

EDITORIAL

ADVANCING AGRICULTURE EXTENSION MODELS IN AFRICA: BRIDGING THE GAP FOR EFFECTIVE DELIVERY OF TECHNOLOGIES AND INNOVATIONS

Oluoch M^{1*} and M Kitanaka²



Mel Oluoch

*Corresponding author email: mel.oluoch@saa-safe.org

¹ Sasakawa Africa Association, Addis Ababa, Ethiopia

² Sasakawa Africa Association, Tokyo, Japan



ABSTRACT

Agriculture in Africa is undergoing transformative shifts, driven by the need for sustainable food production, increased productivity, and resilience to challenges such as climate change. This paper explores the current state of agriculture extension models in Africa and their role in delivering technologies and innovations to target beneficiaries and other stakeholders in agricultural innovation systems. We delve into key challenges, promising approaches, and recommendations for enhancing the effectiveness of extension services in the dynamic agricultural landscapes of Africa. The paper showcases innovative extension models by Sasakawa Africa Association that have made a significant impact. These include Farmer Learning Platforms (FLPs) model, Private and Extension Service Provision (PESP), The Agro-Processing Enterprise Center (APEC) Model, Community-Based Seed Multiplication (CBSM) model, private and extension service provision Model (PESP), and the community savings for investment in Agribusiness (CSIA) model. The Sasakawa Africa Fund for Education (SAFE) Demand Driven Curriculum (SDDC) model is also highlighted. These examples highlight the importance of context-specific approaches and the role of extension in empowering farmers to embrace sustainable and resilient agricultural practices. By addressing key challenges and leveraging opportunities, this paper aims to contribute to the sustainable development of agriculture in Africa.

Key words: Agriculture extension models, Technology Adoption, participatory approaches, Innovation, Sustainable Development



INTRODUCTION

Africa's agricultural sector is crucial for economic development and food security, but it faces many obstacles, including limited access to modern technologies and information. Additionally, agriculture extension faces numerous challenges in Africa, including limited resources, inadequate infrastructure, and a diverse agro-ecological conditions. Agriculture plays a crucial role in the socio-economic development of Africa, but the continent faces challenges in effectively delivering agricultural technologies and innovations to farmers.

The low ratio of extension workers to farmers in Africa, which ranges from 1: 5,000 to 1: 10,000 in Nigeria [1] and 1:1800 in Uganda [2] (the average ratio in Africa is 1:3000), is a problem that affects the provision of agricultural extension services. Effective agriculture extension models play a critical role in addressing these challenges by facilitating the delivery of innovations to farmers and other stakeholders. An efficient agricultural extension and advisory service (AEAS) is required to provide farmers with pertinent and helpful information and technologies that can increase their production and productivity. Governments have traditionally assisted smallholder farmers with extension services for a long time, but because of shifting priorities, financing for these initiatives has decreased in many nations. Several developing nations are also changing their governance structures in response to the multilateral and bilateral donors recommendations to privatize and decentralize extension services and farm-level initiatives that are more in-touch with the public. The degree of grass-roots AEAS involvement encourages farmer-oriented approaches that enable more interactive reciprocal learning between unified, multidisciplinary formal and informal knowledge frameworks. By having good conversations with extension workers and with other farmers, farmers and other rural residents learn how to solve difficulties. It is thus crucial to highlight the importance of aligning extension strategies with the diverse needs of African farmers and fostering collaboration among key actors in agricultural innovation systems. In order to better meet the needs of farmers and support agricultural transformation, this article suggests ways to close these gaps and enhance agriculture extension services.

Strategies for Enhancing Agriculture Extension

Resilient agriculture extension models that can effectively reach and engage farmers are necessary to promote the effective distribution of agricultural technology and innovations in Africa. Some of the key models and approaches that can enhance agriculture extension in Africa may include: a) ICT-Based Extension Services, b) Radio and Television Programs, c) Farmers' learning platforms, d) Community-Based Extension Services, e) Public-Private Partnerships, f) Extension through NGOs and Development Organizations, g) participatory demonstrations, h)



Extension through Cooperatives, l) Market-Oriented Extension, and k) Continuous Training and Capacity Building. Given the variety of agricultural practices and difficulties found throughout the continent, we must align our extension systems and modify these models/approaches to the unique socio-economic and cultural settings of various regions within Africa. Furthermore, to guarantee the validity and efficacy of these extension models/approaches in raising agricultural productivity and livelihoods, continuous monitoring and assessment are necessary. Drawing on successful case studies, research, and best practices, the paper identifies promising extension approaches in Africa, as well as systems-oriented extension services along the agriculture value chain. The paper also explores how these approaches contribute to increased technology adoption, knowledge dissemination, and improved agricultural practices. Drawing on best practices and lessons learned, these strategies include strengthening farmer engagement, leveraging digital technologies, promoting knowledge-sharing platforms, and fostering multi-stakeholder partnerships.

Validated agriculture extension models

A vital part of guaranteeing the efficient transfer of agricultural innovations and technologies is the use of validated and tested agriculture extension models and techniques. These models, which are usually supported by data, have been shown to increase farmer knowledge, encourage the adoption of modern practices, and increase overall agricultural productivity. They also contribute to building a foundation of efficiency, sustainability, and confidence in the delivery of agricultural technologies and innovations. Enhanced sustainability, inclusion and equity, learning from success and failure, scaling up and replication, continuous improvement, partnerships and collaboration, resilience building, scientific rigor and credibility, and efficient resource allocation are all reasons why validated and proven approaches are important. To have a significant and long-lasting impact on farmers' livelihoods and the agricultural sector's overall development, these models are needed. Incorporating a pluralistic perspective into the system is necessary for the verified models to be adopted and scaled up.

Pluralistic agriculture extension models

Various actors, such as public institutions, private sector, non-governmental organizations (NGOs), and local communities, collaborate in pluralistic agriculture extension models. This method encourages a more inclusive and holistic change of the agri-food system while acknowledging farmers' various demands and contexts. This collaborative paradigm acknowledges that change necessitates the joint efforts of all stakeholders striving for shared objectives. Using pluralistic extension methods can help promote more efficient and sustainable development in the African environment, where agriculture is frequently diverse and



complicated. The main ideas and elements of pluralistic agriculture extension models in Africa include: a) public-private partnerships, b) multi-stakeholder platforms, c) community-based organizations, d) value chain approaches, e) customization and localization, f) inclusive gender approaches, g) digital technologies for extension, h) capacity building for extension agents, i) market-driven extension, j) policy support and coordination, and k) monitoring and evaluation. African nations may leverage the diverse strengths of many players in the agriculture sector by embracing a pluralistic approach, resulting in agri-food systems that are more inclusive, resilient, and sustainable [3, 4, 5].

Research and extension model linkage

Nonetheless, a crucial component of agricultural development in Africa is the linkage that exists between extension models and the uptake of agricultural technologies at the farm level. Academic, research, and extension endeavors are interrelated in comprehending, formulating, and implementing effective strategies to promote technology adoption. Creating and putting into practice efficient extension models that promote the adoption of agricultural innovations at the farm level in Africa requires close collaboration between research, academia, and extension personnel. By working together, collaborators can make sure that interventions are grounded in evidence, tailored to the particular context, and adaptable to the changing agricultural landscape in the area [5, 8].

Policy and agriculture extension

Developing efficient decision-making processes in Africa depends on the relationship between policy and agriculture extension. Agriculture extension acts as a link between policymakers and the grassroots level, facilitating the implementation of policies and providing guidance for agricultural Development. Building an environment that fosters equitable and sustainable agricultural development in Africa requires efficient coordination between the development of policies and agriculture extension initiatives. Policies ought to be flexible, adaptable to changing conditions, and actively established with the participation of all pertinent parties. By working together, we can make sure that laws are implemented in a way that benefits farmers and advances the agricultural industry as a whole [6, 7, 9].

Experience of Sasakawa Africa Association

The Sasakawa Africa Association (SAA) has developed innovative strategies to improve the effectiveness and efficiency of extension service delivery. It began collaborating with the private sector alongside government extension agents to create new tools, approaches, and models of extension, including the Agro-Processing Enterprise Centre (APEC) Model, the Private and Extension Service Provision (PESP) model, and Farmer Learning Platforms (FLPs). The community-



based seed multiplication (CBSM) model, the community savings for investment in agribusiness (CSIA) model, and the Sasakawa Africa Fund for Education (SAFE) Demand Driven Curriculum (SDDC) model. Digital transformation strategies powered by information and communication technology (ICT) are also offering chances to improve the provision of extension services to smallholder farmers. All these models are applied in an integrated approach along the entire Agriculture value chain since they are interdependent of each other (Fig 1).

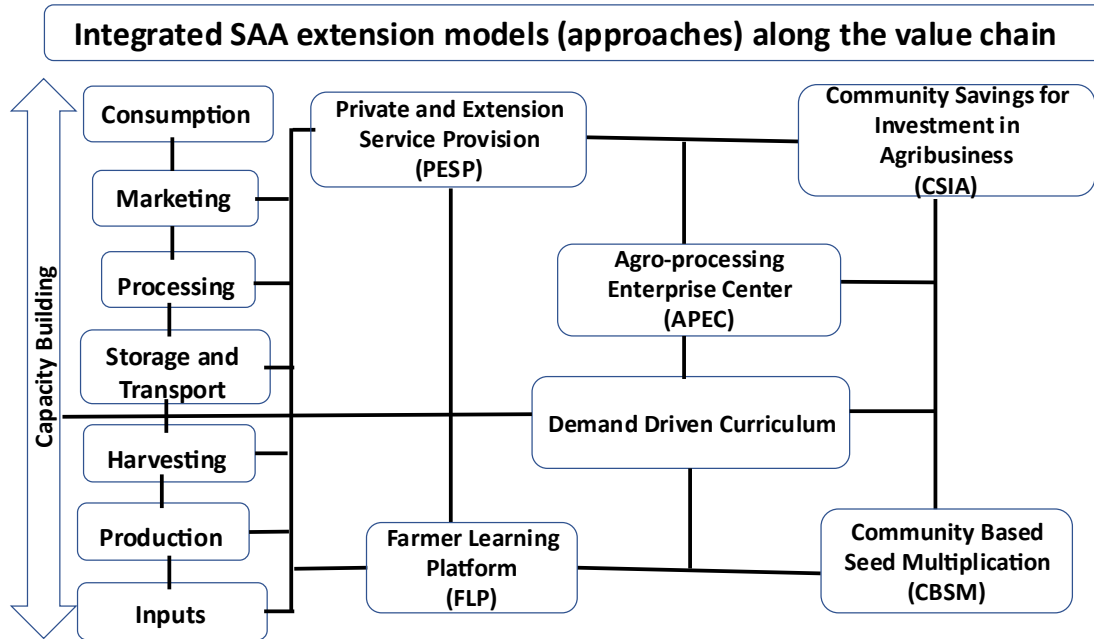


Figure 1. The SAA Integrated extension models implemented along the entire agriculture value chain

a) The Agro-Processing Enterprise Center (APEC) Model

The SAA promotes the Agro-processing and Enterprise Centre (APEC) model which showcases improved technology choices that can be applied to add value, resulting in positive effects on the economy and society. By increasing the nutritional worth of food, people and organizations can use this centre to raise awareness, enhance food quality, and create revenue. For extension workers, students, producers, and marketers, the centre provides additional information on utilization potentials and constraints that are used to create and implement technology diffusion strategies. It also provides practical guidance on starting and operating an agro-processing enterprise in actual environments.

The main objective of APEC is to provide a platform for the development of small and medium-sized agro-processing enterprises by providing training and technical support. It focuses on converting local produce into value-added agricultural goods and transferring technologies for agribusiness expansion in order to boost revenue

creation and food and nutrition security. The APEC model is specifically used to: a) increase the quantity and quality of processed products by using value-adding technologies and techniques; b) improve the business acumen and skills of extension workers, students, producers, and marketers; c) create a platform for the growth of agro-processing businesses that generate income and job opportunities, especially for women and youth; d) connect producers to profitable markets; and e) promote nutrition messaging, cooking, and consumption of adequate, balanced, and varied diets obtained locally.

b) Farmer learning platforms (FLPs) model

Through better farming and extension practices, the Farmer Learning Platforms (FLPs) aim to increase crop productivity and production in Africa. They also create opportunities for interactive learning and active participation among farmers, program staff, and partner extension agents in the process of delivering extension services for technology innovation, adaptation, and dissemination. The purpose of FLPs is also to look into the efficacy and efficiency of the technology packages that smallholder farmers are receiving. They consist of four types of plots: community demonstration plots showcasing climate-smart and productivity-boosting Sasakawa Africa Association technology; technology adoption plots managed by early adopters; model adoption plots that serve as models; and commercial technology adoption plots that are selected based on stringent requirements like complete adoption of the demonstrated technological package and community practices managed by non-participating farmers [10].

c) Community-Based Seed Multiplication (CBSM) Model

The multidisciplinary approach used by the CBSM Model that SAA promotes encompasses a range of stakeholders along the value chain for seeds, such as financial institutions, community-based value chain agents, professional seed companies and retailers, and providers of seed research and extension services. To promote social learning, provide high-quality seeds for farmers to utilize themselves, and offer seeds to other farmers, the CBSM Model divides individual farmers and their support groups into small seed production units [11]. Through social learning, the effective CBSM model improves farmers' knowledge and gives them access to better seed for both CBSM membership and non-membership farmers. According to reports, the model increases access to bean seed in Ethiopia [12], and improves seed access in Nepal [13]. Through the CBSM, SAA hopes to increase farmers' use and access to enhanced seed while also encouraging a greater uptake of its productivity-boosting technology.



d) Private and Extension Service Provision Model (PESP)

The paucity of government extension agents to spread knowledge and technologies generated by the research system, the scarcity of information about better technologies, and the high cost of investing in these technologies pose ongoing challenges for the Sasakawa Africa Association (SAA) in its intervention programs among rural communities in Africa. In order to improve production and productivity, food and nutrition security, and the quality of life for smallholder farmers (SHFs), the Private and Extension Service Provision (PESP) extension model seeks to offer a scale-out strategy for agricultural extension and advisory services with the active participation of the private sector.

The PESP model supports the engagement of private individuals and/or groups to give producers, smallholder farmers, and other value chain actors access to necessary technologies and extension services, promotes enterprise development in the agricultural value chain, and allows them to make a living from those enterprises. It also helps to improve the delivery of agricultural extension and advisory services. The approach calls for identifying and educating a subset of community members who belong to commodities associations as well as enterprising people who are willing to invest in and embrace the technologies of their choosing.

The Production, Postharvest and Trade Centre [PHTC] model [14], which is known as Promoting Sustainable Agricultural Mechanization for smallholder farmers (SHFs), Private Service Providers (PSP); Commodity Association Traders/Trainers (CA/CAT); and Community-based Facilitators (CBF) are the component models of PESP. PESP receive technical and entrepreneurial skill development training, are linked to financial institutions, suppliers of machinery and inputs, and providers of machine repair and maintenance services. Since extension agents are actively involved in the implementation, they gain from a constant stream of new information and expertise on the management and operation of various technologies as well as the financial benefits of doing so.

e) Community Savings for Investment in Agribusiness (CSIA)

SAA have made strides to enrich its agricultural value chain approach through promotion of inclusive and mutually reinforcing interventions varying from staff and extension advisory service capacity enhancement to providing and supporting innovative ways of disseminating improved agricultural technologies to sustainably stimulate commercial farming that can effectively generate more income and ensure food security for smallholder farmers while creating rural employment opportunities for the youth, women and People with Disabilities (PwDs).



Africa's rural areas are underserved in financial services, requiring investment and subsistence needs. Traditional formal financial institutions, such as commercial or agricultural banks haven't provided customized services, hindering rural SHFs' potential. Financial inclusion can increase household income, improve livelihoods, and create jobs, benefiting the impoverished. The SAA has developed strategies for farmers, groups, and extension agents to create sustainable farming groups that practice farming as a business enterprise using the community savings for investment in agribusiness (CSIA) model, focusing on reinvesting and saving.

The CSIA model is a resource mobilization practice used by farmer groups in African SAA communities. It allows self-selected groups to build savings and access finance for their needs. The model is simple, accessible, and encourages SHFs to consider agriculture as a business and build market systems. It creates bonding among members and ensures access to finance. SAA enhances CSIA methodology by linking CSIA groups to other value chain actors, providing sustained access to savings and services for the poor, enhancing investment, and supporting microenterprises development.

f) The Sasakawa Africa Fund for Education (SAFE) Demand Driven Curriculum (SDDC) model

All scheduled educational opportunities offered by affiliated agricultural colleges and universities comprise the SDDC model. The SDDC curriculum that is promoted by SAA outlines the knowledge and abilities that students should learn. These consist of: a) learning and development objectives; b) teacher-taught units and lessons; c) student assignments and projects; d) training materials and modules; and e) evaluation (factual field-level action research assessments and classroom assessments). The course content (modules), teaching approaches (pedagogy and andragogy), learning techniques (experiential learning), evaluation of students' knowledge, and feedback are the main components of the SDDC. In addition to field level-training, mid-career extension agents (EAs) are provided opportunity to upgrade their extension capacity through SAA's collaborating agricultural universities and colleges particularly in conducting their supervised enterprise projects (SEPs)

Demand-driven curriculum (DDC) focuses on stakeholders' interests in agricultural extension advisory services, involving academics and professionals from public and private sectors. It ensures high-quality service, delivery, and content, resulting in desired outcomes for learners [15]. DDC adapts to employer and student needs, community actors, and the rapidly evolving global economy, ensuring skills for both recent graduates and lifelong learners [16].



The SDDC was developed by SAA as a demand driven process to meet the needs of stakeholders, including students, farmers, Agricultural Colleges, Universities, Private Businesses, Non-Governmental Organizations (NGOs), Community Based Organizations, Public and International Organizations, Ministries, and Farmers, in light of the significance and relevance of agriculture in both national and global development. The majority of those involved in agricultural development are small-holder farmers. As a result, the curriculum for the agricultural sector must prioritize needs and adapt to the changing demands of small-holder farmers.

CONCLUSION, AND RECOMMENDATIONS FOR DEVELOPMENT

To enhance the effectiveness of agriculture extension models in Africa, there is a need for strengthening public-private partnerships, fostering a pluralistic approach that engages diverse stakeholders, investing in capacity building for extension agents, and leveraging digital technologies for more widespread dissemination of agricultural information. It is also important to examine the challenges and underscore the importance of tailoring extension approaches to local contexts, ensuring inclusivity, and addressing gender disparities in technology adoption.

There is an urgent need for advancing agriculture extension models in Africa to effectively deliver technologies and innovations. By addressing challenges, embracing promising approaches, and implementing recommendations, stakeholders in agricultural innovation systems can collectively contribute to the sustainable development of the continent's agriculture. Efficient extension should encourage ongoing collaboration, learning, and adaptation to ensure that extension services remain dynamic and responsive to the evolving needs of African farmers and the agricultural sector as a whole. It should also include investing in extension infrastructure, supporting capacity-building initiatives, and creating enabling environments for innovation and entrepreneurship in agriculture. In conclusion, this paper underscores the importance of advancing agriculture extension models in Africa to bridge the gap between technology innovation and adoption. By addressing key challenges and implementing effective strategies, stakeholders can work towards sustainable agricultural development and improved livelihoods for farmers across the continent.



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