

**Extension in Sub-Saharan Africa:
Overview and Assessment of Past and Current Models and Future Prospects**

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Abstract

This paper describes the role of extension in sub-Saharan Africa, and gives a typology for types of extension, which includes the basic forms of public top-down, participatory, and private. An overview of the evidence base for successes or failures of various models is given. The current status of extension in various sub-Saharan African countries is assessed, and new models were discussed. A framework for designing and analyzing extension systems is briefly described.

Key words: Extension, sub-Saharan Africa, advisory services

Introduction

There are many definitions, philosophies, and approaches to agricultural extension, and the views of what extension is all about have changed over time. Extension originally was conceived as a service to “extend” research-based knowledge to the rural sector to improve the lives of farmers. It thus includes components of technology transfer, broader rural development goals, management skills, and non-formal education. The traditional view of extension in Africa was very much focused on increasing production, improving yields, training farmers, and transferring technology. Today’s understanding of extension goes beyond technology transfer to facilitation; beyond training to education, and includes assisting farmer groups to form, dealing with marketing issues, and partnering with a broad range of service providers and other agencies. Thus many people are now using the phrase “agricultural advisory services” instead of extension (which can imply a top-down approach and may ignore multiple sources of knowledge). This paper will continue to use the term extension with the understanding that it encompasses the broader definition explained above.

Agricultural extension can be defined as the entire set of organizations that support and facilitate people engaged in agricultural production to solve problems and to obtain information, skills, and technologies to improve their livelihoods and well-being (Birner, Davis, Pender, Nkonya, Anandajayasekeram, Ekboir, et al., 2006). This can include different governmental agencies (formerly the main actors in extension), non-governmental organizations (NGOs), producer organizations and other farmer organizations, and private sector actors—which include input suppliers, purchasers of agricultural products, training organizations, and media groups (Neuchâtel Group, 1999).

Purpose and Objectives

The purpose of this paper is to give an overview of extension experience in Sub-Saharan Africa (SSA), including a typology of extension models, evidence of the success or failure of various models or extension in general, assessment of the current status of extension and number of agents in selected African countries, and examples of innovative models in use in SSA extension today. A framework for analyzing extension is discussed, as well as prospects for the future of extension in SSA.

Methods and Data Sources

Data were obtained from document analysis, the Internet, and from a simple survey on extension reforms sent out to certain members of the Sub-Saharan Africa Network for Agricultural Advisory Services (SSANAAS) (now known as the African Forum for Agricultural Advisory Services).

Results

Extension Typologies

There are many models and types of extension activities, and several authors have given typologies of extension, shown here for this illustrative review (Table 1). This paper views extension as generally (but not always) falling into three broad categories: diffusion or government-driven; participatory or demand-driven; and private or supply-driven, with the different systems or models falling under these three. Many extension systems in SSA today are combinations of these broad categories.

Table 1

Typologies of Extension by Various Scholars

	Rivera (1988)	Axinn (1998)	Gêmo et al. (2005)
Top-down	<ol style="list-style-type: none"> 1. Conventional 2. Training and visit (T&V) 3. University 4. Technical innovation 5. Integrated agricultural development program 	<ol style="list-style-type: none"> 1. General agriculture 2. Commodity 3. T&V 4. Agricultural participatory approach 5. Project approach 6. Farming systems research and extension 	<ol style="list-style-type: none"> 1. Public 2. Commodity 3. T&V 4. NGO 5. Private sector 6. Farmer field schools (FFS)
Participatory	<ol style="list-style-type: none"> 1. Farmer information dissemination system 2. Farming system research-extension 	<ol style="list-style-type: none"> 7. Cost-sharing 8. Educational institute approach 	
Contract farming	<ol style="list-style-type: none"> 1. Commodity development 2. Commodity focused 		
Rural development	<ol style="list-style-type: none"> 1. Community development 2. Integrated rural development programs 3. <i>Animation rurale</i> 		

Evidence Base for Successes and Failures of Extension Models

Extension impacts *per se* are very difficult to show, especially in terms of dealing with attribution issues and linking cause and effect quantitatively (Purcell and Anderson, 1997). Many infrastructural variables and other factors affect agricultural performance in complex and contradictory ways, and benefits are difficult to quantify (Anderson, 2007; Birkhaeuser, Evenson, and Kinsey, 1991). Measurement challenges of several types contribute to the difficulty, and questions of representativeness abound in any attempt at grouping.

Other issues that may confound studies include endogeneity in program placement and extension-farmer interactions, selection bias, farmer-to-farmer information flow, and policies that affect various measures such as productivity. Extension as an input is also difficult to measure, and usually proxies are used (Birkhaeuser et al., 1991). Very few studies use experimental design, and some studies that have used control groups have run into design problems. Typical problems include lack of baseline data and the inability to include all contributing variables in production equations. Studies on T&V in Burkina Faso and Kenya—which showed high returns to extension (Bindlish and Evenson, 1997)—were later criticized for data errors and limitations due to cross-sectional data (Gautam and Anderson, 1999). Thus some researchers are skeptical of rates of return studies in Sub-Saharan Africa.

In general, extension has been shown to have significant and positive effects on knowledge, adoption, and productivity. Birkhaeuser et al. (1991) reviewed 48 studies of extension, and found that the majority (36) had significantly positive results. Studies of rates of return to extension (also in the same paper) generally showed very high numbers (between 13-500%). (But see the

above critique of rates of return studies.) This review covered a number of different types of extension models, including T&V, but is somewhat dated.

Evenson (1997) reviewed 57 economic impact studies, including seven African countries (the models used were either T&V or not noted). There was a wide range of impact, from no significant difference to highly significant differences with regard to awareness, adoption, and productivity. The variability in results shows that some programs have been highly effective while others have not been. Finally, results showed that the highest payoffs to extension occurred in developing countries that are catching up with industrialized countries and farmers have access to schooling, technology, and extension.

Taking into consideration some of the measurement concerns raised by Birkhaeuser et al., Owens, Hodinott, and Kinsey (2003) estimated the impact of access to extension services on productivity in Zimbabwe by using longitudinal data and controlling for innate productivity using locality dummies, farm plot characteristics, and farmers' ability. They found that access to one or two visits per year from extension agents raised the value of crop production by about 15%, a statistically significant parameter.

The Integrated Rural Development Project (IRDP) approach was used in many countries, including Kenya and Malawi, which in the 1970s (with World Bank support) implemented an integrated extension approach. The IRDP's goals were to address constraints of smallholders by working synergistically in health, nutrition, agriculture, and education. In agriculture, this included inputs such as extension, research, irrigation, credit, roads, water, electricity, and sometimes schools and health centers. The focus was all technical, however, and left out crucial issues such as training, linkages with research, and management. IRDPs' weaknesses were that they were supply-driven, inflexible, disregarded institutions (including NGOs) except as found, were multi-sectoral but not holistic, disregarded cost-recovery or privatization, had an enclave mentality, and had limited sustainability (Anderson, 2002).

According to a review by World Bank's Operations Evaluation Department of research and extension investments in the 1980s and 1990s, three out of five extension projects in Africa were "satisfactory," which alluded to how fully the stated objectives were achieved (Purcell and Anderson 1997). T&V was seen as somewhat satisfactory in Kenya and Somalia (the Gautam (2000) Kenya study was later instituted as a result of disagreement on the initially unsatisfactory rating (see Gautam and Anderson (1999)). In Zimbabwe, a national extension and research project (not T&V) to improve productivity in rural areas via improved incentives for extension staff was as viewed as satisfactory. T&V in Rwanda and Côte d'Ivoire was deemed unsatisfactory.

T&V in particular, and public extension systems in general, came under attack in the 1980s due to the cost of financing coupled with criticisms of irrelevance, inefficiency, ineffectiveness, and lack of equity (Rivera, 2001). In Ethiopia, Dejene (1989) found that the communication system from contact farmers to the rest of the community did not work as expected, and up to 25% of contact farmers did not have the necessary knowledge and skills. In Cameroon, Tchouama and Steele (1997) found that only 30% of respondents had contact with the extension agent, and furthermore had difficulty applying the recommendations. In Nigeria, extension agents lacked communication skills, transportation, and faced cultural barriers (Asiabaka and Bamisile 1992).

The Bindlish and Evenson (1997) study showed that the T&V management system made extension more effective, led to agricultural growth, and realized high rates of return. However, in Kenya, Gautam (2000) later found that although T&V had some benefits in terms of staff

training, increased geographical coverage, and improved linkages with research, overall the system was inefficient, ineffective, and not financially sustainable.

Initially promoted by the World Bank, T&V has since been criticized within the Bank (Anderson et al. 2006) and others, and is referred to tongue-in-cheek by terms such as “talk and vanish” and “tragic and vain” (Axinn, 1988). Despite the yield increases, the program was not sustainable, and left many countries saddled with huge debts. T&V has shown to be more successful in Asia, where there is more homogeneity within farming systems and higher capacity among agents and farmers. T&V was also more successful in promoting very specific packages (where they were suitable). However, the problem is that a tight management system and close control of “messages” does not constitute relevance for the clients.

Some extension reforms have been formally and informally evaluated. Problems encountered with decentralized extension included use of extension agents for non-extension purposes, lack of financial sustainability, and difficulties in linking to research (Anderson and Feder, 2004). In general, participatory and information and communication technology (ICT) reforms have been seen as promising, while fee-for service has not been well taken up in the few low-income countries where it has been attempted. However, in general, most extension reforms have yet to be evaluated as to their effectiveness.

Farmer field schools have been a recent topic of debate as to their impact in SSA and elsewhere (Davis, 2006; Gallagher et al., in press). Although many positive reports exist on the benefits of the FFS approach, some studies have called into question their overall impact and financial sustainability. Farmer field schools have shown remarkable impact in terms of pesticide reduction, increases in productivity, knowledge gain among farmers, and empowerment. However, these effects have been generally confined to the most directly-engaged farmers, rather than demonstrating adequate capacity for scaling up for greater impact. Furthermore, some studies show that FFS have limited or no effect on economic performance, the environment and human health, and farmer-to-farmer dissemination of information and technologies. For a review of impact evaluations of FFS please see van den Berg and Jiggins (2007), who conclude that there was substantial immediate and developmental impact for participation in FFS.

Several reviews have been conducted of Ethiopia’s Participatory Demonstration and Training Extension System (PADETES), based on Sasakawa Global 2000’s (SG-2000) approach to extension that uses demonstration plots and links technologies to inputs through a package deal. Although 55% of respondents used the package, a good number of farmers later abandoned package components such as fertilizer or improved seed (Bekele, Anandajayasekeram, and Kisamba-Mugerwa, 2006). Extension workers saw their role mostly as distributors of fertilizer and credit rather than technical advisors. Other authors found that agricultural extension, as well as other rural services, contributed significantly to agricultural productivity in Ethiopia (Ayele, Alemu, and Kelemework, 2005).

After initial (and favorable) qualitative reviews, Benin, Nkonya, Okecho, Pender, Nahdy, Mugarura, et al. (2005) conducted a quantitative assessment of Uganda’s decentralized, market-oriented, farmer-centered National Agricultural Advisory Services (NAADS) in 2005. The study showed that NAADS had positive impacts on the farm income and availability and quality of services. However, there was no significant difference in yield growth between NAADS and non-NAADS areas for most crops. However, in the NAADS areas, farmers had less decline in income than in other areas due to adverse climactic conditions during that time. Shortage and timeliness of inputs were other problems in NAADS. A forthcoming piece on NAADS shows

that there is a strong knowledge effect but that it does not translate into measurable productivity and income effects (reviewed in Anderson, 2007).

Kenya's National Agriculture and Livestock Extension Programme (NALEP) was started in 2000. The NALEP approach, supported in part by Sida, focuses on stakeholder inclusion, bottom-up planning, and farmer common interest groups (CIGS) in focal areas. The first phase ran five years, and was evaluated in 2006 (Cueller et al., 2006). Data were collected from project documents and interviews with farmers. The analysis shows that 80% of respondents said the program offers new opportunities, and 70% said that they view farming as a business as a result of NALEP. Regarding sustainability, 70% of respondents claimed that NALEP assisted them to receive profits from their farms.

Finally, a study on the impact of extension in Mozambique showed that public and private extension had a statistically significant positive effect on rural livelihoods (ECON Analysis, 2005). Extension mainly focuses on introducing new varieties, promoting natural pesticides, and promoting commercialization. The study showed that access to extension increased farm production by 8.4%. Because only 13% of the rural population lives in villages with extension offices, one policy implication was the need to significantly extend coverage (and quality) of extension.

In summary, this review shows that evidence has been mixed on some of the major extension models in SSA, and that it is difficult to show impact for extension. There is also a lack of evidence on some of the newer models, extension reforms, and pluralistic models that involve many different extension providers. In general, though, problems in extension systems were due to a combination of a lack of relevant technology, failure by research and extension to understand and involve clientele in problem definition and solving, lack of incentives for extension agents, and weak linkages between extension, research, and farmers.

Due to these complications, researchers at the International Food Policy Research Institute put together a framework for designing and analyzing extension (Birner et al. 2006). The framework focuses on (a) the design elements of a system of extension—governance structures, capacity and management, and advisory methods—and their comparative advantages and disadvantages under different frame conditions; (b) performance measurement and quality management in the provision of agricultural advisory services; and (c) impact assessment with regard to multiple goals as well as assessment of the costs and the benefits of different ways of providing and financing extension. This paper calls for a move from “best practice”—imported standardized models—to “best fit”—where location-specific, participatory, sustainable models are used.

Current Status of Extension in SSA

The failure of many of these extension models to effectively meet their goals, coupled with limited budgets for supporting public extension, have led to the implementation of reforms in most SSA countries. Most African countries today are thus experimenting with reforms to existing extension systems. For instance, Ghana modified their extension system in 2003, based upon a 1997 policy to decentralize (Anderson, 2007). However, such modifications take a long time, hence there is no information on its success.

Existing models are typically a general or modified T&V model housed in the Ministry of Agriculture, although many countries are using multiple models with pluralistic service providers. Sasakawa Global 2000 works closely with extension and is currently working in

Ethiopia, Mali, Nigeria, and Uganda. SG-2000 first searches for a pool of appropriate technology to be transferred and then works closely with the government using national extension workers.

These reforms are not changing the system used so much as the approaches within the system. Reforms include use of pluralistic extension providers and approaches, decentralization/devolution, privatization, contracting in and out, cost-sharing, demand-driven/participatory approaches, fee-for service, and use of ICTs. Qamar (2005) has developed a guide for policy makers for reforming extension systems.

Several systems provide for competition among extension providers, allowing for great accountability to farmers who can at times both hire and fire them. The NAADS approach has a certain competitive element, as do some FFS, where farmers have power to “fire” the extension agent if they are not pleased with the service.

Many countries are committed to participatory and pluralistic extension systems. How that takes place, however, is another matter. The increasing number of players and stakeholders makes the issues of coordination and regulation crucial, and underlines the need for the government to remain involved in extension. This includes ensuring food security, regulating food quality and safety, and environmental conservation, among others (Rivera and Alex, 2004).

According to Sasakawa Global 2000, there were about 150,000 extension workers in Sub-Saharan Africa from the private, public, and civil society sector (see <http://www.saa-tokyo.org/english/safe/index.html>). However, Swanson et al. (1990) reported that there were 58,958 extension workers in Africa, based on a survey done for FAO in the late 1980s. Unfortunately, despite calls for it, there has not been enough commitment to collecting these type of data on a regular basis.

Innovative Extension Approaches

Different programs have diverse goals and thus differing strengths and weaknesses. For instance, T&V, although financially unsustainable, proved effective in training agents and improving the management of the overall system. The PADETES/SG-2000 type of model in Ethiopia has proved effective in getting large numbers of farmers to adopt technology packages for maize. Farmer field school models have proven very effective at strengthening farmers’ capacity and empowering rural people.

Fee-for-service extension is provided for by the public (or another sector) and paid for by the farmers (Anderson and Feder, 2005). Small groups of farmers usually contract the services. This set up allows clientele to “vote” on programs and program scale by paying for them (Hanson and Just, 2001). Most of the examples of this model come from developed countries, such as New Zealand, which is completely privatized. In addition to providing feedback, fee-for-service also can provide additional sources of revenue to public extension. It is suitable for rival and excludable products. Hanson and Just argue that universal paid extension is not in the public interest, but that there is an optimal mix of public, private, and paid extension. A problem with this type of extension service is that less commercial farmers may purchase fewer services (Anderson and Feder, 2005). One solution to this is to stratify farmers, allowing the commercial farmers to purchase services while smaller, poorer farmers are serviced by public extension.

In Uganda, the government has been implementing the Plan for the Modernization of Agriculture. One component created in 2001 is the NAADS program mentioned above, which has the goal of increasing market-oriented production through empowering farmers to demand and control extension services. NAADS is an innovative public-private extension approach. The

main components of NAADS include decentralization, outsourcing, farmer empowerment, market orientation, and cost-recover (Anderson, 2007).

Farmer field schools were introduced into sub-Saharan Africa in the mid-1990s. They are in place in at least 27 SSA countries (Braun, Jiggins, Roling, van den Berg and Snijders, 2005). FFS came from Asia, where they were developed to promote integrated pest management programs. In Africa, FFS are being used for a variety of activities, including food security, animal husbandry, and soil and water conservation. They are even moving beyond agriculture into health (HIV/AIDS) and other relevant rural topics.

FFS are a participatory method of learning, technology development, and dissemination based on adult learning principles such as experiential learning. Groups of 20-25 farmers typically meet weekly in an informal setting in their own environment with a facilitator. The defining characteristics of FFS include discovery learning, farmer experimentation, and group action. The approach is an interactive and practical method of training, and empowers farmers to be their own technical experts on major aspects of their farming systems. Farmers are facilitated to conduct their own research, diagnose and test problems, and come up with solutions. Both to ensure sustainability and to enhance the sense of ownership and responsibility, FFS programs are encouraging cost sharing. In East Africa, self-financed and semi-self-financed schools are in place, and schools use commercial plots to repay loans to run the schools. Group members may also cover the cost of travel of the extension staff.

As with many models worldwide, there has not been a tremendous effort to implement FFS in a way to provide hard evidence on its effectiveness. Most programs rely on *ex post* evaluations, which are not able to provide rigorous results as to how the program compares to alternative ones or to having none. If there are data, they often remain in project documents and other grey literature, and the information is not available to the academic community and others who could provide peer review of the methods and results. Future studies would be aided by collecting baseline data, obtaining panel data, and use of experimental designs.

A related concept to FFS are *farmer study circles*. Study circles, much more informal than FFS, provide opportunities for group exploration and learning, to gain knowledge on whatever topic members decide. A group of people meet regularly, with no external “expert” (although resource persons may be called in or facilitators may guide the groups). Study circles allow a forum for people to learn and solve their own problems. The Swedish Cooperative Centre focuses on human rights, improved livelihoods, and increased incomes, and has developed at least 68 different study circle guides in SSA for issues ranging from crops to HIV/AIDS (www.sccportal.org). To date, an inventory has been conducted, but there have been no studies looking at the effectiveness or impact of study circles (Torsten Andersson, personal communication, 19 April 2007).

Other innovative methods are related to the rapidly-expanding *information and communications technology* sector. Although ICTs are used in extension in countries such as China, India, and Chile, Africa has lagged behind in harnessing ICT potential for extension and other rural development issues. However, some examples exist; for instance, in Kenya and Uganda, mobile phone services provide cheap messages about crop price information via text messaging. In Tanzania there are “market spies,” farmers who visit local markets and remain in contact with the village using mobile phones.

An Indian decentralized market-driven extension model that may provide insights for extension in SSA is the *Agricultural Technology Management Agency (ATMA) Model*, an attempt to increase farm income and rural employment (Singh et al. 2006). ATMA is meant to

integrate extension programs across line departments, link research and extension, and use bottom-up planning procedures. Many judge it as a successful model of extension reform (Anderson, 2007). The authors outlined four axioms essential to market-driven extension. These are (a) Don't encourage farmers to produce without a market; (b) Use products that are easily transported; (c) Pay attention to agro-ecological conditions for crops; and (d) Diversify crops to avoid saturation.

There are also several innovative approaches in *financing* extension services. The creation of a Trust Fund (Ghana) and Basket Funding (Tanzania) allows for the pooling of funds and distribution to end-users based on demand. In both cases, stakeholder fora consisting of farmer groups bring together concerns for required services from either public or private bodies. Under the system farmers are empowered to identify and use selected qualified service providers (Government of Kenya, 2005). Other potential methods include levies on export commodities, community-driven development funds (Guinea and Kenya), and contracting by the government (Mozambique) (Alex, Byerlee, Helene-Collion, and Rivera, 2004).

Furthermore, financing can come through decentralization, involvement of farmers' associations and NGOs, contracting-out of extension services, public-private partnerships, privatization, and embedding advisory services in other types of contracts (Anderson 2007). More information can also be found in the Agriculture Investment Sourcebook's Module 3 (World Bank, 2005).

Based on the current status of extension in SSA, it appears that pluralism is the future of extension in SSA, with a greater emphasis on demand-driven, participatory programs. Extension will have a greater focus on facilitation and access to markets through farmer group formation and ICTs. See Table 2 for various approaches and where they may work the best.

Table 2

Extension Approaches and Potentials for Success

Approach	Where does it work?
Fee-for-service	High potential areas; where there are capable public, private, and civil society providers
T&V	Homogeneous areas; hierarchal and structured systems
NAADS	Available markets and market infrastructure; capable public, private, and civil society providers; decentralized systems; ability of farmers to pay; high social capital
FFS	High social capital; capable extension agents
ATMA	Markets; capable research, extension, and other technical backstoppers; decentralized system; strong links between line departments
PADETES	Hierarchal and structured systems
ICTs	ICT infrastructure; enabling policy environment (e.g. low taxes on mobile phone usage)
NALEP	High social capital; available markets and market infrastructure

Educational Importance and Conclusions

It is important to understand the experience of different countries and different extension models to develop and implement more effective models for sub-Saharan Africa countries. There is very little information in the literature on current models and the number of public, private,

and third sector extension agents on the ground. This paper attempts to document past and present extension models, reforms, and number of agents. It then gives prospects for what the future extension models and extension agents in SSA will be like.

Unfortunately, there is no “silver bullet” for modifying extension programs, a magic model that can be standardized and implemented anywhere. This had been tried with Integrated Rural Development Programs, training and visit extension, and to a certain extent, farmer field schools. However, there are many good models with useful features that, when implemented in a flexible, participatory, and sustainable way that meets the unique frame conditions of different countries and farming systems, can lead to improved extension performance and positive impact that policy makers are looking for in sub-Saharan Africa. Promising models include the farmer field school approach; the Indian ATMA market-driven approach; and pluralistic, demand-driven models that incorporate the use of information and communication technologies.

This paper has described the role of extension in sub-Saharan Africa, and given a typology for types of extension, which includes the basic forms of public top-down, participatory, and private. An overview of the evidence base for successes or failures of various models was given. The current status of extension in various sub-Saharan African countries was assessed, and new models were discussed. A framework for designing and analyzing extension systems was briefly described.

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