

An overview of Zambia's Agricultural Extension and Advisory System

Petros Chavula^{1*,2}, Belay Teresa², Marie Grace Ntezimana², Yusuf Umer², Mwaba Muleba¹, Solomon Shentema²

^{1*}Department of Agricultural Economics and Extension, School of Agriculture, University of Zambia, P.O. Box 32379, Lusaka, Zambia. E-mail: chavulapetros@outlook.com; ORCID iD: <https://orcid.org/0000-0002-7153-8233>

²Africa Center of Excellency for Climate Smart Agriculture and Biodiversity Conservation, College of Agriculture and Environmental Sciences, Haramaya University, P. O. BOX 138, Dire Dawa, Ethiopia; Email: ensermu.b@gmail.com

²Africa Center of Excellency for Climate Smart Agriculture and Biodiversity Conservation, College of Agriculture and Environmental Sciences, Haramaya University, P. O. BOX 138, Dire Dawa, Ethiopia; Email: ntezin@gmail.com

²Africa Center of Excellency for Climate Smart Agriculture and Biodiversity Conservation, College of Agriculture and Environmental Sciences, Haramaya University, P. O. BOX 138, Dire Dawa, Ethiopia; Email: yusufumer5@gmail.com

¹Department of Agricultural Economics and Extension, School of Agriculture, University of Zambia, P.O. Box 32379, Lusaka, Zambia. E-mail: mwabamuleba28@gmail.com

²Africa Center of Excellency for Climate Smart Agriculture and Biodiversity Conservation, College of Agriculture and Environmental Sciences, Haramaya University, P. O. BOX 138, Dire Dawa, Ethiopia; Email: solomonshentema@gmail.com

Abstract: For economic development and the reduction of poverty, agriculture is one of Zambia's top priority sectors. Extension and advisory services enable smallholders and businesses to have access to technology and information. In order to promote participatory multi-stakeholder innovation processes, extension and advisory services are progressively tying together significant stakeholders including producer organizations, research institutions, higher education, agribusiness, and lone producers. There are three different categories of service provider models: integrated market models, service provider models, and information-focused models. The main agricultural service providers in Zambia are the private sector, non-governmental organizations, international development partners, and farmer organizations, such as the Zambia National Farmer Union, small-scale farmers associations, livestock services, and Agrivet. Agricultural extension and advisory services are hindered by several issues, including field extension workers' inadequate comprehension of participatory extension methodologies, planned extension programs' focus on non-operational value chains, insufficient and underperforming livestock service and farmer training centers, poor extension planning, reporting, and feedback cultures, and insufficient in-service and refresher training for front-line extension workers. However, in Zambia, the agriculture extension and advisory services play a crucial role in disseminating information among farmers in rural and urban areas farmers despite facing a number of challenges and/or obstacles. However, this piece of article gives a quick overview of Zambia's agricultural extension and advisory services delivery.

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

1. INTRODUCTION

Access to technology and information for smallholder and commercial farmers is made possible by agricultural advisory and extension services (GACSA, 2016). According to the Republic of Zambia extension manual (2016), in order to support inclusive multi-stakeholder innovation processes, advisory services are progressively tying together significant stakeholders like producer groups, research services, higher education, agribusiness, and farmers. The aforementioned are a few that aggressively encourage the adoption of new technology and knowledge transformation among agricultural producers (Republic of Zambia, 2016). Zambia's main priority sector for economic growth and the alleviation of poverty is agriculture. It employs more than 50% of the workforce and accounts for 10% of the country's gross domestic income and is a significant source of foreign exchange (Republic of Zambia, 2016).

Over the years, Zambia has provided agricultural extension and advisory services using a variety of methods. Prior to 1964, a command or military-oriented extended

dissemination strategy was used to target a small number of proactive individual farmers who were given recommendations on what crops to grow. The main maize crop was heavily stressed in this colonial-tailored farm visitation extension approach in order to feed the migrant labourers who were concentrated in the central part of the country.

To further the colonial extension approach of tailored farm visits, Field Institutes, Livestock Service Centers, and Farmer Training Centers (FTCs) were to be developed (FIs). Construction of Farmer Training Centers and Livestock Service Centers were placed in a number of agriculturally significant places, and each of the country's nine provinces at the time had a farm institute. In line with Burrows et al (2017), The goal of the farmers' training centres was to encourage farmer training in better farm management methods while also allowing commodities demonstrations. While Farm Institutes provided in-service training for extension employees and higher-level training to help local farmers, Livestock Service

Centers operated as one-stop shops for livestock services (Burrows et al., 2017).

The *Zambian Agricultural Extension Manual* from 2016 states that the foundation of Zambia's public extension services is adult learning psychology and communication. Under each of the paradigms, an extension might be used to aid in transformation in a range of industries, including production, food quality, product development, rural development, and social enhancement (Republic of Zambia, 2016). Four different paradigms are used to offer extension and advisory services;

- (1) Extension is a method for encouraging and motivating people to take the initiative in defining issues and looking for solutions to personal and social difficulties in human development (United Nations, 2018).
- (2) Technology transfer is the process of proactively influencing voluntary behaviour through the adoption of externally created, tested, or proven technologies or management practices.
- (3) Education is a type of proactive informal education that tries to assist people and organizations in better understanding their issues and being able to take action to improve their situation.
- (4) Extension is a technique for assisting people in recognizing and resolving technological or management problems that are obstructing their goal to increase unit performance and output (CTA, 2019).

The network of agricultural blocks and camps for fisheries, crops, and livestock, on the one hand, and the three main pathways for delivering extension and advisory services in Zambia, which are Farm Institutes, Livestock Service Centers, and Farmer Training Centers (United Nations, 2018). The private sector, Non-Governmental Organizations (NGOs), International Development Agencies, and Farmer Organizations have all teamed up to provide extension and consultation services (Anderson, 2008; Chavula & Yali, 2022). The majority of people in Zambia depend on agriculture for their living, yet due to the industry's reliance on regional climate factors including rainfall, temperature, and soil quality, it is the most susceptible to climate change and fluctuation. Zambia is among African states with a high poverty rate (59%) and reliance on agriculture and natural resources makes 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. The country currently houses more than 17 million people, and by 2035, that population is anticipated to triple.

In Zambia the government has recognized and actively promoted pluralism in the provision of advisory and extension services, pushing beyond conventional notions of extension as a channel for the one-way distribution of technology from research organizations to farmers. The country's rural poor

farming households suffer from climate change shocks. An Increase in annual average temperature by 1.3⁰C was recorded between 1960 and 2006 (Mc Sweeney et al., 2010). The country saw a very high-temperature rise in 2004 ranging from 30⁰ C to 38⁰ C. Extremes in temperature have also been documented, with clear negative effects on the physiology, growth, and productivity of crops and animals. Weather extremes result in changes in agronomic conditions for crops and livestock animals in many areas of the country may improve in many areas. However, climatic shocks have almost probably a considerable impact on the average yields of the country's principal crop yields including sorghum, wheat, and maize, and livestock production (Chavula & Yali, 2022). On the other hand, extreme weather conditions like drought and flooding are anticipated to have a greater effect on agricultural productivity resulting in adverse food insecurity. Human existence is expected to be impacted by decreased food production, as well as by problems with nutrition and food security.

According to estimates, climate change-related agricultural losses in Zambia over the next ten (10) to twenty (20) years would cost between US\$2.2 and US\$3.13 billion (CIAT and World Bank, 2017). The mentioned losses could be combated by the adoption of climate-smart agriculture and sustainable development techniques. These technologies can only reach end users through agricultural extension and advisory services. The adoption of these technologies has been horrible over the years. Innovative methods that improve the deployment and dissemination of technology are used to address adoption with regard to CSA practices by Grubb et al. (2017): (1) In the context of climate-smart technology, learning activities, adoption trials, and learning-by-doing are all instances of knowledge growth; (2) Knowledge diffusion, which promotes information exchange between individuals and business partners; (3) highlighting cutting-edge corporate strategies for the adoption of climate smart technologies, with a focus on the significance of private sector engagement and incubation for both mitigation and adaptation; (4) Resource mobilization is the process of allocating human, material, and financial resources (Simpungwe et al., 2017). The rising cost of climate technology makes it difficult to spread it, which calls for the employment of financial mechanisms like green bonds, subsidies, and other market innovations; (5) advocacy groups with representatives from the public and private sectors to enable institutional support for expanding mitigation and adaptation measures; (6) putting mitigation and adaptation technologies at the top of the list and organizing them in accordance with or as part of developing countries' sustainable development strategies; (7) enhancing stakeholder capacity for scaling-up technology planning and prioritization; (8) increasing the availability of foreign finance for technological projects and programs;

2. A SHORT SUMMARY OF THE AGRICULTURE ADVISORY AND EXTENSION SERVICE DELIVERED IN ZAMBIA

A variety of advisory and extension (EAS) services are promoted by the Zambian Ministry of Agriculture (MoA) through the department of agriculture. Coexistence necessitates diversity in both the organizations that provide services to farmers and the models and services that are available to them (Ferris et al., 2014).

Farmers participating in multidisciplinary agricultural activities require a combination of advice, inputs (including credit), and revenue to preserve the full social, economic, and nutritional benefits of agricultural output for men, women, and children. Organizations employ a variety of extension tactics to meet these goals (Somanje et al., 2021a). To fully understand the social, economic, and nutritional benefits of agricultural output for men, women, and children, people in agriculture need a combination of advice, inputs (including credit), and money (emerging markets) (Somanje et al., 2021b). Different extension strategies are used by organizations to meet these needs. This extends on an earlier analysis of extension services in Zambia and examines EAS models utilized by nine specific public, corporate, and non-governmental organizations in Zambia (Tucker et al., 2015).

Agricultural extension and advisory service delivery is the implementation of fresh perspectives and scientific findings into agriculture through farmer training. Agriculture extension further refers to all programs that make it simpler for farmers, their organizations, associations, and other market participants to access knowledge, information, and technologies. It facilitates communication between farmers and other stakeholders such as researchers, educational institutions, agribusiness companies, and other essential groups. Agriculture extension eventually boosts farmers' capacity by helping them develop their own technical, organizational, and management skills and practices. Agricultural advisory and extension service delivery alters the knowledge, attitude, skills, and aspirations of farmers.

2.1. Types of service providers, prevalent models employed, and target audiences in Zambia

In Zambia, there are three different service provider models. These are included in the table below along with their target demographics and prevalent models.

a. Information-focused models

However, in Zambia four (4) out of the nine (9) groups focus mostly on information sharing. These organizations include—Catholic Relief Services (CRS), MoA, Self Help Africa (SHA), and We Effect—which use organized farmer groups to support the learning process and information sharing among farmers within 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 cooperatives		Private service provider; basic marketing principles
Ministry of Agriculture, Zambia (MoA)	CEO, CEO; Conservation agriculture, farm management through Farmer Field Schools	CEO; coordinate delivery of inputs under FISP			CEO, 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, maize, mango)		Local organization staff; identify and link farmers to financial services (e.g., loan credit scheme)		Study circle organizer; basic marketing principles

b. Service provider models

In Zambia two (2) of the nine (9) organizations (*i.e.*, ACDI/VOCA and iDE), rely on the expansion of local entrepreneurs or service providers to provide varying degrees of access to high-quality inputs, guidance, and access to markets. The goal is to develop market-oriented methods that will give farmers sustainable access to markets, inputs, and knowledge about agricultural production.

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 agriculture 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

Therefore, three (3) organizations offer farmers finance, credit advice, inputs, and some kind of guaranteed market. Heifer, COMACO, and Good Nature all take on the roles of both the market and the provider by supplying agricultural inputs, offering extension assistance, and inserting themselves as private sector participants in the value chain.

Table 3. Integrated market models

Organization	Farming advice	Inputs	Credit	Product aggregation	Markets
Integrated Market Model:					
COMAACO	Lead farmers provide training and instruction in sustainable agriculture, natural resource management Producer group cooperative, field days to exchange knowledge	COMAACO Provide inputs that support productivity		Cooperator purchasing agents aggregate and purchase crops	COMAACO 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 non-seed inputs	Field supervisors, PEAs facilitate and process the sale of farm-grown seed	Good Nature provides a guaranteed market PEAs provide business management advice
Heinz	Milk collection center (MCC), community facilities, CAUVs 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

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 AND ADVISORY SERVICE PROVIDERS

The government of the Zambian Republic recognizes the important contribution nonpublic sector actors have made to the provision of agricultural extension and advisory services. The majority of extension services offered in Zambia traditionally have been public agricultural extension services. The early 1990s saw the government start the process of economic liberalization, and since then, other extensions and consulting service providers have joined. These fall under the following headings:

- ✓ Non-Governmental Organizations (NGOs),
- ✓ Private sector players,
- ✓ International Development Partners (FAO) and;
- ✓ Farmer Organizations (Zambia National Farmer Union (ZNFU), Small scale farmers’ associations, Livestock services and Agrivet).

5. OBSTACLES IN ADVISORY AND EXTENSION SERVICE 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. Field Extension Workers' Limited Understanding of Participatory Extension Methodologies: The competence of professionals in terms of the necessary knowledge, skills, and attitudes is primarily a function of the effectiveness, efficiency, and quality of agricultural extension service providing. For the promotion and spread of the technologies, technical and communication abilities are crucial(Ajayi et al., 2006). Farmers need to see agricultural technologies in action before they accept them, not just hear about them.
2. The lack of engagement between farmers and service providers can be attributed to technological, infrastructural, and cultural factors because these factors have a big impact on communication. Lack of ongoing technical updates for newly developed agricultural technologies, high turnover among extension personnel as a result of lack of rewarding

3. CSA'S EXTENSION APPROACHES

Climate-smart agriculture (CSA) has become a success story and has been quickly embraced by the international community due to its capacity to satisfy the pressing demands of climate mitigation, adaptation, and resilience, as well as food security (Republic of Zambia, 2016). Even though the adoption of CSA is hampered by a lack of location-specific tools, extensive experience, and a supportive enabling environment, there are several known and accessible climate-smart technologies and practices. Extension and advisory services have historically been seen as a way to apply information based on research, with a heavy emphasis on boosting agricultural output.

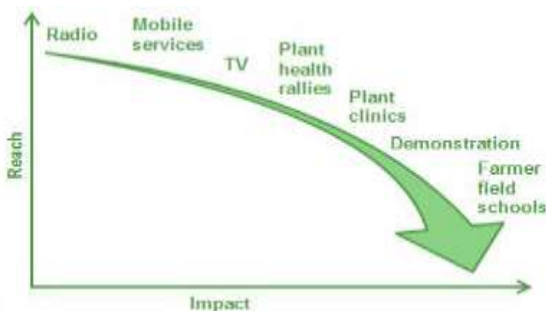


Figure 1: CSA Extension Methods

Table 4. Extension and advisory services strategies

incentives and efforts to advance local political leaders. In addition to these, geographical barriers have made extension workers less effective.

3. The production of current crops and livestock, the issues with the use of natural resources, and the agricultural technology that are currently accessible are generally out of sync. Neither are the current agricultural methods based on the issues with smallholder agriculture nor are they enough for meeting their needs. When it comes to having the necessary knowledge, skills, and attitudes, professionals are primarily responsible for the effectiveness, efficiency, and quality of agricultural extension service delivery.
4. The number of farmers and the demand for agricultural extension services has both increased, but the number of extension workers employed in the fields has not kept pace with these changes. Additionally, it has taken too long to resolve the substantial turnover of extension staff. As a result, in certain instances, the current farmer-to-extension worker ratio is 1:1200(Livune, 2022). The ability of extension employees to deliver high-quality extended services has been hampered by this low ratio, which is much below the norms recommended internationally. The lowest rates are found in the livestock and fishing sectors.
5. The focus of the planned extension and advisory programs is on non-functional value chains. The agricultural extension system in Zambia frequently offers services focused on the promotion of better technology and practices to increase agricultural productivity and production for consumer-based satisfaction. The extension service pays insufficient attention to production systems that are market-driven(Burrows et al., 2017).
6. Uncertainty about Farmer Categories The imprecise definition of farmers results in poor targeting of developmental projects for farming communities and frequently results in substantial capture and advantages for unintended users.
7. A weak extension Culture of planning, reporting, and feedback Future development's success depends on the next generation. The most ardent group of the current productive forces needs to be educated and empowered if agriculture is to be transformed. Public agricultural education, a crucial component of non-formal education, is anticipated to play a large role in addition to formal education.
8. The current state of Livestock Service Centers, which are meant 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 chosen agriculturally strategic districts, is not enough to meet the growing demand for extension services. The few that are now in use have also performed poorly, which has resulted in poor agricultural extension service delivery, low acceptance, and low adaptation rates.
9. The provision of extension services by the private sector and NGOs as a complement to the official extension service is acknowledged and supported by the government. But the influx of new participants has led to disagreements about expanded delivery strategies, with some service providers even going so far as to offer farmers financial incentives to enhance their participation in extension programs(Mulema et al., 2021).
10. Weather pattern unpredictability due to climate change. One of several significant economic sectors that will be influenced by climate change is agriculture. The El Nio effect may delay the beginning of the rainy season, and unpredictable rains may immediately affect agricultural productivity and flowering. Additionally, Zambia has suffered longer-lasting drought episodes, which dramatically lower the outputs of small-scale farmers and notably harm perennial crops and animal nutrition.
11. Inadequate assistance for the extension of services. The provision of extension and consulting services necessitates the correct operational logistical support, which includes access to transportation, appropriate housing (including staff houses and offices), and extension tools and equipment. Currently, extension officers frequently function without any operational support. Sometimes, extension staff are forced to drive considerable distances on their own dime because they reside in run-down dwellings or are not assigned to their designated regions. Regulatory and extension tasks must be performed by extension personnel, which presents additional difficulties.
12. As the commercial sector increases the amount of extension services it offers, unqualified workers are being engaged more regularly to provide agricultural advising services (Kalaba et al., 2010). Similar patterns can be observed in the public sector, where the absence of requisite skills among individuals employed to provide advisory services impedes the effective transfer of innovation and leads to suboptimal advisory service delivery.

CONCLUSION

Rural extension service delivery arrangements have undergone major modification in Zambia during the past few decades. Among the most significant issues mentioned in the article are a lack of ongoing financing to support public extension, disjointed structures, and limited access to extension services throughout rural areas. The demand for EAS as a result of rural farmers' limited participation, notably that of marginalized women and youth farmers, is not well documented in Zambia. Although tackling the requirements of the rural people from a gender perspective has not been the primary focus of the policy discussion on EAS delivery, it is still true that EAS novel ways are required to constantly close the gender gaps in agricultural output. There is still much work to be done, both in terms of devising and putting these novel ideas into practice and in terms of influencing the policy discussion surrounding gender and rural extension and advisory services.

REFERENCES

- [1] Ajayi, O. C., Masi, C. ;, Masi, C., Katanga, R., & Kabwe, G. (2006). Typology and Characteristics of Farmers Testing Agroforestry. *Zambian Journal of Agricultural Science*, 8(2), 1–55. <http://www.worldagroforestry.org/downloads/Publications/PDFS/ja06326.pdf>
- [2] Anderson, J. R. (2008). Background Paper For The World Development Report: 2008 Agricultural Advisory Services. *World Development*, January 2005, 44.
- [3] Burrows, E., Bell, M., & Rutamu, N. G. (2017). Extension and Advisory Services in Zambia: Understanding Structures, Services, Roles & Incentives for Reaching Farmer Households as a Basis for Discussing Potential for Scale. *Feed the Future, August*.
- [4] Chavula, P., & Yali, S. (2022). *Description of Agricultural Extension and Advisory Service System in Zambia. September*.
- [5] CTA. (2019). Digitalising extension: Smart Advisory Services For Farmers. *Spore No. 194, June-August*, 1–48.
- [6] Ferris, S., Robbins, P., Best, R., Seville, D., Buxton, A., Shriver, J., & Wei, E. (2014). Linking smallholder farmers to markets and the implications for extension and advisory services. *MEAS Brief*, 4(10), 13–14.
- [7] GACSA. (2016). *Compendium on Climate-Smart Agriculture & Extension*.
- [8] Kalaba, K. F., Chirwa, P., Syampungani, S., & Ajayi, C. O. (2010). Contribution of agroforestry to biodiversity and livelihoods improvement in rural communities of Southern African regions. *Environmental Science and Engineering*, 461–476. https://doi.org/10.1007/978-3-642-00493-3_22
- [9] Livune, D. (2022). *An establishment of strategies that can make the agriculture extension education programme provided in Zambia effective: a case of Kazungula district*. The University of Zambia.
- [10] Mulema, J., Mugambi, I., Kansime, M., Chan, H. T., Chimalizeni, M., Pham, T. X., & Oduor, G. (2021). Barriers and opportunities for the youth engagement in agribusiness: Empirical evidence from Zambia and Vietnam. *Development in Practice*, 31(5), 690–706.
- [11] Republic of Zambia & a d v i s o r y s e r v i c e s s t r a t e g y. (2016). *January*.
- [12] Simpungwe, E., Dhliwayo, T., Palenberg, M., Taleon, V., Birol, E., Oparinde, A., Saltzman, A., & Diressie, M. T. (2017). Orange maize in Zambia: crop development and delivery experience. *African Journal of Food, Agriculture, Nutrition and Development*, 17(2), 11973–11999.
- [13] Somanje, A. N., Mohan, G., & Saito, O. (2021a). Evaluating farmers' perception toward the effectiveness of agricultural extension services in Ghana and Zambia. *Agriculture and Food Security*, 10(1), 1–16. <https://doi.org/10.1186/s40066-021-00325-6>
- [14] Somanje, A. N., Mohan, G., & Saito, O. (2021b). Evaluating farmers' perception toward the effectiveness of agricultural extension services in Ghana and Zambia. *Agriculture & Food Security*, 10(1), 1–16.
- [15] Tambo, J. A., & Matimelo, M. (2022). An act of defiance? Measuring farmer deviation from personalised extension recommendations in Zambia. *Journal of Agricultural Economics*.
- [16] Unit, C. F. (2007). Conservation Farming & Conservation Agriculture Handbook for ox farmers in agro-ecological regions I & IIa. *Lusaka, Zambia: Conservation Farming Unit*.
- [17] United Nations. (n.d.). *Innovative approaches to accelerating and scaling up climate technology implementation for mitigation and adaptation Contents*.