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Synthesis Report on the "Commercialization and Transfer of Agricultural Technology in Africa"

Workshop sponsored by USAID Africa Bureau
4-7 November 1996, Accra, Ghana.

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WORKSHOP SYNTHESIS

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The Workshop

More than 100 persons participated in a workshop on the Commercialization and Transfer of Agricultural Technology in Africa, held Nov. 4 - 7, 1996, in Accra, Ghana. Participants included representatives from a large segment of African technology development and transfer stakeholders, including African research and development institutions, international research centers, private agribusiness firms, non-governmental organizations, U.S. and African universities and USAID field and Washington offices. The workshop was sponsored by the Government of Ghana and USAID, Africa Bureau, Office of Sustainable Development, Productive Sector Growth and Environment Division.

Purpose

The purpose of the workshop was to provide a forum for dialogue among African - based stakeholders working on technology development and transfer. Participants identified key issues and made recommendations that national and international systems and donor communities can use to accelerate the access and use of agricultural technologies through commercial (private sector) and non-commercial (public sector) means.

Introduction

In Sub-Saharan Africa, agriculture is a major source of employment, income, and foreign exchange and offers opportunities to stimulate economic growth. Capitalizing on these opportunities requires modification in systems of technology development, transfer and commercialization to improve productivity, efficiency and applicability. In plenary and breakout sessions, participants examined opportunities within five thematic areas, identifying major issues and offering recommendations to expedite the process of change.

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Themes

I. Enabling Environment

Creating an enabling environment for technology transfer and commercialization is a continuing process requiring attention to four areas - incentives, institutions, investments and infrastructure. The exact interventions needed will vary from country to country, but can occur through reforms in policies, institutions and infrastructure.

Reforms often require the withdrawal of government from activities that can be more effectively performed by the private sector. The role of government is to put in place an incentive structure for the enabling environment that includes activities such as establishing policy guidelines, developing legal and financial frameworks and providing infrastructure support, especially roads and communication systems.

The creation of an enabling environment requires leadership, political stability and careful planning by all stakeholders. Planning is important to mitigate such difficulties as inflationary prices and higher unemployment.

Lack of financial instruments (credit) is often a constraint to technology transfer and commercialization in rural areas. Lack of mechanisms to enable savings is also a constraint because savings increase the amount of credit available and offer non-agricultural forms of investment to food producers.

Recommendations

1. Governments should consolidate and expand the economic liberalization process and provide institutional, policy, legal and financial incentives to facilitate the active participation of the private sector in technology transfer and commercialization.

2. At all levels, policy dialogue between donors, governments and potential beneficiaries should address the enabling environment for technology transfer and commercialization.

1002

II. Generation of Customer Focused Technologies

In agricultural research systems, a customer-focused process is required to ensure appropriate technology development, transfer and commercialization. Customers are end-users (farmers, consumers, input businesses, marketing agents, traders and processing firms) and transfer agents (extension officers).

Customer - focused approaches are also referred to as "demand-driven" or "participatory" approaches. Generally, customer-focused approaches involve joint problem definition with end-users, an understanding of the socio-economic context, integration of relevant disciplines in research and extension, an acceptance of farmers and other customers as experts, and a process of skill building for all persons involved.

For example, Ghana has a system of technology generation and transfer that involves researchers, farmers, agribusinesses, non-governmental organizations and extension staff. Difficulties being addressed include the unfamiliarity of scientists with working in teams and the lack of strong farmer organizations to represent farmers interests.

In Uganda, a unified extension system has reduced duplication, improved coordination and developed priorities across programs, Extension and research are now linked at three levels.

Customer-focused approaches are expensive to maintain but experience suggests they are worthwhile in identifying problems and improving productivity. For example, a review of Ghana's record shows a respectable number of production technologies generated, transferred and commercialized.

Research systems are oriented to initiating and developing new technologies, but some balance must be found between customer-driven research and research that works creatively to meet a potential demand. For example, biotechnology offers considerable promise but requires national strategies and private initiatives to promote its development.

Customer-focused technologies should provide certain advantages. They should offer a high rate of adoption and a high rate of return on investment.

They should be cost-effective, efficient, and broadly applicable. They should contribute to a high quality product, enhance people - level impact and promote partnership among stakeholders.

As research systems respond to customer demand, they will gain better understanding of the mechanisms and processes that promote customer-focused technology.

An additional element in the customer-focused orientation is the element of commercialization and profitability of agriculture, especially for smallholder farmers. There should be an increased focus on the development of appropriate technologies that puts money into the farmers' pockets on a sustainable basis. Products of such technologies should be market-driven and should involve introduction and promotion of high value crops (and trees) as well as increased focus on value-added processes that increase the overall value of agriculture. Sustainability should be a key factor in such technologies.

Recommendations

1. Research institutions should create mechanisms to respond to customer demand. Experience suggests that research and development should be organized along program lines, not disciplines, for example by focusing on a group of commodities, an agroecological zone, a production system, or a client group.
2. Research-development/extension collaboration should be institutionalized in national research and development programs. This could be done, for example, through joint implementation of pilot projects for technology development and transfer.
3. In allocating funds for research, governments and donors should target some funds specifically for integrated research requiring inter-institutional and research-development collaboration for particular agroecological zones.
4. Agricultural researchers should conduct market-demand analyses, wherever appropriate, to assess the demand for new technologies and

identify and address issues of transfer and commercialization during the research process.

III. Sharing of Technology

A sharing of technologies and information within and among countries can accelerate the transfer and commercialization of agricultural technologies. Given the growing integration of economies and the levels of collaboration in research and development processes, clear rules are needed regarding the ownership of new technologies and the distribution of economic returns from them. Intellectual property rights promote the invention of technologies, protect the interests of inventors and investors and promote the use of inventions/technologies. Local instruments or laws include patents, trademarks and copyrights. Patents and other measures could assist in the sustainable financing of agricultural research by generating funds from royalties.

Having an appropriate legal framework in place is a first step, but a credible well-functioning legal system is needed to implement the laws.

The major problems in the area of intellectual property rights include a lack of public awareness, a lack of knowhow in adapting and commercializing technologies, the costs of licensing, and an absence of links between inventors and investors. Many people do not know that patent offices and free access to patent information exist in their own countries. Inventors themselves are unfamiliar with trademarks and methods of creating a value-added market image for their inventions. Unsuspecting inventors and even public policy makers enter into license agreements with little or no knowledge of the consequences of what they have signed.

In developed countries, there are well-established service support sectors that provide technical, marketing and financial support to help inventors and to assist in transforming inventions into salable commodities. African countries do not appear to have these necessary support sectors.

Numerous examples of successful commercialization and transfer exist in Africa. For example, numerous animal vaccines used in Africa are available because the pharmaceutical companies that invented them were able to patent them and then license African partners to manufacture and use them.

Equipment for improved tillage, of Ethiopian origin, is now in use in more than a dozen countries, in part through the promotion created by its having been patented. Many of the rose varieties being exported to Europe have been patented, increasing their marketability and niche in that market. The introduction of a leguminous tree species, *Calliandra calothyrsus*, as an alternative protein source for dairy cows, has helped to reduce the reliance on commercial dairy meal and increased milk production and profitability for smallholder farmers in the highlands of Kenya. Transfer of this technology was through effective partnership between research and government extension.

Issues relating to the protection of African plant and animal resources could be addressed through intellectual property rights.

Information sharing is a multidirectional process that can be achieved by the use of a combination of mechanisms of dissemination. Throughout Africa, there are numerous examples of information sharing and dissemination that facilitated technology transfer and commercialization. For example, FAO facilitated the transfer of the Chorkor Smoker, a local technology for smoking fish. Transfer was accomplished through training, face-to-face interaction and community mobilization.

The Leland Initiative and AfricaLink are two-current efforts to increase information sharing and dissemination through internet linkages. Services available include E-mail, electronic conferences, bulletin boards, file transfer and interactive services.

Recommendations

1. Governments should take the initiative to raise public awareness of intellectual property rights issues, for example, by sponsoring invention competitions and by supporting the creation of Product Development Centers to help fill the gap between inventors with good ideas and investors with the money and connections to market inventions. (Opportunities exist for the private sector to share the risk and cost of such initiatives.)
2. African governments should address the infrastructure, human resource capacity, legal and regulatory constraints affecting information and

communication systems. Electronic communication offers multiple opportunities for training, information sharing and dissemination to accelerate technology transfer and commercialization.

IV. Access to Inputs

To accelerate the transfer and commercialization of agricultural technologies, improvements in the accessibility and utilization of inputs are essential.

Two African seed companies have been relatively successful in meeting customer needs. The Kenyan Seed Company was a government-controlled monopoly for 30 years, providing consistent service to Kenya and neighboring countries. The company is now a private firm, competing with national and international seed companies. The Zimbabwe Seed Company started as a cooperative and is now a corporation with shares bought and sold in public auction. Major concerns in both companies are the need to develop varieties for marginal areas and the apparent duplication between the private companies and public research institutions. A majority of African countries lack similar seed companies.

Transport and equipment for processing and storage are major areas of concern. Why have so many post-harvest technologies not been used? Perhaps the problem is the inadequacy of analyses done by researchers. Technology transfer would be facilitated by the involvement of end users in technology development, the collection of accurate information on prospective markets, and ongoing attention to the affordability of technologies to target groups. Demand can be generated by creating technologies that add value and give customer choices.

The high cost of capital and the limitations of infrastructure are major constraints. Post-harvest technologies have long lead times and require assistance from manufacturers who are willing and able to commercialize.

African soils require fertilizer to replenish nutrients and optimize production. Constraints include high fertilizer costs, lack of access and environmental and health problems. There should be increased promotion and support for the use of organic sources of fertilizer and for its combination with inorganic fertilizers.

The existence of a market for the end-product (the one produced using the input) is key to a sustained adoption of inputs by farmers. Cash crops benefit from a coordinated promotion system (availability of credit, guaranteed output market, stable prices, an effective extension system). No similar support is provided to facilitate the use of inputs in food crops.

The removal of subsidies under adjustment has led to a decrease in input use, in particular, fertilizers. In some countries, government has phased out input distribution and the private sector has not filled the vacuum.

Access of small farmers to inputs is a special problem because of lack of training, information and credit. Recently, Zimbabwe initiated training, to encourage farmers to see the benefits of fertilizer use.

Recommendations

1. As part of creating an enabling environment for technology transfer and commercialization, governments should facilitate the involvement of the private sector in the establishment of seed systems and in the processing of food crops, with emphasis on traditional food grains and roots and tubers. Governments may need to protect emerging new industries from unfair foreign competition.
2. Governments should strengthen regulatory agencies to ensure quality control of inputs. In particular, governments should promote regional harmonization of seed, pesticide and fertilizer laws.
3. National research systems should work with manufacturers to create appropriate post-harvest technologies and monitor their adoption. This work should include increased attention to the small-scale, informal processing sector.
4. National research systems should collaborate with private companies to maximize research efforts and avoid duplication of activities. One area for collaboration is market studies to gain a better understanding of national and regional markets for products and inputs.

5. Governments should make long-term investments to maintain soil fertility and rebuild the natural resource base. Without these investments, the long-term sustainability of the natural resource base will be threatened.

6. Governments, in collaboration with donors, should invest in increasing business and entrepreneurial skills in rural areas to help small business development in input production and distribution. For example, research and extension systems, working through non-governmental organizations and community-based programs, could provide technical support to enable farmers to multiply seed.

V. Innovative Partnership Development

Workshop participants examined several cases in which partnership initiatives facilitated technology transfer and commercialization.

The Farmers' Field School in Ghana illustrates a partnership that brings together several disciplines in participatory, action-oriented research. A Burkina Faso project partnered farmers, agronomists, local scientists and artisans with the Sustainable Energy Center in providing solar energy for the post-harvest storage of potatoes. Both partnerships used a holistic approach to research and extension.

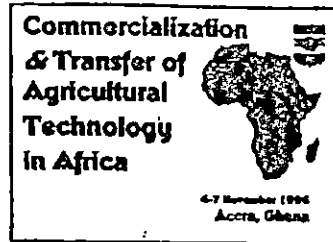
Major issues in partnership development include the need to reduce donor dependency while sustaining research, problems with existing governmental cultures that lack openness, accountability and transparency, difficulties in defining the respective roles of partners, the need for new ways of thinking to accommodate the realities of an increasingly changing global market, and lack of awareness of the activities and comparative advantage among potential partners..

In situations limited by poor infrastructure and a meager resource base, a process approach is needed to integrate institutional components such as research, extension and credit. Cross-border information sourcing and collaboration in local-level partnerships provide viable opportunities to enhance technology development, transfer and commercialization.

Experience shows that innovative partnership development requires institutional commitment, catalytic leadership and sustainable funding. One mechanism for sustainable funding is for government and private sector entities to match donor support in establishing endowments from which accruing interest can be used to sustain funding for technology transfer and commercialization.

Recommendations

1. Agricultural research systems, in collaboration with donors, should develop mechanisms to facilitate partnerships among inventors, manufacturers, end-users, and financial institutions to promote commercialization. Mechanisms should include the clear definition of partner roles and benefits and transparent norms. Experience and lessons learned should be documented and disseminated widely.



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