  
- No. of extension agencies of research systems: ca 1 100  
- No. of extension agencies of research systems of education system: ca 500  
- No. of private extension agencies: ca 100 000 |

Generally speaking, the overall environment for EAS in China is quite favourable and conducive to agricultural and rural development, which helps mitigate the negative factors stemming from its large population, limited arable lands, occasional environmental issues, and predominantly top-down planning and
decision-making. China has a well-developed and nationwide public agricultural EAS system, often referred to as agricultural technology extension (ATE) system in China. The ATE system was formalised after decades of experiments and practice and has continued evolving across its history (Table 2). It is especially worth noting that the national level organizational changes from late 1970s to 1980s later laid the foundation for creating a modern, nationwide and public agricultural technology extension (ATE) system, operating at five administrative levels, namely, national, provincial, city (or prefecture), county, and township (Table 3). The county and township levels are the basis of the ATE system.

**TABLE 2. A brief timeline of the evolution of China’s ATE system since 1950s**

<table>
<thead>
<tr>
<th>Period</th>
<th>Government actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950s</td>
<td>County-level demonstration farms, manned by Mutual Help Group model laborers and technicians, and stations of the agricultural technology extension (ATE) were established</td>
</tr>
</tbody>
</table>
| Mid-1960s to 1970s| A four-level county agricultural sciences experiment network was extended nationwide:  
- county agricultural research institute  
- commune agricultural scientific technology station  
- agricultural scientific technology brigade  
- production extension team |
| Late 1970s to 1980s| Scattered functions of agricultural technology generation, experimentation, demonstration, extension, training and commercial services (mainly supply of agricultural inputs) were merged into one agricultural extension system, encompassing:  
- National General Agricultural Technology Extension Station (1982)  
- National General Plant Protection Station (1982, formerly Plant Protection Bureau)  
- National General Seed Management Station (1982, formerly Seed Bureau)  
- National General Soil Fertilizer Station (1986) |
| 1980s             | Market-oriented reforms:  
- the agricultural technology staff were allowed to sign service provision contracts with economic institutions and obtain pro rata bonus from enhanced production (1983).  
- ATE institutions were allowed to launch enterprise-type business entities, and extension agents were allowed to charge for certain services (1985). |
<p>| 1991              | A government directive for strengthening Township Agricultural Technology Extension Stations (TATES) as grassroots extension institutions. Accordingly, graduates of junior colleges and technical secondary schools were to serve as frontline extension workers, and the staffing and funding for the TATES were to be provided by provinces, autonomous regions or municipalities according to their respective financial status. |
| 1993              | The Agricultural Technology Extension Law of the People’s Republic of China was passed (amended in 2012) |
| 1996              | A government order issued directed the enhancement and guaranteeing of funds for ATE at all levels, which also covered the type, number and structure of staff |</p>
<table>
<thead>
<tr>
<th>Period</th>
<th>Government actions</th>
</tr>
</thead>
</table>
| 2000   | - the grassroots township extension structure was further consolidated through the merger of various ATE institutions  
- the transfer of personnel, financial and property rights from the county to the township level |
| 2003   | Ministry of Agriculture joined hands with the State Commission Office for Public Sector Reform (SCOPSR), Ministry of Science and Technology, Ministry of Finance, and Ministry of Human Resources and Social Security. |
| 2006   | A government document “Opinions of the State Council on Deepening Reform and Strengthening the Building of Agricultural Technology Extension System at the Grassroots Level” recommended gradual introduction of pluralistic extension system involving relevant national level institutions rural cooperative economic bodies, research institutes, academic institutions and agricultural enterprises. |
| 2008   | “Decisions” of the government directed:  
- further extension reforms in the form of capacity building of extension staff for improving its technical quality  
- innovation in the management system  
- improvement of township and regional ATE institutions within three years  
- gradual building of village level service stations. |
| 2009-2010 | Large amount of investment made in constructing and improving physical extension infrastructure at the township level. |
| 2012   | “Document 1 of 2012” stipulated:  
- acceleration of the innovation and extension of agricultural science and technology  
- enhancement of the ATE capacity  
- implementation of the nationwide demonstration program for reform  
- establishment of the ATE system at the grassroots level, including the construction of infrastructure for the township level extension setup  
- activation of extension institutions at all levels. |

**TABLE 3. Public EAS institutions at different administrative levels in China**

<table>
<thead>
<tr>
<th>Admin. level</th>
<th>Type of EAS agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>National level</td>
<td>Centres or general stations of Animal Husbandry, Fishery, Agro-technical (NATESC), Agro-mechanical, Ecological protection, Farm Operation</td>
</tr>
<tr>
<td>Provincial or county level</td>
<td>Centres or stations of Animal Husbandry, Fishery, Seed and Seed Industry Soil and Water, Plant Quarantine and Protection, Crop Production, Farm Operation and Management</td>
</tr>
<tr>
<td>Township level</td>
<td>Comprehensive agro-technical extension centres or station</td>
</tr>
<tr>
<td>Village level</td>
<td>Farmer technicians or demonstration households</td>
</tr>
</tbody>
</table>
Institutional setting

The Ministry of Agriculture and Rural Affairs (MARA) is responsible for providing free-of-charge EAS to the farmers. MARA has 14 public institutions engaged with EAS (e.g. Agricultural Management Institute, National Agro-technical Extension and Service Center (NATESC), General Stations of Animal Husbandry, Livestock Feed Management, Fishery Technology Extension and Ecological Environmental and Natural Resources Management, China Agricultural Machinery Testing Center, China Agricultural Film and Television Center, Chinese Academy of Agricultural Sciences, etc.).

Mandates

Agronomy sector

✔ Technical evaluation and demonstration including introduction, field trial and field demonstrations of new agronomic technologies:
  • new crop varieties;
  • new inputs;
  • new cultivation technologies;
  • balanced fertilisation;
  • water saving and rain-fed agriculture;
  • integrated pest control;
  • agro-ecological management;
  • safe use of chemicals.

✔ Monitoring and forecasting:
  • crop pests;
  • soil moisture and quality;
  • drought and flooding.

✔ Law enforcement:
  • plant quarantine;
  • registration and management of new crop varieties;
  • inputs quality testing and market supervision;
  • crop seeds quality;
  • fertiliser quality;
  • pesticide quality;
  • implementing national EAS laws and policies.

✔ Farmer training and education:
  • farmer agronomic technical training;
  • farmer vocational education;
  • farmer digital literacy training.
Animal husbandry sector

✓ **Resources management:**
  - investigation, protection and management of livestock, poultry, pasture, and feed varieties;
  - verification, registration, introduction, breeding, and promotion of related varieties.

✓ **Animal production and development:**
  - quality certification of animal and husbandry products;
  - pasture improvements;
  - pasture and grassland pest control;
  - animal product processing;
  - livestock industry statistics and economic operation analysis;
  - antimicrobial resistance management;
  - animal husbandry technology.

✓ **Monitoring and forecasting:**
  - pasture and grassland monitoring;
  - monitoring animal breeding environment.

✓ **Law enforcement:**
  - animal quarantine;
  - registration and management of new livestock varieties;
  - livestock feed quality testing and market supervision;
  - implementing one health laws or policies;
  - emergent responses to emerging animal diseases.

✓ **Farmer training and education:**
  - herder technical training;
  - herder vocational education.

Aquaculture sector

✓ **Resources management:**
  - protection and management of fishery resources;
  - verification, registration, introduction, breeding, and promotion of related fish varieties.

✓ **Technical evaluation and demonstration including introduction, trial and demonstrations of new fishery technologies:**
  - polyculture pond such as fish-rice, fish-crab etc. systems;
  - aquaponics technologies;
  - smart aquaculture;
  - fish disease control technologies;
  - fishery product processing technologies;
  - fishery product traceability technologies.
Monitoring and forecasting:
- natural fishery resources monitoring;
- fishery industry statistics.

Law enforcement:
- conservation and protection of natural scarce fishery resources;
- registration and management of new fish varieties;
- fish feed quality testing and market supervision.

Farmer training and education:
- fish farming technical training;
- fish farming vocational education;
- digital literacy training.

Agro-machinery sector

Technical evaluation and demonstration including introduction, trial and demonstrations of new agro-machinery:
- agro-machineries including land preparing, harvesting and processing etc.;
- smart agriculture;
- agricultural drones and robotics.

Law enforcement:
- quality testing and market supervision of agro-machinery;
- judicial detection and arbitration of agro-machinery accidents;
- management and licence of safe use of agro-machineries.

Farmer training and education:
- farmer agro-machinery operation training;
- farmer agro-machinery education;
- farmer smart agriculture training.

In 2003, a synergy was established between MARA and the State Commission Office for Public Sector Reform (SCOPSR), Ministry of Science and Technology, Ministry of Finance, and Ministry of Human Resources and Social Security. This inter-ministerial collaboration mechanism has paved the way for a systemic approach to reforming the public EAS system (which concerns the mandates of multiple ministries), marking a significant progress in terms of extension reforms.

The grassroots ATE system has roughly undergone three major reforms (Jia & Yang, 2021). The first one was market-oriented and took place between 1989–1990, when the decision making of mandate and recruitment of personnel, funding, and infrastructure (the so-called “three powers”) of the county bureau of agriculture were devolved to township ATE stations. Although the original intention was to provide incentives to grassroots extension agents to earn additional income from non-extension activities and promote self-sufficiency...
of township ATE institutions, this reform resulted in worsening functionality of grassroots ATE stations, as some local governments had drastically reduced their investment and support for these stations. The second reform had two stages, while the county bureau of agriculture reclaimed the “three powers” in the first one (1991–2000), in the second one (2001–2003), it devolved again the “three powers” to township ATE stations and downsized the grassroots personnel to reduce the budget pressure. In this way, the township level was assigned a central role in the grassroots EAS. During the third reform starting in 2003, ATE agencies in similar sectors were appropriately merged into (township) comprehensive ATE stations (also called territorial stations or comprehensive stations). Meanwhile, EAS personnel were differentiated based on the services that they provided, namely, public or private, and managed through job competition and performance assessment.

The most recent reform measure is “Document No. 1 of 2012”, issued by the State Council which stipulated to 1) accelerate the innovation and extension of agricultural science and technology, 2) enhance the ATE capacity, 3) implement the nationwide demonstration program for reform, 4) establish the ATE system at the grassroots level, including the construction of infrastructure for the township level extension setup, and 5) activate extension institutions at all levels. Throughout the reform process, the improvement and enhancement of legal and regulatory framework have remained a key issue. In 1993, the Agricultural Technology Extension Law of the People’s Republic of China was passed, which was amended in 2012. Since 2006, there has been a call for moving towards pluralistic EAS systems, which was accepted in the amended Agricultural Technology Extension Law. At present, the EAS system of China has evolved into one that is both public-led, consisting of 75,000 institutions at the five administrative levels ranging from national to township with more than 800,000 professional extension agents, and pluralistic, including such new agricultural service market entities as 1.7 million agri-food enterprises, 1.93 million farmers’ professional cooperatives, and 270,000 for-profit service organizations (Jia & Yang, 2021).

The decades of reforms of China’s ATE system have been consistent and sustained. This on the one hand suggests that reforming EAS systems is essentially a time-consuming (long-term), learning-by-doing, and non-linear dynamic process of continuous deconstruction and reconstruction (Jia & Yang, 2021); on the other hand, reflects both the recognition and the political and financial commitment of the central government to the public ATE system. As a result, the system has performed satisfactorily if not ideally. However, despite the legal status of ATE as a public good, unclear institutional functions tend to undermine the performance of such a public EAS system. Often times, the three functions of public-good ATE delivery, for-profit services, and law enforcement management are not well-defined and balanced (Li, 2021; Luo, 2019). This can lead to a series of problems, leading ATE personnel to favour for-profit services over public-good services (Luo, 2019).
Institutional management

Generally speaking, the three pillars of agricultural and rural development, agricultural education, scientific research, and EAS, lack unified management and clear division of labor (Wang et al., 2016). A poor level of education-research-extension integration is still a persisting problem (Li, 2021). According to the amended *Agricultural Technology Extension Law* (2012), “ATE agencies at the township level can be mainly managed either by the ATE departments of the county-level people’s governments or by the township people’s governments. The ATE departments of the county-level people’s government are to provide professional guidance to ATE agencies at the township level. The specific management system is to be determined by the people’s governments of provinces, autonomous regions, and municipalities” (Article 12). Article 32 also stipulates that, “ATE departments at or above the county level and township people’s governments shall supervise and evaluate the performance of public-good functions of the national ATE agencies under their management.”

Human resource system

China’s ATE system has quite strong human resources system in terms of both ATE-related institutions (i.e. ATE agencies, universities, research institutes) (Table 4) and ATE agencies (Table 5). However, the quality of ATE personnel is not high, the ATE team is not well-developed (through continued in-service training) and regenerated (through new hiring to renew the aging personnel team), and there exists inter-generational gaps (He & Dou, 2004; Li, 2021; Liu et al., 2014; Luo, 2019; Wang et al., 2016; Wang et al., 2017).

| TABLE 4. Overview of institutional and personnel structure of ATE-related institutions in China (2017) |
|--------------------------------------------------|--------------------------------------------------|
| Category                                | No. of institutions (in thousand) | No. of staff (in thousand) |
| Gov’t agencies                      | 177.0                              | 1 138                       |
| Agro-research institutes            | 1.1                                | 7                           |
| Agro-universities                   | 0.5                                | 45                          |
| Farmer-based agencies               | 100.0                              | 1 500                       |
| Agri-businesses                     | —                                  | —                           |
| Total                                | 218.6                              | 2 690                       |
TABLE 5. Number of ATE agencies and personnel in China according to ATE sector (2017)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>No. of agencies (in thousand)</th>
<th>No. of staff (in thousand)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomy</td>
<td>49</td>
<td>370</td>
</tr>
<tr>
<td>Animal husbandry</td>
<td>53</td>
<td>375</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>13</td>
<td>40</td>
</tr>
<tr>
<td>Agro-machinery</td>
<td>27</td>
<td>180</td>
</tr>
<tr>
<td>Agro-economics management</td>
<td>35</td>
<td>175</td>
</tr>
<tr>
<td>Total</td>
<td>177</td>
<td>1140</td>
</tr>
</tbody>
</table>

This strong personnel system is guaranteed by sound legal framework and continuous and adequate government investment. Regarding the staffing and management of the (grassroots-level) ATE personnel, the amended *Agricultural Technology Extension Law* (2012) stipulated that:

♦ the staffing of the national ATE agency shall be reasonably determined in accordance with the scale of planting and breeding, the scope of services, and work tasks in the area it serves, so as to ensure the performance of public-good functions. The post setting of the national ATE agency shall be mainly of professional and technical nature. The posts of national ATE agencies at the township level shall be all of professional and technical nature. Of the total number of posts of national ATE agencies at the county level, no less than 80 percent shall be of professional and technical nature. For the rest of national ATE agencies, professional and technical posts shall account for no less than 70 percent of the total number of posts. (Article 13);

♦ the professional and technical personnel of national ATE agencies shall have the corresponding professional and technical qualifications and meet the requirements of the job responsibilities. The new professional and technical personnel employed by the national ATE agencies shall have a college degree or above in the relevant professional education and pass the professional and technical level examination organized by the relevant departments of the people’s government above the county level. Farmer technicians who meet the conditions after examination may be awarded corresponding technical titles and issued certificates in accordance with relevant regulations. The national ATE agencies shall strengthen the guidance to village ATE stations and farmer technicians. Villagers’ committees and village collective economic organizations shall promote and help village ATE stations and farmer technicians to carry out their work. (Article 14);

♦ ATE departments at all levels and national ATE agencies shall establish an accountability system and an evaluation system for professional and technical personnel of the national ATE agencies. The performance assessment,
Since 2003, efforts have been made to reform the ATE personnel system. EAS personnel were differentiated based on the services that they provided, namely, public or private, and managed through job competition and performance assessment (Jia & Yang, 2021). Another reform practice was to encourage ATE staff to get involved in business enterprises, so as to motivate them to learn about production and marketing and thereby make them eventually competent in advising the farmers on enhancing the production, improving the quality and value addition to the produce, establishing market linkages, and possibly operating the farms as agri-businesses. However, the trade-off between for-profit services and public-good services that public ATE staff are supposed to provide puts the efficiency of this reform practice under question (Li, 2021). According to Li (2021), the emerging “joint demonstration model” led by public non-profit ATE agencies that integrates public-good and for-profit ATE entities in China has led to an innovative approach to human resource development. This model contributes to the joint development and sharing of human resources. Public ATE agencies and for-profit ATE organizations jointly conduct professional training for EAS personnel. This joint training makes full use of the professional knowledge of the former and the experience of technological transfer and application experience of the latter. As a result, the trained technical service personnel are very likely to become beneficial supplement to the ATE team.

**Funding**

The overall funding is predominantly public at national, departmental, and municipal levels. Starting 2009, China started investing in the promotion and reform of the ATE system about RMB 800 million (equal to about USD 127 million) per year from its own resources. The amended *Agricultural Technology Extension Law* (2012) made it explicit that agricultural EAS belonged to “public good category” for which government investment and support were to be secured. The central government has shifted the responsibility for financing ATE to governments of lower administrative levels.

However, there is a serious shortage of government funding (He & Dou, 2004; Yang, 2010). Because the financial capacity of county and township governments
is very limited, many grassroots ATE agencies have insufficient funds, lack all necessary facilities, and service methods are relatively backward (Wang et al., 2016). Currently, cost-sharing is an emerging practice in China to overcome the lack of funding at the grassroots level. This is done mainly through the so-called “joint demonstration model” led by public non-profit ATE agencies (Li, 2021). This model is one of the typical models that are aimed to promote the integrated development of public-good and for-profit ATE in China, helping achieve project resource sharing (Li, 2021). Public ATE agencies share their long-term accumulated solutions with for-profit ATE organizations to help the latter optimise their solutions. At the same time, the former support the latter through incentives, project subsidies, and government funding.

Through the establishment of comprehensive ATE stations, namely, merging township-level agricultural economic management stations, ATE stations, agricultural machinery management stations, and animal husbandry and veterinary stations into the comprehensive township-level agricultural service centre, various resources can be integrated and effectively used, which is conducive to saving operation costs (Wang et al., 2017). Comprehensive ATE stations are conducive to the integration of human resources, financial resources, and physical assets, and thereby increases ATE stations’ collective advantage (e.g. concerted poverty alleviation campaigns and ATE activities at a larger scale) and capacity to deploy adequate and multi-disciplinary personnel (ibid.).

Support and incentives

Regarding incentives to ATE agents, the amended Agricultural Technology Extension Law (2012) stipulates that:

♦ rewards shall be given to units and individuals who have made contributions to the promotion of ATE (Article 8);
♦ the State encourages and supports village ATE stations and farmer technicians to promote ATE. Subsidies are to be provided to farmer technicians who assist in the development of public-good ATE activities (Article 15);
♦ those engaged in ATE can enjoy preferential taxation, credit and other aspects prescribed by the State (Article 33).

However, there has long been a lack of effective incentive mechanisms, which affects the performance of the public-good function of the grassroots ATE system (Zhi et al., 2007). At present, even if all the government’s investment in grassroots ATE agencies is used for wages, it is still far from enough to maintain the wages of ATE personnel at the national average level (ibid.). This level of investment is difficult not only to attract college graduates to engage in ATE and to ensure the minimum material conditions required for carrying out ATE activities, but also to make existing agents feel at ease to engage in ATE activities (ibid.).
Infrastructural settings

In terms of the infrastructural settings of grassroots ATE agencies, there exists an evident variance among different geographical areas across China. Most township-level ATE agencies have lagging office facilities and poor office conditions. Some township-level agricultural comprehensive service stations have no formal office space, and even basic desks and chairs are not enough. Backward technology-supported service methods and facilities and equipment make it difficult to experiment and demonstrate new technologies and new achievements as well as training the personnel (Liu et al., 2014). Generally, the infrastructure can be divided into five categories, i.e. office space, training room, laboratory, information consultation room, and experiment and demonstration base. Taken a county in Hunan Province for example (ibid.), each township-level ATE station is offered infrastructure construction funds of RMB 150 000 to 200 000 through the provincial finance. These funds are mainly used for the construction and expansion of office spaces of the township-level ATE station, technical training of ATE personnel, and purchase of the instruments and facilities necessary for the township-level ATE station, etc.

<table>
<thead>
<tr>
<th>Space</th>
<th>Facilities</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office space</td>
<td>tables and chairs</td>
<td>min. 80m²</td>
</tr>
<tr>
<td>Training room</td>
<td>- tables and chairs; TV, DVD player, projector, radio and other audio-visual facilities; disease and insect specimens, science and education, exhibition pictures; books and newspapers materials on agriculture, animal husbandry, agricultural machinery, fishery technology, etc.</td>
<td>min. 60m²</td>
</tr>
<tr>
<td>Laboratory</td>
<td>- soil nutrient rapid measuring instrument; moisture rapid measuring instrument; ground temperature thermometer; pesticide residue rapid measuring instrument and other instruments; necessary disease and insect identification equipment and utensils and pesticides</td>
<td>min 20m²</td>
</tr>
<tr>
<td>Information consultation room</td>
<td>- information service facilities such as TVs, DVD players, projectors, laser printers, copiers, computers, and other Internet facilities; guarantee that one portable motorcycle per each ATE agent</td>
<td>min 20m²</td>
</tr>
<tr>
<td>Experiment and demonstration base</td>
<td>establish an “agricultural science and technology experiment and demonstration field” at the township level</td>
<td>min 3.33 ha</td>
</tr>
</tbody>
</table>

Source: Liu et al., 2014
Each township is required to allocate land for free to the township-level ATE station to establish an experiment and demonstration base. The base provides vital spaces for ATE agents to carry out the experiments and demonstrations of new agricultural technologies and new varieties, excellent seedling breeding, and practical technical training.

For for-profit ATE organizations, there is generally a lack of policy and special financial support, access to construction land, and infrastructure and supporting functions (Li, 2021). Consequently, most of them are of small scale and scattered, limited coverage, low standardisation, relatively lagging human resources and supporting facilities, and weak independent research and development capabilities (ibid.).

References


Costa Rica

Introduction

In Costa Rica, the development of agricultural extension has been extremely important for the processes of economic and social modernisation of agriculture and the rural development. This contributes to the fortification of the agriculture sector as one of the main contributors to the country’s economy. For several decades, the extension has gone through different times and approaches determined by the different models and styles of development incorporated by the authorities in search of an increasingly efficient system.

The agriculture sector of Costa Rica is governed by a complex public institutional structure, which consists of eleven institutions under the stewardship of the Ministry of Agriculture and Livestock. These institutions enjoy various degrees of autonomy, and some of them must follow mandates established by legislation, which presents some challenges for the Rector Minister of coordination with transversal activities with the Agricultural Public Sector (SPA).

Currently, the public agricultural extension and advisory (EAS) system in Costa Rica is led by the National directorate of Agriculture and Livestock Extension, but reinforced by other public institutions in areas such as research, agricultural education and surveillance (Table 1).

| TABLE 1. Three systems contributing to agricultural and rural development in Costa Rica |
|---------------------------------|------------------|
| System                          | Component                                                  |
| Research                        | - No. of public research institutions in total: 2 (INTA and INCOPESCA), within the MoA and 4 public universities with agronomy schools.  
- No. of private research institutions: 2 regional R&D organizations (IICA and CATIE). Research is also conducted by private consortia from big commodities such as banana (CORBANA), sugarcane (LAICA), rice (CONARROZ) and coffee (ICAFE) |
| Education                       | No. of agricultural universities and colleges: 4 Agricultural Schools in Universities such as University of Costa Rica, National University, Technological institute of CR and Distance State University.  
No. of Agro-vocational colleges: 45 Technical Colleges from the Ministry of Education |
| Extension                       | No. of government public extension agencies: 86  
No. of extension agencies of research systems: 4  
No. of extension agencies of research systems of education system: 0  
No. of private extension agencies: 0 |

It currently has a predominantly public EAS system ran by the Ministry of Agriculture focusing on small- and medium-sized farmers. The system covers three administrative levels, from national, regional and district level, and runs through programmes involving a limited percentage of the farmer population.
The system recognises two types of farmers: “regular farmers” who are properly incorporated in the registry system of the MoA and are affiliated with a programme. These farmers receive at least four visits per year and are involved in training and demonstration events. Follow-up is given through telephone messaging. The second group are the “occasional farmers” who occasionally seek for help from the MoA. They are not registered in the MoA’s system and follow-up visits are not conducted due to personnel shortage.

Institutional setting

In Costa Rica, the Ministry of Agriculture and Livestock (MAG) [www.mag.go.cr] is legally responsibility of providing agricultural extension service to small- and medium-sized producers as indicated by the Law for the Promotion of Agricultural Production (FODEA law)\(^\text{16}\). This law seeks to improve the competitive capacities of rural families of small- and medium-sized agricultural producers, rural youth and their organizations, by improving productivity, knowledge and technology transfer, productive diversification, and agro-business strengthening. With this objective, internally, under the Organic Regulation of the MoA, updated under decree #40863 of the Executive Power of Costa Rica\(^\text{17}\), the National Directorate of Agricultural Extension (DNEA)\(^\text{18}\) is assigned the mission of promoting, directing and executing policies and strategies, following methodologies that offer integrated institutional services for agricultural production in an economically, socially and environmentally sustainable manner, responding to the demand for advice on sustainable production articulated within the production chains aimed at various markets.

There are public-private efforts that complement some governmental services such as research and technical assistance. However, less than 30 percent of farmers belong to some type of agricultural associations, including corporations (INEC, 2014).

The strategic objectives of the MAG are:

♦ develop sustainable production models on livestock and agricultural farms;
♦ increase zoo-phytosanitary control and surveillance for the protection of the national agricultural heritage, public health and the environment (SENASA);
♦ contribute to the economic reactivation in the rural area, through the generation of income through the implementation of the program for the insertion of groups of women and young people into the productive sector, with the development of income-generating activities. (4-S CLUBS).

\(^{16}\) [www.mag.go.cr/legislacion/1987/Ley-7064.pdf]

\(^{17}\) [www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=85882&nValor3=111197&strTipM=TC]

\(^{18}\) [www.mag.go.cr/acerca_del_mag/estructura/oficinas/DNEA.html]
Article 68 of the FODEA law clarifies that the MAG can count on the collaboration of national institutions in matters related to extension and agricultural research, as well as seeking help from international organizations specialized in the matter. Since the agricultural extension provided with public funds by the MAG is focused on small- and medium-sized producers, the law indicates that large producers must have their own or contracted technical assistance.

The Costa Rican Institute of Fisheries and Aquaculture (INCOPESCA)\(^\text{19}\) is an institute attached to the MAG and in charge of research and technology transfer in aquaculture, while INTA (National Institute for Agricultural Research and Transfer)\(^\text{20}\) is in charge of agricultural research and technology transfer.

MAG has a national mandate with its headquarters located in the capital, San José, and subdivides its operations into 8 Development Regions with a total of 86 Agricultural Extension Agencies\(^\text{21}\).

The Ministry of Agriculture and Livestock has a structure divided into five levels, where the highest hierarchy is found in the Minister on duty and its deputy ministers, who represent the Political Power. The following four levels are in descending order starting with the Advisory Instances, the Management Level, the Operational Level (Departments) and the Operational Level (Units). FIGURE 1 shows in detail the distribution of powers in the Organizational Chart of the MAG structure, focusing on the Agricultural Extension area.

\(^{20}\) http://www.inta.go.cr/
\(^{21}\) http://www.mag.go.cr/regiones/
Agricultural extension within the Ministry of Agriculture and Livestock (MAG)

**FIGURE 1.** Organogram. Adapted from: http://www.mag.go.cr/acerca_del_mag/estructura/ORGANIGRAMA%20MAG.pdf
### TABLE 2. A brief timeline of the evolution of Costa Rica’s EAS system since 1940s*

<table>
<thead>
<tr>
<th>Period</th>
<th>Government action</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Before 1942</strong></td>
<td>Technology was spread through documents: magazines, newspapers. In the reports of the National Centre for Agriculture, reference is made to research and extension units.</td>
</tr>
<tr>
<td>1942–1948</td>
<td>As agriculture started increasing, producers required technical advice, for which a group of agricultural technicians was appointed: Agronomists, in technical support for production, on the farms, becoming the first agricultural agents in extension work.</td>
</tr>
</tbody>
</table>
The Inter-American Technical Service for Agricultural Cooperation (STICA) is created to give continuity to agricultural extension action. It begins through the "Bilateral Agreement" between the US Government and Costa Rica, (Ministry of Agriculture and Industries: MAI), in this way the agricultural extension service is formally established.  
Single address and a network of 33 Agencies in different cantons of the country. Full freedom of action of the extensionists and the system in the execution of budgets and hiring of personnel.  
Department of specialized technical services in the areas of agronomy.  
A dynamic system of stimuli. Work based on the interpersonal relationship of the technicians with the producers. A dynamic process of programming, monitoring and evaluation of the work. It is based on individual care methods and techniques. |
| 1956–1963      | Agricultural extension service in the Ministry of Agriculture and Industries:  
The principles of STICA were maintained.  
It was used to design and implement agricultural strategies and policies.  
Support of other services such as credit, research, road infrastructure.  
Expansion of the agricultural frontier.  
Separation of the MAI into the MAG and the MEIC (1960). |
| 1963–1973      | The Regionalisation of the Agricultural Extension System:  
Creation of eight Regional Agricultural Centres.  
Limitation of budgetary resources and governed by State mechanisms.  
Exodus of extension workers to private companies.  
Weakening of the Central Directorate, indirect functions of coordination, evaluation, programming and training.  
Disappearance of programmes such as soil conservation and management, supervision, supply of inputs.  
Personnel administration was modified (different selection criteria).  
Extensive institutional growth and new demands for attention such as agrarian reform, supervised credit, community development.  
Emphasis on self-sufficiency of food for the country.  
Import substitution. |
<table>
<thead>
<tr>
<th>Period</th>
<th>Government action</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008–present</td>
<td>Agro-chain approach: National Food Programme Environmental conservation</td>
</tr>
</tbody>
</table>

*https://www.mag.go.cr/acerca_del_mag/historia/extension.html*
**TABLE 3. Public EAS institutions at different administrative levels in Costa Rica**

<table>
<thead>
<tr>
<th>Admin level</th>
<th>Type of EAS agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>National level</td>
<td>Administrative Centres/ Agronomic, Animal husbandry, Fishery and Aquaculture, Plant Health, Communication, Rural Entrepreneurship, Gender, Methodological Development, Ag. Research</td>
</tr>
<tr>
<td>Regional level</td>
<td>Sub-Administrative Centres, Agronomic, Animal husbandry, Fishery and Aquaculture, Plant Health, Ag. Research stations, demonstration plots and training facilities</td>
</tr>
<tr>
<td>District level</td>
<td>Extension offices: Agronomic, Animal husbandry: extension and Plant Health Officers.</td>
</tr>
</tbody>
</table>

**Mandates**

MAG agencies at the regional and district levels which directly provide EAS to farmers assume the following mandates:

**Agronomy sector**

- **Technical evaluation and demonstration including introduction, field trial and field demonstrations of new agronomic technologies:**
  - new crop varieties;
  - new inputs;
  - new cultivation technologies;
  - balanced fertilisation;
  - water saving and rain-fed agriculture;
  - integrated pest control;
  - agro-ecological management;
  - safe use of chemicals.

- **Monitoring and forecasting:**
  - crop pests;
  - soil moisture and quality.

- **Law enforcement:**
  - plant quarantine;
  - registration and management of new crop varieties;
  - inputs quality testing and market supervision;
  - crop seeds quality;
  - fertiliser quality;
  - pesticide quality;
  - implementing national EAS laws and policies.
✔ Farmer training and education:
  • farmer agronomic technical training.

Animal husbandry sector

✔ Resources management:
  • investigation, protection and management of livestock, poultry, pasture, and feed varieties;
  • verification, registration, introduction, breeding, and promotion of related varieties.

✔ Animal production and development:
  • quality certification of animal and husbandry products;
  • pasture improvements;
  • pasture and grassland pest control;
  • animal product processing;
  • antimicrobial resistance management;
  • animal husbandry technical.

✔ Monitoring and forecasting:
  • pasture and grassland monitoring;
  • monitoring animal breeding environment.

✔ Law enforcement:
  • animal quarantine;
  • registration and management of new livestock varieties;
  • livestock feed quality testing and market supervision;
  • implementing one health laws or policies;
  • emergent responses to emerging animal diseases.

✔ Farmer training and education:
  • livestock farmer technical training.

Aquaculture sector

✔ Resources management:
  • protection and management of fishery resources;
  • verification, registration, introduction, breeding, and promotion of related fish varieties.

✔ Technical evaluation and demonstration including introduction, trial and demonstrations of new fishery technologies:
  • polyculture pond such as fish-rice, fish-crab etc. systems;
  • aquaponics technologies;
  • smart aquaculture;
  • fish disease control technologies;
  • fishery product processing technologies;
  • fishery product traceability technologies.
✔ Monitoring and forecasting:
  • natural fishery resources monitoring;
  • fishery industry statistics.

✔ Law enforcement:
  • conservation and protection of natural scarce fishery resources;
  • registration and management of new fish varieties;
  • fish feed quality testing and market supervision.

✔ Farmer training and education:
  • fish farming technical training.

Agro-machinery sector

The Ministry of Agriculture has no current actions on technical evaluation and demonstration, including introduction, trial and demonstrations of new agro-machinery, law enforcement nor farmer training and education within the EAS.

Human resource system

The success of an extension programme or system not only depends on the organizational forms and the implementation of pertinent or more general policies, but especially on the quality and type of human resources that participate in it. With the changes introduced by the processes of globalisation and especially due to the effect of the technological revolution underway, human resources linked to extension programmes in most countries have not evolved at the same pace as events. An extension policy must include the structuring of training programmes for the necessary human resources, which, depending on the multifunctionality of the extension. Added to the above is the need to review the systems for contracting, renewing and evaluating the performance of extension personnel.

According to the interviews with high-level officials of the MAG-DNEA, the institution’s current staff are not sufficient to cover the extension needs. It is considered that it would be necessary to increase the number of personnel by 400 percent. Murillo and Sanchez (2017) pointed out that the insufficiency of human resources and not having technical support at the national level are the greatest limitations. Producers must rely on the regional technical staff for technical advice, but the specialised human resources of the agencies to implement the diagnoses of the organizations are still insufficient. Another problem that aggravates the situation is the absence of a plan for generational replacement. About 25 percent of the extension technicians in 2021 were close to retirement age, but the speed observed for the assignment of new personnel to fill these positions has been slow, mainly limited by budget. The Ministry of Agriculture is betting on the use of technology and methodologies such as the one introduced through the CABI-Plantwise22 programme, to increase its capacity to respond to the service needs of producers.

22 www.plantwise.org
TABLE 4. Overview of institutional and personnel structure of EAS-related institutions in Costa Rica (2022)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>No. of institutions (total)</th>
<th>No. of staff (total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gov’t agencies</td>
<td>3</td>
<td>2496</td>
</tr>
<tr>
<td>Agro-research institutions</td>
<td>2</td>
<td>309</td>
</tr>
<tr>
<td>Agro-Universities</td>
<td>4</td>
<td>N/A*</td>
</tr>
<tr>
<td>Farmer-based agencies</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agro-businesses</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
<td>3118</td>
</tr>
</tbody>
</table>

*Complete amount unavailable

TABLE 5. Number of EAS agencies and personnel in Costa Rica according to sector (2022)

<table>
<thead>
<tr>
<th>Sectors</th>
<th>No. of agencies (total)</th>
<th>No. of staff (total)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomy</td>
<td>86</td>
<td>1358</td>
</tr>
<tr>
<td>Animal husbandry</td>
<td>8</td>
<td>629</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>3</td>
<td>N/A*</td>
</tr>
<tr>
<td>Agro-machinery</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agro-economics management</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>1987</td>
</tr>
</tbody>
</table>

*Amount unavailable

**Funding**

The financing of the EAS comes from public funds, although in specific cases it can incorporate donations, funds from services provided by the Ministry of Agriculture (MAG) or loans for specific programmes. The MAG receives an annual budget of around 88 million dollars (2021), of which approximately 23 percent (20.5 million USD for 2021) are allocated to the agricultural extension programme. This amount has varied between 1.128 and 0.712 percent of agricultural GDP in the past 16 years (FIGURE 2). The use of allocated funds must meet guidelines previously established by law for the development of the country.

The Law of Financial Administration of the Republic and Public Budgets 8131 (LAFRPP) establishes the subjection of the Institutional Operational Plans (POI) to the National Development Plan (PND) in such a way that “every public budget must respond to the annual, medium and long-term institutional...”

http://www.pgrweb.go.cr/scij/Busqueda/Normativa/Normas/nrm_texto_completo.aspx?param1=NRTC&nValor1=1&nValor2=47258&nValor3=73503
operational plans, adopted by the respective hierarchies, as well as to the principles generally accepted budgets...”. This law also indicates that public resources must be budgeted according to macroeconomic programming, reflecting the priorities and strategic activities of the Government, as well as the objectives and goals of the PND. The investment projects to be executed, in the corresponding fiscal year, must be incorporated in the POI, for the respective opinion of linkage with the PND, this in order to reconcile the programming and budgeting of Public Investment within the framework of the National Public Investment Plan (PNIP).

It is important to note that the elements included in these technical and methodological guidelines correspond to:

♦ objectives, goals and indicators of Sustainable Development Goals (SDG) 2030, signed by the Government of the Republic before the United Nations and ratified through the National Intersectoral Agreement (Executive Decree 40203 PlanR-MINAE 2016)24;

♦ the priorities established in the Presidential Government Plan;

♦ institutional programming requires the establishment of strategic objectives and indicators with pertinent and reliable goals that allow the production of goods and services to be measured and that can be monitored and evaluated based on the results that citizens expect from their execution. Through the results chain methodology;

♦ the institutional programming will introduce the rights approach that allows the gender perspective, the use of the results of the Multidimensional Poverty Index (MPI), as appropriate; as well as disaster risk management in public investment projects to improve access and quality of public goods and services;

♦ the planning, programming, execution, budget, follow-up and evaluation process will be based on the principles of efficiency, effectiveness, transparency and accountability.

To develop the planning processes, the regional and national levels have to formulate their proposals and work strategies in full integration with the needs, possibilities and resources available to the Agricultural Extension Agencies (AEA). In this way, each instance that needs to develop its actions in the regional and local space must do so in close coordination and through the AEA. In turn, the priorities and technical guidelines defined at the national level must be addressed at the regional and local levels.

Infrastructural settings

The National Directorate of Agricultural Extension (DNEA) is made up of five Departments: Department of Rural Information and Communication, Department of Rural Entrepreneurship, Department of Agro-environmental Production, Department of Organic Production, Gender Programme, Methodological Development Unit and the Development Regions. To facilitate access to the population of agricultural producers, there is a Regional Directorate of the DNEA in each of the eight Development Regions: Brunca Region (located in the southeast of the country and encompassing the cantons of Golfito, Buenos Aires, Osa, Coto Brus, Corredores and Pérez Zeledón; and has ten agencies); Western Central Region (located in the western section of the Central Valley of Costa Rica and includes nine cantons from the province of Alajuela and nine from the province of Heredia; and has 12 agencies); Western Central Region (covers the province of Cartago and seven cantons of San José; it has 12 agencies); South Central Region (located in the centre of the country and encompasses eight cantons of the province of San José; it has eight agencies); Chorotega Region (located in the North Pacific region of Costa Rica, encompassing the entire province of Guanacaste; it has 11 agencies); Huetar Caribe Region (located in the eastern
part of the country, covering the entire province of Limón; it has six agencies); North Huetar Region (covers seven cantons of the province of Alajuela and one canton of Heredia; it has 14 agencies); Central Pacific (covers the province of Puntarenas; it has 13 agencies) for a total of 86 Extension Agencies. All agencies are equipped with offices, meeting/training rooms, office equipment and a variable number of cars (a total of approx. 258 cars/trucks) for reaching farmers in the field (Table 6). The research and demonstration facilities are under INTA’s management. There are 4 Experimental stations with a total area of 15 675 m² use for demonstration plots, experiments and seed production. There is a coordination between DNEA and INTA for technology transfer activities as their work programmes are based in the general priorities defined for country development.

**TABLE 6. Infrastructural settings of agricultural extension agencies in Costa Rica**

<table>
<thead>
<tr>
<th>Space</th>
<th>Facilities</th>
<th>Size (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office space</td>
<td>- 344 offices. Approx 344 tables and 1 376 chairs</td>
<td>5 504</td>
</tr>
<tr>
<td></td>
<td>- computer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- printer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- whiteboard</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- video beam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- 258 cars/trucks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- computer</td>
<td></td>
</tr>
<tr>
<td>Training rooms</td>
<td>- approx. 172 tables and 3 440 chairs.</td>
<td>4 816</td>
</tr>
<tr>
<td></td>
<td>- photocopier</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- printer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- television</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- video beam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- DVD player</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- manual</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- flyers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- books</td>
<td></td>
</tr>
<tr>
<td>Laboratory</td>
<td>- 4 labs (equipment distributed according to lab specialty).</td>
<td>Size not available</td>
</tr>
<tr>
<td></td>
<td>- soil nutrient rapid measuring instrument</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- moisture rapid measuring instrument</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- ground temperature thermometer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- pesticide residue rapid measuring instrument</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- disease and insect identification equipment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- utensils</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- chemicals (e.g. pesticides, fertilisers)</td>
<td></td>
</tr>
</tbody>
</table>
### Space Facilities Size (m²)

<table>
<thead>
<tr>
<th>Space</th>
<th>Facilities</th>
<th>Size (m²)</th>
</tr>
</thead>
</table>
| Information consultation rooms             | - EAS offices are used as consultation rooms for attending farmer queries: 344 offices  
- approx 344 tables and 1376 chairs  
- computer  
- printer  
- whiteboard  
- video beam  
- 258 cars/trucks | 15 675    |
| Experiment and demonstration base          | - 4 experimental stations.  
- warehouses (1)  
- offices (18)  
- experimental plots  
- laboratorries (2)  
- greenhouses (3)  
- training rooms (4)  
- demonstration plots  
- functional zoning: Crops and livestock distributed according to zones |          |

*Source: Personal communication with Alfredo Arce (senior extension officer-DNEA), Ruth Leon (Ag Researcher-INT)*

### References


**INEC.** 2014. *Censo Nacional Agropecuario XI 2014*, Instituto Nacional de Estadística y Censos (INEC), San José, CR.


Transforming public agricultural extension and advisory service systems in smallholder farming: Status quo, gaps, way forward

Institutional setting and function

In Egypt, the tendency is for the public sector extension system, at least in theory, to serve the vast majority of smallholder farmers, while the private-sector suppliers and consultants work with corporate farms and large estates (Rivera et al., 1997). Egypt public sector is represented by the Ministry of Agriculture and Land Reclamation (MALR), the Ministry of Water Resources and Irrigation (MWRI), other public universities and national research institutions. MALR function was reformed to get rid of commercial activities and limit its function to cover only seven sectors (Diab et al., 2020). One of these sectors is the Agricultural Extension Sector (AES). The AES was established and comprised of four central administrations, including: (1) the Central Administration for Horticulture and Field Crops, (2) the Central Administration for Afforestation, Nurseries, and Environment, (3) the Central Administration for Soils and Water, and (4) the Central Administration for Agricultural Extension and Environment (CAAAE). Nonetheless, not all these administrations provide extension-related services (Diab et al., 2020). Egyptian public EAS system cover all administrative levels, starting from the CAAAE at the central level in Cairo, Directorates of Agriculture at governorate and district levels, and to Agricultural Extension Centres (AECs) at the village level.

To support extension communication and media production, the MALR established four Development Support and Communication Centers (DSCCs). These DSCCs have distributed to serve the main agriculture regions, namely, Ismailia (Northeast of Delta), Dikirnis (Middle of Delta), Maryout (East of Delta), and (middle-Upper Egypt), with a focus on producing extension teaching and training material and organize extension events inside DSCC facilitates or in the villages in the surrounding governorates. The MALR also established in 1995 the Agricultural Extension Centres (AECs) at the village level to work as a basic EAS unit. About 210 AECs were created to support and develop the infrastructure of EAS in Egypt, provide EAS at village level, be a focal point of extension specialists, and improve EAS in general. Each AEC has a director with a group of extension specialists in various fields of agricultural activities. AECs play four key roles, including:

♦ planning for the agricultural extension programmes after identifying local community resources and priorities;
♦ supporting to solve agricultural problems and discover rural leaders;
♦ coordinating among rural organizations inside the local community; and
♦ training local farmers with agricultural information and involving them in rural extension programmes (Zahran, 1998).

To develop more responsive, accessible, and local-based extension programmes, the MALR established nine Regional Research and Extension Councils (RRECs)
covering the seven geographical regions of Egypt. The main function of each RREC is to carry out research efforts to develop EAS programmes responsive to farmers’ needs and the prevailing production patterns (CAAEE, 2018a).

The CAAEE is composed of eighteen departments, all of which deal with EAS such as preparation, planning, implementation, and evaluation in a specific field, including animal production, horticulture, cotton and fibers, sugar crops, cereals, pulses and oil crops, crops of newly reclaimed lands, agriculture extension programmes, extension publications, media, marketing, agriculture councils, extension units, extension centres, rural development, financial and administrative affairs, technical office, and information technology (CAAEE, 2018a). The CAAEE established 60 Rural Development Centres (RDCs) distributed in the main villages in 16 governorates, which are aimed to promote integrated sustainable development efforts at local levels.

However, public EAS are highly criticised for being ineffective and irrelevant (Abdel-Ghany & Diab, 2013). According to the Egyptian Strategy for Agricultural Development up to 2030, the existing EAS system needs reform and development policies for several reasons, including: (1) ineffective performance of extension personnel, associated with limited resources and ever-decreasing numbers of extension workers, (2) lack of trust of producers, especially those working in highly specialized and sophisticated activities, in extension worker, (3) lack of mutual relationships between research and extension workers in addition to lack of involvement of university staff and technicians in extension work, and (4) unfair salaries of extension workers, especially VEWs (El-Shafie, 2009 cit in Abdel-Ghany & Diab, 2013).

In Egypt, some private companies provide information and EAS to corporate farms, and consultants sell their services to large estates. Few non-governmental organizations (NGOs) are committed to rural development and none of them is lending support to the work of public sector in extension. Many farmer-based organizations were established under USAID assistance to fill the gap in technical assistance for farmers that is essential for achieving positive rural development, water management and food security. Today less than half of these associations that are still active represent the building block for renewed effort to deliver agricultural extension services to farmers in Egypt.

Institutional management

The EAS at the governorate level is supervised by the Directorate of Agriculture. Governorate administration includes technical and administrative staff and supervise the extension workers at both district and village levels whereas Village Extension Workers (VEWs) interact with farmers and farming families on almost daily basis (Diab et al., 2020).
**Human resource system**

The majority of the EAS agents are about to reach the retirement age (Diab et al., 2020; McDonough et al., 2015). Due to little hiring of fresh graduate extension staff, there is a lack of EAS agents especially at the village level. The total number of agricultural EAS agents in Egypt in 2007 was 9,658, which decreased to 2,503 in 2018 (CAAEE, 2018b), indicating that the EAS system lost about 74.1 percent of its human resources in only ten years. This suggests a risk of lack of continuity and inadequate knowledge and experience transfer from one generation to another (Diab et al., 2020).

Technical staff are concentrated at the central and provincial levels, while most of the staff, including field extension workers, is based at district, sub-district and lower levels (ibid.).

**Funding**

In Egypt, the funding for EAS is limited only to the government and, sometimes, donor-funded projects, while there are no other sources of funding (Abdel-Ghany & Diab, 2013). Operational funds for field EAS activities have never been sufficient and agents always complain about shortage of funds (ibid.).

**Support and incentives**

Village Extension Workers (VEWs), being the most important grass roots level, working closely with farmers and their families, suffer from several problems related to low socioeconomic status due to low salaries, incentives and promotion opportunities, lack of sufficient educational qualifications and training, insufficient transportation facilities (ibid.).

**Infrastructural settings**

Transport facilities for the field extension staff are inadequate to enable the staff to move from village to village to contact farmers (Abdel-Ghany & Diab, 2013). Each of the Development Support and Communication Centres (DSCCs) is equipped with audio-video studio, a printing house, and an auditorium and training halls. Some of the centres can provide full board accommodation to the trainees, visitors, and the staff participating in EAS campaigns, and rural development programmes. Agricultural Extension Centres (AECs) are equipped with furnished training hall for extension meetings, facilities of audio-video aids, computers, and a library of pamphlets, magazines, books, videos, and CDs (CAAEE, 2019 cit in Diab et al., 2020). The Rural Development Centres (RDCs) are equipped with machinery for dairy production, bakery and agro-processing facilities and for manufacturing of handcraft (CAAEE, 2018a).
References


Ethiopia

Institutional setting and function

Ethiopia’s EAS system is considered as a key policy instrument for necessary behavioural and attitudinal changes and creating demands on national agricultural extension programmes (MOANR, 2017). It is predominantly public and operates in a decentralised way (Davis, 2020). Regarding EAS delivery, the system has evolved from one that was largely top-down and managed by the federal ministry to one owned and operated by the regions and woredas (districts) following the decentralisation process. It comprises:

- Ministry of Agriculture (MOA) as key institution responsible for developing and refining the overall national agricultural and rural development strategies and policies.
- Major government ministries concerned with or affecting agricultural and rural development, such as Ministry of Finance and Economic Development, Food Security Coordination Bureau (FSCB), Ethiopian Agricultural Transformation Agency (ATA), etc.
- Several agencies beneath the MOA including Agricultural Development Sector, Livestock Resources Sector, Natural Resources and Food Security Sector, and Agricultural Inputs and Production Market Sector.
- Regional, woreda, and kebele (lowest administrative level) institutions.

The principal regional and sub-regional institutions include:

- Bureau of Agriculture and Rural Development (BOARD) at the regional level. Each region has a BOARD. The regions and their BOARDs are responsible for agriculture and rural development policy implementation, coordination, and evaluation. Each BOARD has a director and a number of technical and administrative staff, including department heads. These personnel provide technical and administrative backstopping, as well as supervision and monitoring for the woreda- and kebele-level extension offices. Each region is divided into major agro-ecological zones, which provide more detailed technical and administrative support, especially for the large regions.
- Office of Agriculture and Rural Development (OOARD) at the woreda level. The OOARDs are composed of five main sectors: agricultural development, natural resources, environmental protection and land administration, water supply and rural roads, and input supply and cooperative promotion (Gebremedhin et al. 2007 cit in Davis et al., 2009). The largest sector, agricultural development, is responsible for extension services and is usually divided into crop production, livestock production, NRM, and extension teams (ibid.). The OOARDs represent

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25 Ethiopia has five administrative tiers: federal level, regions, zones, woredas, and kebeles from the top to the bottom. Each kebele consists of at least 500 families, or the equivalent of 3,500 to 4,000 persons.
a more operational level in terms of reaching smallholder men and women farmers and pastoralists.

- Farmer Training Centers (FTCs) at the kebele level. To date, 12,500 FTCs have been established across Ethiopia in which all of them are reported to be found at varying levels of functionality and currently most of them are not capable of providing the expected services to farmers.

The four major components of the Ethiopian EAS system:

- Participatory Demonstration and Training Extension System (PADETES).
- Farmer Training Centres (FTCs).
- Agricultural Technical and Vocational Education (ATVET).
- Institutional Coordination.

Ethiopia’s EAS system depends heavily on Farmer Training Centers (FTCs) and trained Development Agents (DAs) that give extension support to farmers. FTCs serve as an entry point for providing effective and efficient extension services, hubs for knowledge and information sharing, and centres for promoting best practices. At the same time, it is important to notice that FTCs are self-sustaining to ensure both commercial viability and developing sense of community ownership. Successful FTCs should focus on developing modern farmers who are able to harness positive changes in farming technology while also being able to cope with changing conditions and stresses. According to the “Agricultural Extension Strategy of Ethiopia (2017)”, the key bottlenecks leading to inadequate performance of FTCs include: (1) limited involvement of farmers in FTC management; (2) insufficient resources for FTCs; (3) most FTCs have no long-term plans for sustainability; (4) inadequate incentives to motivate and retain DAs; (5) limited knowledge and skill of DAs; (6) limited training to farmers; and (7) inadequate incentives for model farmers for their time to support resource poor farmers.

Public research and education institutions, such as Ethiopian Institute of Agricultural Research (EIAR), Regional Agricultural Research Institute (RARI), Ethiopian Development Research Institute (EDRI), Ethiopian Economic Policy Research Institute (EEPRI), Haramaya University, etc., are not directly involved in the EAS delivery. Instead, they play a significant role in knowledge generation and supply. The semi-autonomous EIAR has the mandate to generate, develop, and adapt agricultural technologies that focus on overall development and needs of users and coordinates the decentralised agricultural research activities at federal and regional research centres, and through higher education institutions.

In Ethiopia, the overwhelming presence of the government in all areas of agriculture has limited private sector expansion in previous years. Despite the government’s efforts to bring the private sector into play in the EAS system, there are still a number of barriers that limit private sector involvement. For example, it is difficult for new market entrants to build a distribution network that can compete with that of the Ethiopian Seed Enterprise (ESE). The NGOs (known to have many innovative and participatory approaches), while becoming increasingly important, are often left out of extension initiatives (Davis et al., 2009). Farmer cooperatives
in Ethiopia do not provide extension services directly to their members; rather, they are a major source of both agricultural inputs and farm credits.

**Institutional management**

The Government of Ethiopia (GOE) established the Agricultural Development Partners’ Linkage Advisory Council (ADPLAC) in 2008 to enhance institutional arrangements, coordination, and linkages among key agricultural development partners engaged in agricultural extension, research, and development at different levels, from the federal to the *woreda* levels. However, three bottlenecks have undermined a smooth implementation of ADAPLAC: (1) lack of vibrant linkage and alignments; (2) weak coordination and communication between agriculture sectors and Higher Learning Institutions (HLIs)/Agricultural Technical and Vocational Education and Training (ATVETs); and (3) inability to take responsibility and accountability in linkage platforms.

It is suggested that if extension priorities are to be decentralised to better serve the specific needs and opportunities of farm/pastoral households at the *kebele* and *woreda* levels, then the needs, opportunities, and priorities for all major categories of farmers must be agreed to: first at the *kebele* level (e.g. through the FTC MC), and then this FTC plan should be reviewed, coordinated, and supported by the *woreda* Extension Advisory Committee (WEAC) (Davis *et al*., 2009) (FIGURE 1).

![Image of institutional management structure](source: Davis et al., 2009)
Human resource system

The current extension services at various levels are challenged with high shortage of staff (MOANR, 2017). It was reported that about 45 000 Development Agents (DAs) currently on duty at the kebele level, including about 12 to 22 percent women depending on the region. The number of frontline extension personnel is expected to increase to roughly 60 000 when all FTCs have been established and are fully functional. As of 2008, about 63 000 DAs have graduated from the ATVETs with 12 percent of them being female (MOARD, 2009). Most teaching personnel in the ATVETs are B.Sc. holders, and this number has on the whole been increasing since 2001/02.

While official staffing policy indicates that DAs ought to be staffed in home woredas, DAs are sometimes transferred to regions where they have no connection. In some cases, DAs have been transferred to a different FTC after only six to nine months. This is detrimental to DA impact, as experience shows it takes at least two to three years before a DA has earned the respect, relationships, and location-specific expertise to add real value to farmer communities.

The main bottlenecks related to human resource development and its effective utilisation are: (1) limited demand-based training at HLIs and ATVETs; (2) poor staffing and high staff turnover; and (3) a lack of clear chain of command (MOANR, 2017). Plus, DA’s capacity to reach adequate numbers of farmers remains a constraint.

Funding

The federal government of Ethiopia has demonstrated a strong commitment to agriculture and rural development sector, allocating more than ten percent of the country’s total budget.

About 2 500 FTCs have been strengthened with financial support from the World Bank RCBP. FTCs were not meant to generate their own revenues. Those that generated revenues did not have the legal right to re-use the generated income. However, recently some efforts are being made in few regions that allow the use of revenue generated by these FTCs (MOANR, 2017).

The major funding sources for ATVETs are the MOA, BOARD, RCBP (Rural Capacity Building Program) and, to a very limited extent, the colleges themselves.

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26 Information collected from different woredas indicates that there is no well-defined line of chain, leading to poor flow of information and lack of accountability. For example, DAs are accountable to both Woreda Administration and the Woreda Agricultural Development Office (WoADO). Being accountable to multiple institutions makes it difficult for DAs to prioritise tasks and may lead to over-stretching and hence to under-performance. As a result, the DAs fail to meet the requirements of either institution (MOANR, 2017).
Support and incentives

DA performance incentives are limited in some regions and many DAs seek alternative career opportunities due to low job satisfaction. As the DA programme has developed, progress has been made to develop incentive programmes for DAs, including university scholarships and regional and national DA rewards. These efforts represent a good initial step towards creation of a DA incentive system. However, the lack of a clear professional career path that includes incentives, salary increases, awards, and/or other professional opportunities (e.g. scholarships) for the extension field staff remains a major constraint. Some regions and woredas have implemented successful incentive programmes including offering university scholarships and small increases in pay based on performance, but most have not implemented sufficient incentive structures (Davis et al., 2009).

Both a lack of incentives and a lack of clarity in reward system design are considered as accountable for low job satisfaction. Opportunities for increasing education, considered by DAs as one of the most appealing incentive, are often very limited, with most DAs feeling they have very little chance of ever being selected for one of these scholarships. Additional opportunities to enhance their expertise, improve their extension services to farmers, and have the opportunity to move up professionally within the extension system are non-existent in some regions and woredas.

Very limited support and emphasis are given by local and regional bureaus to FTCs (MOANR, 2017). This has been particularly inadequate in physical and financial resources, value-added management, technical advice and regular follow-up to make the FTCs function as desired.

Infrastructural settings

Over the past years, the GOE has invested substantially in the infrastructure and resources required to create a strong agricultural field extension presence, and it is committed to further expanding this to become one of the most intensive systems in the world. The plan is to ultimately establish an FTC in each kebele. The FTC should include an office/classroom building, housing for the DA staff, livestock buildings, wells, fencing, demonstration farms (DFs), and other needed facilities. The kebele will typically allocate 1.0 to 2.5 ha of community land to the FTC, land that can be used to demonstrate and train farmers about new technologies, farming systems, new crops, livestock, or other enterprises.

According to Davis, Swanson and Amudavi (2009), however, constraints exist in terms of actual infrastructure and resources in most FTCs, even those supported by donor programmes. The sustainability and effectiveness of the FTCs are considerably undermined due to a lack of seed financing and operating funds to invest in basic training infrastructure and to turn the DFs into teaching-learning plots that are at least partially economically sustainable. Some FTC buildings were poorly constructed and requires continued maintenance to keep
them functional. Others were built as permanent structures that are already being used as community centres, and EAS activities have to compete with other community activities for space. Most FTCs are not timely maintained or repaired (MOANR, 2017). Most FTCs do not have access to electricity, therefore, only a few have TVs with DVD players and almost none have any other type of advanced teaching equipment (e.g. overhead projectors, screens, computers). In fact, some do not have any teaching material at all. FTCs also have few independent learning materials (e.g. training materials/manuals) that farmers can use for independent learning and support. Most FTC DFs have not been developed or used. Almost all FTCs (except for those supported by projects or NGOs) have inadequate funds and lands for practical training, establishment of demonstration plots, and other basic infrastructure and facilities such as basic furniture, farm implements, ICT and training materials (MOANR, 2017).

References


MOARD, Department of Agricultural Technical and Vocational Training and Education. 2009. Data on ATVET Colleges Graduates. Addis Ababa, MOARD.
Kyrgyzstan

Institutional setting and function

Kyrgyzstan is a mountainous country with less than 10 percent of arable land for farming, and its agriculture, forestry, and fishing sectors contribute to 11.6 percent of its gross domestic product (GDP)\(^{27}\) (Aitmatov et al., 2021). Since its independence from the Soviet Union, like other countries of Central Asia, Kyrgyzstan has made concerted efforts to “decollectivise” and “individualise” (a shift from the predominance of large corporate farms to individual or family farms)\(^{28}\) its agriculture and rebuild EAS systems to enhance agricultural productivity (Aitmatov et al., 2021; Lerman & Sedik, 2018). However, in the absence of government-supported EAS programmes, non-governmental organizations (NGOs) have played a dominant role in providing EAS and technical assistance to family-owned farms (Aitmatov et al., 2021). Policy reforms have encouraged development of EAS programmes through government-supported institutions, local universities, and civil society organizations (ibid.), so as to promote private sector-based, cost-effective and capable EAS (Vögltli, 2008). Notwithstanding the remarkable reform progress and economic performance, the situation in Kyrgyzstan remains fragile and subject to important vulnerabilities, including weak policy responses and lack of policy ownership, governance deficiencies and corruption problems, weak policy implementation and management capacity of institutions, and weak infrastructure (ibid.). A reluctance to change continues to slow policy reforms, and strong vested interests continue to block essential institutional change (ibid.).

Till the end of the 1990s, previously there was no public EAS at all in Kyrgyzstan (Katz, 2002). The Ministry of Agriculture, Forestry and Water Resources\(^{29}\) (MAFWR) is responsible for the development and administration of the agriculture sector and has 16 specialised subordinate agencies, three scientific research institutes and 17 agro-industrial sub-sectors to oversee (Mirzabaev et al., 2009). As MAFWR has the overall responsibility for the provision of public EAS to the farmers, it is in charge of policy-making, financing, institutional linkages, and capacity building of EAS staff. Kyrgyzstan has attracted numerous external donors who have actively provided financial and technical assistance to help develop to various aspects of its agriculture sector. Donors’ interventions focused not only on restructuring the agriculture sector, but also on establishing meaningful non-government EAS agencies and strengthening relevant public institutions to

\(^{27}\) Compared to one-third in 2008 (Akramov & Omuraliev, 2009).

\(^{28}\) Evidence shows that the individualisation of agriculture is associated with the observed post-transition recovery in Central Asia (and in Commonwealth of Independent States in general) and that small family farms outperform the large enterprises. This clashes with the traditional philosophy of economies of scale and with the inherited view of small family farms as an undesirable aberration (Lerman & Sedik, 2018).

\(^{29}\) Used to be called The Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic and The Ministry of Agriculture, Water Resources and Regional Development of the Kyrgyz Republic until being renamed to the current name in May 2021.
better support family-owned private farms and the diversification of agricultural systems (Aitmatov et al., 2021). MAFWR has taken advantage of these non-government, civil society EAS agencies, which were established under various donor-funded programmes and have functioned at various administrative levels. These agencies, along with strengthened preexisting institutions, constitute the EAS system of Kyrgyzstan.

Basically, the state has fully withdrawn from agricultural EAS (Crewett, 2015), a semi-autonomous, non-governmental, multidonor-financed30, and participatory Rural Advisory Service (RAS) has been running small offices in all seven regions of Kyrgyzstan since 1999. In fact, the RAS is the only nationwide network of agricultural advisors providing EAS (Katz, 2002; Mirzabaev et al., 2009). RAS (Rural Advisory Services) centres were established in 1999 at Oblast (province) level, with branch offices in the Rayons (districts). At Oblast and Rayon levels, there are steering councils composed of representatives of the farming community and various local organizations and administrative bodies. The RAS secretariat at the central level has supervisory, coordinating and significant controlling functions. It also has the financial responsibility for the system (Katz, 2002). Each of the decentralised extension centres of RAS builds knowledge and experience on particular topics that are of importance in its area, to become a centre of competence in that specific field (ibid.).

Four main agricultural research institutes compose the national agricultural research system of Kyrgyzstan, namely, Kyrgyz Research Institute for Agriculture (KRIA), Kyrgyz Research Institute of Veterinary (KRIV), Kyrgyz Research Institute of Livestock and Pastures (KRILP)31, and Kyrgyz Research Institute for Irrigation (KRII). Several other institutions are also involved in the agricultural research, namely, the State Project Institute “KyrgyzGiprozem” of the State Register for monitoring of agricultural lands, and the research institutes under the National Academy of Sciences (such as Institute of Biology, Institute of Biochemistry and Plant Physiology, etc.). Operational linkages between research institutes and EAS are minimal. However, there are two important contributions of the research institutes to extension: first, the provision of in-service training to the extension, and second, researchers’ cooperation with the advisory staff in conducting field trials on farmers’ fields.

Despite the efforts of external donors to promote the private sector’s participation in Kyrgyzstan’s agriculture since the 1990s, there is no private company presently engaged in the provision of EAS. However, a few private organizations, such as Association of Agribusinessmen of Kyrgyzstan, Seed Association of Kyrgyzstan, Kyrgyz Agricultural Market Information Service, Legal Assistance to Rural Citizens, and Global Development Alliance, have been supplying various agricultural inputs

30 The RAS was co-created by the World Bank, the International Fund for Agricultural Development (IFAD), and the Swiss Agency for Development Cooperation (SDC), as a part of the Kyrgyz-Swiss Agricultural Project (KSAP). It was funded by SDC and implemented by HELVETAS (Swiss Inter-cooperation Kyrgyzstan) from 1995 to 2010.
31 The Kyrgyz Research Institute of Veterinary (KRIV) and Kyrgyz Research Institute of Livestock and Pastures (KRILP) used to be unified as the Kyrgyz Research Institute of Livestock, Veterinary and Pastures before 2008.
and information to farmers. After the end of the Soviet era, many external donors supported the creation of a number of NGOs. Over the last decade, many of these NGOs have stopped operating due to the withdrawal of donor funds. Some of the survived NGOs are now important pillars of Kyrgyzstan’s EAS system, such as the above-mentioned Rural Advisory Services (RAS), Training, Advisory and Innovation Center (TAIC), Forum of Women’s NGOs, and Training and Extension System (TES) Center. Quite a number of farmers-based associations have emerged in Kyrgyzstan. It is however not certain how much do they offer to their members in the way of EAS. Most cooperatives in Kyrgyzstan, few in number and widely scattered, are more of production cooperatives (successors of former collective farms) than “pure” service cooperatives, although the former partially fulfill the function of the latter by providing farm services also to nonmembers (Lerman & Sedik, 2017). Kyrgyzstan, most likely, will soon be faced with the challenge of sustaining the gains in the extension advisory field when the very significant and lengthy external donors’ assistance comes to an end.

Institutional management

There is a lack of coordination between various EAS agencies (Karasartov et al., 2015).

Human resource system

Few young staff, low salary of consultants, temporary work, and irregular training for consultants are main drawbacks of the EAS personnel system (Karasartov et al., 2015). Short-term contracts are provided which affect the turnover significantly (ibid.).

In Kyrgyzstan, a result-based payment system was put in place on the initiative of donor agencies in 2001 to increase EAS efficiency. All service providers belonging to the semi-autonomous Rural Advisory Services (RAS) are required to utilise result-based payment to motivate EAS agents to improve cost-effectiveness and quality of service delivery, enhance accountability for delivered services, and increase the influence of farmers on the services provided. Specifically, EAS agents receive a basic salary (60–80 percent of total remuneration), while the remainder depends on performance, which is monitored biannually. Such monitoring is done within unit teams of EAS agents in order to promote solidarity and collaboration. Since the introduction of the RBP, the overall mean salaries of EAS agents have risen slightly (to 106.5 percent of the previous standard payment) and efficiency of service delivery is said to have increased significantly (Helvetas, 2005 cit in Bitzer, 2016). As salaries are directly linked to achievements, EAS agents have become more dedicated to produce results and focus on measurable on-farm outputs rather than inputs of service delivery (Vöglti, 2008). Attitudinal changes towards farmers and changes in organizational culture and transparency are also reported

32 TAIC started its activities in 2002 as Advisory-Training Center (ATC) of Rural Advisory Service (RAS).
(Helvetas, 2005 cit in Bitzer, 2016). However, this result-based payment system requires considerable efforts in monitoring, reporting and communication, which are time consuming and costly, and drives a shift towards output-orientation which has resulted in a focus on topics of high visibility and low risk in their implementation (Bitzer, 2016). EAs have also tended to select farmers who are likely to exhibit better performance (Vögltli, 2008). The lack of accountability to farmers, increased occurrences of manipulating the result-based payment system, and declining efficiency over time have led to attempts to introduce cost recovery to increase the influence of farmers on extension activities, but without much success so far (Kaegi, 2015).

**Funding**

Generally speaking, the decollectivization of agriculture in Kyrgyzstan was accompanied by a significant decline in agricultural public expenditures, leading to significant declines in the availability of agricultural services (Akramov & Omuraliev, 2009). The overall funding scheme is based on a public-donor partnership, including funding from central government and external donor funds. More than 90 percent of NGOs which deliver EAS are dependent on donors, i.e. on external financing (Karasartov et al., 2015). The government almost does not provide support to the RAS, i.e. services of the RAS are not purchased with the use of state budget (ibid.). The RAS merged different donor programmes for agricultural training and advice. However, it does not appear to be sustainable due to its insecure long-term financing (Mogilevskii et al., 2017), as the donors’ long-term perspective is to fully withdraw and leave agricultural advisory services to private providers (Crewett, 2015). Plus, it was also criticised for its insufficient coverage, being too expensive, lack of participatory governance, and weak demand orientation (Schmidt, 2012).

Cost-recovery has been experimented in some parts of the country, although its efficiency remains questionable. For example, in southern Kyrgyzstan, the TES (Training and Extension Services) Centre in Osh has supported private extensionists in establishing contracts with farmer groups for services. When the first payments were due, it turned out that the extensionists often felt they could not ask the users for payment despite the contract that had been signed, as the users were mostly from their own or a nearby village who themselves did not feel obliged to pay (Katz, 2002). Generally speaking, farmers and recipients of RAS are still not financially self-sufficient (Karasartov et al., 2015).

Attempts have been made to innovate the funding systems. For example, in the RAS (Rural Advisory Services), a pilot service mandate between the central RAS secretariat and a subordinate advisory centre has been initiated. Funds are paid on three different grounds: 50 percent of the planned budget is core funding based on annual work plans. 30 percent of the budget is output funding, based on achievable and measurable outputs such as training conducted, demonstrations arranged, publications produced, etc. 20 percent is paid for measurable results in the field (e.g. income from a specific product produced by farmers participating
in training compared to nonparticipating farmers). There are expectations about the effects on cost-effectiveness of such a new arrangement. In common supply-side financing systems, the budget allocated to an extension organization usually depends heavily on the budget used in the previous year. The organization is thus not motivated to use the funds as efficiently as possible, because efficiency would reduce the financial resources available in future. If the extension organization is mandated to provide specified services at pre-determined cost, and is allowed to keep unused funds, it will be much more motivated to use the funds efficiently. This setting must be accompanied by very good, result-oriented quality monitoring, because there is also a motivation to save funds at the cost of quality of services. Indeed, the challenge is to find indicators for which the advisory service is actually responsible with no other factors involved (Katz, 2002).

**Support and incentives**

Specific incentives have been provided to EAS agents to increase the access of women farmers to agricultural EAS (Bitzer, 2016). In Kyrgyzstan, quotas for female extension staff have been introduced, resulting in around 30 percent of extension agents being women by the end of 2009 (Kaegi, 2015). This confirms the need to introduce separate incentives to increase the number of female EAs and to increase the number of female farmers reached (Bitzer, 2016).

**Infrastructural settings**

Some of the RAS do not have their own working space (Karasartov et al., 2015). Profits that some RAS units were able to generate over the period of result-based payment system introduction have been economised or invested in infrastructure (Vöglt, 2008).

**References**


Female agents have tended to cope better with performance expectations than their male colleagues and as a result, their salaries were even slightly higher than those of male agents (Helvetas, 2005). Furthermore, this led to an increased focus on women farmers as the recipients of extension services who constituted around 60 percent of clients (Kaegi, 2015).


Schmidt, P. 2012. Rural advisory services in Kyrgyzstan: learning from 20 years of development cooperation. Swiss Cooperation Office in the Kyrgyz Republic.

Sri Lanka

Introduction

Agriculture sector plays a key role in Sri Lankan economy in terms of safeguarding food and nutrition security, contributing significantly to employment, economic growth and export earnings, while ensuring the sustainable use of natural resources. It provides nearly seven percent for Gross Domestic Product (GDP) and contributes 21.7 percent for total exports and 25.5 percent for national labour force (Central Bank of Sri Lanka, 2021). The agriculture sector is constituted mainly of the crop subsector comprising the plantation and non-plantation crop segments, livestock and poultry, and the fisheries and aquaculture subsectors. The total land area developed for crop production consists of about 865 000 ha planted to permanent crops (primarily tea, rubber, coconut and spice crops) and another 850 000 ha developed for paddy cultivation and 200 000 ha used for other food crops (Sri Lanka Overarching Agricultural Policy, Ministry of Agriculture, 2019). Monsoon and inter-monsoon rainfall patterns shape the agricultural seasons and irrigation patterns. The dry zone of Sri Lanka has two thirds of the agricultural land where the bulk of Sri Lanka’s irrigation infrastructure is located. The majority of farmers cultivate both lowland rice and other food crops. Nearly 80 percent of the total production is dominated by smallholder farmers.

The animal production systems are dominated by small producers who primarily involve in poultry and dairy production and some small ruminants and pigs. The fishery segment includes coastal and deep-sea marine fishery and aquaculture. Fisheries sector is also dominated by small producers with half of the over 30 000 fishing fleet comprising small traditional crafts.

The following figure illustrates the share of various enterprises comprising the agriculture sector in Sri Lanka.

![FIGURE 1. Shares of various enterprises comprising the agriculture sector in Sri Lanka](image-url)
Because of COVID-19 pandemic, the Sri Lankan economy contracted in 2020 and recovered a bit in 2021. However, due to several deeply entrenched structural problems and current global trend, Sri Lankan economy in early 2022 showed a dwindling nature. The economy was already in a fragile state lacking the necessary buffers to withstand shocks by COVID-19 pandemic and other multifaceted headwinds that emanated from the global and domestic fronts.

Agriculture in Sri Lanka is operating in a highly dynamic and transforming context. In order to develop the agriculture sector, improved skills, information and innovations are necessary, which will help meet complex demand patterns, reduce poverty and preserve or enhance ecological resources. Therefore, an efficient public agricultural extension and advisory (EAS) system together with strong research and education systems is crucial for obtaining and sustaining this great agricultural achievement (Table 1) to cope with the current scenario.

**TABLE 1. Three systems contributing to agricultural and rural development in Sri Lanka**

<table>
<thead>
<tr>
<th>System</th>
<th>Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research System</td>
<td>Number of public research institutions in total 69. All research institutes are under central Government.</td>
</tr>
<tr>
<td>Education System</td>
<td>Number of Agricultural Faculties and schools 20, such as Faculty of Agriculture, University of Peradeniya. Agricultural colleges such as Sri Lanka School of Agriculture. No separate Universities for agriculture.</td>
</tr>
<tr>
<td>Extension System</td>
<td>Number of Government public extension 31 (this includes 25 Deputy Provincial Director of Agriculture and 6 Deputy Director of Agriculture (Inter-Province) offices. Provincial DoA are under Provincial setup and Inter-provincial DoA are under Central Government. No established private agriculture extension service providers.</td>
</tr>
</tbody>
</table>

**Overview of public EAS reform**

Sri Lanka does not have a sustainable agriculture policy. Any reform efforts have special reference to eradication of poverty, food security and sound ecosystem management.

♦ Land development ordinance of 1935 says to hold untitled land under Government ownership and distribute such lands as smallholding for agricultural production purpose. Paddy lands act of 1956 consolidates the rights of the tenant paddy farmers and restricts the use of paddy lands for any other purposes. However, the Agrarian Services Act of 2000 relaxes above.

♦ The National Water Policy of 2000 aimed at transferring the management of irrigation works to farmer organizations. Introduction of taking irrigation
charges proposed many times and even attempted at a pilot scale. However, this was not succeeded due to various reasons including socio-political setting.

♦ A National Agriculture Policy was formulated in the 1980s to foster a public national agricultural system and ensure high quality research and knowledge dissemination. Since this is government-centred and not successful in commercialising agriculture, only the paddy sector has undergone significant changes. Other agricultural products are still under traditional farming methods and characterised by low productivity. Agricultural extension is under increasing pressure to become more effective and various attempts made to reform it. However, the process of reform remains incomplete.

As per an organic policy decision, the Sri Lankan Government issued the Gazette Extraordinary No.2226/48 of May 6, 2021 banning the importation of chemical fertilisers and pesticides with immediate effect. There was a special concern about the potential impact on rice and tea, one a staple food and the other a very important foreign exchange earner of the country.

Institutional setting

The Department of Agriculture (DoA) under the Ministry of Agriculture (MoA) is responsible for providing free-of-charge EAS to farmers. The DoA is mandated to carry out research and extension of major food crops. Agricultural extension being a devolved subject, the central DoA undertakes extension activities in the inter-provincial areas, with the Provincial DoAs covering the remaining area. Research, development and extension for spice crops are managed by the Department of Export Agriculture and in plantation crops by the respective commodity research institutes and corporations/boards.

There are nine Provincial and six Inter-Provincial DoA providing extension services in Sri Lanka. Extension staff from these two main Departments provide their services to farmers to enhance agricultural knowledge, improve skills and develop their attitudes towards the increase of national food production and uplift the living standards of farmers by increasing their income.

Each Provincial DoA has District offices and there are 25 District offices. Assistant Director of Agriculture (ADA) segments function under District office and Agriculture Extension Centres/Offices work under ADA segments.

Inter-provincial areas located in the commanding areas of major irrigation schemes are under the purview of the Extension and Training Centre of the DoA. Parts of the Districts of Ampara, Anuradhapura, Hambantota, Moneragala, Polonnaruwa and Kandy are demarcated as Inter-provincial areas.
<table>
<thead>
<tr>
<th>Period</th>
<th>Government actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1820</td>
<td>The British colonial government established an institutional set-up to ensure the food security with the beginning of Second World War. As a result, four Agriculture Extension Officers were appointed for Sri Lanka Food Production Overseers were appointed to aid above Extension Officers and leaflets with the information on agriculture were printed and distributed by an institute established in Colombo</td>
</tr>
<tr>
<td>1912</td>
<td>The Department of Agriculture established – an important Institute for disseminating knowledge in the country</td>
</tr>
<tr>
<td>1939</td>
<td>74 Diploma holders in Agriculture were appointed to the post of Agriculture Instructor in order to strengthen the agriculture extension system in Sri Lanka</td>
</tr>
<tr>
<td>1940</td>
<td>Sri Lanka Agriculture Association was established and the Food Production overseers were attached to the above association</td>
</tr>
<tr>
<td>1952</td>
<td>Mobile cinema unit was used in agriculture extension system. During the period concerned, farmers were made aware of agricultural innovations by establishing field demonstrations</td>
</tr>
<tr>
<td>1957</td>
<td>Appointing of District Agriculture Extension Officers with a view to launch the agriculture extension system at the district level by decentralizing the provincial level agriculture extension system was a very significant event that took place</td>
</tr>
<tr>
<td>1964</td>
<td>Separate division headed by Deputy Director of Agriculture (Extension) under the DoA was established for agriculture extension and the responsibility of agriculture extension was entrusted to that division</td>
</tr>
<tr>
<td>1979–1980</td>
<td>The training and visit extension system were introduced to develop a proper coordination among Extension Officers, Research Institutes and Training Institutes. During this period, adaptive researches were carried out in farmers’ fields and thereby disseminating modern technology to farmers. Under new extension system, the post of Subject Matter Specialist was established in training institutes.</td>
</tr>
<tr>
<td>1980s</td>
<td>As a result of Public reformation program, the post of Subject Matter Specialist was abolished and they were appointed to the post of Grama Seva Niladhari. The reformation adversely affected for smooth functioning of agriculture extension system of the country.</td>
</tr>
<tr>
<td>1993</td>
<td>Agricultural Extension Project was implemented under the financial assistance of World Bank with a view to redevelop the prevailed agriculture extension system in Sri Lanka.</td>
</tr>
<tr>
<td>1998</td>
<td>The project was terminated and since then a proper agriculture extension system was not adopted island wide.</td>
</tr>
<tr>
<td>2012</td>
<td>A revolutionary decision was taken by the cabinet and 25 District Directors were appointed covering all Districts. These District Directors were placed under the purview of the Government Agent/District Secretary and the whole system was supervised by the Ministry of Agriculture under the central government</td>
</tr>
<tr>
<td>2015</td>
<td>Instead of the post of Subject Matter Specialist which was abolished previously, the post of Technical Assistant was established under the DoA and Diploma Holders in agriculture were recruited for this post. The decision taken to empower the agriculture extension system by having the Technical Assistants attached to the Agriculture Instructors’ Division, was another crucial turning point of agriculture extension in Sri Lanka.</td>
</tr>
</tbody>
</table>
Sri Lanka has three tiers of government: national, provincial and local authority with the devolution of powers defined under three lists in the Constitution. At the local level, the administration is dual, i.e. Divisional Secretariat under the Central Government, and the Local Government under the Provincial setup. The MoA is generally responsible for crops, irrigation, animal production and health, inland fisheries and environmental affairs.

**Mandates**

The Provincial and Inter-provincial DoA at the Provincial and District levels directly provide EAS to farmers assume the following mandates:

**Agronomy sector**

- **Technical evaluation and demonstration including introduction, field trial and field demonstrations of new agronomic technologies:**
  - new crop varieties;
  - new inputs;
  - new cultivation technologies;
  - balanced fertilisation;
  - water saving and rain-fed agriculture;
  - integrated pest control;
  - agro-ecological management;
  - safe use of chemicals.

- **Monitoring and forecasting:**
  - crop pests;
  - soil moisture and quality;
  - drought and flooding.

- **Law enforcement:**
  - plant quarantine;
  - registration and management of new crop varieties;
  - inputs quality testing and market supervision;
  - crop seeds quality;
  - fertiliser quality;
  - pesticide quality;
  - implementing national EAS laws and policies.

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**TABLE 3. Public EAS institutions at different administrative levels in Sri Lanka**

<table>
<thead>
<tr>
<th>Admin level</th>
<th>Type of EAS agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>National level</td>
<td>Department of Agriculture</td>
</tr>
<tr>
<td>Provincial/Regional</td>
<td>Provincial Department of Agriculture / Inter-Provincial</td>
</tr>
<tr>
<td>District level</td>
<td>Office of the Deputy Provincial Director of Agriculture /</td>
</tr>
<tr>
<td></td>
<td>Office of the Deputy Director of Agriculture (Inter-Province)</td>
</tr>
<tr>
<td>Segment level</td>
<td>Assistant Director of Agriculture segments</td>
</tr>
<tr>
<td>Village level</td>
<td>Agriculture Extension Centres / Agriculture Extension Office</td>
</tr>
</tbody>
</table>
Farmer training and education:
• agronomic technical training;
• vocational education.

Animal husbandry sector

Resources management:
• investigation, protection and management of livestock, poultry, pasture, and feed varieties;
• verification, registration, introduction, breeding, and promotion of related varieties.

Animal production and development:
• quality certification of animal and husbandry products;
• pasture improvements;
• pasture and grassland pest control;
• animal product processing;
• livestock industry statistics and economic operation analysis;
• antimicrobial resistance management;
• animal husbandry technical.

Monitoring and forecasting:
• monitoring animal breeding environment.

Law enforcement:
• animal quarantine;
• registration and management of new livestock varieties;
• livestock feed quality testing and market supervision;
• implementing one health laws or policies;
• emergent responses to emerging animal diseases.

Farmer training and education:
• Livestock farmer technical training;
• Livestock farmer vocational education.

Aquaculture sector

Resources management:
• protection and management of fishery resources;
• verification, registration, introduction, breeding, and promotion of related fish varieties.

Technical evaluation and demonstration including introduction, trial and demonstrations of new fishery technologies:
• polyculture pond such as fish-rice, fish-crab etc. systems;
• aquaponics technologies;
• smart aquaculture;
• fish disease control technologies;
• fishery product processing technologies;
• fishery product traceability technologies.

✔ Monitoring and forecasting:
• natural fishery resources monitoring;
• fishery industry statistics.

✔ Law enforcement:
• conservation and protection of natural scarce fishery resources;
• registration and management of new fish varieties;
• fish feed quality testing and market supervision.

✔ Farmer training and education:
• fish farming technical training;
• fish farming vocational education.

Agro-machinery sector
✔ Technical evaluation and demonstration, including introduction, trial and demonstrations of new agro-machinery:
• agro-machineries including land preparing, harvesting and processing etc.;
• smart agriculture;
• agricultural drones and robotics.

✔ Law enforcement:
• quality testing and market supervision of agro-machinery;
• judicial detection and arbitration of agro-machinery accidents.

✔ Farmer training and education:
• agro-machinery operation training;
• agro-machinery education;
• smart agriculture training.

Human resource system

Sri Lankan agriculture extension system has limited human resource system in terms of both ATE-related and institutions (i.e. ATE agencies, universities, research institutes) (Table 4) and ATE agencies (Table 5).

Agricultural extension service is still conceptualised as a diffusion support process, starting from publicly-funded technology generation and dissemination. Consequently, the extension service suffers from being treated as a linear process that is supply-driven or top down by design. There are several drawbacks related to agricultural extension system such as large performance gap between research system and the farmer; fails to meet the information demands of the farmers and rural communities; it is primarily geared up to promote state-sponsored
programmes irrespective of farmers' interests; increased reluctance among policy-makers to invest in extension leading to reduced budgets and slow adjustment to reform policy process.

TABLE 4. Overview of institutional and personnel structure of ATE-related institutions in Sri Lanka

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of institutions</th>
<th>No. of staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government Agencies</td>
<td>31</td>
<td>-</td>
</tr>
<tr>
<td>Agro research institutes</td>
<td>35</td>
<td>-</td>
</tr>
<tr>
<td>Agro universities</td>
<td>9</td>
<td>471</td>
</tr>
<tr>
<td>Farmer based agencies</td>
<td>15,993</td>
<td>-</td>
</tr>
<tr>
<td>Agro businesses</td>
<td>2,473</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>18,541</td>
<td>-</td>
</tr>
</tbody>
</table>

TABLE 5. Number of ATE agencies and personnel in Sri Lanka according to ATE sector

<table>
<thead>
<tr>
<th>Sectors</th>
<th>No. of agencies</th>
<th>No. of staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agronomy</td>
<td>159</td>
<td>3,223</td>
</tr>
<tr>
<td>Animal husbandry</td>
<td>337</td>
<td>742</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>20</td>
<td>2,300</td>
</tr>
<tr>
<td>Agro-machinery</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>Agro-economics management</td>
<td>1</td>
<td>38</td>
</tr>
</tbody>
</table>

Considering the current scenario, it is clear that the existing state-sector organizations have failed to provide the whole spectrum of extension services to farming community. This may due to non-availability of adequate field-level extension workers, no coordination among existing field staff to provide services in a cost-effective manner, lack of allocated resources, etc. Due to misunderstanding of priorities of different groups of professionals, some of the attempts failed to integrate the extension services. Therefore, it is essential to develop policy measures to enable integration of extension services even if they remain decentralised.

It is a common phenomenon in Sri Lanka that senior extension experts are not adequately represented in most regional and national policy-making bodies related to agricultural research or extension. For an example, the administrative service personnel with lack of practical extension often occupy senior positions of such bodies. These types of issues exist in livestock extension services which suffer due to a lack of understanding between veterinarians and livestock officers.

Agriculture education system is slightly different in Sri Lanka. Governing bodies established agriculture faculties and agriculture schools many decades back, extending significant patronage to uplift agriculture education. Nearly 750
agriculture graduates and 250 diploma holders are produced annually. Productive use of agricultural knowledge gained by these graduates and diploma holders is associated with the development of the country in many ways.

**Funding**

The main source of financing for Central and Provincial Councils level activities is the Government Treasury, which allocates funds based on annual budget estimates in compliance with their mandates, while Provincial Councils have the authority to mobilise their own revenue. For provincial councils, the chief secretary is responsible for financial management, and the provincial treasury is under the deputy chief secretary for finance. The Finance Commission is responsible for facilitating fund allocations from the central government to provincial councils.

Devolution of responsibilities has led to an inadequate service delivery structure, particularly for agricultural extension. The linkage between knowledge generation and knowledge dissemination is weak with duplication of functions, poor coordination in resource allocation, limited participation of Provincial Councils at national planning, etc. There is a lack of formalised agreements and coordination mechanisms between central government departments and those of Provincial Councils to address the major issues in the sub-sector.

The planning, budgeting and implementation of agricultural development has been made difficult and inefficient due to initiation of production programmes at the central government level and handed down to provinces for implementation.
Support and incentives

Sri Lanka’s highly fragmented agricultural research and extension system has been severely underfunded for more than a decade. Previously international donors provided financial support for research projects and extension programmes, as well as opportunities for professional development, but presently only a few projects of interest to donor agencies remain (Table 6). Government personnel policies serve to restrict opportunities for career advancement, professional development, and/or incentive programmes that recognise and/or reward superior service and performance due to COVID-19 and current economic crisis.

TABLE 6. Details of the recent foreign funded projects

<table>
<thead>
<tr>
<th>a) Name of the project</th>
<th>b) Donor agency</th>
<th>c) Estimated cost of the project-Rs. Mn</th>
<th>d) Project duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Climate smart irrigated agriculture project</td>
<td>World Bank</td>
<td>22 500</td>
<td>2018–2024</td>
</tr>
<tr>
<td></td>
<td>International development agency (IDA)</td>
<td>Revised (23 800 Rs. Mn)</td>
<td></td>
</tr>
<tr>
<td>2. Agriculture sector modernization project Component 1</td>
<td>World Bank</td>
<td>9 374.37 (US$64.23*145.95 LKR)</td>
<td>2017–2021</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Estimated cost 12 059)</td>
<td></td>
</tr>
<tr>
<td>4. Importation of 20 000 dairy animals Expenditure 4 499.18 (Rs. Mn)</td>
<td>GOSL / Australia</td>
<td>10 723</td>
<td>2017–2020</td>
</tr>
<tr>
<td>5. Development of mini dairy cooperative societies expenditure 2 117.6 (Rs. Mn)</td>
<td>GOSL / France</td>
<td>3 600</td>
<td>2019.02.17 - 2020.02.17</td>
</tr>
<tr>
<td>6. Construction of new diary processing plant at Badalgama expenditure 10 796.8 (Rs. Mn)</td>
<td>Denmark</td>
<td>Euro 63.93 Mn 9 531.32 (Rs. Mn)</td>
<td>2016.05.10 - 2020.11.10</td>
</tr>
</tbody>
</table>

Without a comprehensive agricultural extension policy, agricultural extension is unlikely to get the priority and attention it deserves. Therefore, formulation and implementation of an extension policy should be the first priority for improving extension delivery. The extension workers should be recognised and given the necessary incentives such as enhanced status, increased salaries and allowances, and transport facilities to perform their duties effectively.
Infrastructural settings

Agriculture Extension Centres/Offices function as grassroots agencies in providing agriculture extension services to farmers. The majority of them are attached to Agrarian Services Centres to provide combined services to farmers. They run in old buildings with poor office conditions and some of the Agriculture Extension Centres are equipped with digital extension facilities.

Generally, the infrastructure can be divided into five categories, such as office space, training room, laboratory, information consultation room, and experiment and demonstration base. In each District, there is a training centre called District Agriculture Training Centre (DATC) where farmers’ trainings take place.

<table>
<thead>
<tr>
<th>TABLE 7. Infrastructure settings in a DoA facility in Sri Lanka</th>
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</thead>
<tbody>
<tr>
<td><strong>Space</strong></td>
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<tr>
<td>Office Space</td>
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<tr>
<td>Training Room</td>
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<tr>
<td>Laboratory</td>
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<tr>
<td>Information and Consultation Room</td>
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<tr>
<td>Experiment and Demonstration Base</td>
</tr>
</tbody>
</table>

References


