

An overview and SWOT analyses of Sustainable Agriculture Intensification systems and Agricultural Extension Systems:

(Ethiopia, Kenya, Malawi, Rwanda, South Africa and Tanzania)

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An overview and SWOT analyses of Sustainable Agriculture Intensification systems and Agricultural Extension Systems:

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1 Introduction

One of the root causes of low productivity in Africa is the poor performance of the extension and advisory services (EASs), and the lack of financial support (Davis and Terblanche, 2016). EASs are systems and mechanisms designed to build and strengthen the capacity of smallholder farmers. EASs plays a crucial role in facilitating linkages of smallholder farmers with other relevant actors such as private sector and non-governmental organizations (NGOs), research institutes and education centers (Birner et al. 2009; Davis et al 2013). Agricultural extension and advisory services (EASs) are critical for improved agricultural productivity and food security. However, making these EASs effective, demand driven, and responsive to the needs of a diverse set of farmers remains a challenge in many developing countries (Davis 2008; Birner et al. 2009). The extension delivery system requires continuously new strategies and capacities to perform these roles. It is critical to note that extension services are only one among many factors contributing to agricultural development. Others include economic, social, political and environmental factors that have potential to contribute to the success or failure of extension programs (Eicher, 2007).

The impact of agricultural extension is often not immediate and difficult to measure. This has resulted in the neglect of public extension service in terms of resource allocations in national budget in most developing countries. The necessary political will and budgetary support are lacking in agricultural extension compared to other public program interventions like infrastructure development, input support and irrigation development programmes (Beintema and Elliot, 2009) that have much more tangible and observable results (Beintema and Stads, 2017; Oladele and Sakagami, 2004) and are thus more attractive to politicians than extension programmes. Mink (2016) observed that although Malawi, for instance, has fared well in terms of meeting the CAADP Maputo Declaration of allocating 10 percent of national budget to agriculture, the bulk of it (90%) is accounted for by the Farm Inputs Support Programme (FISP) and not financing support programmes like research and extension. Thus only about two percent (2.3%) of the national budget allocation in Malawi went towards financing agricultural extension related activities in 2014 (Mabutwa and Pauw, 2017). The same applies to the other countries, where programmes and projects with quick tangible and observable results are more preferred by policy makers for funding due to their political attractiveness.

Changes in agriculture extension approach

Agricultural extension relays information and new technologies to farming households for adoption to enable them to improve their productivity, incomes and livelihoods. It provides a channel through which problems encountered by farming communities are identified for research and the reformation of agricultural policies. The increasing quest for liberalization, commercialisation, intensification and modernisation of African agriculture has brought about significant changes in agricultural extension delivery systems of Ethiopia, Kenya, Malawi, Rwanda, South Africa and Tanzania. However, despite much more extensive work having been done in recent years aimed at strengthening extension delivery services to rural farming

communities in these countries, not much is known about building the much needed capacities within these systems. According to Sulleiman and Davis (2012), there still exists a knowledge gap with regards to the role that extension and advisory services should play within the agricultural innovation system (AIS). Instead of the public extension delivery systems remaining the sole service provider, *the extension landscapes in these countries have undergone massive reconfiguration, becoming more pluralistic in approach, with an increasing role and participation of the private sector (agribusinesses dealing with agro-inputs, mechanisation, financial services, etc.), international and local non-governmental organisations (NGOs); producer cooperatives and associations; and ICT-based services (Ibid).* The pluralistic approach is more pronounced in South Africa, where there are now numerously diverse actors in agricultural extension delivery including public extension agencies, private sector commodity-based extension services, NGOs (farmer organisations, and development agencies (Magoro and Hlungwane, 2014). ICT-based on-line extension and advisory services to farmers, including the promotion of model farms as mentioned by Waddington et al. (2010), have the potential to be applied in many more countries besides South Africa (Taye, 2013).

Public and/or private actors

Although National Agricultural Research and Extension Services (NARES) still remain the main public actors commanding a leading role in extension delivery in all the six countries under review, there has been a more pronounced role for private and non-state actors such as agro-input suppliers, buyers of agricultural commodities, credit and financial service providers, NGO outreach agencies and private media (Saliu, Obinne and Audu, 2009). According to Eicher (2007), virtually all developing countries now have a mixture of public, NGO and private sector (seed, fertilizer, agrochemical and mechanisation dealers) players delivering agricultural extension support to smallholders. Countries that are more dependent on donor aid like Malawi have a more pronounced role for NGO-led extension delivery system than less donor-dependent countries like South Africa. However, in terms of coverage, government departments and parastatals continue to be the dominant extension service delivery institutions in all the six ESA countries. These institutions are often vertically oriented and hierarchically organised in the way they operate. Magoro and Hlungwane (2014) assert that, through the top-down approach that predominates in South Africa, agricultural extension practitioners in this and the other five countries have often treated farmers as empty vessels that need to be filled with knowledge and information. They argue that the practitioners should not behave as if only those innovations from outside (external to local farming systems) are beneficial to their farmers. While in the past, capacity development through extension largely referred to provision of technical information and knowhow to farmers, nowadays, the narrative and focus have begin to change. It is now focusing more broadly at the ‘innovation systems perspective’ to capacity building (Davis and Terblanche, 2016). The increasing role of other non-state actors in agricultural extension delivery has increasingly become important and largely been prompted by failure of many African countries to sustain public extension service provision due to resource and budget constraints. Agricultural extension service delivery encompasses a wide range of supportive activities and programs that are made available to a farmer, including trainings, technology transfer, and market linkage. These programs are the most effective way to strengthen the entrepreneurial, social, and ecological capacities of the farmers to enable them to successfully engage in productive and livelihood activities (Magoro and Hlungwane, 2014). In most SSA countries, such programs have historically been government-led and mostly



underfunded, resulting in them not being as effective throughout much of the sub-continent as they have been in other regions like Asia and Latin America. Eicher (2007) noted that while massive reforms in agricultural extension delivery systems were taking place in Asia and Latin America during the early 2000s, the same cannot be said for Africa, where reforms have been slow and less pronounced. However, Davis and Terblanche (2016) argue that although numerous extension-specific policies have been formulated in many SSA countries, the problem has been in developing good extension policies, which remain only on paper and are not implemented due to lack of political will or lack of resources and capacity to do so. The relevance of agricultural extension services has increasingly become apparent, as recent innovations have offered optimism about their role in driving African agriculture. Due to technological innovations, the dissemination of information and technologies has become easier due to their increasing effectiveness (Taye, 2013).

In the past two decades there has been evolution in the EASs towards more participatory demand-driven systems, decentralized, pluralistic extension approaches (Davis, 2008; Parkinson 2009). There has been increased participation of private sector, NGOs and CBO in the EASs delivery systems. Despite the increasing number of actors offering diversified options for EASs delivery systems, substantial challenges remain in the adoption and diffusion of agricultural technologies and transfer of knowledge and skills to smallholder farmers. There are also hitches in harnessing the full potential of pluralistic agricultural extension systems (IFPRI and World Bank, 2010; Davis et al 2013). NGOs and CBOs are often constrained by limited capacity and heavy dependence on external support (Bwana et al. 2011), and the private sector extension and advisory services is frequently targeted to relatively defined group of smallholder farmers dealing with high-value agricultural commodities (IFPRI and World Bank, 2010; Davis et al 2013). With the flooding of reformed EASs delivery systems, agricultural productivity and food production has not really improved in many sub Saharan African countries

Gender

Despite this positive achievement and the great potential posed by the emerging innovations, the major setback is the documented evidence that delivery of extension services in developing countries like Ethiopia has not equally benefited men and women farmers in rural areas (Mbo'o-Tchouawou and Colverson, 2014). *Serious gender gaps between men and women in terms of access to agricultural extension were revealed in a regional gender study conducted collaboratively by IFPRI and World Bank in 2010*, which also encompassed Ethiopia. The gender gap has been found to be mainly due to limited participation of female farmers in extension-related activities and the general lack of incentives for reaching out to and including these female farmers (IFPRI and World Bank, 2010). In a study to assess the effectiveness of new extension approaches in reaching women farmers in rural Kenya, Mbo'o-Tchouawou and Colverson (2014) found that women, more than men, face greater challenges and limitations that hinder them from accessing available agricultural extension services. They note that even the new innovative extension models that have been tailor made to be either gender-sensitive or to focus primarily on supporting rural women farmers' access to the extension services have not been that effective due to their lack of scaling up mechanisms for sustainability and significant impact.



The first part of this report provides an introduction to the topic followed by the objective of the study and approach. In the later part, overview of sustainable agriculture intensification systems (SAIs), Innovative Institutional Approaches (IIAs) and EASs in the case countries and country-specific SWOT Analyses of Agricultural Extension Systems is provided. Towards the end a brief summary and conclusion is given. The analysis on sustainable agriculture intensification systems (SAIs) in the six case countries was covered in Deliverable 1.1 and the various EASs topologies has been described in the report. Hence, this report focuses more on the analyses of EASs in the case countries.

2 Objectives of the study

This study was aimed at identifying and documenting EASs delivery systems focused on best-fit approaches in the six project countries using a strengths, weaknesses, opportunities and threats (SWOT) analysis. The report provides a review and a summary of insights from literature on the structure and organisation of agricultural extension service delivery systems in the selected SSA countries (Ethiopia, Kenya, Malawi, Rwanda South Africa and Tanzania). The literature comprised of contemporary national policy documents, government reports, research reports and peer reviewed publications. A comprehensive literature search was conducted for peer-reviewed publications using the online database ISI Web of Science and Google Scholar. This report synthesized the various contextual conditions of the services in each of the selected countries and draws insights and conclusions from existing literature before offering recommendations to the relevant stakeholders (governments, donors, NGOs, private sector, etc.) for strengthening their agricultural extension systems to better serve the needs of smallholder farmers.

3 The Approach

In this study, a SWOT analysis was carried out on the EASSs existing in each country and the different approaches employed. SWOT analysis makes it possible to assess the various strengths, weaknesses, opportunities and threats within the agricultural extension and advisory system as a whole (Nyambi, 2012; Oladele, Lepetu, Subair. and Obuh, 2009). SWOT is an analytical technique that provide answers to the questions related to each of the four words whose first letter forms the acronym. *Strengths* relate to advantages, areas of excellence, relevant resources possessed and available institutions. *Weaknesses* include things to improve, areas of poor performance. *Opportunities* are available enabling factors, favourable trends and comparative advantages while *Threats* are obstacles that interfere with and hinder success, and areas to avoid. In the application of the SWOT technique for the analysis of EASs in the countries studied, the organizational setting of extension services and the indicators for determining their effectiveness, capabilities and efficiencies were examined. Carrying out an analysis using the SWOT framework helps to focus activities into areas of strengths and where the greatest opportunities lie (Nyambi, 2012; Oladele, Lepetu, Subair. and Obuh, 2009). Information from Deliverable 1.1 was used to analyse the SWOT of EASs. In the following section, a general overview of SAIs, IIAs and country wise SWOT analysis of EASs are provided.

4 An overview and SWOT analyses of SAIs and EASs in the case countries

The six case study countries of InnovAfrica project are Ethiopia, Kenya, Malawi, Rwanda, South Africa and Tanzania which constitute a total population of 292 million (28 percent of SSA). In all the case countries, except South Africa, agriculture is recognized as the backbone of the economy. It accounts for 26 to 50 percent of gross domestic product (GDP); with highest contribution being in Ethiopia and lowest in Kenya. Agriculture is also the largest employer for more than 80 percent of the labour force. Smallholder farmers account about 70 percent of all farmers and up to 90 percent of the national food supply comes from them. Most of the crop production is pre-dominantly rain fed. In South Africa, the contribution of agriculture to GDP is relatively small. Crop-livestock and inter-cropping systems are commonly practised except in Malawi where mono-cropping dominates the agricultural landscape. Although crop diversity exists, maize is the most widely grown crop except in Ethiopia (where it is teff). The major factors contributing to low production in these countries include climate change, low adoption of improved technologies, weak advisory services, soil and nutrient loss, unfavourable policies and weak institution framework. The majority of the rural people in the case countries are food insecure at household level except South Africa which is food secure at national level.

Table 1: The interventions coverages of SAIs, EASs & IIAs in case countries of InnovAfrica project

<i>Sustainable Agricultural Intensification</i>	Ethiopia	Kenya	Malawi	Rwanda	S-Africa	Tanzania
Intercropping of legumes with cereals	●	●	●	●	●	●
Use of cover crops		●				●
Animal integration in farming systems	●	●		●		●
Brachiaria grass/ Napier grass	●	●	●	●		●
Push-pull integrated pest management		●				
Agroforestry systems	●	●		●		●
Conservation agriculture	●	●	●	●	●	●
Fanya-juu terraces	●	●		●		●
Contour bunds farming	●		●		●	
Soil cover/mulching	●	●	●	●	●	●
Climate smart agriculture	●	●	●	●	●	●
Organic farming/ compost manuring	●	●	●	●	●	●
Soil & water conservation	●	●	●	●	●	●
Integrated soil fertility management	●			●		
<i>Extension & Advisory Services</i>						
Farming systems research & extension	●	●	●	●	●	●
Training and visit system	●	●	●	●	●	●
Farmer field schools/ Farmer training centers	●	●	●	●	●	●
Demand-driven extension/ Participatory extension	●	●	●	●	●	●

Farmer-to-farmer extension	•	●	●	•	•	●
Integrated farm plan (PIP)	●			●	●	
Private agricultural extension	•	●		●	•	•
ICT-based extension/village knowledge centre		●				●
Government led top-down extension	●	●	●	●	●	●
<i>Innovative Institutional Approaches (IIAs)</i>						
Multi-actor innovation platforms	●	●	●	●	●	●
Integrated seed systems	●		●			●

Note: Size of circles is proportionate to the intensity of interventions in each case country.

The main innovations in agriculture technology, extension and institutional approaches implemented and promoted in each case country are presented in Table 1. Some of these innovations are common across countries, while others are specific to certain farming system.

4.1 SWOT analysis of Brachiaria forage-livestock system

Livestock is one of the key assets for rural households in most parts of the world and it is a major livelihood resource for most rural communities in Africa. About 752 million of the world's poor keep livestock mainly to (FAO, 2012) for cash; food, build assets and manage risks for security purposes. Furthermore, livestock are important component of crop production and provide draught for land preparation and manure in crops. Inadequate quantity and low quality of feeds has been cited as major constraints in livestock productivity. Africa has the lowest livestock productivity due to lack of suitable forage that can produce green forage throughout the year (Leeuw et al., 1992). This is despite Africa being the centre of origin for most of the widely cultivated grasses in the tropics and sub-tropics. One such grass the Brachiaria grass.

The genus Brachiaria consists of about 100 species distributed across tropical and sub-tropical region (Renvoize *et al.*, 1996). Grasses in the genus Brachiaria have advantage over those in other genera including adaptation to drought and low fertility soils, ability to sequester carbon; increase nitrogen use efficiency through biological nitrification inhibition (BNI) and arrest greenhouse gas emissions (Mureithi and Djikeng, 2016). For example, compared to Napier grass, one of the most popular fodder grown for dairy cattle in highlands of Kenya, Brachiaria is more tolerant to drought and can withstand heavy grazing (The Organic Farmer, 2015). Millions of hectares of Brachiaria species have been sown in South and Central America with estimated acreage of 99 million hectares in Brazil alone (Jank *et al.*, 2014), supporting a highly vibrant beef industry. Despite the immense benefits demonstrated of these grasses in South America, the potential Brachiaria grass in Africa remains unexploited.

The rising interest in livestock development fueled by increased demands of animal products has renewed interest in research on forages particularly to climate resilient forages like Brachiaria grass. This has necessitated the analysis of the Brachiaria grass to identify its benefits to the livestock industry and how it can be integrated in the smallholder systems. Additionally, a meta-analysis is applied to understand the productivity and nutritive values of the Brachiaria grass and its benefits for livestock productivity (milk and meat). Table 2 gives a brief SWOT

analysis of Brachiaria technology that has been tested and upscaled in Kenya.

Table 2: An analysis of Brachiaria Strength, Weakness, Opportunities and Threats (SWOT)

Strengths	Weakness
<ul style="list-style-type: none"> • Produce high dry matter yield • Drought tolerant • Has high crude protein • Results in increased milk production • Pest and diseases tolerant • Good carbon sink 	<ul style="list-style-type: none"> • Inadequate labour for harvesting • Lack of seeds for planting • Low seed production in Kenya • High cost of seeds
Opportunities	Threats
<ul style="list-style-type: none"> • High demand for Brachiaria seeds • Seed is available in tropical America (Brazil) • Many companies willing to multiply seed in Kenya • Authorities are willing to release Brachiaria variety for commercial seed production • Can be propagated using splits 	<ul style="list-style-type: none"> • Emerging pest and diseases • Low funding of government to carry out research on Brachiaria • Climate change and unfavourable weather • Inadequate institutional support and policy for farmers to adopt Brachiaria

4.2 SWOT analysis of maize/millet legume cropping systems

Monocultures have dominated for the last three decades resulting in poor soil fertility, high risk to pest and diseases and low climate adaptability and poor nutrition and income to smallholders (Bezner *et al.*, 2012). Growing cereals/ e.g. bio-fortified maize/millet and legumes in rotations or intercropping increases production from the same area, improves nutrition through diet diversification (proteins and vitamin A), increases soil fertility, increases market value and farm income while reducing greenhouse gases. Table 3 shows the main SWOT analysis of maize/millet cropping system.

Table 3: Analyses of Maize/millet legume Strength, Weakness, Opportunities and Threats (SWOT)

Strengths	Weakness
<ul style="list-style-type: none"> • Combined maize and legume produce high dry matter yield • Better adapted to climate extremes • Improves soil fertility • Produces high protein, better food & nutrition • Good carbon sink 	<ul style="list-style-type: none"> • Low market value chain • Inadequate labour for harvesting • Lack of seeds for planting • High cost of seeds • Lack of storage facilities
Opportunities	Threats
<ul style="list-style-type: none"> • Ability to reduce GHGs • Reduce fossil energy consumption • Efficient use of residual moisture in the soil • Disrupt the life cycle of pests and diseases • Legumes are low fat, low sodium and good sources of iron, fiber, potassium etc. • Diversity in cropping and soil fauna 	<ul style="list-style-type: none"> • Emerging pest and diseases • Low funding of government to carry out research • Climate change and extreme weather conditions • Inadequate institutional support and policy for farmers to adopt maize legume systems

Maize-legume cropping systems along with improved maize and legume varieties have been the focus of several regional projects have shown their potential to contribute to improved

productivity and ultimately food security in East and southern Africa while at the same time ensuring environmental sustainability (Thierfelder *et al.*, 2016).

5 Country-specific SWOT Analyses of Agricultural Extension Systems

5.1 Agricultural extension in Ethiopia

Since 1995, the Government of Ethiopia (GoE) has implemented a Participatory Demonstration and Training Extension System (PADETES) as the central element of the country's agricultural extension system. The main objective of the PADETES has been to improve smallholder participation in generation and utilisation of beneficial agricultural technologies for enhancing farm productivity, incomes and livelihoods of the predominantly rural communities (ATA, 2014). Recently (in 2010), a modified version has been introduced in the form of Participatory Extension System (PES) to succeed the PADETES. Under the PES, farmer training centres (FTCs) have been established in proximity to farming communities to serve as sources of information, knowledge, skills and technologies to farmers (ATA, 2014). Besides providing trainings, the FTCs also serve as platforms for testing and demonstration of new technologies and innovations within the farmer's context (Table 4).

Table 4: SWOT analysis of agricultural extension system in Ethiopia

Strengths <ul style="list-style-type: none"> • Comprehensive agricultural extension strategy which spells out the vision, systemic bottlenecks and priority interventions for the country • Over 12,500 FTCs established closer to the farmers for convenient service provision • Over 85,000 DA trained and graduated from the FTCs • Decentralized and well-structured extension system • Dedicated agricultural vocational training colleges to train and produce middle-level skilled extension personnel • Robust workforce of extension agents (21 per 10,000 farmers) • Greater access to extension facilitated by establishment of FTCs at community-level 	Weaknesses <ul style="list-style-type: none"> • Lack of policy clarity on involvement of non-state actors in agricultural extension service delivery • Mainly public dominated and focus is on rain-fed agriculture with little focus on modernisation • Weak market linkage and marketing information system • Weak research-extension-farmer-industry linkage • Gender-insensitive extension delivery system
Opportunities <ul style="list-style-type: none"> • Potential for Pluralistic Extension System under the new Extension Strategy • Incentives for multi-stakeholder innovation platforms • Scope for market oriented extension system, business development and entrepreneurial skills, value chain development approach • Farmers largely organised into development groups and social networks • Emerging agro-processing industries for value chain development and provision of embedded extension services. • Existence and growing network of farmer cooperatives and unions to provide complementary extension services 	Threats <ul style="list-style-type: none"> • Top-down and command type extension management and delivery system • High turnover of experienced professionals in agricultural extension • Unstable price on international markets for agricultural products • Climate change and recurrent droughts. • Small farm sizes caused by high population density threaten viability of smallholder farming

<ul style="list-style-type: none"> • Increased focus on value chain development and marketing • Renewed interest by donors and NGOs to support extension • Existence of reliable regional and international market opportunities for agricultural products, • Increasing number of agricultural universities, colleges and vocational training centres for production of skilled manpower • Strong social networks through farmer-group formation and peer-to-peer learning • Increased demands by farmers for improved technologies 	systems and weaken value of extension advice
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5.2 Agricultural extension in Kenya

For almost two decades lasting until 1998, the agricultural extension system of Kenya was anchored on the T&V approach that had been introduced and supported by the World Bank since 1982 (World Bank, 1999). Efforts have been made over the years to reform the extension system in Kenya. The country now has a comprehensive stand-alone national agricultural sector extension policy, which recognises extension service delivery as one of the key change agents needed for transformation of subsistence farming into modern and commercial agriculture to ensure attainment of food security, improvement in incomes and reduction of poverty (GoK, 2012). However, Chimoita (2014) notes that the country's agricultural extension delivery system is characterized by a multiplicity of players, with each of the extension service providers having their own peculiar challenges. The major service providers include the public service under the Ministry of Agriculture, private sector under various cash crop programmes, NGOs and farm inputs supply companies. Coordination among these various actors is poor with each actor driven by its own interests and motives, which may sometimes be conflicting. A study by Muyanga and Jayne (2006) found private extension provision to be generally skewed towards high potential regions and high-value crops (such as coffee, tea, pyrethrum and sisal) and livestock (especially dairy) value chains.

Mbo'o-Tchouawou and Colverson (2014) observe that although a wide range of traditional and reformed agricultural extension and advisory service delivery systems have been tried in Kenya, very little has been achieved in terms of systematic consideration of the gender perspective. Very few strategies have been designed and implemented, while policy discourses on agricultural extension delivery have not fully concentrated on addressing needs of the country's rural population from a gender perspective. They advocate for innovative extension models that focus on best-fit gender approaches to provide opportunities to groups with specific needs and priorities (Table 5).

Table 5: SWOT analysis of the agricultural extension delivery system in Kenya

Strengths <ul style="list-style-type: none"> • Wide coverage and all-encompassing extension system • Strong staff training and high professionalism at all levels of the service • Relatively well-resourced frontline extension staff in terms of transport and accommodation • National Agricultural Livestock Extension Programme (NALEP) aimed at revitalising the agricultural extension system • Well established tertiary training institutions (universities, colleges) and farmers training centres 	Weaknesses <ul style="list-style-type: none"> • Limited public resources for allocation to agricultural extension • Limited capability of smallholder farmers to pay for extension services • Strong top-down planning, weak farmer participation and excessively supply-driven approaches • Extremely broad objectives with no specific targeting • Low staff motivation • Weak monitoring and evaluation • High dependence on donor and external funding • Poor packaging and dissemination of extension information • Poor gender consideration in designing and delivering extension services
Opportunities <ul style="list-style-type: none"> • National Agricultural Sector Extension Policy that advocates demand-driven extension services • Donors and NGOs calling for reforms to make the extension system more demand-driven • Willingness by smallholder farmers to pay for private extension services • Recent adoption of Farmer Field Schools (FFS) approach as a participatory extension delivery method • High level of ICT penetration and use (internet, mobile phone, computers) 	Threats <ul style="list-style-type: none"> • Lack of flexibility in the public extension system • Poor accountability of the public extension system • Poor linkages and coordination and conflicts among extension service providers • Aging and reduced extension personnel • Lack of adequate funding for operations • Lack of participatory technology development • Low levels of rural incomes • Poor physical infrastructure • Growing calls for privatization of extension services

5.3 Malawi Agricultural Extension System

Rural populations in Malawi often lack reliable and accessible information sources that can help increase their agricultural productivity (Steinfeld et al., 2015). The country has a well-written agricultural extension policy whose objective is to assist farmers in achieving and maintaining self-sufficiency in food production and income generation through promotion of technologies proven to improve productivity (GoM, 2016; 2000). The key features of the Malawian agricultural extension policy are pluralistic in approach; demand-driven extension services, accountability, users pay principle (service at cost), and equalization (inclusion of marginalized and vulnerable groups). The department of agricultural extension services under the Ministry of Agriculture, Irrigation and Water Development is the one mandated with provision of holistic and demand-driven agricultural extension services (GoM, 2016). Other extension service providers include civil society organizations, non-governmental organizations, private sector and farmer organizations. It is generally acknowledged that extension service delivery has mainly been conducted in a top-down manner, where major decisions have been made centrally at the top level of government. This has recently been

changing towards a more participatory and pluralistic approach to agricultural extension service delivery as nuanced in the national extension policy (GoM, 2000).

Regasa and Chiu (2017) found that agricultural extension development officers in Malawi, who are basically government extension workers, continue to play a big role in the provision of extension advice, implying that the public extension remains the dominant service delivery system relied upon by 66 % of farmers. Their study reveals that the farmer-to-farmer extension pathway is still the major source of awareness of technologies while community group meetings are the major pathway for disseminating information on agricultural technologies, followed by radio, face-to-face visits, and short-term trainings done within small groups of farmers. Chapota, Fatch and Mthinda (2014) as well as Steinfield et al. (2015) found the radio to be the most commonly used communication channel for rural Malawians for accessing agricultural extension and advisory services. With more than 30 radio stations run by both government and NGOs, there is a significantly wide range of reach. Both public and private radio stations offer agriculture-related programs commonly sponsored by the government, NGOs or donor agencies (Chapota, Fatch & Mthinda, 2014). Steinfield et al. (2015) found that around 75 percent of radio stations broadcast farming-related programs (Table 6).

Table 6: SWOT analysis of the agricultural extension delivery system in Malawi

Strengths <ul style="list-style-type: none"> • Relatively high exposure and access to extension advice by farmers • Existence of a comprehensive stand-alone agricultural extension policy • Strong support networks and organisations dedicated to good governance in agricultural development (e.g. Extension Department of LUANAR and CISANET) • Pluralism in the provision of agricultural extension services 	Weaknesses <ul style="list-style-type: none"> • low or weak coverage of extension services provision resulting in low awareness of new technologies being promoted • gender-biasedness: Males have more access than females; female-headed households have a lower likelihood of receiving extension advice • limited access to modern extension pathways like ICTs • inadequate financial literacy including credit and crop insurance amongst extension personnel and farmers leading to high farm input loan default rates • personnel, knowledge and skills gaps for livestock extension
Opportunities <ul style="list-style-type: none"> • generally high ratings for and satisfaction with the quality of agricultural extension and advisory services (> 70%) by farmers (IFPRI, 2016) • low awareness and adoption of newly promoted technologies • growing interest in agricultural extension from development agencies & NGOs • new commodity market instruments including warehouse receipts programmes • emerging climate-smart agricultural practices and technologies • growing mobile phone penetration in rural areas 	Threats <ul style="list-style-type: none"> • diminishing public spending on agriculture, including extension • low levels of education and literacy among farmers • lack of proper motivation and incentive mechanisms for frontline extension staff • climate change and declining soil fertility militating against extension efforts. • Small farm size (+/-1 ha) per household promote maize monoculture

5.4 Rwanda agricultural extension system

The widely accepted notion that agricultural EASS should be delivered through a pluralistic system that include the public and private sectors as well as international and local NGOs fits well into the Government of Rwanda's new agricultural extension strategy. These national stakeholders are actively involved in providing extension advisory services in Rwanda to all categories of farmers across all the farming areas. Besides the dominant public sector-driven agricultural extension delivery system, there are other common approaches used in Rwanda. The voluntary lead farmer extension approach relies on a system of identified progressive farmers providing voluntary agricultural extension and advisory services to their colleagues. The voluntary service providers are farmers identified to be innovative people, possessing good interpersonal and communication skills and living harmoniously with their neighbours, who agree to work on a voluntary basis. Their motivation for work comes from incentives to participate in trainings, study tours, and token awards handed to them during agricultural events and competitions (GoR, 2009). Each voluntary extension service provider is tasked with responsibility to assist at least five farming households in their own neighbourhood.

There are also NGO-led extension service provision programmes, which train and supervise farmers through their organisations and/or commodity associations. The farmer groups are trained in different technical aspects of agriculture as well as various other organisational activities. The training modules, which cover both theoretical and practical aspects of farming, are delivered to groups of 20 to 25 farmers. After completing the training, the trained farmers are expected to become lead farmers who identify more farmers in their respective villages and organise them into new groups to be trained. This snow-ball effect helps with reaching as many farmers as possible with extension education.

Similar to the NGO-led extension approach is the commodity chain development approach, which is normally used by different private sector companies and development partners in promoting specialization on particular commodities (e.g. coffee, tea, pyrethrum and quinquina). Extension services are provided starting from inputs supply through production to the marketing of the final processed product. This approach has the advantage that it tends to organize the producers into groups that have the potential to replicate and replace public extension services for certain tasks within their specific commodity chains (Table 7).

Table 7: SWOT analysis of the agricultural extension delivery system in Rwanda

Strengths	Weaknesses
<ul style="list-style-type: none"> • Existence of a National Agricultural Extension Strategy • Numerous farmers organizations, NGOs and Projects as alternative extension service providers • Qualified extension workers at stationed district and community level • Existence of infrastructure and facilities to augment extension services (training centres, marketing and storage facilities); • Many trained and progressive farmers in the country 	<ul style="list-style-type: none"> • Most non-state actors work in isolation with little or no coordination or sharing of information among them • Weak synergies and harmony among different agricultural approaches and development program initiatives at different levels • Inadequacy of training resources and material for frontline extension workers • Limited specialized in-service training for extension workers

<ul style="list-style-type: none"> • Trained technical staff working in other development institutions and organizations • Good gender balance in the national extension staff establishment – over 36% female extension workers 	<ul style="list-style-type: none"> • Inadequate human resources with specialised extension skills, particularly livestock and veterinary specialists • Inadequate resources (means of transport, GPS, Veterinary Kits, Computers. Etc.) for extension workers • Weak organisational and technical capacity of existing farmers organizations • Lack of public and private media interest and effectiveness in disseminating agricultural extension messages • Poor coordination in the national extension system resulting in communication break-downs • Research results not properly translated and simplified into extension messages • Resistance to change by the farmers
<p>Opportunities</p> <ul style="list-style-type: none"> • Creation of Rwanda Agricultural Board (RAB) and the National Agricultural Export Board (NAEB) as promotional bodies • Recent decentralization of agricultural extension activities aimed at addressing specific needs of farm households within each district • Good governance and political will for development of the agricultural sector • Existence of a supportive National Agricultural Policy and related policies, approaches and programs • A growing network of micro-finance institutions in rural districts • Increasing Agricultural Education Institutions • Increasing small-to-medium scale agro processing units • Well established communication infrastructure and facilities (Several radio stations, newspapers, ICTs) • Existence of a good policy for Cooperatives promotion; • Agricultural shows and exhibitions as platforms for extension • Political stability in the country • Good climatic conditions favourable for agriculture development. • The use of one local language understood by everyone • Existing regional and international markets 	<p>Threats</p> <ul style="list-style-type: none"> • Some local authorities do not consider agriculture as a priority in development • Lack of motivation for Extension Workers; • Lack of proper coordination between higher offices and field level staff • Diversion of public extension workers from discharging their main duties at district and community levels to political and other non-agricultural tasks • Insufficient public financing (budget allocation) to agricultural sector • Climate change related risks • Inadequate credit and high cost of borrowing (interest on bank credit) • Lack of insurance schemes dedicated for the agricultural sector • HIV/AIDS pandemic negatively impacting on the labour force in rural areas

5.5 Agricultural extension in South Africa

South Africa is a country that has long been regarded as having “two agricultures” (Williams et al. 2008), the country’s agricultural sector is characterised by a dualistic structure comprised of white dominated large scale commercial farming on one hand and a smallholder sub-sector made up of former reserves and homeland areas on the other. The extension delivery system during the apartheid era offered two parallel services – one to the large scale commercial sub-sector and another to the smallholder sub-sector in the self-governing territories (Liebenberg, 2015). With the attainment of independence in 1994, the South African Government revamped the agricultural extension system, which had previously emphasized on the conventional transfer of technology (ToT) approach and was highly skewed in favour of the large-scale commercial agriculture. However, there has been a paradigm shift from the ToT model to a holistic model where research, extension and farmers work together in partnership to generate solutions for the farmers’ problems. The new integrated extension system promotes participatory and pluralistic approach to extension delivery, where the extension worker plays a facilitator’s role unlike in the conventional top-down ToT model, where a rigid hierarchy is created which discourages feedback from the technology recipients (Williams et al., 2008). It is argued by Koch and Terblanche (2013) that although the extension service delivery system and service conditions in South Africa have changed in many aspects, the basic principle of “helping people to help themselves” has remained unchanged. Furthermore, the system is still largely top-down in its approach and dominated by the state through the Ministry of Agriculture (Magoro and Hlungwane, 2014).

Shortage of skilled manpower is considered as one of the major reasons for poor performance of the agricultural extension delivery system in South Africa (Davis and Terblanche, 2016). Skills are therefore increasingly becoming the 'missing link' in the country’s quest for rural transformation and development. The National Extension and Advisory Service Policy of South Africa seeks to guide agricultural development through the provision of extension and advisory services (Liebenberg, 2015). The new policy thrust has adopted a multidisciplinary approach to capacity development for extension professionals as a way of improving service delivery to farmers (Table 8).

Table 8: SWOT analysis of the agricultural extension delivery system in South Africa

Strengths	Weaknesses
<ul style="list-style-type: none"> • Existence of voluntary professional bodies - the South African Society for Agricultural Extension (SASAE) and the South African Institute for Agricultural Extension (SAIEX) - which play a critical role in promoting the professional standing of its members • Existence of a National Extension and Advisory Service Policy to guide extension delivery • Nine universities and 12 agricultural colleges offering extension related qualifications • Well motivated and resourced extension personnel and system, in general 	<ul style="list-style-type: none"> • Shortage of skilled and experienced manpower for the smallholder agricultural sector • Predominantly top-down approach which is not amenable to participatory, bottom up approaches • Weak linkages between farmers, extension and research • Limited opportunities for in-service training - very few extension officers exposed to formal skills training programmes • Gender imbalance in the extension staff compliment

Opportunities	Threats
<ul style="list-style-type: none"> • Well-equipped institutions of higher learning with capacity to produce high quality extension personnel • Development of a National Policy on Extension and Advisory Services for Agriculture, Forestry and Fisheries to guide and regulate the provision of extension and advisory services in the country • Refocusing on best-fit approaches under the new policy • Potential for embracing pluralism and use of participatory approaches • Growing capacity for extension personnel development and long-term institutional support. 	<ul style="list-style-type: none"> • Competition for recognition and resources between research and extension • Diminishing government expenditure on research and extension • Insufficiently qualified extension officers operating as Agricultural Advisors or Subject Matter Experts • Frequent droughts and climate change • High prevalence of HIV/AIDS

5.6 Agricultural extension in Tanzania

Tanzania's public extension delivery system has undergone many reforms largely donor funded. Over the past years, the AES was dominated by the public sector. However due to dwindling resources, the Tanzanian government saw a need to trim down the extension component in order to make it more effective and efficient and as a way of decentralising services to remote districts, where services are most needed. They have also made extension services community based at district levels, hence have transferred extension responsibilities to local authorities, (Rutatora & Mattee, 2001). Despite these reforms, the extension delivery system in Tanzania has not improved.

Tanzania's extension service system employs the Train and Visit approach. It has not yet attracted significant participation of the private sector, it is largely dominated by the government and donors. The main reason being the inability of the extension system to adjust to market demands. As a result private extension services providers are more visible where processors, traders and retailers have contracted services to ensure high quality, timely and reliable supply of produce from farmers, (Wambura, et al., 2015).

With ever changing technology developments occurring on a daily basis, the use of technology in seeking and providing services in Tanzania is increasing. A study by (Sanga, et al., 2013) on the assessment of the effectiveness of an impact-driven, radio-based extension in Tanzania, in order to ease extension service shortages and increase awareness showed that technology is an effective extension delivery tool, however it is largely accessible to well-to-do farmers. This criterion in Farmer Voice Radio, excludes the poor farmers who are largely women. Despite this challenge with access to technology, mobile phones and other technology based devices are gaining momentum in providing accurate, instant and cheap forms of information relay in agriculture. According to (Nyamba, 2012), the Ministry of Agriculture Food Security and Cooperatives together with donor agencies has employed the use of compact disks (CDs), short message service (sms), free phone calls, websites, newsletters articles and pod-casts in order to increase its reach in the maize value chain to safe guard farmers against unscrupulous middle man and dealers who take advantage to price changes in different markets to disadvantage farmers (Table 9).

Table 9: SWOT analysis of the agricultural extension delivery system in Tanzania

<p>Strengths</p> <ul style="list-style-type: none"> • Highly decentralised as part of the government devolution drive to increase reach and reduce expenditure • Model has shifted role extension officer from trainer to facilitator • Private sector contracts services from the public sector in AES • Government's will power is high in ensuring effective extension delivery • The government is embracing technology in its quest to service farmers 	<p>Weaknesses</p> <ul style="list-style-type: none"> • Supply driven. Despite efforts to have the system demand driven, weak partnerships with private sector fosters traditional extension methods rather than more innovative methods • High donor dependence • Poor farmer-market linkages which introduces information gap to farmers' disadvantage • The system is vulnerable to political manipulation • The AES is not well monitored and regularly evaluated • Needs of poor women are not catered for
<p>Opportunities</p> <ul style="list-style-type: none"> • Introduction of technology in extension is increasing reach and innovative agriculture is spreading • Private sector participation responds to the extension needs of farmers most profitable to them • There are opportunities for privatising some extension services to the private sector • Potential for embracing pluralism and use of participatory approaches • Growing capacity for extension personnel development and long-term institutional support. 	<p>Threats</p> <ul style="list-style-type: none"> • Donors agencies and community based organizations that supplement public extension services and share costs with government have not been formally integrated into the AES. • Diminishing government expenditure on research and extension which spreads resources too thinly • Limited coordination of extension activities between government and other interested players. As a result, there has been no platform to device strategies, set priorities, share information and rationalise functions. • Decentralisation is not monitored, local authorities are far removed from the interests of farmers

6 Summary and Conclusion

The farming systems and farmer typology differs among the six case countries. Although, there is evidence that adoption of innovations led to increased productivity, none of them alone can be regarded as a silver bullet in resolving the food and nutrition insecurity in SSA. A combined applications of the SAIs, EASs and IIAs will be more effective under the specific context of the case countries of InnovAfrica project. The main lessons learned from the six case countries with regard to SAIs, IIAs and EASs are presented in Table 10.

Table 10: The main lessons to learn from each case country experiences in SAIs, EASs and IIAs.

ETHIOPIA	RWANDA
<ul style="list-style-type: none"> • Adoption and dissemination of technologies should be participatory rather than a top-down approach. • Combination of SAIs results better than use of a single SAI technology application. • Demonstrations, field days, seed fairs and multimedia coverage, have accelerated seed disseminations to farmers. 	<ul style="list-style-type: none"> • Agricultural value chain actors have limited capacity for value addition. • Major focus is given to sensitize crop intensification program in the consolidated farm land. • Inadequate postharvest handling and low seed quality coupled with under developed seed systems are agricultural problems
KENYA	SOUTH AFRICA
<ul style="list-style-type: none"> • Agricultural production and improvement will be derived from innovations and intensifications. • EASs strengthen the capacity of farmers knowledge to improve productivity. • IIAs reduces barrier in systems and facilitate product value chain effectiveness 	<ul style="list-style-type: none"> • New ideas need to be built on existing practices and priorities of smallholder farmers. • Environmental concerns need to be embedded during project design phase • Access to inputs, materials and tools is a prerequisite for adoption of innovative SAI systems
MALAWI	TANZANIA
<ul style="list-style-type: none"> • Maize/millet and legume intercropping is embedded in the indigenous knowledge systems. • Agricultural EASs have shifted from expert-based services to farmer to farmer extension. • Agricultural projects that are farmer inclusive have shown better results than others. 	<ul style="list-style-type: none"> • Public EASs have more focus on the production side of agricultural food value chain. • Many private extension providers are donor/project based and very selective in terms of commodities and services provision. • Promoting public - private partnership could play a critical role in service delivery system

The rising interest in livestock development fueled by increased demands of animal products has renewed interest in research on forages particularly to climate resilient forages like Brachiaria grass. This has necessitated the SWOT analysis of the Brachiaria forage grass, and the results show how it can be integrated in the smallholder systems.

Growing maize/millet and legumes in rotations or intercropping increases production from the same area, improves nutrition through diet diversification (proteins and vitamin A), increases soil fertility, increases market value and farm income while reducing greenhouse gases, as shown in the results of SWOT analyses of maize/millet legume.

The swot analysis of EASs in the six case countries reveals that each country has a comprehensive agricultural extension and advisory strategy which spells out the vision and mission but implementation varies significantly among countries. It was interesting to note that there has been a shift to more of pluralistic agricultural extension and advisory approaches in all the countries yet public extension still dominates. In addition, there is limited coordination or sharing of information among the public and non-public extension officers. The main strength observable in the six case countries is existence of qualified extension workers and facilities to augment extension services (training centres, marketing and storage facilities) at community level. Despite efforts to decentralise the extension system in all the countries, the frontline extension workers are poorly resourced with training materials and transport to reach out to farmers. All the countries except South Africa relied on donor funding



for most of the frontline extension workers operations. Limited coordination with private sector and developmental organisations fosters traditional extension methods rather than more innovative methods.

In most countries entry of new ICT technology mobile phone based services and the use of Innovation Systems approaches is set to transform extension delivery services in the future. In all countries poorly motivated, shortage of skilled and experienced manpower constrained effective delivery of the extension services to the smallholder agricultural sector. The extension delivery approach is predominantly top-down, not amenable to participatory, bottom up approaches leading to weak linkages between farmers, extension and research. In most cases, research results are not properly translated and simplified into extension messages leading to poor adoption of innovations. Worth noting as well weak monitoring and evaluation of extension system, poor gender consideration in designing and delivering extension services. For example, in Ethiopia, Malawi and Tanzania the extension approaches are male biased and the needs for poor women are not catered for. There is also limited access to modern extension delivery approaches such as ICTs in all the countries except South Africa where high illiteracy of smallholder farmers is still a limiting factor.

The analysis of this report has shown that agricultural EASs offered to farmers in the six case countries is context specific, determined by history and level of economic development. The systems are characterised by more weaknesses and threats than there are inherent strengths. The fact that there are numerous opportunities abounding in the country-specific extension delivery systems implies unexploited potential for extension-driven agricultural growth. These opportunities include

- renewed commitment and thrust towards increasing public spending on agriculture by the national governments under the ambit of the CAADP;
- proliferation of affordable ICTs, which lessen the burden of extension services provision; and
- increasing interest from non-state actors towards provision of these services.

These have offered some optimism for agricultural development in these case countries. The remarkable paradigm shifts in agricultural extension delivery in the countries, from full public service provision to more of pluralistic approaches has witnessed increased participation of non-state actors - private sector and NGOs in extension service delivery.

Recent policy developments specific to agricultural extension in all the countries suggest renewed interest and commitments by these governments towards extension as a prime mover of agricultural development. The weaknesses highlighted in national extension systems of all the countries suggest that there is still need for renewed capacities to address the currently existing and emerging challenges and threats. The success of the national extension programmes will also depend on political will to avail resources for proper functioning of the extension systems. Performance of these other support services also determines the performance and effectiveness of each country's extension programmes. Increasing awareness about new extension approaches, training farmers especially women and youth should be a focus in all the six case countries.

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Appendix 1: SWOT Analysis of extension system in the six countries

i) Strengths

Ethiopia	Kenya	Malawi	Rwanda	South Africa
<ul style="list-style-type: none"> • Comprehensive agricultural extension strategy which spells out the vision, systemic bottlenecks and priority interventions for the country • Over 12,500 FTCs established closer to the farmers for convenient service provision • Over 85,000 DA trained and graduated from the FTCs • Decentralized and well-structured extension system • Dedicated agricultural vocational training colleges to train and produce middle-level skilled extension personnel • Robust workforce of extension agents (21 per 10,000 farmers) • Greater access to extension facilitated by establishment of FTCs at community-level 	<ul style="list-style-type: none"> • Wide coverage and all-encompassing extension system • Strong staff training and high professionalism at all levels of the service • Relatively well-resourced frontline extension staff in terms of transport and accommodation • National Agricultural Livestock Extension Programme (NALEP) aimed at revitalising the agricultural extension system • Well established tertiary training institutions (universities, colleges) and farmers training centres 	<ul style="list-style-type: none"> • Relatively high exposure and access to extension advice by farmers • Existence of a comprehensive stand-alone agricultural extension policy • Strong support networks and organisations dedicated to good governance in agricultural development (e.g. Extension Department of LUANAR and CISANET) • Pluralism in the provision of agricultural extension services 	<ul style="list-style-type: none"> • Existence of a National Agricultural Extension Strategy • Numerous farmers organizations, NGOs and Projects as alternative extension service providers • Qualified extension workers at stationed district and community level • Existence of infrastructure and facilities to augment extension services (training centres, marketing and storage facilities); • Many trained and progressive farmers in the country • Trained technical staff working in other development institutions and organizations • Good gender balance in the national extension staff establishment – over 36% female extension workers 	<ul style="list-style-type: none"> • Existence of voluntary professional bodies - the South African Society for Agricultural Extension (SASAE) and the South African Institute for Agricultural Extension (SAIEX) - which play a critical role in promoting the professional standing of its members • Existence of a National Extension and Advisory Service Policy to guide extension delivery • Nine universities and 12 agricultural colleges offering extension related qualifications • Well motivated and resourced extension personnel and system, in general

ii) Weaknesses

Ethiopia	Kenya	Malawi	Rwanda	South Africa
<ul style="list-style-type: none"> • Lack of policy clarity on involvement of non-state actors in agricultural extension service delivery • Mainly public dominated and focus is on rain-fed agriculture with little focus on modernisation • Weak market linkage and marketing information system • Weak research-extension-farmer-industry linkage • Gender-insensitive extension delivery system 	<ul style="list-style-type: none"> • Limited public resources for allocation to agricultural extension • Limited capability of smallholder farmers to pay for extension services • Strong top-down planning, weak farmer participation and excessively supply-driven approaches • Extremely broad objective with no specific targeting • Low staff motivation • Weak monitoring and evaluation • High dependence on donor and external funding • Poor packaging and dissemination of extension information • Poor gender consideration in designing and delivering extension services 	<ul style="list-style-type: none"> • low or weak coverage of extension services provision resulting in low awareness of new technologies being promoted • gender-biasedness: Males have more access than females; female-headed households have a lower likelihood of receiving extension advice • limited access to modern extension pathways like ICTs • inadequate financial literacy including credit and crop insurance amongst extension personnel and farmers leading to high farm input loan default rates • personnel, knowledge and skills gaps for livestock extension 	<ul style="list-style-type: none"> • Most non-state actors work in isolation with little or no coordination or sharing of information among them • Weak synergies and harmony among different agricultural approaches and development program initiatives at different levels • Inadequate of training resources and material for frontline extension workers • Limited specialized in-service training for extension workers • Inadequate human resources with specialised extension skills, particularly livestock and veterinary specialists • Inadequate resources (means of transport, GPS, Veterinary Kits, Computers. Etc.) for extension workers • Weak organisational and technical capacity of existing farmers organizations • Lack of public and private media interest and effectiveness in disseminating agricultural extension messages • Poor coordination in the national extension system resulting in communication break-downs • Research results not properly translated and simplified into extension messages 	<ul style="list-style-type: none"> • Shortage of skilled and experienced manpower for the smallholder agricultural sector • Predominantly top-down approach which is not amenable to participatory, bottom up approaches • Weak linkages between farmers, extension and research • Limited opportunities for in-service training - very few extension officers exposed to formal skills training programmes • Gender imbalance in the extension staff compliment

iii) Opportunities

Ethiopia	Kenya	Malawi	Rwanda	South Africa
<ul style="list-style-type: none"> • Potential for Pluralistic Extension System under the new Extension Strategy • Incentives for multi-stakeholder innovation platforms • Scope for market oriented extension system, business development and entrepreneurial skills, value chain development approach • Farmers largely organised into development groups and social networks • Emerging agro-processing industries for value chain development and provision of embedded extension services. • Existence and growing network of farmer cooperatives and unions to provide complementary extension services 	<ul style="list-style-type: none"> • National Agricultural Sector Extension Policy that advocates demand-driven extension services • Donors and NGOs calling for reforms to make the extension system more demand-driven • Willingness by smallholder farmers to pay for private extension services • Recent adoption of Farmer Field Schools (FFS) approach as a participatory extension delivery method • High level of ICT penetration 	<ul style="list-style-type: none"> • generally high ratings for and satisfaction with the quality of agricultural extension and advisory services (> 70%) by farmers (IFPRI, 2016) • low awareness and adoption of newly promoted technologies • new commodity market instruments and systems including warehouse receipts programmes • emerging climate-smart agricultural practices and technologies • growing mobile phone penetration in rural areas 	<ul style="list-style-type: none"> • Creation of Rwanda Agricultural Board (RAB) and the National Agricultural Export Board (NAEB) as promotional bodies • Recent decentralization of agricultural extension activities aimed at addressing specific needs of farm households within each district • Good governance and political will for development of the agricultural sector • Existence of a supportive National Agricultural Policy and related policies, approaches and programs • A growing network of micro-finance institutions in rural districts • Increasing Agricultural Education Institutions • Increasing small-to-medium scale agro processing units • Well established communication infrastructure and facilities (Several radio stations, newspapers, ICTs) • Existence of a good policy for Cooperatives promotion; • Agricultural shows and exhibitions as platforms for extension • Political stability in the country • Good climatic conditions favourable for agriculture development. 	<ul style="list-style-type: none"> • Well-equipped institutions of higher learning with capacity to produce high quality extension personnel • Development of a National Policy on Extension and Advisory Services for Agriculture, Forestry and Fisheries to guide and regulate the provision of extension and advisory services in the country • Refocusing on best-fit approaches under the new policy • Potential for embracing pluralism and use of participatory approaches • Growing capacity for extension personnel development and

<ul style="list-style-type: none"> • Increased focus on value chain development and marketing • Renewed interest by donors and NGOs to support extension • Existence of reliable regional and international market opportunities for agricultural products, • Increasing number of agricultural universities, colleges and vocational training centres for production of skilled manpower • Strong social networks through farmer-group formation and peer-to-peer learning • Increased demands by farmers for improved technologies 	<p>and use (internet, mobile phone, computers)</p>		<ul style="list-style-type: none"> • The use of one local language understood by everyone • Existing regional and international markets 	<p>long-term institutional support.</p>
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iv) Threats

Ethiopia	Kenya	Malawi	Rwanda	South Africa
<ul style="list-style-type: none"> • Top-down and command type extension management and delivery system • High turnover of experienced professionals in agricultural extension • Unstable price on international markets for agricultural products • Climate change and recurrent droughts. 	<ul style="list-style-type: none"> • Lack of flexibility in the public extension system • Poor accountability of the public extension system • Poor linkages and coordination and conflicts among extension service providers • Aging and reduced extension personnel • Lack of adequate funding for operations • Lack of participatory technology development • Low levels of rural incomes • Poor physical infrastructure • Growing calls for privatization of extension services 	<ul style="list-style-type: none"> • diminishing public spending on agriculture, including extension • low levels of education and literacy among farmers • lack of proper motivation and incentive mechanisms for frontline extension staff • climate change and declining soil fertility militating against extension efforts 	<ul style="list-style-type: none"> • Some local authorities do not consider agriculture as a priority in development • Lack of motivation for Extension Workers; • Lack of proper coordination between higher offices and field level staff • Diversion of public extension workers from discharging their main duties at district and community levels to political and other non-agricultural tasks • Resistance to change by the farmers • Insufficient public financing (budget allocation) to agricultural sector • Climate change related risks • Inadequate credit and high cost of borrowing (interest on bank credit) • Lack of insurance schemes dedicated for the agricultural sector • HIV/AIDS pandemic negatively impacting on the labour force in rural areas 	<ul style="list-style-type: none"> • Competition for recognition and resources between research and extension • Diminishing government expenditure on research and extension • Insufficiently qualified extension officers operating as Agricultural Advisors or Subject Matter Experts • Frequent droughts and climate change <p>High prevalence of HIV/AIDS</p>