

Description of Agricultural Extension and Advisory Service System in Zambia

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Abstract: *One of Zambia's top priorities for economic development and the reduction of poverty is agriculture. For smallholders and companies to have easier access to technology and information, extension and consulting services are crucial. In order to facilitate inclusive multi-stakeholder innovation processes, extension and advisory services are increasingly acting as a bridge between important parties including producer organizations, research institutions, higher education, agribusiness, and lone producers. Information-focused models, service provider models, and integrated market models are the three different categories of service provider models. Private sector players, non-governmental organizations (NGOs), international development partners (UN agencies), farmer organizations (Zambia National Farmer Union (ZNFU)), small-scale farmer associations, livestock services, and Agrivet are the main agricultural service providers that the Zambian government uses. Agricultural extension and advisory services are hindered by a number of issues, including field extension workers' lack of understanding of participatory extension methodologies, planned extension programs' focus on ineffective value chains, insufficient and underperforming livestock service centers and farmer training centers, inadequate extension planning, reporting, and feedback cultures, and insufficient in-service and refresher training for front-line extension workers. Despite the numerous obstacles, Zambian agricultural extension agents play a crucial role in getting the technology to end users.*

Keywords: Challenges, Farmers, Policy, Smallholder, Training, Transferring

1. INTRODUCTION

Agricultural extension and advisory services are essential globally for smallholders and businesses to have easier access to technology and information (Ferris et al., 2014; Swanson, 2008; Khan et al., 2020). Advisory services are increasingly serving as a link between significant parties such as producer organizations, research services (Chavula et al., n.d.), higher education (Melaku & Minh, 2021), and agribusiness and producers in order to enable inclusive multi-stakeholder innovation processes (Guijt et al., 2021). Advisory services are frequently the only industries that actively encourage the adoption of contemporary technologies and smallholder

knowledge (Republic of Zambia, 2016). Agriculture is one of Zambia's key goals for economic growth and the fight against poverty (Hangoma & Surgey, 2019). It currently accounts for 10% of the country's GDP and employs more than half of the workforce (Rajaram et al., 2022). Furthermore, agriculture has developed into a significant source of foreign currency (Republic of Zambia, 2016).

Zambia has provided agricultural extension services using a range of methods over the years (Livune, 2022). Prior to 1964, a command or military-style extension distribution technique was employed to identify a small number of progressive individual farmers and provide them with

recommendations for the crops to grow (Republic of Zambia, 2016; Gibbon, 2018). The main maize crop was vigorously promoted in this colonial customized farm visitation extension approach to feed migrant workers who were concentrated in the Copper belt Province (Craven, 2022).

According to the Zambia Agricultural Extension manual (2016), Zambia's public extension services are built on communication and adult learning psychology principles. Extension and advisory services are delivered using four distinct paradigms;

- (1) Technology transfer is the process of actively influencing voluntary behavior through the adoption of technology or management techniques that have been developed, tested, or proved externally.
- (2) Problem-solving: Extension is a method for aiding individuals in identifying and overcoming management or technology challenges that are impeding their ability to improve the performance and productivity of their units (CTA, 2019).
- (3) Education is a form of proactive informal education that aims to make individuals and groups more aware of their problems so they can make decisions and act to improve situations.
- (4) Extension is a strategy for empowering individuals and communities to define problems and seek answers to societal and personal challenges that arise in human growth (United Nations, 2018). Each of the paradigms would allow for the employment of an extension to help transform a variety of industries, including production, food quality, product creation, rural development, and social improvement (Republic of Zambia, 2016).

Zambia's three main channels for distributing extension services are the network of agricultural blocks and camps for fisheries, crops, and livestock as well as Farm Institutes, Livestock Service Centers, and Farmer Training Centers (United Nations, 2018). Individuals from the private sector, Non-Governmental Organizations (NGOs), International Development Partners, and Farmer Organizations have all joined the effort to provide extension and consultancy services (Anderson, 2008).

In spite of the fact that the majority of people in Zambia depend on agriculture for their livelihood, this sector is the most vulnerable to climate change and fluctuation because it depends on local climate elements like rainfall, temperature, and soil quality (Nhemachena et al., 2020; Gwambene et al., 2022). Zambia's high poverty rate (59%) and reliance on agriculture and natural resources make it particularly susceptible to climate change and unpredictable weather (Anderson, 2008). A fast-growing population is also placing pressure on the ability of the natural resource base to generate enough food, water, and wood fuel. Zambia currently has 17.5 million residents, and by 2035, that figure is anticipated to triple (Bhandari & Pandit, 2018).

Beyond traditional concepts of extension as a channel for the one-way diffusion of technology from research groups to farmers, "the Zambian government has acknowledged and actively fostered heterogeneity in the provision of consultancy and extension services. Climate change affects the rural, underprivileged farming households in Zambia." Between 1960 and 2006, Zambia's yearly average temperature rose by 1.3 degrees Celsius. McGeeney and associates (2010) Zambia's Meteorological Department reports that the country saw extremely high temperatures in 2004 that ranged from 30 to 38 degrees Celsius. There have also been reports of temperature extremes, which have obvious negative consequences on the physiology, growth, and productivity of plants and animals. Climate change will almost probably have a significant impact on the average yields of Zambia's primary crops since agronomic conditions for these crops may improve in many locations of the country (maize, wheat, and sorghum). On the other hand, "catastrophic weather events like drought and flooding are predicted to have a higher impact on crop yield. Food security and nutrition concerns, as well as decreased food production, are expected to have an impact on human life. Climate change-related agricultural losses in Zambia are anticipated to cost between US\$2.2 and \$3.13 billion over the next ten to twenty years (CIAT and World Bank, 2017)."

Innovative approaches that contribute to enhancing technology deployment and diffusion:

- 1) In the context of climate technology, learning exercises, adoption tests, and learning by doing are all forms of knowledge expansion.
- 2) Knowledge diffusion, which enables knowledge sharing among participants and partners;
- 3) Highlighting innovative business models for climate technology adoption, particularly the importance of private sector involvement and incubators, for both mitigation and adaptation.
- 4) The allocation of financial, material, and human capital is referred to as resource mobilization (Simpungwe et al., 2017). Climate technology dissemination is frequently challenging due to its high cost, necessitating the use of financial tools such as green bonds, subsidies, and other market innovations.
- 5) Advocacy coalitions that include public and commercial sector players to allow institutional support for scaling up mitigation and adaptation solutions.
- 6) Prioritizing and planning mitigation and adaptation technologies as part of or per the sustainable development strategies of developing nations;
- 7) Increasing stakeholder capacity for prioritizing and planning of scaled-up technologies;
- 8) Improving technology project and program access to foreign financing;

2. DESCRIPTION OF AGRICULTURAL EXTENSION AND ADVISORY SERVICE SYSTEM IN ZAMBIA

In Zambia, the Ministry of Agriculture (MoA) supports pluralism of extension and advisory services (EAS). Coexistence implies diversity not only in the organizations that provide services to farmers, but also in the models and services offered or available to farmers (Ferris et al., 2014).

Farmers involved in multidisciplinary agricultural activities demands a combination of advice, inputs (including credit) and income (markets) to sustain the full social, economic and nutritional benefits of agricultural production for men, women and children. Organizations' extension approaches differentially respond to these needs (Somanje et al., 2021a).

In farming, people need a combination of advice, inputs (including credit) and income (markets) to understand the full social, economic and nutritional benefits of agricultural production for men, women and children (Somanje et al., 2021b). Organizations' extension approaches differentially respond to these needs. This also describes EAS models used across nine select public, private and non-governmental organizations in Zambia and builds on an earlier review of extension services in Zambia (Tucker et al., 2015).

Agricultural Extension is the application of scientific research and new knowledge to agriculture through farmer education. Agriculture extension involves all the activities that facilitate access of farmers, their groups, organizations and other market actors to Knowledge, Information and Technologies. It facilitates farmers' interactions with other stakeholders such as researchers, training institutions, agribusiness companies and other relevant organizations. Eventually agriculture extension builds farmers' capacities by developing their own technical, organizational and management skills and practices. Agricultural Extension brings about changes in Knowledge, Attitude, Skills and Aspirations among farmers.

2.1. Typology of service providers, dominant models used and target groups Zambia

There are three types of service provider models in Zambia. Those are listed in below table with their dominant models and target groups.

a. Information focused models

b. Service provider models

c. Integrated market models

a. Information-focused models

In Zambia, four of the nine organizations focused primarily on the delivery of information. These organizations, Catholic Relief Services (CRS), MoA, Self Help Africa (SHA) and We Effect, work through organized farmer groups as a channel for sharing information and promoting learning amongst farmers in the same community.

Table 1. Information focused models

Organization	Farming advice	Inputs	Credit	Product aggregation	Markets
Information-focused Models					
Catholic Relief Services (CRS)	Field supervisors, field agents, lead farmers; Conservation agriculture, post-harvest handling and storage, small livestock, food and nutrition		Field agent, private service provider: Savings and loans through savings and internal lending communities		Private service provider: basic marketing principles
Ministry of Agriculture, Zambia (MoA)	REG, CEO; Conservation agriculture, farm management through Farmer Field Schools	CEO; coordinate delivery of inputs under FISP			REG, CEO: basic marketing principles, farm management, access to markets through study circles
Self Help Africa (SHA)	Facilitators, lead farmers; sustainable agriculture practices and technologies, food and nutrition				Facilitators: enterprise development
We Effect	Study circle organizer: skills to improve production, productivity and quality of crops (e.g., cotton, honey, maize)		Local organization staff: identify and link farmers to financial services (e.g. lama credit scheme)		Study circle organizer: basic marketing principles

b. Service provider models

Of the nine organizations, ACDI/VOCA and iDE rely on the development of local entrepreneurs or service providers to provide differing access to quality inputs, advice and market support. The intent is to build market-oriented approaches to sustainably provide farmers with access to farm management skills and to facilitate access to inputs and markets.

Table 2. Service provider models

Organization	Farming advice	Inputs	Credit	Product aggregation	Markets
Service provider models					
ACDI/VOCA	Demo host and lead farmers; conservation agriculture, including fertilizer application, pest management, crop rotation, aflatoxin mitigation; CABs: embedded advice specific to inputs sold	CABs: market and sell inputs to farmers	CABs: facilitate formation of savings groups and internal lending within agricultural service groups	CABs: aggregate products for sale at market	Staff, CABs: link farmers to high-value output markets, train in business management
iDE	FBAAs: advice embedded in sale of inputs	FBAAs: generate demand for and facilitate sale of inputs	FBAAs: facilitate access to credit from microfinance institutions; Staff: negotiate financial packages/services with MFIs		

c. Integrated market models

Three organizations provide advice, inputs and credit to farmers along with some form of guaranteed markets. Heifer, COMACO and Good Nature each act as both the supplier and the market, providing agricultural inputs and extension advice and inserting themselves in the value chain as private sector actors.

Table 3. Integrated market models

Organization	Farming advice	Inputs	Credit	Product aggregation	Markets
Integrated Market Model:					
COSMAGO	Lead farmers provide training and instruction in sustainable agriculture, natural resource management Producer group cooperative, field days to exchange knowledge	COSMAGO Provide inputs that support productivity		Cooperator purchasing agents aggregate and purchase crops	COSMAGO provides a guaranteed market
Good Nature	Field supervisors, PEAs, sustainable agriculture, natural resources management	PEAs: loan seed to producer groups	Field supervisors facilitate the financing of farm-need inputs	Field supervisors, PEAs facilitate and process the sale of farm-need seed	Good Nature provides a guaranteed market PEAs provide business management advice
Heath	Milk collection center (MCC), community facilitator, CAVEs offer livestock production advice and basic veterinary care	MCC provides small livestock producer groups with inputs to farmers	MCC provide products on credit	MCC aggregate milk for sale to private sector	MCC purchases milk

3. EXTENSION APPROACHES USED IN CSA

Because of its ability to meet the critical demands of climate mitigation, adaptation, and resilience as well as food security, climate-smart agriculture (CSA) has become a success story and has been quickly adopted by the international community (Turyasingura & Chavula, 2022). While there are a number of recognized and readily accessible climate-smart technologies and practices, their application is hampered by a lack of location-specific tools, long-term experiences, and a supportive enabling environment. Extension services have historically been seen as a way to apply information based on research, with a heavy emphasis on boosting agricultural output.

According to Turyasingura and Chavula (2022), Climate-smart extension strategies should be considered as a component of a larger set of adaptation strategies and initiatives for agricultural systems at various sizes by integration of ICT. Promotion of CSA policies should target both practices and products, including financial services and ways for managing and distributing knowledge.

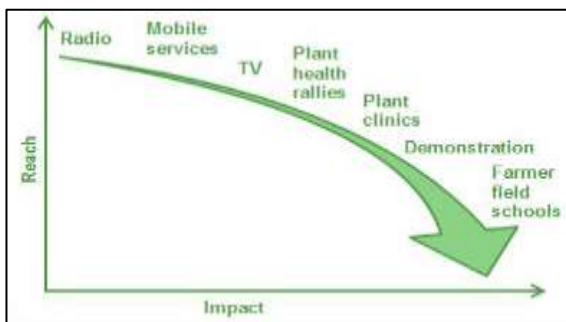


Fig 1: Impact of Extension Approaches (Sala et al., 2016)

Table 4. Different approaches used in extension services

No.	Approaches
1	Climate Awareness programs/Campaigns, Exhibitions
2	Climate Trainings
3	Climate workshops
4	Plant health Rallies
5	Climate Farmers field schools (FFS)
6	Field visits to progressive farmers
7	Demonstration on different adaptation or mitigation practices
8	Dissemination of appropriate climate resilient technology
9	ICT-supported network
10	Participatory crop planning
11	Appointment of climate manager at the village level
12	Appointment of monsoon manager at the district level
13	Use of indigenous technical knowledge (ITKs)
14	Establishment of plant clinics

4. MAJOR EXTENSION SERVICE PROVIDERS

“The Republic of Zambia's government acknowledges the significant contribution made by nonpublic sector participants to the delivery of agricultural extension and advisory services. Public agricultural extension services have dominated the provision of extension services in Zambia historically (Republic of Zambia, 2016).

5. MAIN CHALLENGES OF EXTENSION SERVICES DELIVERY IN ZAMBIA

Government efforts to improve the rural poor's livelihoods through increased production and productivity have been constrained by a number of challenges both structural and institutional in nature and these include:

1. Inadequate Understanding of Participatory Extension Methodologies among Field Extension Workers

In the year 2000 the Government of the Republic of Zambia introduced Participatory Extension Approach as the main vehicle for delivery of public extension services. Turyasingura et al. (2022) noted that building on these observations, it follows that developing resilient livelihoods is essential to enhancing the health and effectiveness of socio-ecological systems and ensuring food security thus, extension is very important in agriculture to reduce poverty. This development did not however go hand in hand with the necessary adjustments in the syllabi of agricultural training institutions (Ajayi et al., 2006). This has brought about a knowledge gap in participatory extension service delivery methods among graduates resulting into ineffective dissemination of agricultural innovation. There are insufficient skills to implement PEA in the country.

2. Non-Functional Value Chains as Focus in Planned Extension Programs

The Zambia agricultural extension system commonly delivers extension services that focus on the promotion of improved technologies and practices in order to increase agricultural production and productivity for consumption-based satisfaction. The extension service poorly addresses market-oriented production systems.

3. Inadequate and Underperforming Livestock Service Centers and Farmer Training Centers

Livestock Service Centers which are supposed to serve as one-stop-shops for all livestock extension services and Farmer Training Centers (FTCs) which are designed for farmer tailored training as well as commodity demonstrations in selected agriculturally strategic districts are currently inadequate to meet the increased demand for extension services. Moreover, the few available have been performing below expectation resulting in poor agricultural extension service delivery, low adoption and adaptation rates.

4. Poor Extension Planning, Reporting and Feedback Culture

Execution of spontaneous extension activities is a common occurrence at field level thereby leading to inefficient use of scarce resources (CFU, 2007). This is further exacerbated by unavailability of functional information sharing platforms for harmonization and planning of field extension programs among 7 stakeholders. In addition, outcomes from most field extension activities are either not reported or inadequately covered for conveyance to facilitate management decision making. In cases where reports are conveyed, the culture of not giving feedback has been prevalent thereby defeating the whole notion of a management information system. Overall, the extension monitoring and evaluation system is inadequate.

5. Inadequate In-Service and Refresher Trainings for Front Line Extension Workers

The current extension service delivery system does not adequately cater for extension staff in-service and refresher training. This could result in most field extension workers confronting farmers with obsolete extension messages leading to a possible loss of confidence in public extension services delivery and eventually to poor adoption and adaptation of innovation hence low production and productivity (Burrows et al., 2017). The Government introduced the establishment of Farm Institutes in every province of the country in recognition of the need to continually refresh and update field extension workers with the latest innovation in the agricultural sector. Over time the refresher information has diversified from the crop and livestock orientation to include fish. In addition to inadequate financial support for In-Service training, there have not been strong linkages between the Farm Institutes and main sources of innovation leading to underutilization and dilapidation of the institutions. Currently the original purpose of establishing Farm Institutes is not being realized also partly because staff assigned to manage them is arbitrarily posted without the necessary competencies (Mulema et al., 2021).

6. Low Extension Officer-to-Farmer Ratio

There has been an increase in the farmer population with increased demand for agricultural extension services without a corresponding increase in the number of extension workers at field level. In addition, the rate of addressing the high extension worker turnover has not been adequate. This has resulted in the current extension worker to farmer ratio of 1:1200 in some cases (Livune, 2022). This low ratio which

falls far below the international recommended standards has stretched the capacity of extension officers to deliver effective extension services. The ratios are lowest in fisheries and livestock sub-sectors

7. Lack of Clarity on Farmer Categories

Targeting of developmental interventions to farmer communities has been poor because of unclear farmer categorization which has often resulted into rich capture and benefit to unintended beneficiaries.

8. Conflicting Methodologies in Extension Service Delivery between Public and Private Sector Players

Turyasingura, Alex, et al. (2022) noted that the Government recognizes and encourages the participation of the Private sector and NGOs in the delivery of extension services to compliment public extension service. However, the coming on board by other players has brought about conflict in extension delivery strategies, with some providers going to the extent of enticing farmers with monetary payments to woo their participation in extension programs.

9. Inadequate coordination and Communication among Extension Service Providers

Pluralistic extension service delivery entails the need for effective coordination and communication among the players at all levels (National, Provincial, District and Community) for effective resource utilization. Currently, the extension service delivery is characterized by duplication of efforts between and amongst service providers while other needy areas are not covered. Further, the lack of effective coordination and communication has often resulted in conflicting information given to the same target group (Ajayi et al., 2006).

10. Inadequate Support to Extension Service Delivery

Effective extension and advisory services delivery requires provision of adequate operational logistical support such as transport, appropriate accommodation (both staff houses and offices), and extension equipment and tools. Currently, it is not uncommon for extension officers to work with limited or without operational resources. In some cases, extension staff may inhabit dilapidated houses, or are not placed in their designated areas and have to commute long distances at their own costs. Further challenging the extension workers is the fact that they have to play both extension and regulatory roles.

11. Inadequate Technical Capacity in Advisory Service Provision

There has been an increase in unqualified individuals hired to provide agricultural consultancy services since the private sector began offering extension services (Kalaba et al., 2010). A similar pattern is beginning to emerge in the public sector, when employees hired to provide advisory services lack the necessary skills, leading to inefficient innovation transfers and subpar advisory service delivery.

12. Unpredictable Weather Pattern Due to Climate Change

Numerous important economic sectors, including agriculture, will be impacted by climate change. The El Nio influence could postpone the onset of the rainy season or result in unsteady rainfalls that have an immediate impact on crop blossoming and productivity. Zambia has not been exempting from drought periods that are getting longer and longer. These droughts particularly impair perennial crops and animal nutrition, which results in significantly decreased outputs for small-scale farmers.

13. Constrained Access to Agricultural Information and Technologies Due to Gender Inequality

Despite the fact that men tend to interact with extension agents and receive more extension advice than women, a significant amount of agricultural work is carried out by women, according to scientific study (Tambo & Matimelo, 2022). In some communities with strong patriarchal traditions and bias, female extension workers' opinion is not always taken seriously, which presents an issue of gender bias.

CONCLUSION

The Zambian government has recognized and worked to actively foster pluralism in extension and advisory service delivery, moving beyond traditional definitions of extension as a dissemination channel for one-way technology transfer from research institutes to farmers. There are three types of service-provider models. Those are information-focused models, service provider models, and integrated market models. Climate-Smart Agriculture (CSA), as an approach, is a success story and has been rapidly taken up by the international community because of its potential to address the urgent needs of climate mitigation, adaptation, and resilience as well as food security. The government recognizes the important role played by nonpublic sector players in the provision of agricultural extension and advisory services. The major agricultural service providers that are used by the Zambian government are: private sector players; non-governmental organizations (NGOs); international development partners (FAO); and farmer organizations (Zambia National Farmer Union (ZNFU), small scale farmer associations, livestock services, and Agrivet). Finally, during the implementation of agricultural extension and advisory service approaches in Zambia, there are some challenges like inadequate understanding of participatory extension methodologies among field extension workers, nonfunctional value chains as a focus in planned extension programs, inadequate and underperforming livestock service centers and farmer training centers, poor extension planning, reporting, and feedback cultures, and inadequate in-service and refresher trainings for front line extension workers. Finally, in Zambia, for the future, even if those challenges are there, extension workers are the key players in the transfer of technology in the country to end users.

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