

# PUBLIC AND PRIVATE SECTOR INVESTMENT IN AGRICULTURAL RESEARCH AND EXTENSION IN AFRICA: A REVIEW OF SOME ISSUES

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## ABSTRACT

*Agricultural support services such as research and extension significantly influence agricultural productivity. For example, many of the new technologies, inputs, and techniques of production that increase agricultural productivity are developed through agricultural research. Agricultural extension, on the other hand, transfers information from the global knowledge base and from local research to farmers and also ascertains and transmits information to researchers regarding farmers' needs, problems and constraints. This paper reviews the problems associated with agricultural research and extension systems in Africa and lists the required changes to public and private sector investments in agricultural research and extension.*

## KEYWORDS

Public, private, investment, research, extension, problems, changes

## INTRODUCTION

Agricultural support services such as agricultural research and extension can significantly influence the agricultural sector's level of productivity. For example, agricultural research, by its very definition, is logically "applied research" because it aims to apply a wide variety of scientific disciplines to the development of new approaches to agricultural production and the solution of problems besetting farmers and consumers of agricultural products (Arnon, 1975). Agricultural extension, on the other hand, is an educational process with a dual goal: it brings information and technology to farmers and teaches them how to use it to improve their productivity; and it enables farmers to specify their own needs and provide feedback on the effectiveness of extension in meeting them (Saito and Weidemann, 1991; van der Ban and Hawkins, 1996). Through this two-way communication between farmer and researcher, extension services can provide effective transfer of relevant information and technology to farmers. A partnership is, therefore, needed between the research system which generates technology, the extension agency which transfers technology, and the farmers who use the technology (Saito and Weidemann, 1991).

Historically, agricultural research in Africa, as in most developing countries, has been a task performed largely by the public sector. The issues that received considerable attention in public research agendas were the levels of intensity of research and the amount of human and capital resources necessary to achieve the research targets (United Nations, 1974; World Bank, 1981; Pardey and Roseboom, 1988). Although these issues continue to be of significant relevance, the sustainability of predominantly public research systems has become an issue of concern. In an era

where developing countries are faced with increasing fiscal imbalances, the issue of the private sector's role in agricultural research is taking on greater significance (Umali, 1992). In Africa, agricultural extension has also been largely confined to the public domain, and provided through Ministries of Agriculture, or through parastatals supervised by the Ministry of Agriculture (Cleaver, 1993). Usually, these structures are highly centralized, with a Director of extension in the capital city, and District Directors at regional levels. Field-level extension staff are usually based throughout each country at the local level. In recent years, disenchantment with centrist and traditional extension programmes has grown. The high costs and perceived limited impact of the traditional programmes have been the major sources of concern which have led to the emergence of new approaches in the design of public agricultural service programmes (World Bank, 2002).

The objectives of this paper are to: (a) review the problems associated with agricultural research and extension in Africa, and (b) list the changes that are required to public and private sector investment in agricultural research and extension. The first section of the paper is the introduction. The second section reviews the problems associated with agricultural research in Africa. The third reviews the problems associated with agricultural extension in Africa. The fourth section shows the changes that are required to public and private sector investment in agricultural research and extension. The last section contains the conclusion and recommendations.

**PROBLEMS ASSOCIATED WITH AGRICULTURAL RESEARCH IN AFRICA**

Agricultural research in Africa suffers from multiple weaknesses: These include:

- (a) Chronic shortages of well-trained scientific and technical staff. Thus, an adequate number of trained national researchers and technicians have not been available; those who were trained lacked experience. This has had adverse effects on research station operations, laboratory management (particularly in the operation and maintenance of complex items of equipment) and on-farm experimentation (Idachaba, 1980; Harrison, 1990; Pritchard, 1990).
- (b) Lack of government commitment to research as exemplified by budgetary cuts and low levels of funding for operational expenses. The technological lag in African agriculture is primarily a symptom of under-investment and lack of adoption, not low rates of return to research. African leaders have perceived research services to be weak, lacking in energy and drive, poorly managed, fossilized in approach and a drain on the national economy rather than an essential tool for aiding development (Idachaba, 1980; Harrison, 1990; Pritchard, 1990; World Bank, 2002).
- (c) Low salary levels and poor incentives for research staff and lack of adequate personnel management procedures and policies. Weak management has been due to bureaucratization of research by governments which manage or oversee most research (Pritchard, 1990; Cleaver, 1993).
- (d) Inadequate research priority setting, planning and programming. Most research projects have been identified without a national master plan (Pritchard, 1990; Cleaver, 1993).
- (e) Many agricultural research establishments are too small to undertake the entire gamut of research necessary. In some cases, countries themselves are too small or too poor to afford the "critical mass" of around 100 scientists thought to be a minimum to create a national programme with its own momentum (Harrison, 1990; Cleaver, 1993).
- (f) Research facilities are often fragmented among separate commodity or area programmes. In some cases, there has been the tendency for each public agricultural institution to pursue its own research agenda independently (Harrison, 1990; Cleaver, 1993).
- (g) Donors with divergent priorities have helped to create a proliferation of new institutions and buildings, which African governments are unable to sustain when donor finance pulls out (Harrison, 1990).
- (h) Private sector agricultural research continues to be inhibited in many countries by outmoded regulations and constraints (Cleaver, 1993).
- (i) In seeking to push forward the frontiers of scientific knowledge, researchers often lose sight of the most pressing concerns of farmers and cease to develop products that extension workers can promote successfully (Dowswell, 1992).
- (j) Research managers and decision-makers have remained too aloof from programme execution at the grassroots level. They simply have not spent enough time in the field monitoring what is happening. In spite of much involvement with on-farm experimentation, research organizations have also been somewhat detached from the realities in farmers' fields, preferring to measure their achievements by the number of products developed rather than by adoption of these in the countryside. Likewise, in evaluating the agricultural development projects they have supported, donor organizations have too often been concerned more with determining whether the funds were disbursed according to the original plan than with measuring the impact of the work on agricultural development (Dowswell, 1992).
- (k) Lack of well-established research/extension linkages. Thus, research and extension are poorly integrated in many African countries. Often, the two are not even located within the same government ministry. Other barriers have to do with differences in levels of training and reward structures. Under such separate management structures and incentive structures, research systems give little weight to the extension service's opinions and priorities. Also, because the performance of research systems is often assessed according to the recognition it receives within the scientific community, research priorities are not necessarily aligned with those of extension managers or the farmers they come in contact with (Pritchard, 1990; Dowswell, 1992).
- (l) Research institutes had research programmes with little relevance to agricultural needs, and did not collaborate (Cleaver, 1993).

#### PROBLEMS ASSOCIATED WITH AGRICULTURAL EXTENSION IN AFRICA

Agricultural extension in Africa is also plagued by a myriad of problems. These include:

- (a) Within agriculture, extension tends to be a weak claimant on agricultural budgets. In nearly half the extension projects examined in a mid-1990s World Bank study, lack of commitment and support by senior government officials adversely affected implementation and funding (Purcell and Anderson, 1997). Feder *et al.* (2001) posit that a plausible reason for the lack of

out reaching these clients through means that do not require face-to-face interaction (Anderson and Feder, 2004).

The large size of the clientele means that only a small number of farmers can interact directly with extension agents. Because direct contacts are rationed, agents often select the farmers they will interact with often preferring larger-scale, better-endowed and more innovative farmers who can provide some in-kind payment and are likely to exhibit better performance. Since the farmers who tend to have more extension contacts are often not typical of the farming population, other farmers are less inclined to follow the example of contact farmers or to seek their advice (Feder and Slade, 1993; Keynan *et al.*, 1997; Anderson and Feder, 2004).

Because extension services typically employ large numbers of public civil servants at the rural community level, governments are often inclined to assign other duties to extension staff such as collecting statistics, administering loan paperwork and input distribution and performing regulatory duties. This represents a clear misallocation of agents' time at the expense of information dissemination (Feder and Slade, 1993; Purcell and Anderson, 1997; Anderson and Feder, 2004).

**REQUIRED CHANGES TO PUBLIC AND PRIVATE SECTOR INVESTMENTS IN AGRICULTURAL RESEARCH AND EXTENSION**

The needed changes to public and private sector investments in agricultural research and extension include:

(a) Increased resources from international and national sources for agricultural research will be crucial. According to the Forum for Agricultural Research in Africa (FARA), Africa should increase from rates of about US \$ 1 billion today to US \$ 2 billion ten years from now (Harrison, 1990; World Bank, 2002).

To improve the effectiveness of spending for agricultural research, more needs to be done to decentralize resources; involve farmers and agribusinesses in decisions on research priorities, funding, execution and evaluation; outsource research activities through competitive grants; bring research closer to farmers' fields; improve coordination among research institutions; and systematically monitor and evaluate results (World Bank, 2002).

adequate support by politicians and senior officials to extension investments is the absence of the kind of political payoffs that can be earned from other public outlays that have visible impacts such as the reduction in transport costs following construction of a bridge or road.

(b) Public research and extension organizations often compete for budgets. Researchers typically enjoy a higher status (they are often better educated and have greater independence), and this produces tension in interactions with extension services that are not conducive to two-way feedback or to effective extension services (Anderson and Feder, 2004).

(c) A World Bank review of a large portfolio of extension projects found that research-extension links were generally weak and that neither research nor extension was sufficiently conscious of the need to understand the constraints and potentials of different farming systems as a basis for determining relevant technology and technology-development requirements (Purcell and Anderson, 1997).

(d) The public goods nature of many extension services makes cost recovery at the individual beneficiary level difficult, whereas the dependence on public funding is problematic because of weak political commitment (Hanson and Just, 2001; Anderson and Feder, 2004).

(e) Extension staff are poorly trained and know little more than the farmers do. The poor remuneration of extension staff also translates into poor motivation to share the knowledge they do possess (Cleaver, 1993).

(f) Extension agents are not accountable to farmers. This is because there are neither mechanisms nor incentives to make extension services accountable to farmers. Little attention is also given to systematic participation by farmers in problem definition, problem solving, and extension programming (Cleaver, 1993; Anderson and Feder, 2004).

(g) Since management systems are poor, there is little pressure on staff or their supervisors to seek new knowledge and transfer it to farmers (Cleaver, 1993).

(h) The potential clients of extension services live in geographically dispersed communities. Underdeveloped transport links add to the cost and difficulty of reaching these farmers (Anderson and Feder, 2004).

(i) High rates of illiteracy and limited connections to electronic mass media rule

- (c) Private sector agricultural research should be encouraged and promoted. The private sector is more likely to address the technology issues of the most profitable commercial crops, grown on large farms and plantations when investing its own resources in research. Besides, some successful privately-managed agricultural research efforts exist in Africa. In Zimbabwe, private companies conduct research in poultry diseases, hog production, and sugar. Besides, by encouraging private sector research, government may be able to focus more on crops, livestock and husbandry of greatest concern to small and subsistence farmers (Cleaver, 1993).
- (d) Public research institutions can improve cost recovery by collecting fees for improved seeds and other technologies generated through research (World Bank, 2002).
- (e) The rehabilitation and refocusing of research systems is needed in the content of agricultural research to make it more responsive to both farmers' needs and to local, national and regional development challenges. The relevance and responsiveness of research to clients should be improved by providing capacity for policy analysis within research establishments; ensuring that clients are adequately represented on the various controlling bodies of research institutes; verifying the technical quality of research; ensuring that researchers make contact with farmers; and making researchers (and their managers) accountable for the quality and impact of their work (Cleaver, 1993).
- (f) More work is required to develop and adapt technologies which show promise in smallholder conditions. The technological improvements needed include new agricultural products, low-cost soil nutrient improvement, soil and water conservation on farms, agroforestry and tree planting, integrated crop-livestock systems, improved multi-cropping systems, improved seed varieties, integrated pest management combined with the limited use of chemical pesticides and herbicides, improved hand tools, animal and machine traction, improved livestock, use of local by-products for animal feed, simple processing and storage technology, and increased fertilizer use (Dowswell, 1992; Cleaver, 1993; Schuh, 1993).
- (g) Agricultural research in and for Africa should focus on the conditions and constraints that prevail in Africa and that determine the production environment of farmers. Direct application of "off-the-shelf" technology imported from other places has rarely proved successful. The capability of national agricultural research systems to undertake multilocal verification of international and national research findings on farmers' fields and the analysis of farmers' constraints should therefore be strengthened (Harrison, 1990; Cleaver and Schreiber, 1992; Schuh, 1993).
- (h) The institutional base for agricultural research should be made more pluralistic, including the private sector, universities, industrial country research establishments, international agricultural research centers, as well as the government agricultural research systems (Cleaver, 1993; Schuh, 1993).
- (i) National agricultural research programmes should be based on master plans which are integrated into agricultural research frameworks developed for groups of countries. These multi-country frameworks provide for sharing of information and results, networking between research institutes in the countries of the group and the creation of poles located in each country of the group for research on specific subjects to develop a critical mass on each subject (Cleaver, 1993).
- (j) All aspects of management of national agricultural research systems need improvement: administration, personnel, finance, and scientific endeavours (the latter to include quality control and the establishment of effective linkages with extension, input supply, and other services) (Cleaver, 1993).
- (k) More efforts need to be made to focus the research and extension agenda on the needs of women farmers. This will require: (i) reaching out to community organizations to learn what special constraints women face and then focusing research programmes to tackle them; and (ii) providing advice centred on simple, low-input technology that deals with the production of food crops and with food storage and processing. Women could also benefit from labour-saving devices designed to help them with transport, pumping water and crop husbandry (Cleaver, 1993; World Bank, 2002).
- (l) Decentralizing resources and responsibilities for extension to local governments and communities has the advantages of: (i) giving farmers a bigger role in designing, funding, governing, executing and evaluating extension programmes; and (ii) improving responsiveness and accountability of extension agents (World Bank, 2002).

of options for farmers to choose from - rather than deliver prescriptive composite "technology packages" (Cleaver and Schreiber, 1992; Cleaver, 1993). Sharing costs of extension services among national governments, local governments, farmers' associations, NGOs, donors and farmers will make financing of extension services more sustainable and less dependent on national budgets (World Bank, 2002). Fee-for-service extension programmes can help reduce the fiscal burden of public extension services. Small groups of farmers can contract for extension services to address their specific information needs. Because this solves the accountability problem, the quality of service is likely to be higher. A stratification of extension systems by types of clients may be appropriate. Small-scale and poor farmers may be served by public extension or by subsidized contracted extension services (for example, an association of small-scale farmers would receive public funds to hire extension staff) while commercial farmers would be expected to pay a higher share of extension costs (Wilson, 1991; Lindner, 1993; Sulaiman and Sadamate, 2000; Dinar and Keynan, 2001; Anderson and Feder, 2004).

**CONCLUSION AND RECOMMENDATIONS**

Agricultural research and extension services are farm technology development and dissemination mechanisms critically important for achieving improvements in agricultural productivity. However, if future investments in research and extension are to enjoy greater success, impact in farmers' fields must become the paramount criterion for judging their value. The following recommendations may be proffered:

- (1) More needs to be done to increase funding for research by international and national research centres.
- (2) The effectiveness of resource use in research can be achieved by drawing national plans for agricultural research in which priority tasks are clearly identified and necessary resources calculated to ensure continuity of funding.
- (3) Agricultural scientists must learn to fit their intimate understanding of local constraints and gender aspects of farming systems is essential. Partnerships and expanded cooperation is required in research and extension with the private sector, NGOs, university research centres and international agricultural research institutes.
- (5) The work environment for staff of research institutions and extension services should be

- (m) Private sector extension should be encouraged where possible. This will usually be for high-value crops and for the most efficient farmers. Contract farming is one arrangement under which private concerns commonly provide extension services. Many horticultural enterprises in Kenya provide extension advice to farmers, as do the British-American Tobacco Company (for tobacco), East African Industries in Kenya (for sunflower), and Del Monte in Cameroon (for banana). Also, seed companies will provide extension advice to farmers contracted as seed multipliers, and some fertilizer and chemical distributors will provide advice on the use of their products (Cleaver, 1993).
- (n) Outsourcing extension services to nongovernmental organizations, private groups and others improves efficiency of delivery and accountability of extension agents, especially where a choice of providers is available. By collaborating with private initiatives and by ceding certain functions to them, public sector extension can free more of their resources for work with poor farmers and on commodities and technologies that the private sector generally neglects (Cleaver, 1993; World Bank, 2002).
- (o) The effectiveness of extension can be enhanced by improving the quality of agricultural education and the use of modern communication technology for reaching farmers. Improved education in rural areas will help in developing a capacity among future farmers to understand increasingly complex agricultural and livestock technologies. Mass communications, on the other hand, can be used to complement field-level extension (Cleaver, 1993).
- (p) As in the case of research, public sector extension needs to become more pluralistic, cooperating with researchers, educators, farmers, private enterprises, NGOs, and others. Stronger linkages improve the relevance and impact of extension (Cleaver, 1993; World Bank, 2002).
- (q) Extension systems should be made more responsive to farmers' needs by more actively encouraging farmers to participate in message selection and testing and in the identification of farm-level problems to be addressed by research and extension. Often, the best way to achieve this end is by making farmer groups the major point of contact with extension (Cleaver and Schreiber, 1992; Cleaver, 1993).
- (r) If extension services are to offer farmers the best techniques to suit their specific circumstances, they must provide "menus"

- improved through training, payment of good salaries, and provision of operational support.
- (6) Governments should encourage the private sector to provide research and extension services wherever possible.
- (7) Research and extension should increasingly be oriented to the needs of women farmers, partly in view of the fact that women have primary responsibility for producing food and have numerous information needs which differ from those of men.
- (8) In addition to simple, modern technologies, farmers also want conditions that would allow them enjoy the benefits of these technologies more fully. These include better roads for transporting inputs and farm produce, fair prices for their output, and minimum standards of public health and education for their families.

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