Food Security in a Changing Africa

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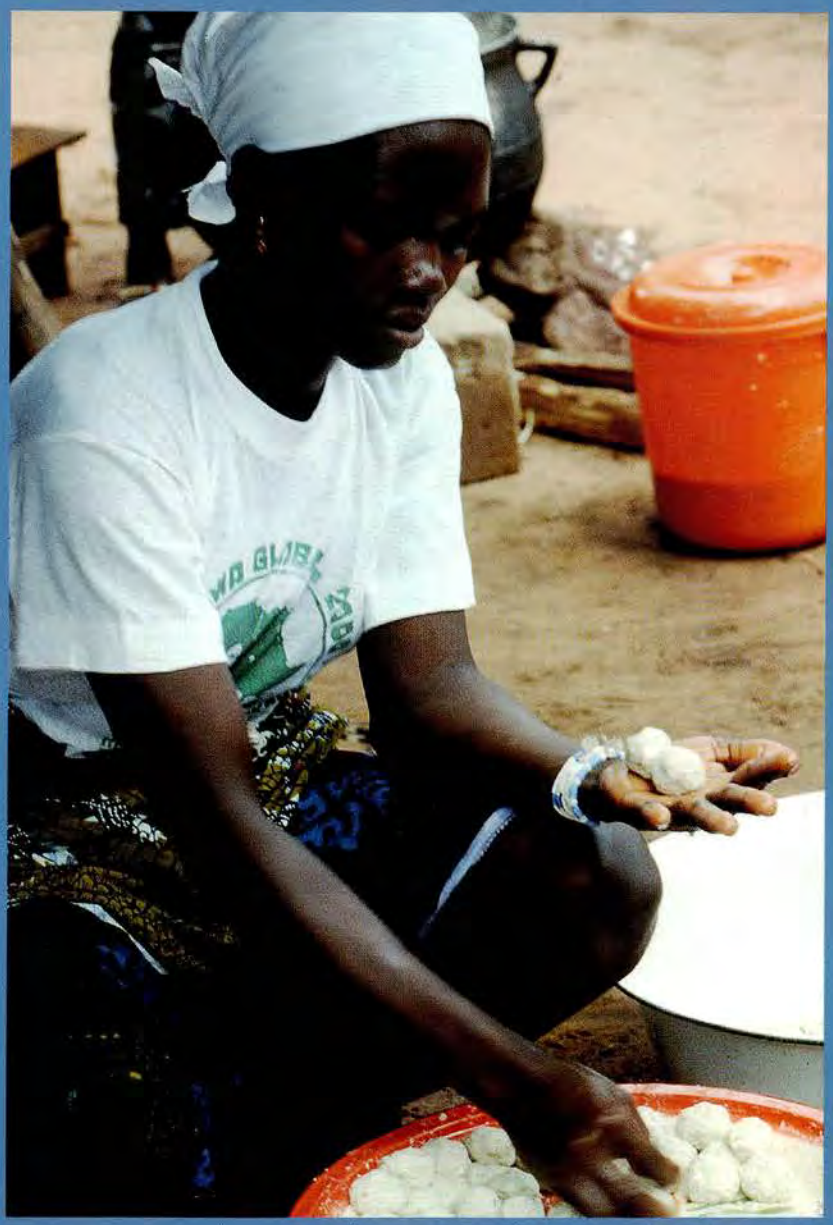

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Proceedings of the Workshop on Africa Food Security in a Changing Environment: Sharing Good Practices and Experiences held in Kampala, Uganda, June 6–9, 2001.

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Steven A Breth, editor

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Abstract: This publication is the fourteenth proceedings of a series of workshops that address measures for improving sub-Saharan Africa's food security and other issues relevant to economic progress in the region. The chapters cover the impact of decentralization, privatization, urbanization and globalization on African food production and food security; progress in delivery of extension services and inputs; new programs in agricultural intensification; and adding value to food production through agroprocessing.

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Foreword

The environment in which agricultural development occurs is rapidly changing. Decentralization, liberalization, and economic structural reforms as well as urbanization and democratization provide a new framework for development in many African countries. These major changes at the national level are further compounded by globalization, which presents fresh opportunities and risks for producers and consumers alike.

This changing environment affects the way farmers produce food. It directly impacts the delivery of inputs (seeds, fertilizers, and agrochemicals), rural credit, agricultural advisory services, food processing, and marketing. It influences food security and farmers' livelihoods.

Those changes pose significant challenges to the extended chain of individuals and institutions engaged in agricultural development: farmers, input and credit providers, extension workers, middlemen, universities and research centers, local authorities, ministries of agriculture and finance, government development agencies, and NGOs such as SG 2000. Workshop 2001 examined some of those challenges, their significance and their impact. It looked at how they are currently met and examined ways they could be addressed in the future. After an initial session devoted to setting the stage and reviewing the main features of the changing environment, Workshop 2001 explored in more details—as sub-themes—the different dimensions of these challenges as they impact food production, food processing, and, ultimately, food security. Sub-themes encompassed issues such as increasing productivity through agricultural intensification, rural finance, agricultural advisory services, and agroprocessing.

The workshop objective was to provide a forum to share lessons learned, experiences, and good practices, as well as to identify practical policy options and decisions to be taken.

This workshop has proved trying for all those who have worked behind the scene, and I would like to pay tribute to them. I am thinking particularly of the director and the staff of the SG 2000 country program in Uganda. They put in an enormous amount of work to enable the participants to visit some of the most instructive and interesting agricultural schemes in the country. Of course special thanks goes also to the national, regional, and local staff of the Ministry of Agriculture, Animal Industry, and Fisheries and of the other projects that have been visited as well as to the team that handled the logistics.

I also wish to recognize the work and commitment of the speakers, chairpersons, discussants, and rapporteurs who ensured the success of Workshop 2001. My sincere and heartfelt thanks to all of them.

Finally, I would not end these remarks without emphasizing that the success of any workshop is the result of the effort and dedication of numerous people working behind the stage. I am thinking particularly of the directors of the country programs and their staff on whom we rely heavily for contacts, local links and, above all, field visits. I also want to express my gratitude to Chris Dowswell, who was instrumental in setting up and finalizing the program, to Gertrude Monnet and Daphné Chapuis who, among others, saw to the smooth running of Workshop 2001. I also want to acknowledge the important work of Steven Breth, the editor of this volume.

Jean F. Freymond
Director, CASIN
Geneva

Glossary

CAN	calcium ammonium nitrate
CASIN	Centre for Applied Studies in International Negotiations
Danida	Danish Agency for Development Assistance
DAP	diammonium phosphate
DFID	Department for International Development (U.K.)
FAO	Food and Agricultural Organization of the United Nations
FDA	Food and Drug Administration (USA)
GDP	gross domestic product
GNP	gross national product
IITA	International Institute of Tropical Agriculture
K Sh	Kenya shilling
Mt	metical (Mozambique)
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
NAADS	National Agricultural Advisory Services
NARO	National Agricultural Research Organization
NGO	nongovernmental organization
OPEC	Organization of Petroleum Exporting Countries
PEAP	Poverty Eradication Action Plan
PMA	Plan for Modernisation of Agriculture
QPM	quality protein maize
RBDF	Rural Business Development Fund
SAA	Sasakawa Africa Association
SG 2000	Sasakawa-Global 2000
SAFE	Sasakawa Africa Fund for Extension Education
SEP	supervised enterprise project
SSP	single superphosphate
t	tonne
USAID	U.S. Agency for International Development
U Sh	Uganda shilling

Meeting Summary

Opening Statements

Ayako Sono, Chairperson of the Nippon Foundation, commented that food availability is essential to the dignity of all people. But assuring that human beings have enough to eat is not sufficient. Chairperson Sono went on to say that after food came education, which is food for the spirit, and it is essential to spread and advance technology.

Yohei Sasakawa, President of the Nippon Foundation, noted that the security of human resources is the basis of development. Food security is obviously the key to human survival and thus to the maintenance of our stock of human resources. He called attention to the importance of private, public, and international organizations working together. But he warned that discussion without action yields nothing.

Former U.S. President Jimmy Carter commended Uganda's efforts to eradicate Guinea worm and river blindness, two health issues in which the Carter Center is involved. He went on to describe the origins and current activities of Sasakawa-Global 2000 in Uganda.

Welcoming Address

The President of Uganda, Yoweri Kaguta Museveni, called attention to the nation's recently launched Poverty Eradication Action Plan. The plan rests on rapid economic growth and structural transformation, good governance and security, greater opportunities for the poor to raise their incomes, and a better quality of life for the poor. Agriculture will be transformed from predominantly subsistence production to commercial farming. President Museveni stated that international trade must be a part of sustained food security. He emphasized that Uganda, and other African nations, have to move toward exporting processed primary goods instead of raw commodities. In the absence of rapid growth in manufactures, African nations will not be able to generate sufficient trade surpluses to make the capital investments needed for further development, he said. He further called for major structural adjustments in the global order of trading relationships so that Africa can benefit from new opportunities for economic growth.

Food Security in a Changing Environment

Nicephoré Dieudonné Soglo, former President of Benin examined the emergence of the globalization phenomena by recounting a prescient World Bank analysis of changes in world economic trends in the early 1980s. President Soglo stated that the present international integration of economies is obliging national governments to turn to international partners to deal with the changes in trade, financial

flows, and the environment.

Privatization in Africa, President Soglo said, was impelled by donor institutions as a result of the debt crisis. Debts mounted in 1970s and 1980s as a result of excessive amount of petrodollars in circulation and poorly conceived development projects. So far the results of privatization are mixed, he said.

Decentralization is an effort to preserve political stability in the face of rising local demands, President Soglo observed. One danger is that decentralization may be applied with little regard for administrative traditions or the rights of local property owners. In Africa, he said, decentralization remains unfinished business. Two essentials are that duties must be clearly distributed between administrative levels to reduce ambiguity and that the decentralization of expenditures must accompany decentralization of revenues.

President Soglo commented that the pace of urbanization in Africa is faster than that of any other region in the world. Rapid urbanization can be an impediment to development if urban agglomerations form that are badly managed and without sufficient services to attract investment or create jobs. On the other hand, well-administered, safe towns with a solid skills base attract foreign and national investment necessary for economic growth. To take advantage of urbanization and reduce its negative facets, there must be strategic planning at the municipal level. That will require coherent national policies and the promotion of synergies between urban and rural areas, President Soglo said.

Facing Uganda's Food Security Challenges

Wilberforce Kisamba-Mugerwa, Minister of Agriculture, Animal Industry, and Fisheries, Uganda, explained the dramatic changes that have taken place in Uganda's agricultural sector over the past 15 years. Although the economy is still dependent on agriculture, a new political and economic environment has speeded the growth of agricultural processing and agricultural services as a means to overcome the chronic shortages that affect agricultural productivity, he said. The chief instruments have been restructuring ministries, decentralization, divestiture, and privatization of the economy. Although progress has been made farmers are now increasingly exposed to international competition. Uganda is helping farmers meet this challenge through establishment of farmers organizations, encouragement of stockists, more readily available credit, and more widespread agroprocessing facilities.

Opportunities for Growth

A. M. Haroun, Deputy Minister for Food and Agriculture, Ghana, delivered a paper that characterized Africa's precarious food security as a longstanding problem, which should not be blamed on privatization, decentralization, urbanization, or globalization. Instead these recent phenomena should be considered opportunities for growth.

Farmers will be able to take advantage of privatization trends if they organize into efficient production units and into market entities so that they can control what they sell. Farmers' organizations also help farmers gain access to credit, extension services, and inputs.

Decentralization brings governance closer to the people governed. It has been expensive and grossly ineffective for central governments to run local economies from the capital. Local residents thoroughly know their problems and can select leaders who will consult them, plan

with them, and share with them the everyday tasks of development.

Trends toward urban agglomeration offer the promise of larger markets for agricultural output.

Globalization opens international markets to Africa. But to be competitive, African nations have to take the agricultural sector seriously and ensure that it has the infrastructure, institutions, innovations, initiatives, incentives, and information it needs to flourish.

Challenges to Food Production and Security

Globalization, decentralization, privatization, and urbanization are topics that touch on the major forces affecting both the international economy and individual national economies, according to G. Edward Schuh, Regents Professor, University of Minnesota.

Globalization, Mr. Schuh said, is one of the most powerful forces and opportunities affecting national economies as policy makers seek food security and other goals for their citizens. Globalization stems from technological revolutions in transportation, communication, and information technology. These revolutions have drastically cut the cost of economic transactions from afar and have sharply raised the benefits of international trade and financial transactions.

Concern about globalization relates to declining national sovereignty. Mr. Schuh observed that international trade and financial markets are increasingly beyond the control of national economic policies while at the same time they are capable of causing shocks to national economies. On the positive side, international trade and international financial markets make possible more efficient use of the world's resources as resource owners maximize their comparative advantage. Also the constraints that limited market size imposes on small economies can be overcome by specializing and engaging in international trade.

Mr. Schuh said that decentralization is a logical consequence of globalization. Along with the shift of some economic policy making to the international level, other policy making, such as that on incomes and resources, shifts down from the central level to localities where it can be more efficiently tailored to local resource endowments.

Privatization is driven in large part by the same technological forces as those driving globalization. Markets and private ownership are a more efficient means of allocating and organizing a nation's resources, which is necessary to compete and benefit from globalization. But the public sector cannot be totally dismantled, Mr. Schuh cautioned.

Urbanization is driven in part by the natural forces of economic development, but exacerbated by bad economic policy. Urbanization occurs, in part, because demand for nonfood goods and services grows faster than demand for food in a prospering economy. But urbanization can be forced by policies that discriminate against agriculture.

Summing up, Mr. Schuh said institutional and policy innovations need much more attention. In the absence of such innovations, agricultural modernization will be restrained, and the rate of return to investments in agricultural research and extension will be limited.

Decentralized Farmer-Owned Extension

In 1997, the government of Uganda launched the Poverty Eradication Action Plan (PEAP), intended to eradicate mass poverty, raise the incomes of farmer households, and improve the quality of

life of the majority of the population. Silim Nahdy, Task Force Leader, National Agricultural Advisory Services, Uganda, noted that the primary strategy is to increase earnings from productive employment, including self-employment. Liberalization and privatization of goods and services delivery continue to be emphasized, along with progressive commercialization of public services. PEAP has been supported by the donor community through the Highly Indebted Countries Initiative for debt forgiveness. Mr. Nahdy said Uganda is channeling these resources to social development, focusing on rural transformation and modernization of agriculture.

Agricultural transformation—moving agriculture from subsistence farming to commercial farming—is being guided by the Plan for Modernisation of Agriculture (PMA). The aim of the PMA, Mr. Nahdy remarked, is to remedy the key factors undermining agricultural productivity: poor husbandry; low use of improved inputs; limited access to technical advice; poor access to credit; poor transport, communication, and marketing infrastructure; and insecure land tenure rights.

Under the PMA, the principal program is the National Agricultural Advisory Services (NAADS). Mr. Nahdy said the rationale for NAADS is the failure of traditional extension to bring about greater productivity and expansion of agriculture, despite costly government interventions. The program is developing a demand-driven, client oriented, farmer-led agricultural service delivery system targeting the poor and women in particular.

MAAIF-SG 2000 Technology Transfer Program

In 1996 Uganda invited SG 2000 to assist its development efforts. A. M. Foster, SG 2000 Country Director for Uganda, explained how the MAAIF-SG 2000 program supports Uganda's Poverty Eradication Action Plan by providing technology options that improve the livelihoods of smallholders. Among the goals of the MAAIF-SG 2000 program are increasing food production and reducing food losses so that small-scale farmers have a surplus to sell beyond their needs for food security, raising the profitability of small-scale production, improving market access for farm inputs, and strengthening produce marketing through aggregation of produce by farmers' organizations.

To help make Uganda's subsistence farmers more productive and food-secure, SG 2000 is establishing a technology transfer process that is appropriate for small-scale farmers, devising mechanisms to ensure that the technology transfer programs help the poorest farmers, and working with governments and others to create, expand, and maintain support systems and services for the economic advancement of farmers.

In its second project phase, SG 2000 will deepen and consolidate improvements in advisory services and organizational structures for farmers. MAAIF-SG 2000's second project phase will require a more integrated effort with other development partners in support of mainstream institutional efforts that enhance the advancement of small-scale farmers. The MAAIF-SG 2000 program will strive to reinforce key national programs that have been honed as instruments for poverty reduction and transforming subsistence farmers to food-secure, market-oriented producers.

Addressing the Challenges of Extension Services Delivery

Agricultural extension services in sub-Saharan Africa must change in response to

the rapidly changing dynamics of the agricultural and rural development globally and in Africa, according to Henk C. Knipscheer, Senior Managing Director, Winrock International. Changes have to be made in the various subsystems of the agricultural knowledge and information system, including agricultural training institutions, research institutions, farmers' organizations, government agencies responsible for agricultural policy, and both for-profit and not-for-profit services providers.

Mr. Knipsheer urged agricultural training institutions to take responsibility for changing extension services delivery by developing flexible and responsive agricultural and extension education programs. Such programs will equip individuals and groups within the subsystems of the agricultural knowledge and information system to comprehend their new roles and responsibilities as change managers, to deal with today's challenges of extension services delivery, and to competently address future changes and opportunities.

Coherent government policy is required to respond to the pressing challenges of extension services delivery, Mr. Knipsheer said. Short and long-term policies are vital to foster the combined efforts of public and private extension services providers to achieve sustainable development.

Mr. Knipsheer commented that every nation expects its universities to be the first to experiment with new teaching designs, new concepts, and new partnerships and alliances. Agricultural extension services need to regroup, develop new mission statements and procedures, and take the lead in developing productive relationships with nongovernmental stakeholders, agribusinesses, and the NGO community.

The new roles of the institutions imply a new role for the agents, Mr. Knipsheer said. They are to be managers of change, facilitators, information seekers, and option providers. New skills are needed—ones that are seldom taught in traditional curricula but that are often categorized as leadership skills. In fact, training in leadership and client-orientation is what a large part of extension training should be.

Rural Business Development Fund

In support of the Government of Uganda's Plan for Modernisation of Agriculture, which stresses the importance of technology-based agriculture to increase productivity, the Norwegian Agency for Development Cooperation has proposed establishing the Rural Business Development Fund (RBDF). Karl H. Solberg, Development Officer, Norwegian Agency for Development Cooperation, explained that RBDF would basically make fertilizer available to farmers at an acceptable price and expand knowledge on the appropriate, economic, and environmentally friendly use of fertilizer.

According to Mr. Solberg, the goals of RBDF are improved production of food and cash crops and developing an entrepreneurial attitude in the farming community. To meet these goals, demonstrations in farmers' fields will show how to use high yielding varieties of seeds, the correct use of fertilizer, and improved cultivation methods for proper conservation of the environment. Second, farmers will be taught technology for preserving crops for later consumption or for sale when prices are more attractive. Third, farmers will be encouraged to participate in rural savings and credit schemes, which enable them to purchase the input package required for the demonstration plot and to pay back the loan at the end of the season. Finally, the formation of a stockists' network will

make inputs required for crop production readily available in local markets. Mr. Solberg concluded that greater numbers of stockists will foster a business environment at the village level and expand opportunities for farmers to sell their excess production.

So Much Progress in Agriculture and Finance, So Little in Rural Credit

While the Green Revolution has changed the face of agriculture and financial liberalization has transformed financial markets around the world, J. D. Von Pischke, President of Frontier Finance International, Washington D.C. observed that little seems to have happened at the farm level where agriculture and finance meet. Rural and agricultural credit in developing countries deserves to be revisited, keeping in mind the reasons for the massive public sector, donor-support failures of the past. Institution building offers a platform for potentially constructive reengagement by donors and governments. Appropriate lending technologies are also essential for the creation of sustainable relationships between farmers and lenders. Three of them explored by Mr. Von Pischke are a method for ascertaining the debt capacity of large farms, a microfinance approach for small farms, and a recommendation to explore the benefits and disadvantage of suppliers' credit and other trade finance.

Microfinance Innovations in the Gulf of Guinea Region

Pierre Markowski, Coordinator, Microenterprise Development, CARE International, Ghana, begins by examining how access to financial services can increase households' food security. For example, households may be more inclined to adopt more risky, but more profitable, income-generating activities. Also, households may reduce their holdings of traditional assets that have lower returns because they are exposed to risks such as theft, loss, or disease. Or households may reduce the amount of high cost credit they obtain from informal sources. Finally, households may less frequently face distress sales of productive assets (land, livestock, and seeds) at low prices.

Turning to innovations that have improved access to financial services for the rural poor Mr. Markowski underscores the importance of looking at both the savings and credit aspects of financial intermediation. Mobilization of local savings gives microfinance institutions an inexpensive source of funds for on-lending. On the credit side, some of the innovations in recent decades have been group-based liability, acceptance of collateral such as TV's or radios, and moral guarantors. Providing incentives to staffs of microfinance institutions has improved loan volume, repayment, and savings rates.

West Africa has had diverse experiences in delivering rural financial services, Mr. Markowski says. Among the recent developments are commercial banks' growing interest in acting as wholesalers to microfinance organizations and in developing links with informal lenders such as susu collectors. Another promising financial concept is self-managed financial services in which villagers form an association to gather savings and lend to members. Also, through networking, microfinance institutions are better able to manage risks and seasonal cash flow fluctuations.

Changing Environment, Land Tenure, and Agricultural Performance

Kaori Izumi, Land Officer, FAO Sub-Regional Office for Southern and Eastern

Africa, Zimbabwe, reviews African experiences in land tenure. She suggests that African countries need various policy options for land, taking into consideration the specific local constraints and opportunities. The empirical correlation between land tenure security and agricultural performance is unclear. She states that although land tenure security is a necessary condition for agricultural intensification, improved agricultural productivity, and economic development, it is not sufficient condition. Evolution of land tenure itself is unlikely to lead to agricultural intensification and improved production. Factors other than tenure security itself are essential for promoting agricultural development.

Ms. Izumi stresses that carrying out tenure reform demands substantial financial resources as well as a high level of technical and administrative capacity within government institutions. So far, land reform in most African countries has been focused on policy and legal reform, physical movement of people for resettlement, and establishment of other institutional reforms at various levels. What Ms. Izumi finds missing is specific agricultural policy and programs linked to land tenure reform. It is time to explore more sophisticated but pragmatic policy options that take into account local and country-specific conditions. She says it is also time to go beyond limited debates on tenure reform and agricultural performance to reconsider land reform policy within a broader context of the development path in Africa.

Because land is becoming an increasingly political issue, she warns, there is an urgent need to resolve land questions peacefully. Despite recognition that resolving land issues is important for economic and political stability, donor support to land reform in Africa has been limited. Further delay in the resolution of the land question may lead to further economic decline in the region as a whole.

Tanzania: Soil Fertility Recapitalization and Agricultural Intensification

Simon Muro, Project Coordinator, Ministry of Agriculture and Food Security, Tanzania, explains that because most smallholder farmers in Tanzania employ low input/low output agricultural systems, the nation suffers from degradation of soil resources and a stagnant agricultural system. To address these problems, the Government of Tanzania is launching the Soil Fertility Recapitalization and Agricultural Intensification Project. Mr. Muro said the project aims to intensify agricultural production through improved land and crop husbandry practices, increased access to and utilization of agricultural inputs and support services, enhanced private participation in input and output markets, grain marketing policies, and inputs policies.

The project is based on three key principles, Mr. Muro pointed out. First, rural communities and farmer groups will make decisions regarding sustainable technology and service delivery and will be primarily responsible for implementing subprojects. Second decentralization will be strengthened by giving districts significant flexibility in proposing the use of project resources. Third the performance of key rural markets will be improved by encouraging competition for project resources including the provision of extension services.

Implementation and management will be largely at the district level. The district management team will be responsible for translating the project concepts and strategies into activities and results. At the national level, a project coordination unit will have overall responsibility for project

management and coordination, Mr. Muro said.

Agroprocessing: Adding Value to Food Production

Ruth Oniang'o, Professor of Food Science and Nutrition, Jomo Kenyatta University of Agriculture and Technology, observed that the lack of enlightened problem-solving innovation in the agricultural and agro-industrial sector in Africa, and therefore the slow pace of needed technological change, has led to a widespread stagnation and even decline in both crop yields and diversification of high quality food products.

The potential for agro-industrial development is related to the relative abundance of agricultural raw materials and low-cost labor. The most suitable industries under such conditions, Ms. Oniang'o pointed out, are those that make relatively intensive use of these abundant raw materials and unskilled labor and less-intensive use of presumably scarce capital and skilled labor. Africa is fortunate in having a young and educated elite able to undertake these actions, and what may be lacking in financing and technical assistance is available through banks and international organizations.

Cutting post-harvest losses through agroprocessing is of paramount importance if Africa is to avoid food shortages. A holistic approach should be advocated. Tackling the food chain piecemeal only creates confusion. Ms. Oniang'o urged research groups and higher learning institutions to interact with each other and with rural communities to preserve perishable commodities close to the point of production, thereby alleviating unemployment in rural areas, reducing poverty and micronutrient deficiencies, and benefiting women, who are heavily engaged in food processing.

Field officers need to be trained in marketing, post-harvest handling, basic agroprocessing, and agribusiness so that they are able to advise farmers on, for example, improved storage techniques, Ms. Oniang'o said.

Rural food processing can create employment and thus reduce poverty and undernutrition in these areas. Women would benefit greatly since they dominate such activities and have been harshly affected by current economic reforms.

Introducing Improved Agroprocessing Equipment

L. Halos-Kim, Research Specialist, International Institute of Tropical Agriculture, explained that the SAA/IITA Agroprocessing Project is a collaborative effort to make agroprocessing technology available to metal workers (manufacturers), farmers, and processors. The major activities are research and development, agro-industrial extension, and manufacturers' training.

According to Ms. Halos-Kim, regular meetings and monitoring visits make the team visible and effective project managers. Field demonstrations and activities in the model processing centers have proved useful in creating awareness and generating interest from farmers, agroprocessors, manufacturers, and funding organizations.

From 1994 to 2000, the SAA/IITA Agroprocessing Project has disseminated various types of agroprocessing equipment in Ghana and Benin. The project sees increasing demand, sales, and use of the equipment.

The most widely adopted equipment is the cassava grating machine, either as a unit or a part of the cassava processing package; the multicrop thresher; and the wet-type grinder. These machines can support income-generation activities in

contrast with other components that help facilitate the job or reduce drudgery, Ms. Halos-Kim said. In general, the agro-processing technologies introduced help increase farm household welfare through more efficient use of labor and additional cash income. At the village level, they add to existing capacity. The impact of the project and utilization of agroprocessing equipment is being evaluated.

Working with the Private Sector to Create Rural Economic Growth

Susan Bornstein, TechnoServe's Acting Regional Director for Africa, read a paper outlining TechnoServe's work in helping rural producers build sustainable relationships with major commercial enterprises. The paper provides two case studies demonstrating how these partnerships are mutually beneficial.

In Kenya after structural adjustment led to the demise of the monopoly dairy parastatal, small dairy producers lost their main market outlet, while urban consumers suffered shortages of milk. TechnoServe helped a farmer cooperative develop a dairy plant where small producers' milk could be assembled, tested, and chilled. By having a reliable supply of high quality milk, the cooperative was able to contract to supply a large private milk pasteurizer.

In Mozambique, TechnoServe works with the banana producers' association to create a division that would help smallholders produce high quality bananas. The division also buys bananas for resale in domestic and South African markets. To differentiate the products in the marketplace and attain a quality premium, a brand identity was created. The banana association's output is now being sold in South African supermarkets under the Sweet Mozambique brand and label.

Globalization, Institutional Change, and Food Security

G. Edward Schuh, Regents Professor, University of Minnesota reflected on four themes that emerged from the workshop. All relate to the effect that new technology beyond the farm level has on the transformation of the world economy.

Globalization, Mr. Schuh pointed out, has been driven by technological revolutions in transportation, communications, and information technology. These breakthroughs have lowered the costs of economic transactions and expanded the scope of markets to organize economic resources. This trend, Mr. Schuh argued, will most likely become more extensive and more complex. Globalization, he said, is changing where economic policy making and implementation take place and is propelling the drive for privatization and greater dependence on markets.

A second theme was partnerships and self help. Mr. Schuh presented data showing that foreign aid is relatively insignificant in African economies. That, Mr. Schuh suggests, means that most of the resources for economic development must come from domestic resources or international markets. Governments will have to strengthen financial institutions to encourage savings and take steps to raise productivity so that individuals have a surplus to save. Mr. Schuh said foreign aid, with its demeaning patron-client overtones, should be replaced by cooperation between countries in which programs are mutually formulated and both sides learn and benefit from them.

Institutions and policy was the third important theme at the workshop. One aspect, Mr. Schuh said, is that new technology, which everyone is counting on to raise productivity, will not fall from the sky; it will require research institutions to generate it. Second, new technology will

not be employed unless it is profitable, which in large part will be determined by macroeconomic policy making.

The fourth theme was the contribution of international trade to food security. The implication is that to the extent that a country is willing to specialize and engage in international trade, there is no limit to its growth potential, Mr. Schuh said.

Closing Session

Israel Kibirige Sebunya, Minister of State for Agriculture, Uganda, speaking for Uganda's Vice President, Wandira Speziosa Kazibwe, expressed gratitude for the opportunity to show participants the strides Uganda is making meeting food security needs.

Opening Statement

Ayako Sono

Every 2 years, I come to Africa to attend this workshop. And every 2 years, I am overwhelmed by a warm feeling of friendship, similar to the one I experience on meeting close friends from my school days. No, perhaps the feeling is stronger than that. At school, everyone had different interests and goals, but here at this workshop, people are all devoting their lives to the same cause. The cause we are working for is more fundamental than any other—people's well-being and happiness. Thus, it is only natural that we feel closer to each other than we do to our former classmates.

This project, the deliverance of all of Africa from starvation, is a truly significant undertaking, one that requires more effort than any one of us is capable of. As a Christian, I have since childhood been saying "The Lord's Prayer." One line that stands out in my mind today is, "Give us, this day, our daily bread." Perhaps you have heard the story of the child who added, ". . . and butter, too!" I am sure that many other children have prayed for sweets. Children, you see, are not satisfied with the basic minimum and, really, we should not be either. The idea behind "daily bread" is of course a full stomach, but it goes farther than that to the satisfaction of a large and generous heart. It addresses the needs of both essential parts of a human being—the spirit as well as the body. The things we require, the things we pray for, have not changed over the centuries.

Elsewhere in the Bible, it is written, "Man shall not live by bread alone." Africa's response to this is, "Yes, but *first* we must eat!" I think that Africa has its priorities straight. Biblical teaching does not contradict this. What the Bible has done is to extend our ultimate goal beyond the satisfaction of physical needs. Beyond simply feeding people, it gives us a reason for living. It tells us that, in the end, we must assure the dignity of all people. I believe that everyone gathered here feels the same way. First we need to deliver people from starvation, but beyond this, we have a responsibility to educate people. Simply assuring that human beings have enough to eat does not turn them into people. If this were all that was required, even animals could become people! However, after we have guaranteed people the right to life, it is through education that human beings gain food for the spirit and thus become people. This process is vital, and those of

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you gathered here are wholeheartedly working toward this noble objective.

Fifty years ago, one would never have thought that the countries of Africa would come together to solve a common problem such as this. However, the world is changing rapidly. In Asia, as well, countries are beginning to work together to solve the problem of starvation. This solidarity and the spirit of friendly competition in research that have sprung up are bearing fruit of immeasurable worth. It is my sincere hope that this workshop turns into a sort of African Olympics of agriculture. Of course, in the real Olympics, the abilities of one runner cannot be transferred to the other competitors, but in an agricultural race, this is more than possible. Through education, the know-how and technology that one country has attained can be transferred to other countries. When this happens, the humanistic focus of our workshop gives it much more significance than the Olympics.

As always, I pray that God will continue to bless you and your families with prosperity and peace. May your efforts continue to fill you with contentment and pride. I look forward to seeing greater progress the next time we meet.

Opening Statement

Yohei Sasakawa

I am pleased to be here at the opening of this SG 2000 workshop, sponsored by the Nippon Foundation and the Sasakawa Africa Association, and organized by CASIN. As president of the Nippon Foundation, there is no greater joy for me than to see you gathered here, ready to participate in a productive debate and a lively exchange of ideas.

When my late father, Ryoichi Sasakawa, was chairman of the Nippon Foundation, he saw the 1985 Ethiopian famine on television and went into action, organizing the First Conference on African Famine in Geneva. At the time, there were few people who truly took the African agricultural situation seriously. Among those who did, most were pessimistic about the state of affairs here. However, my father realized that on a continent where 70 percent of the people are involved in farming, there can be no sustainable development without improved agriculture.

On the strength of this belief, he enlisted the help of Dr. Norman Borlaug, winner of the 1971 Nobel Peace Prize for work igniting the Green Revolution, and joined forces with former U.S. President Jimmy Carter. Together, they built SG 2000, the program that has had such a positive effect on this region.

Over the last 15 years, the guidance of Dr. Borlaug, the self-sacrificing hard work of the country directors, and the help of the governments involved have made SG 2000 the most exemplary program of its type. I am thankful to all involved for bringing us this success.

The thing that makes me happiest is the way in which SG 2000 has served to trigger the support of other institutions such as the World Bank. The World Bank is working out a new loan system to aid the agricultural efforts of developing countries, based on the experience of SG 2000. SG 2000 itself has begun to collaborate with USAID and Plan International on a program to provide implements for animal traction. And the Norwegian Agency for Development Cooperation has been building a fertilizer distribution network in tandem with our programs.

Agriculture is the heart of the Ugandan economy. It accounts for 90 percent of its total exports. Ninety percent of the population is involved in agriculture. This underscores my firm belief that agriculture is the most important industry for African development. Every African nation must take an aggressive stance in

Yohei Sasakawa is President of the Nippon Foundation, Tokyo.

this field, focusing their energies so that it is advanced and people are fed. Only when all people can eat will we be able to say that regional security is being built. Uganda has attained self-sufficiency in the area of food and in this, the Ugandan government's positive action has been exemplary.

Yesterday, I visited a Ugandan demonstration plot and had the pleasure of meeting the farmers. I could really feel the success and promise of our program here. It is the self-sacrificing hard work of the SG 2000 workers under Dr. Michael Foster, country director for Uganda, that has produced such results. But, in any discussion of success, the role of the Ugandan government cannot be stressed enough.

SG 2000 is nothing more than an NGO with limited financial and human resources. To raise its effectiveness to a national level, cooperation between various institutions and with the governments of the participating countries is necessary. In this way also, Uganda is a perfect model for other countries to follow.

The theme of this year's workshop is African food security in a changing environment. Africa, like all of the world, is deeply affected by the wave of globalization in such areas as democratization, decentralization, and liberalization. In such unprecedented circumstances, the theme of this workshop is thus critical.

To reiterate, the security of food resources is the basis for security of a country. It must be given the highest priority in national policy making. It must be approached from a scientific perspective for production to increase. Finally, the whole circle of government, international organizations, and NGOs must work together if we wish to achieve our objectives.

At the 1985 Geneva Conference, my father grew emphatic when he said, "One action is worth more than 100 discussions." Of course, discussion is important but, without action, it results in nothing. It is my sincere hope that this workshop becomes the motivating force for still stronger action in the field. We must join hands and work together for the brightening future of Africa's agriculture.

Opening Statement

Jimmy Carter

When I was president of the United States, Uganda was looked upon as a blemish, an embarrassment on the map of Africa. A brutal dictatorship was in power, one of the most ruthless I have ever known. But there was also a young freedom fighter in the bush, who was filled with courage and who, in 1986, prevailed and became the leader of his country. From a foreign perspective, few people have appreciated, more than I, what changes have taken place in Uganda. I am always pleased and honored to be with my friend President Museveni, who has brought to this country worldwide recognition not only for its own progress but also for the influence that he, as a leader, has had in this whole region of Africa.

I would like to mention one or two Carter Center programs in which President Museveni has been our partner. As part of our program to eradicate Guinea worm from the face of the earth, we came to Uganda in 1992, where we found 126,000 cases of Guinea worm, mostly in the northwest, an area that is still afflicted to some degree by violence. Last year, because of the cooperation of President Museveni and his health officials, we diagnosed only 92 cases, and between November 2000 and the end of April this year, only two cases.

We also have a program on river blindness, and in the near future we are hoping to launch a program on trachoma, which is the number one cause of preventable blindness.

Last year, with the cooperation of the authorities of this country, the Carter Center administered medicine to 906,000 people who suffer from river blindness, and this year we expect to reach more than 940,000.

Also, not quite 2 years ago, President Museveni asked me, as head of the Carter Center, to help resolve the conflict between Uganda and Sudan. We convened a meeting in December 1999 in Nairobi where President Museveni and the president of Sudan, worked out what we called the Nairobi Agreement. There has been a good faith effort since then to alleviate a conflict that has afflicted Sudan for more than 18 years and has resulted in more than 2 million deaths. But, because of such good leadership we are confident of ultimate peace.

Yesterday, we visited some sites in eastern Uganda that have participated in

Jimmy Carter is the former President of the United States and Chairman of the Carter Center, Atlanta, Georgia, USA.

the SG 2000 program. This brought back vivid memories to me. Sixteen years ago in Geneva, Ryoichi Sasakawa, one of the great figures of Japan; Dr. Norman Borlaug, a Nobel Laureate; and I had a preliminary meeting to find out what could be done to help alleviate starvation on the African continent.

And about a year later we decided on a strategy that has become the SG 2000 program, which brings us all to Uganda. We decided to try an experiment in four countries in Africa. We chose Ghana, Sudan, Zambia, and Tanzania. And we began our program according to some basic principles that are still prevalent.

The technologies are to be simple—nothing dependent upon a fancy tractor, but only upon the labor of small farmer families: breaking land with a hoe, planting with perhaps a pointed stick, and cultivating with a hoe.

We bring to this program the finest seed available in the entire world for a particular latitude and altitude, as derived from the experiment stations that circle the globe.

Instead of slash-and-burn techniques, we propose planting crops in contour rows, which permits many more plants per hectare and a much better opportunity to control weeds.

And we recommend the use of a moderate amount of fertilizer to maintain the productivity of the land.

There is a separate approach to each country we are working in. We explain our program to the leaders of the country, not just to the minister of agriculture, but also to the president, the prime minister, the ministers of transportation, finance, education, health, etc., so that the entire cabinet, in effect, is involved in the SG 2000 program in individual forms.

We send in one foreign expert and let the local government provide the extension workers trained by our expert. They work with individual farmers' families, perhaps 15 or 20 per extension worker. An extension worker is going from one farm to another by bicycle. We furnish the bicycles, but we require the extension workers to pay for them because we want real cooperation between the SG 2000 and the host country.

And we agreed during our first meeting in Geneva that SG 2000 would remain in a country for a limited number of years and would then turn the responsibilities over to the government so that, eventually, the country itself would grant limited credit to a farmer's family at the beginning of a season with reasonable interest payments and take action to maintain stable prices. SG 2000 could thus retire from that country and move to another one.

We now have programs in 12 countries in Africa. This has been a wonderful contribution to the prospect of food production throughout this continent, and the successes that we have seen in Uganda have been typical of those we have seen in some other countries.

Now, in the SG 2000 programs, we are looking for a more uniform and definitive yearly assessment of the actual results, not only in the test plots but also in results obtained in transferring responsibility to the local government: credit, supply of good seed, extension work, prompt supplies of fertilizer, stable prices at harvest time, and better delivery of commodities to the consumers of the cities. All these can be put into a package.

And SG 2000, supported by the Nippon Foundation out of the generosity of the Japanese people, inspired by Yohei's father, Ryoichi Sasakawa, has indeed changed the lives of hundred of thousand of farmers in Africa and has changed the lives of people like me who have observed

those remarkable accomplishments. The scientists, who provide the best seed, deserve a great deal of credit; so do the suppliers who provide adequate fertilizers, etc. SG 2000 country representatives deserve a great deal of credit. Dr. Borlaug perhaps deserves more than any I have named so far, but I would say that the main instigators of the success of this program are the individual farmers' families in the 12 countries where we work, who have been so intelligent, so dedicated, and so ambitious and who have worked so hard, and with such high family values. Most of these farmers are women. Perhaps 70 percent of the gloriously successful farmers in Uganda are women, and this is something of which we can all be proud.

So in closing let me say that I am grateful, on behalf of the Carter Center, to have played a small role in this process, and we look forward to working with all those I have named to have even greater success in the future.


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Welcoming Address

Yoweri Kaguta Museveni

I warmly welcome to Uganda the many eminent representatives of governments, academics, and practitioners of development with whom we hope to share experiences.

This meeting is taking place at a time when the only constant in Africa is change. Some of these changes amount to irreversible shifts in our development paradigm. In a way, such change is good because it is evident that Africa is shedding an old image of stagnancy for a new image of vibrancy and dynamic social, economic, and political progress.

In that regard, words like democratization, decentralization, liberalization, and privatization serve only to describe the processes that underlie a determined and gigantic struggle to enhance the well-being of the poor. In Uganda, and elsewhere in Africa, we are acutely aware that, when we take aim at the crippling effects of poverty, we are in effect aiming at a moving target. The dynamic nature of our challenges has in effect been an additional hurdle among many that have denied us the realization of our true potential for so long.

In spite of remarkable economic and social advances in Uganda, a significant portion of the population remains in need. Our own records and those of international partners confirm that during the National Resistance Movement's governance absolute poverty has declined by about 16 percent to its current level of 40 percent with a GDP of US$330 per capita.

President Carter and distinguished participants, I am sure that you share our intolerance of poverty. The Government of Uganda has, therefore, launched a second attack on poverty through the Poverty Eradication Action Plan (PEAP). The plan is built on four pillars:

- rapid and sustainable economic growth and structural transformation
- good governance and security
- increased ability of the poor to raise their incomes
- enhanced quality of life of the poor

The government is determined to improve the livelihoods of the poor, especially those in our rural areas. They have received a smaller share of the fruits of our current progress, so significantly increasing the benefits that accrue to them is a matter of urgency. We have, therefore, designed, in partnership with the international community, the Plan for Modernisation of Agriculture (PMA),

Yoweri Kaguta Museveni is President of the Republic of Uganda.

which will transform predominant subsistence farming to a more commercially oriented farming sector. The PMA will give the rural poor new opportunities to further their own prosperity in accordance with their own dreams.

Our principles of social equity and participatory development have been enshrined in these new policy instruments (PEAP and PMA) and woven into our new strategic approach for the establishment of National Agricultural Advisory Services (NAADS).

NAADS is a new program to redress past shortcomings in extension delivery, incorporating best practice features to make extension delivery more efficient and effective. NAADS' mission is to increase farmers' access to information, knowledge, and appropriate technology for profitable agricultural production.

We have many people to thank for the insights that led to these visionary policy instruments and action plans that are now being translated into field projects. Permit me on this occasion to cite, among them, our friends and colleagues from SG 2000. President Carter, Mr. Sasakawa, and Dr. Borlaug, by creating an institution that shared our mutual goals for agricultural development and empowerment of small-scale farmers, you took a stand by our side, shoulder to shoulder, in the fight against poverty. We thank you for the innovative and creative way in which you have reached out to the rural poor through activities of the SG 2000 project in Uganda. Our collaboration is notable in

- supporting and guiding the farming community on proper and timely use of improved agricultural technologies, especially improved seeds and planting materials and soil fertility management
- use of animal traction
- agroprocessing, focusing on women's groups
- proper post-harvest handling, including construction of drying yards, cribs, and granaries
- development of a rural stockist network for seeds and inputs

The Ministry of Agriculture, Animal Industry, and Fisheries provided the institutional framework for our partnership with the Sasakawa Africa Association and the Carter Center. The sub-counties have been the arenas for our joint action. The rural communities have been the primary activists in successful programs for increased productivity in crop production, increased efficiency, and in the propagation of simple methods of post-harvest storage and primary processing.

Furthermore, our staff and your representatives have worked closely with other development partners to ensure that the lessons we have learned together are built into future efforts of the National Agricultural Advisory Services. We hope to sustain the current spirit of collaboration with SG 2000 and other development partners including UK's DFID, Irish Aid, Danida, the European Union, and the World Bank as we carry out NAADS.

Africa is making progress with intensification and diversification of agriculture. However, our progress is limited by the imbalance of our trading relationships with the developed world. African countries like Uganda need opportunities for marketing processed primary goods to traditional trading partners with whom we already have significant trade deficits. Without quantum growth in Africa's manufacturing sector, we cannot generate sufficient trade surpluses to make the capital investments needed for further development. In Uganda, we know that macroeconomic structural adjustment alone is not enough to create widespread prosperity. In Uganda and elsewhere in Africa, we now need major structural

adjustments in the global order of trading relationships so that we can benefit from the new opportunities for economic growth. We have to do much more to improve our marketing systems, and we will welcome greater assistance from the international community in this area. Perhaps we need more NGOs to will help bridge the gaps between the public sector and the private sector. Such interventions will help place Africa's small-scale farmers in a more competitive position in the changing global economy.

Uganda's strategy in the Plan for the Modernisation of Agriculture is the transformation of subsistence agriculture to producers that are market oriented and have greater productivity. Uganda is fortunate to have the goodwill of many partners who are sharing this task of creating new opportunities for prosperity among the rural poor. I consider it a great humanitarian undertaking that many of you are looking beyond the alleviation of poverty and suffering to the creation of wealth and prosperity. This would be a strong buffer against food insecurity.

Allow me to pay a deserved tribute to the late Ryoichi Sasakawa whose generous spirit led to the initiative whose fruits we are witnessing in the SG 2000 project. I am happy to see that Yohei Sasakawa continues to bear the stewardship for the initiative as President of the Nippon Foundation and thus continues the humanitarian legacy of his father.

I first met Dr. Borlaug in 1998, when he visited me together with my good friend, Prof. Edward Schuh. I was impressed then, as I am now, by Dr. Borlaug's zeal for transformation of African agriculture and his dream that Africa too can benefit from the rewards of agricultural science, as Asia did many years ago. His appetite for revolution has remained unquenched so long as there are people who suffer from hunger. We share a kindred spirit in the quest to defeat hunger.

We are fortunate to have President Carter for a friend. He was America's first president to really champion the causes of the poor and suffering all over the world and especially in Africa. The world recognizes that the supreme compassion and integrity of Jimmy and Rosalyn Carter have been a balm of salvation for those afflicted by disease and conflict. This "magical" balm has even eased the way for fairer elections in many countries as the spirit of democracy took a hold on the populace.

I am inspired by the fact that such noble individuals can look beyond such lifetime achievements as the Presidency of the United States, a Nobel Peace Prize, and wealth to share their fortunes with the rural poor in Africa.

I, therefore, wish to assure you that the government and people of Uganda are committed to the common goals that brought us together in this workshop. As we examine Africa's food security in a changing environment, I hope we will bear in mind not only the centrality of human beings to development efforts, but also the interdependence of people, and the natural environment of plants, trees, lakes, and wildlife.

I am confident that the caliber and experience of participants in this workshop will result in recommendations that will be invaluable to Africa and to Uganda's effort to achieve food security for our people and to eradicate absolute poverty from our nation. I trust that other African countries, some of which are represented here today, will also benefit from the outcomes of this workshop. Indeed, as we continue to build peace with our neighbors, Uganda is ideally placed to share such experiences in the Central African region.

Food Security in a Changing Environment

Nicephoré Dieudonné Soglo

This workshop addresses food security in a changing Africa. The principal elements of this change that directly or indirectly influence agricultural production and security of food supplies in Africa are globalization, urbanization, decentralization, and privatization. The question is, to what extent do those four factors favor or handicap agricultural production in sub-Saharan Africa and thus increase or compromise the security of food supplies? Our exchanges will enable us to answer this question. I will content myself with presenting the elements indispensable to our debates.

Globalization

To have a good grasp of a phenomenon, you have to go to its roots. At the beginning of the 1980s, the more perspicacious analysts had already begun to see the precursors of the phenomenon we now call globalization. The Berlin Wall had not yet fallen but the grid through which we read the world's economy in terms of a North-South bipolarity had already lost much of its relevance.

Twenty years ago, A. W. Clausen (1982), then president of the World Bank, put forward a concept that has become globalization. He contended that the North-South model of the 1960s and 1970s had lost much of its usefulness. We had created a bipolar representation of the dynamics of the world's economy within the rigid framework of the North-South dichotomy. This representation was no longer useful, Clausen said. Besides, it is no longer profitable to apply dogma and ideology to global economic problems. There are certainly strategies, but we will only discover them when we all see the world economy for what it is in reality—a dynamic phenomenon, changing and very underestimated.

Clausen foresaw that we would henceforth be living in a multipolar world, and in broad terms he described eight poles presenting markedly different characteristics: Western Europe; North America; Japan; Eastern Europe; countries on the road to industrialization; petroleum-exporting, capital-surplus countries in the Middle East; highly populated countries of Asia, notably China and India; and the very poor countries of Africa south of the Sahara.

Clausen observed that Western Europe, with its 300 million inhabitants and a total annual GNP of more than US$300 billion,

Nicéphore Dieudonné Soglo is the former President of the Republic of Benin.

was the most active group in world commerce. It had more than a 30 percent share of the market, characterized on the one hand by the intensity of transactions between European countries—total exports often represented over 25 percent of the GNP—and on the other by the slowdown in its growth compared with the 1960s, with its share of world production having dropped from a third to a quarter.

North America's share, Clausen found, had dropped from 30 percent in 1960 to a little under 25 percent in 1980. He stressed two features of the region's economy—a high energy consumption (the United States alone bought about 15 percent of the total output of OPEC) and a low rate of internal savings, which was slowing down capital accumulation and investment.

Evincing incredible dynamism, the Japanese economy has had an extraordinary influence on the world's economy, Clausen said. In 1960 Japan's share of the world's production output was only 3.4 percent. In 1980, it had tripled, rising to more than 10.5 percent. Its industrial production alone had almost quintupled in real terms, going from more than US$100 billion (at the 1979 value) to nearly US$500 billion. Its exports rose from US$10 billion in 1960 to more than US$100 billion in 1980. Japan exported nearly one-fifth of its manufactured goods.

Eastern Europe comprised industrialized nations but their economies had hardly been flourishing. Eastern Europe's share of the world's production had topped out at about 11 percent for more than 20 years. Consumers were deprived of numerous goods and services. The region was discovering the costs of slow progress. It had started to pick up the pace, but internal tensions created by this reorientation were evident.

The countries on the path to industrialization—about 20 countries spread across Latin America, southern Europe, and East Asia—had seen their share of the world's output double, going from 5 percent in 1960 to 10 percent in 1980. Clausen noted that the 8.4 percent rate of growth in their production (a little less than Japan's 9.6%) was three times more than that of the deprived developing countries.

The sixth group, the Middle East petroleum-exporting countries with a capital surplus were very active in the financial markets, but they were short of manpower and imported about 3 to 4 million workers. The latter sent home some US$4 billion in 1980 alone.

The seventh pole, comprising the densely populated and nonindustrialized Asian nations, showed an exceptional dynamism in agriculture to which they owed their success, Clausen said. Not content with having ended their chronic deficits, some of these countries were producing enough cereal foodstuffs to cover internal demand and expected to soon become exporters.

The eighth and last pole was sub-Saharan Africa, the poorest region and one still ravaged by wars, famine, and sickness. The region comprised 18 countries where the income per inhabitant has diminished in the course of the 1970s. The majority of the countries in this region had scarcely any hope of seeing it go up during the 1980s. But, Clausen argued, these countries could exceed projections if they used their resources more rationally. He called for a joint effort on the part of every African country and all those providing development aid.

Thus there is no doubt that we are living today in a multipolar world and that the analysis producing these eight poles—this figure is not sacrosanct—can be refined and result in the development of much more complex models.

The acceleration in the history of the world economy has now surpassed those indices used by Mr. Clausen. The present globalization underlines the theme of the last *World Development Report* (World Bank 2000). The international integration of economies is obliging national governments to turn to international partners to be in a better condition to face the changes affecting trade, financial flows, and the environment.

Technological advances in the field of telecommunications enable us to know instantly what is happening at the other end of the world. The major spot still occupied by services and information in the world economy enhances the intangible portion of economic goods, which instead of being carried in container transports are transmitted by fiber optics. Advances in telecommunications facilitate the management of these new interconnections.

In recent years, international trade has progressed more rapidly than the international economy, and this trend seems set to continue. The creation of the World Trade Organization in 1995 in the wake of the General Agreement on Tariffs and Trade is the final multilateral measure to create a favorable environment for the exchange of goods and services.

Globalization can be advantageous for the growth of agricultural production, or it can constitute a handicap. It is within this context of globalization, which spares no sector, that the problem of privatization arises in certain countries.

Privatization

In the years following their independence, sub-Saharan African countries, inspired by the desire to further their development and confronted by meager internal savings and a low degree of investment, launched a policy of creating state enterprises funded by external sources. At the time, the idea found favor with financial backers and certain countries. In countries like Benin that consequently adopted the socialist option of development, nationalization was going to accelerate the rhythm of state control of the economy.

This movement was to grow with the flare up in petrol prices. Thanks to the avalanche of petrodollars circulating in the rich countries, turnkey project were proposed to the poor countries without conducting serious studies. The more prudent countries were hesitant about the burden of debt they would have to assume, but they were persuaded by lenders' assurances that if there was no return their debt would end up being cancelled. Thus from 1970 to 1989 the debt of African countries multiplied 19-fold and reached the equivalent of their collective GNPs. At the same time the debt of Latin America was only 60 percent of its GNP.

But in the 1980s bad governance, deterioration in exchange rates, drops in oil prices, and successive devaluations of the various currencies in the region pushed the African economies toward collapse.

Recourse, which had become unavoidable, to the international funding institutions led to the targeting of these economies by the International Monetary Fund and the World Bank. Among the reforms advocated by these institutions, privatization was among the most important.

Is privatization necessary? Is it important that goods be placed under a regime of public, private, or mixed ownership? The answers depend, first, on knowing whether privatization lets you achieve better results. Numerous empirical studies (mostly dating from the 1980s) that compare public with private enterprises in industrialized market economies generally, but not universally, conclude that

private companies display higher rates of production and better results than those in the public sector. A recent analysis of the results obtained before and after privatization and taking 61 companies in 18 countries (6 developing and 12 industrialized) came to convincing conclusions (Makalou 1999). In two-thirds of the cases, profitability of sales, operating profits, and expenditure on equipment increased, all without a conspicuous reduction in the workforce.

The start of the privatization vogue in sub-Saharan Africa can be pinpointed as being 1985. Two hundred companies were privatized between 1985 and 1990. The tempo quickened, reaching 2,804 by the end of 1997, with peaks of 339 in 1994, 472 in 1996, and 357 in 1996, to drop back to 102 in 1997. Then it was only small and medium enterprises, but nowadays, large companies are coming into the portfolio of privatizations more and more.

The largest share of the privatizations was concentrated within a small number of countries. Of the 2,804 privatizations that occurred up to 1997, two-thirds were in Mozambique (549), Angola (331), Ghana (219), Zambia (217), Kenya (156), Tanzania (124), Guinea (114), Uganda (88), Madagascar (84), and Nigeria (81).

However, it must be pointed out that in Mozambique most of the privatizations involved small businesses. In contrast, in Zambia the largest number of privatized enterprises stemmed from the dismantling of large entities into small private businesses. Another significant indicator is the wind-up value of those units. For the 1993–97 period, the 10 highest values were distributed as follows:

Country	*Transactions (no.)*	*Value (US$ millions)*
South Africa	7	2,209
Ghana	219	555
Côte d'Ivoire	47	357
Senegal	50	262
Nigeria	81	207
Mozambique	549	201
Kenya	155	186
Zambia	217	180
Uganda	88	134
Tanzania	124	132

Another indicator is the sectors affected by privatization:

- 509 in agriculture, agro-industries, and fisheries
- 90 in finance
- 701 in industry and manufacturing
- 520 in services and tourism
- 232 in commerce
- 529 in other sectors

In other words, as with all the sectors, agricultural production and security of food supplies are affected.

In Africa the predominant methods of privatization are bids (895), sales of assets (687), liquidations (520), leasing and concessions (109), and direct sales (101). The choice of mode depends on the type of case.

The principal impetus for privatization on a large scale is the shift of countries from planned economies to a market economies. Two strategies have been used: shock treatment and the gentle approach.

Shock treatments prescribed a maximum number of reforms in a minimum amount of time. As the writer and poet Vaclav Havel, the president of the Czech Republic, said: "You cannot jump over an abyss in two stages." This method was applied to his country and also to the former East Germany with a greater or lesser degree of good fortune. The Federal Republic of Germany spent US$700 billion to make the living standards in the two halves of the current nation compatible.

An example of the gentle or gradual approach is privatization in the People's Republic of China. Deng Xiaoping considered that the change from a socialist planned economy to a "socialist market economy" could only be undertaken in the same way as crossing a stream, where you only reach out one foot after the other has found a solid point of support.

In the USSR, Mikhail Gorbachev, at one and the same time, went to work on political reforms (*glasnost*) and economic restructuring (*perestroika*). In an immense federation where savings had dried up, this method threw open the doors of the USSR to Western capital. We know the consequences.

But in the face of galloping globalization, should sub-Saharan Africa, where neither communism nor capitalism has been solidly implanted, expose itself to a hybrid with a still uncertain success?

In general, the revenues African countries have derived from privatization have had little influence on state resources.

In the long run, the cleaning up of public finances that these reforms entail gives hope for increasingly significant fiscal returns from these enterprises, stability of employment, modernization of the industrial fabric, and the birth and development of national or regional financial markets.

Decentralization

Decentralization is a system of administrative organization in which the state allows other legal public entities to govern themselves. Since the mid-1990s decentralization has had mixed fortunes in Africa. In fact territorial administration reforms appear to have been choked in some countries and to have been limited if not bogged down in others. The reforms often run into technical problems and the unpreparedness of the population, but in reality, when central authorities pull back from this necessary change it seems to be inspired by deep-seated problems of governance and fears of being challenged.

Throughout the world, people are demanding more autonomy and want more of a say in the decisions of those governing them. Ninety-five percent of the democracies today have elected territorial bodies and all over, small or large, rich or poor, countries delegate political, financial, and administrative powers to them. However, decentralization is often carried out blindly. Frequently, decentralization patterns are applied with no regard for administrative traditions or the rights of local property owners.

So what are the stakes in decentralization? The delegation of powers influences political stability, the operation of the public sector, social equity, and macroeconomic stability. In fact a fundamental aim of decentralization is to preserve political stability in the face of a rise in local demands. In some African countries, decentralization has cleared the way to national unity. For example, South Africa and Uganda have adopted ambitious decentralization programs and, despite difficulties during their implementation phase, they are considered models for delegating powers held by the central administration. In South Africa, after the abolition of apartheid, the country was divided into 9 provinces, 5 metropolitan areas, and 850 municipalities, each with its own local elected representatives, and within which all the races coexist. In Uganda, the 46 districts created after 1985 exercise not insignificant responsibility in the fields of education, health, and local infrastructure.

Decentralization increases administrative efficiency and obliges the government to lend more of an ear to the people

governed. Local elected representatives have better knowledge of the problems than the national authorities and theoretically are therefore better placed to provide the services desired by those they serve. In addition, their physical proximity enables the governed to more easily ask these representatives to account for themselves.

Yet decentralization can also translate into degradation in the quality of public services, as has been the case in Latin America and Russia. Poorly implemented decentralization can compromise macroeconomic stability. When public finances are decentralized, control of public resources partly escapes from central government. For example, in the Philippines, the state is reputed to be sharing nearly half of its fiscal receipts with the territorial administrations. In general, when spending and taxation powers are hived off, local authorities take only on a small proportion of the political and financial costs of their expenditure.

Any decentralization program must be adapted to suit the national context. The main difficulty is institutionalizing the balance of power between the national and local authorities by means of regulations guaranteeing and, at the same time, limiting the powers of the regional governments.

The distribution of powers between the central government and local authorities depends on the influence that the regional players can exert upon the state. This influence depends on two factors. One is the way in which the regional players are represented in national legislative bodies. The second is the power of the national executive to ensure that the government is more or less able to resist pressure.

To maintain a balance of power there must be a communality of interest between the national and infranational political elite.

The question of the local authorities' resources is an essential one. This concerns resources marshaled by the local governments themselves and those transferred to them by the state.

The thorniest question decentralization poses is knowing what level of the administration controls what resources. Two lessons can be drawn from what has happened in this field. The first is that local governments' resources must be commensurate with their responsibilities. The second is that local governments must function in accordance with strict budgetary parameters so as not to count on the state's generosity and spend or borrow thoughtlessly.

Transfers constitute an important portion of local finances in every country. That is why the systems for these transfers play a crucial role in the success of decentralization. The principle is that local services provided by local governments on behalf of the state must be funded by transfers from the state, while local expenditure must, in principle, be funded out of local revenue.

The number of regional echelons appropriate for a country depends on it physical characteristics, on its ethnic and political composition, and possibly on its income level. Countries have to choose between representation and cost. So while some African countries have decided to reduce the number of infranational administrations for reasons of efficiency and cost, others have increased them. Thus Morocco has gone from 859 communes to 1,544. In Malawi, Zambia, and Madagascar, as well, the number of local administrations has increased.

Local governments' political responsibility is important, which is why the more that administrators are accountable for their management, the more that decentralization has a chance of achieving its

objectives and thus improving services and strengthening autonomy.

Last, I would like to say that the electoral system contributes to determining whether local political life is a reflection of the population's expectations or is the local elites' little backyard.

Apart from the public sector, there are numerous players—local groups, trades unions, universities, charitable institutions, commoners' associations, NGOs, and residents' associations—that exert an influence on the management of public affairs.

Only an efficient local administration can improve local services. A political team, however full of goodwill it may be, can do nothing if the administration does not possess the desired competencies.

The elements of reform must be synchronized by taking several slow and difficult steps to establish new relations between the central authority and local governments. Rules governing income and expenditure must be laid down before political freedom is granted. A function and the corresponding revenue must be decentralized simultaneously. Many African countries have delegated a whole set of public services to regional authorities without providing them with the necessary income.

What lessons should be remembered for the future? In Africa more than elsewhere, decentralization remains an unfinished process. The implementation of a system that obeys the rules produces better results. Duties must be clearly distributed between the administrative levels to reduce ambiguity and increase political responsibility. The decentralization of revenue must accompany that of expenditure.

Can decentralization influence agricultural production and the security of food supplies? Right now in Uganda, we are fast seeing that this can be so.

Decentralization represents one of the most promising means of taking up the challenges of rapid urbanization. It is the path more and more African countries are choosing. It can in the future slow the swelling and expansion of capitals and large urban centers and redistribute the urban population—the challenge of urbanization.

Urbanization

The acceleration of urbanization is a recent phenomenon on a planetary scale. Urban populations are growing about four times faster than rural areas.

In 1950, only 20 million people or about 10 to 15 percent of the population of sub-Saharan Africa lived in urban areas. In 1960, in the whole of sub-Saharan Africa, Johannesburg was only conurbation of more than 1 million inhabitants. In 2000 you could count almost 20 urban centers with a million inhabitants or more. In 2010, there will be at least 40. In most countries, one city occupies a dominant position. Thus in Mozambique, Maputo is home to 83 percent of the population. Dakar, Lomé, and Kampala shelter 65, 60, and 52 percent of the national population, respectively. Nigeria is an exception, with 14 towns of a million or more inhabitants.

Since the beginning of 1970s, sub-Saharan Africa is the region in which urbanization is accelerating the fastest, averaging 5 percent annually. The urban population now stands at around 40 percent. It has thus passed 250 million, and at the current rate it is expected that half of the region's inhabitants will be city dwellers by 2010.

In most African countries, political and administrative power is still centralized relative to regions, districts, and towns great or small. Dysfunctional urban agglomerations, badly managed and with insufficient services cannot attract invest-

ment nor create jobs. Far from being engines of growth, these towns become an impediment to development. On the other hand, well-administered, safe towns endowed with a solid skills base attract foreign and national investment that is necessary for economic growth.

Urbanization is usually accompanied by an increase in earnings per inhabitant. That has proved to be the case in Europe, Latin America, and Asia. Unfortunately, Africa is the exception to the rule. In Africa, between 1970 and 1995, the urban population increased by about 4.7 percent per year while the per capita earnings per inhabitant went down by 0.7 percent annually.

There are three principal factors affecting urbanization. Migration from rural to urban areas, particularly after serious droughts, is the most significant. Migrants account for between 60 and 75 percent of the urban population. This is one of the causes of urbanization without growth. The second factor is natural increase in population. The rate in Africa is high, whether in cities or in the country. Last, recurring, persistent conflicts in a large number of countries are an increasingly significant cause for the increase in the urban population.

City management has been affected by the lack of transparency in the election of urban officials. This situation has led to complications such that, instead of contributing to the solution of the economic crisis, cities have become one of the elements in the problem.

As a country develops, cities assume an ever increasing share of the national revenue. On average, urban areas represent 56 percent of the GNP in countries with a low revenue, 73 percent in countries with a middling revenue, and 85 percent in countries with a high revenue.

Urban poverty, unemployment and underemployment constitute the current plagues in African cities. Numerous young people, country folk, and town dwellers remain without work for years after leaving school. Most go to swell the ranks of the poor in the cities. In countries trying their best to get back on their feet after war, child soldiers, often alienated and traumatized by their experiences, form a formidable challenge. It is estimated that at least 25 percent of the active population of African cities is out of work. While young people (15 to 24 years old) represent about 35 percent of the population, they constitute 70 percent of the unemployed in urban areas. In contrast to the first decades after independence, the civil service and public-sector bodies no longer form outlets for new graduates.

The informal economy plays an important role in the creation of jobs in the cities. In most sub-Saharan African cities, the modern, formal economy provides jobs for only about 10 percent of its active population while producing three-fourths of the urban added value. The informal economy employs 60 percent of the active urban population and accounts for only a quarter of the cities' production. It must be emphasized that women actively participate in the informal economy twice as dynamically in terms of jobs as in the formal economy (7% compared with 2 to 3%).

A number of the problems confronting urban centers today are the fruit of bad government.

So that city development rests on efficient and enduring funding, we must perceptibly increase local resources and tackle urban funding in a new way.

High unemployment rates and the lack of economic opportunities have created social problems that threaten to become explosive in many African cities. This situation carries in its wake rising crime

and insecurity. That is why throughout the continent, economic growth and the creation of jobs have become imperatives in urban development.

The tempo of urbanization has often surpassed the authorities' capacity to ensure public order. A major challenge to be taken up consists of reestablishing confidence in the forces of order.

Transport, energy, communications, and water supplies are other municipal services that often leave much to be desired. Care and resources should be assigned for maintaining existing equipment, rather than being devoted solely to creating new infrastructure.

To derive the maximum positive aspects from urbanization and reduce its negative facets, there must be strategic planning and management at the municipal level. This also depends on the coherence of national policies and the promotion of synergies between the urban and rural areas.

Middle-ranking towns offer the best possibilities for strengthening the ties between town and country and of encouraging dynamic young people to stay in their home regions and to slow migration from rural areas to urban ones.

It is clear that one of the most pressing challenges for African governments on the level of public administration is finding solutions for the political, social, and economic problems posed by rapid urbanization.

Faced with the challenges that decentralization, privatization, urbanization, and globalization represent for the sub-Saharan countries, what is to be done about Africa's immediate preoccupations, which are agricultural production and above all the security of food supplies? The CASIN workshop held at Bamako in 1999 gave me the opportunity to reflect on this essential subject (Soglo 2000).

I indicated that dependence on food supplies results from several bottlenecks notably:

- the omnipotence of public authorities in the management of the economy
- inefficient monetary policies and industrial development strategies, and dilatoriness in modernizing procedures and plowing tools
- political fragility
- weak infrastructure (transport, storage, etc.)

In addition, I recommended some reforms in keeping with the stakes for the time when these difficulties have been overcome:

- a policy that favors smallholder farms without ignoring the large ones
- a policy of real incentives
- a policy of agricultural research and extension in keeping with the stakes
- unequivocal support for irrigation efforts, for mechanizing agriculture, and for promoting and expanding infrastructure

I then stressed the need for modernizing agriculture, which requires steps to increase productivity:

- reducing the hardship of field workers' tasks through mechanization
- improving water use through progressive irrigation
- skillful use of biological and chemical fertilizers
- the fight against pests, i.e., insects, rodents, etc.
- constant improvement of arrangements for preservation and stocking
- agronomic research and the extension of its results

Without doubt, there are stimulating implications in the implementation of such a policy right across decentralization, privatization, urbanization, and globalization. The closer decision-making centers become to the poles of agricultural

production, the more the work tools and resources will be in the hands of their real users. The more that needs are significant and expand across the planet, the more stimulus is given to devote oneself to agricultural production. However, there is no shortage of barriers. Only the risk of rapid depopulation of the countryside and the accumulation of idle hands in the city can hurt an agriculture with a low degree of mechanization.

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Facing Uganda's Food Security Challenges

Wilberforce Kisamba-Mugerwa

After positive growth in the 1960s, Uganda's agricultural sector declined by 2 percent a year in the 1970s due to civil strife, economic mismanagement, disintegration of public infrastructure and services, lack of private investment, scarcity of foreign exchange for agricultural inputs, and the collapse of the emerging commercial agricultural sector. The Economic Recovery Programme introduced in 1987 and the structural adjustment policies of the early 1990s have led to a stable macroeconomy and have established a conducive environment for private investment, which has generated robust economic growth.

In the agricultural sector, the focus was on rehabilitation of the infrastructure for traditional exports (coffee, cotton, tea, and tobacco); development of nontraditional exports; removal of physical, technical, and institutional constraints for agricultural development; liberalization of agricultural pricing, trade, and marketing; and strengthening agricultural research and extension. Specifically, the marketing of agricultural produce was liberalized, export taxes were abolished and other market distortions were removed, and regulatory and promotional agencies were set up for key export crops, quality control, and dissemination of market information. As a result of the policy and institutional reforms, the agricultural sector grew 6 percent a year from 1992 through 1996.

Nevertheless, the welfare of subsistence farmers has not improved substantially, although the proportion of the population that lives below the absolute poverty level declined from 56 percent in 1992/93 to 44 percent in 1997/98 according to household expenditure surveys of the Uganda Bureau of Statistics. Household incomes are still low, and food security is not guaranteed.

A 1998 survey conducted by the Economic Policy Research Centre in 14 districts indicated that at any one time, about 40 percent of the population is food insecure. The research system is not closely linked to the farmer. Extension services are not adequate and reach few farmers, while the rate of technology adoption is below 30 percent. Only a third of the total food production is marketed, up to 60 percent of household expenditure is spent on food, and 56 percent of agricultural GDP is subsistence production for

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household consumption.

In addressing food production and security, Uganda has experienced challenges in decentralization, privatization, and globalization. The reforms initiated by the government focus on eradicating poverty and improving the welfare of people by modernizing agriculture. It is envisaged that food production and security can be raised through better accessibility to improved seeds and plant stock, soil and water conservation, sustainable land use, minimizing post-harvest losses, and expanding markets through agroprocessing.

The 1995 Constitution of Uganda emphasizes the people's fundamental rights to social justice and economic development and ensures that all citizens enjoy equal rights, opportunities, and access to education; health services; clean and safe water; and food security. It calls on the state to take appropriate steps to encourage people to grow and store adequate food, to establish national food reserves, and to promote proper nutrition through universal primary education and other means to build a healthy nation.

Performance of Agriculture

Uganda's economy is dominated by agriculture, which contributes 80 percent of employment and 42 percent of GDP. The GDP has grown by at least 5 percent a year for the last 10 years, in contrast with the negative growth rates before the National Resistance Movement took power in 1986. In the last 2 years, GDP has grown by 7.8 percent. Despite this impressive achievement, the per capita income, US$330, is still too low to ensure food security. The situation is exacerbated by unemployment—7.4 percent of a labor force of 8 million. Poverty among the unemployed was reported to be 62 percent in 1998/99.

Uganda is endowed with a benign climate and favorable ecological conditions for the production of a wide range of foods including tropical, temperate, and arid and semi-arid crops. The main producers of this food are 3 million smallholders, who have on average about 2.5 hectares of land each. Large-scale producers are relatively minor, occupying some 40,000 hectares of tea and sugar estates. Foodcrop production dominates the agricultural sector, accounting for 66 percent of agricultural GDP.

Uganda, despite its potential to produce enough food to feed the population and for export, experiences seasonal food shortages and chronic undernutrition in some areas. These disparities are due to uneven distribution of rainfall, market networks, and infrastructure. A national census of the population indicated 38 percent of stunting, with 43 percent in the Western region and 42 percent in the Northern region. Other nutritional characteristics show similar trends. The fact that about 60 percent of household expenditures is devoted to food puts food security at the center of any economic development dialogue.

The problems faced by smallholders in Uganda must be addressed if development initiatives are to have a significant impact on poverty and hence food security. The following are some of the problems we face:

1. Considerable disguised unemployment in the agricultural sector due to low productivity, though the sector employs over 80 percent of the population.
2. Encumbrances inherent in the land tenure system. Landlords acquired large landholdings at the expense of the majority of people; often customary occupants have been enclosed without their knowledge. There is also considerable fragmentation due to population pressure and

primogeniture inheritance of land. The comprehensive Land Act 1998 is yet to be fully implemented. There is an on-going debate on land co-ownership to take care of the land-less, spouses, and orphans and on the need for sustainable management.

3. Chronic shortage of critical inputs to increase rural productivity.
4. Lack of awareness and skills due to ineffective mechanisms for delivering extension services.
5. Weak linkages between projects and macroeconomic policies.
6. Declining soil fertility due to continuous cultivation and rampant land and environment degradation.
7. Uneven distribution of water resources, though the country is rich in bodies of water.
8. Inaccessibility to new technologies particularly high yielding seeds, planting materials, and stock.
9. Lack of a dynamic, viable, and sustainable rural financial system.
10. The impact of HIV/AIDS on assets, incomes, and agricultural productivity.
11. The loss of 30 to 40 percent of food production due to post-harvest handling and disease infestations.
12. Weak farmers organizations to cope with stiff competition.
13. Poor marketing infrastructure, weak information flow, and limited marketability of farm produce in a liberal market.
14. Lack of focused gender-mainstreaming programs that target vulnerable groups.
15. Political strife and instability that led to loss of confidence.
16. Internal strife that led to loss of oxen through rustling.

Macroeconomic Policy Interventions

Recognizing the impacts of these inherent agricultural problems on food security, the government instituted a number of policy changes under the structural adjustment program. Uganda privatized parastatals, liberalized the economy, divested some central government functions, and decentralized and democratized the decision-making process. The constitutional and legal bases for these changes are as follows:

The 1995 Constitution of Uganda enshrined principles of good governance as prerequisites for sustained economic growth, restored the private sector as the main engine of sustainable growth, ensured security of persons and property, guaranteed the rights of citizens, and established accountability for effective management of public funds.

The Local Government Act (1997) provides the basis for decentralization and divestiture of some functions from central government to local governments.

The Land Act (1998) ushered in an enabling environment for registration and land administration under an assured ownership status.

Post-constitutional reconstruction ministries resulted in the reorganization and transformation of government ministries, downsizing of the civil work force, and reduced direct government involvement in production, commercial transactions, and resource reallocation for better efficiency, effectiveness, motivation, and remuneration of staff.

The Poverty Eradication Action Plan (PEAP) 2000 identified the agricultural sector as an entry point for increased rural incomes and food security.

The Plan for Modernisation of Agriculture (PMA), a strategic framework for eradicating poverty through multisectoral interventions, enables the people to improve their livelihoods in a sustainable manner. It is an outcome-focused set of principles upon which sectoral and

intersectoral policies and investment plans can be developed at both the central and local government levels, making people more productive and healthier. The PMA is part of a broader strategy of government for poverty eradication contained in PEAP. Through PMA, the government plans to transform agriculture from predominantly subsistence production to a market-orientation by increasing productivity through improved seeds and planting material, research, advisory services, credit, water harvesting, and sustainable use of resources.

Civil service reform started in the early 1990s. The objective was to strengthen the public sector by producing an effective, efficient, well-remunerated civil service and also to increase efficiency in public resource allocation by ending the direct role of government in production and commercial activities. As a result, the headquarters staff of the Ministry of Agriculture, Animal Industry, and Fisheries was reduced from 1,400 to 440. Also, the Directorate of Agricultural Extension was dissolved, and day-to-day activities of extension service were transferred to local governments.

The functions of the central government ministries were redefined. They include

- policy formulation and review
- sectoral planning
- control and management of crop and animal epidemics and disasters
- control of agricultural chemicals
- regulation of fisheries activities and livestock marketing
- fisheries development
- ensuring technical audit and support supervision to service providers
- training and capacity building
- building agricultural information databases
- coordination, facilitation, and supervision of national agricultural projects and programs
- monitoring and evaluation of agricultural sector
- mobilization of financial and technical resources for the sector

Decentralized Functions

As a consequence of the 1995 Constitution and the Local Government Act, 1997, the following functions, which originally belonged to and were performed by Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF), have been decentralized to the local governments: crop, animal, and fisheries husbandry extension services; entomological services; vector control; district agricultural statistical services; district planning for the agricultural sector; piers, jetties, and fish-landing sites; dipping tanks; control of local fishing; and human resources management and development for all the above.

Divested Functions

To free central government ministries from service delivery functions and to facilitate effective execution of these functions, a wide range of functions once performed by the MAAIF have been divested to autonomous bodies:

1. Agricultural research and development as well as dissemination of research findings through outreach have been divested to the National Agricultural Research Organization.
2. District farm institutes, except those designated as agricultural research and development centers, were decentralized or divested to district local governments.
3. Agricultural colleges were transferred to the Ministry of Education and Sports.
4. Coffee development was divested to Uganda Coffee Development Authority.
5. Cotton development was divested to Cotton Development Organization.

6. Dairy development and regulation was divested to Dairy Development Authority.
7. Planning, coordination, and oversight on extension services was mandated to a parastatal—the National Agricultural Advisory Services.
8. Government farms, agricultural mechanization workshops, and stock farms are divested to the private sector.
9. Class II agricultural mechanization workshops were also divested to the districts.
10. Government is to lease or enter joint ventures with local and international investors on the use of Class I agricultural mechanization workshops, stock farms, and irrigation schemes.

Divested Bodies and Institutions

Five divested bodies have been created: the National Agricultural Research Organization, the National Agricultural Advisory Services, the Uganda Coffee Development Authority (which resulted from privatized Coffee Marketing Board), the Cotton Development Organization (which resulted from Lint Marketing Board), and the Diary Development Authority.

The mandate of the National Agricultural Research Organization (NARO) is to undertake, promote and coordinate research in all aspects of crops, fisheries, forestry, and livestock and to ensure dissemination and application of research results. This is being executed through NARO's institutions comprising 9 research institutes and 12 agricultural research and development centers.

In line with the decentralization policy and the PMA, MAAIF has adopted a policy to decentralize agricultural research to each of the 12 broad agroecological zones in the country. Each zone will therefore have an agricultural research and development center.

The National Agricultural Advisory Services (NAADS) is a newly divested body, under MAAIF, conceived under the Plan for Modernisation of Agriculture. It will promote new approaches for extension delivery to redress past shortcomings and incorporate best practice features to enhance the efficiency and sustainability of service delivery. The philosophical underpinning for the NAADS design is the need to empower farmers, particularly the poor and women, to demand and control agricultural advisory services. It is grounded in government policies of decentralization, liberalization, privatization, and increased participation of the people in decision making.

Impact of the Reforms

The reform program has had a positive impact in a variety of ways.
1. Participatory grassroots decision making has ensured ownership and accountability.
2. Private-sector involvement has made inputs available nearer to the farmer through stockists.
3. There is marked improvement in marketing of produce since private buyers are not restricted to buying farm produce.
4. Farmers are now being paid cash on delivery rather than credit or promissory notes.
5. The feeder road network has improved because local governments are directly responsible for the maintenance of the roads under their jurisdiction.
6. Growing entrepreneurship has led to development of new agroprocessing and storage facilities.
7. These changes have stimulated community demand-driven services like electricity supply, processing facilities, and water and sanitation services.
8. Farmers are learning the advantages of using fertilizers and improved seeds. This

will stimulate increased demand and supply of produce to local markets and milling facilities in areas where SG 2000 has operated.
9. Employment opportunities have been increased in the private sector.
10. Democratization has ensured peace and security, and peaceful change of government.

Challenges of the Reform Program

At the same time, many challenges remain, which need to be studied to find remedies.
1. The lack of subsidies has exposed farmers to market forces making inputs too expensive.
2. Regulatory services need to be strengthened to ensure quality.
3. There is need to strengthen regulation of inputs in the market and to ensure produce quality meets market standards.
4. Although tariffs have been replaced by rigorous quality standards, they are difficult to attain due to the low capacity of the private sector.
5. Stronger links between the districts and the center are needed to ensure the flow of field reports and agricultural data.
6. Most districts still have narrow revenue base and development budgets have not been fully decentralized.
7. Local governments need capacity-building to produce staff able to handle the rising volume of responsibility.
8. There is need to increase farmers bargaining powers through collective farmer groups, associations, and cooperatives.
9. There is need to formulate an effective national food reserve policy.

Conclusion

Uganda's economy is still dependent on agriculture. However, agroprocessing and service sectors are now emerging due to an enabling political and economic environment, which was ushered in by this government. Agricultural production is the domain of the 3 million small households that lack land and capital and are still using rudimentary tools. They have chronic shortages of critical inputs such as credit, draught animals, and fertilizers.

To solve some of these problems, the government has taken bold steps in restructuring ministries, decentralization, divestiture, and privatization of the economy. Although Uganda's economy has started enjoying the fruits of these changes, there are still many challenges that need to be addressed. These changes have exposed poor farmers to stiff local and international competition. The establishment of farmers' organizations, stockists, credit lines, and agroprocessing facilities are some of the pillars we proudly associate with SG 2000 in addressing these challenges.

Opportunities for Growth

Courage Quashigah

A. M. HAROUN

The challenges that face food production and food security in Africa cannot be attributed solely to the high sounding words, privatization, decentralization, urbanization, and globalization. It is apparent that, even at the height of the green revolution of the latter half of the 20th century, sub-Saharan Africa was bypassed. Where was Africa when the drama of miracle seeds unfolded in Asia? Why has African stuck to backbreaking hand-hoe cultivation technology when water buffaloes have borne the brunt of tillage labor in Asia? What have we, as well-traveled, foreign-trained technocrats and politicians done to stem the tide of youth migrating to city centers, leaving behind ageing parents to not only carry on the slow, poor-yielding effort of food production, but also to carry products from farmgate to the roadside by the head load? High-sounding though it may seem, urbanization is fueled by that drift of productive youth from the, apparently, torturous life of the rural environment to the cities.

I want to make this presentation a soul-searching assessment of the opportunities for growth. My argument is that the challenges to food production and food security particularly in sub-Saharan Africa have always been there and should not now be blamed on privatization, decentralization, and urbanization or on globalization. Indeed, to me, all four parameters create inroads along which food production and food security can be enhanced.

Let us break down food security on the basis of food production and income. Is the poverty of our farmers solely an attribute of low production or low incomes? One issue we must face is that of incomes during periods of gluts. Some gluts, it will be noted, are not annual, not even seasonal, but just periods of up to a couple of months, during which farmers must virtually give away hard-earned products for unsubstantial remuneration because they need cash at harvests peaks when prices are severely depressed. How, under such a circumstance, can we expect the farmer to acquire and conveniently pay for new, proven technology in the following season? As I leave you to reflect on this puzzle of the small farmer, which Prof. Borlaug so aptly calls the "double cost/price squeeze on imports and

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outputs," let us assess our four key parameters individually for the opportunities they provide for growth.

Privatization

In Ghana, over 60 percent of the working population is in agriculture. Most are smallholder producers and, by definition, private owners. Marketing of agricultural produce is itself driven by a complex but efficient system of private entrepreneurs, most of whom are women, and hence the popular sobriquet, "market mammies." They not only facilitate time and spatial value addition, but they also often prefinance agricultural production, filling the gap that institutional finance has so woefully failed to satisfy after 43 years of independence!

If one word is missing from the list of parameters, it is "organization." What is needed for farmers to take advantage of privatization and globalization as useful routes to poverty alleviation is to organize themselves not only into efficient production units, but also into marketing entities so that they too can control what to sell (i.e., during periods of depressed prices or later). There is evidence that farm-based associations can benefit from the basic market function of storage. In Ghana, TechnoServe, a small USAID-supported organization, has organized farmers into inventory-credit groups that allow them formal credit for consumption while they wait for output prices to recover from their post-harvest lows. This has made some farm communities gain more value for their farm efforts.

Clearly, the emphasis placed by SG 2000 on farm-based organizations as mechanisms for diffusing extension skills and forming efficient units of production falls in the right direction. The profit motive has a momentum of its own (economists will have us believe) and, therefore, the transformation is bound to be progressive as increased production attracts new ideas for high remuneration marketing. The sound organizational principles of Israeli farmers in their kibbutz units have made them some of the world's best exporters of cut flowers and fruits, despite their harsh environment compared with much of sub-Saharan Africa.

Finally, let me remind all that there is no attractive alternative to privatization. In Ghana, the perpetual poor-performance of the highly capitalized Ghana Food Distribution Corporation and its inevitable ultimate collapse while small private agricultural traders with a turnover of under US$1,000 a year remain vibrant and successful supports this assertion and shows that finance alone is not a sufficient condition for institutional success. Motivation deriving from an anticipation of private gain can often hold a greater store of value.

Decentralization

On decentralization, let me lean on a proverb common to much of sub-Saharan Africa, which says that he who lives in a room knows best where it leaks. It is becoming expensive, and grossly ineffective for central governments to continue to run our economies from the capital. Sharing the national cake to reach consumers in every corner of our respective countries can often be difficult. Indeed it is a rational assumption that may even be a contributor to the dissatisfaction that has ignited abrupt changes in government or ethnic conflict, or both, in much of the developing would over the years. Decentralization offers sub-Saharan Africa countries opportunities for growth. It offers a better way by which local residents, who are thoroughly knowledgeable about their problems, can also select for

themselves a leadership that will consult with them, plan with them, and share with them the everyday tasks of development, be it social, political, or economic. Decentralization affords us the opportunity to build local capacity, check corruption at the microeconomic level, and focus our productive energies on the efficient exploitation of our comparative and competitive advantages.

Urbanization

I have already touched on urbanization in relation to rural-urban migration. I would only add that urbanization affords us the opportunities of larger markets for agricultural output because peri-urban lands will often be too expensive for the low-remuneration agriculture that characterizes Africa.

Globalization

While globalization may have gained renewed importance as a result of the "just-in-time" production and marketing opportunities engendered by computerization and therefore real-time transmissions of information and monetary transfers, it is nothing new to Africa. Kenyatta and Nkrumah, the early leaders of nationalization of Africa, advocated intra-African trade and political union. When they met resistance, they were not discouraged but went on to form smaller but nevertheless still "global" economic and political regional associations such as the Ghana-Guinea-Mali Union and the East African Economic Union, which had a common airline. Thus, it is clear that it was not just early humans who originated in Africa, but that the roots of the idea of a European Union of the modern day can be traced to the minds of great African nationalists like Osagyefo Dr. Kwame Nkrumah.

Today, the markets are open. With the click of a cursor, gold, cocoa, coffee, tea, fertilizer, even human skills such as accounting expertise, university lessons, and the not-so-beneficial trade of pornography can all be conducted in real time on the internet!

Thus opportunities are open for sub-Saharan Africa to exploit our resources and those of others in a competitive spirit. We must, first, however, confront the numerous barriers that limit our potential. To be competitive, the strategy must be for us to take our agricultural sector seriously. To do that, we must be mindful of what the theory books call the necessary six "ins" that must be invested into agriculture: infrastructure, institutions, innovations, initiatives, incentives, and information. To these I shall add integrated crop and livestock production.

While Airbus is even today building the largest passenger plane in the world, the flat-log canoe remains our way of crossing rivers in Africa. Is there any surprise that valuable human capital in lives is lost? While American and Russian technology have permanently set man in space with regular earth-to-space trips to service them, lorries and buses daily kill (through road accidents) more traders in Ghana alone than the total loss of lives in a decade from space travel.

I think we as leaders in Africa must take ourselves more seriously and order our priorities well so that we too can gain from the many opportunities that globalization provides. Globalization teaches us to reach out and exploit the already-invented "wheels" of technology to our advantage. Let's take the simple case of information provisioning. Recently Burkina Faso suffered a maize deficit of 31 percent and Mali 18 percent. In contrast, a bumper harvest in Malawi reduced prices from US$111/t in 1998/99 to a mere US$45/t in 1999/2000. Imagine what

gains we African countries could make from greater trade among ourselves. Perhaps its time a central grains exchange market was established in Africa, or that of the Republic of South Africa was expanded to service all African countries. That would really be exploiting the regional advantage of globalization.

In much of the developing world, we trade. We do not market our output. But one cannot win the global trade war through sheer buying and selling. Our billboards should not only advertise Coke and Camel cigarettes. They should also tell the world of our healthy organic oranges and passionfruit. Let us promote our research, development, and the utilization of our agricultural products and vigorously market them through advertisements and promotions on the global market.

Further, to be beneficiaries of the new global trade order, we must establish truth in labeling. It will be the role of governments to ensure that grades and standards for output quality are set and adhered to. We must ensure that there is a working legal framework to discourage violations.

International trade today requires a good education. We must not only understand the changing needs of the consumer outside our borders, but we must also be mindful of international regulations for trade. Let's be frank: how many of our negotiators read the fine print prior to attending World Trade Organization and other such negotiations? Indeed, how many members of our trade delegations understand what they are negotiating for or against? Invariably we tend to rely on demonstrators to foil World Trade Organization meetings even if it is to us the protocols seem unfair. Let us be up and doing.

Underlying all the above, let us work hard to establish sound macroeconomic environments in our countries. Exchange-rate variability disrupts trade; overvalued exchange rates are punitive to domestic agricultural producers. High inflation leads to high interest rates, which, when they combine with government borrowing, discourage or even crowd out private borrowing. The use of government bonds to mop up liquidity can also signal reduced bank lending as the banks themselves simply settle on the gentle art of purchasing and repossessing government bonds, which are, for them, less risky.

Finally, we must be vigilant in our surveillance of the exploitation of our national resources be they soil, forests, or fishing waters. Sustainability is the key.

Conclusion

Let me summarize by saying that, yes, globalization may mean the flooding of our markets with cheaper exotic agricultural products that not only depress our markets, but do also change our taste habits unsustainably.

Yes, globalization may expose our weak competitiveness. But, if we can organize ourselves well enough; if we can monitor, harness, and regularly update ourselves on changing trends; if as leaders we can create sound macroeconomic environments in our respective countries; if developing countries can see and set information and communication as tools in the extensive commercialization that is now called globalization, then we may yet gain much from a better competitiveness by our participation in the inevitable, ever-increasing sophistication of trade that has itself the oft-misunderstood, even sometimes scary title: globalization.

Challenges to Food Production and Security

G. Edward Schuh

Globalization, decentralization, privatization, and urbanization are topics that touch on the major forces affecting both the international economy and individual national economies. I will begin with a discussion of the forces driving globalization because globalization is one of the most powerful forces and *opportunities* affecting national economies as policy makers seek food security and other goals for their citizens. I will follow that with a discussion of decentralization, for that is a logical consequence of globalization. Then I will discuss the issue of privatization, a process driven in large part by the same technological forces as those driving globalization. Finally, I will discuss urbanization, an issue somewhat independent of the other three topics, and one driven in part by the natural forces of economic development, but exacerbated by bad economic policy.

Globalization

Globalization may be the most debated economic policy topic all around the world. Its two main features are the growth in international trade relative to global gross product and the emergence of a huge international financial market. A logical consequence of the emergence of this large international financial market has been the breakdown of the Bretton Woods fixed exchange rate system and the more general use of flexible exchange rates.

The culpability for globalization is often ascribed to the United States and its purported drive for global hegemony and to the growth and power of large multinational firms seeking larger markets. There may be a little truth in these charges, though it is easy to confuse association with causality. If one digs deeper, the main causal forces are found to be very different. Globalization is rooted in three rather fundamental technological revolutions—in transportation, in communication, in information technology. These three technological breakthroughs have dramatically reduced the costs of economic transactions from afar. They have also greatly increased the benefits from international trade and international financial transactions.

The significance of this process of

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globalization being rooted in technological breakthroughs is that society seldom gives up the benefits from such progress. Hence, the idea that this process could be shut down, or reversed, is misguided. In fact, an important feature of the three breakthroughs is that they have occurred mainly in developed countries. As they extend their reach to developing countries, where 80 percent of the world's population lives, and to the previously centrally planned economies, the process of globalization can be expected to expand and to become more complex.

There are two explanations for the great concern about globalization. The first is that as national economies become more open through the growth in international trade and international financial markets, they increasingly become beyond the reach of national economic policies. The second is that the combination of huge international financial markets and flexible exchange rates makes it possible for national economies to receive large shocks from abroad. These shocks tend to be destabilizing. The consequence of these two factors is that national policy makers lose sovereignty over their economies. They are no longer able to manage their economies as they might like.

This loss of sovereignty is real and is a proper concern of national policy makers. Reform of the international monetary system to reduce monetary instability would reduce the significance of the instability in national economies. However, the problem of openness and the loss of control over the economy from that source would still remain.

There is a positive side to globalization, however, although it seems to be lost in the debate about the negative consequences. International trade and international financial markets make it possible to make more efficient use of the world's resources as resource owners in national economies realize their comparative advantage. This trend raises per capita incomes generally around the world, and that contributes to food security. International trade also eliminates or reduces the limits to economic growth that small countries inevitably experience due to the small size of their economies. With international trade they are able to specialize and engage in an international division of labor. For these countries, international trade is an engine of economic growth and development—the key to their addressing their food security problem.

Finally, there are the more direct effects of international trade in addressing the food security problem. Trade is a means of balancing the shortfalls and surpluses among countries that are inevitable in a sector so subject to weather and production instability.

Decentralization

An important consequence of globalization is that some parts of economic policy making and implementation shift up to the international level and become imbedded in international institutions and organizations, such as the World Trade Organization and the European Union, and regional institutions for economic integration, such as the North American Free Trade Organization. This shift is associated with the loss of sovereignty and mostly involves policy relative to product markets.

Less well recognized, but perhaps more pervasive, is the shift downward to the state, or province, and local level of other parts of economic policy making and implementation—those associated with incomes policies and resource (environmental and land) policies. These are critical elements of policy for agriculture and agricultural development.

It is less obvious why these components of policy should shift downward. However, keep in mind that national agricultural policy, for example, typically has multiple objectives. The essence of national agricultural policy becoming less effective is that it becomes excessively costly in a cost-benefit sense. It eventually is abandoned as some of its components such as trade policies shift upward, but the problems of incomes and resource policies remain. In the search for policy effectiveness and efficiency, the elements of policy that affect incomes and resources are shifted down to the state and local level where they can be more carefully tailored to local resource endowments. This is the second part of the larger search for efficiency that the globalization of the international economy creates.

Despite the pervasiveness of this downward shift in economic policy making and implementation, there has been little effort to strengthen state and local institutions, although the World Bank and bilateral international development institutions are giving it increasing attention. Note that for agricultural modernization, the critical institutions are agricultural research and extension—important sectors delivering public goods. Education and health care are additional public goods sectors that should be decentralized, as well as whatever incomes policy a country has.

A viable criticism of such systems as they evolve in more decentralized forms is that they lead to uneven and unequal distributions of income in a geographic sense. The problem is that poorly endowed regions find it difficult to raise themselves by their bootstraps and to compete with more well-endowed regions. That is a domestic political issue, however, and one that has to be resolved by national fiscal policy and inter-regional transfers of resources.

We should not lose sight of the positive benefits from this shift downward in policy making and implementation. For example, it makes it possible to adapt the programs of local institutions to local resource endowments and thus for them to be more efficient. At the same time, it makes it possible for democratic processes to exercise control over the local institutions. Thus, although there may be a loss of sovereignty at the national level, there is a gain in sovereignty at the local and state or province levels. These are certainly positive gains. Moreover, for agriculture, the gains in fiscal efficiency permits resources to be freed for poverty alleviation and the modernization of the sector—important keys to addressing the food security problem.

Privatization

I want to make only two points about privatization. The first is that privatization is all too often construed as an ideological issue. That is, it is too often articulated as the free-enterprise, capitalist system winning out over the socialist or communist system. Although there may be an element of truth in such an assertion, the more important point is that privatization is driven by the same technological revolutions that have driven globalization and the shifts in where policy making and implementation take place. Markets and private ownership are simply more efficient means of allocating and organizing a nation's resources, and the process of globalization creates a drive for efficiency if countries are to keep up with each other. Privatization and increased reliance on markets are the means to that end.

My second point is that some international organizations and some popular opinion leaders tend to push the need for privatization too far. They tend to argue

that all economic activities should be privatized and that nothing should be left in the public sector.

Even the strongest adherent of the free-market approach to organizing a nation's resources, however, knows that there are public goods that have to be provided by the public sector. Public goods are those that will not be provided by the private sector. Moreover, they are typically the goods and services that have a high social rate of return and are critically important to economic development. They include such things as the production of new knowledge—research, education, extension, and health care. Each is critical to increasing per capita income and hence to addressing the problem of food security.

The discussion of what sectors should be in the private sector and what sectors should be in the public sector is all too often garbled and, as noted above, drifts into ideological debates. This issue should be removed from the arena of political debate. There are sound empirical tests for which sectors should be in the private sector and which in the public sector. Policy makers should make use of these tests.

Urbanization

As one looks around the world, the process of urbanization is almost as significant as globalization. People are leaving rural areas in large numbers and accumulating in urban centers, often arriving there poorly equipped for gainful employment and creating large pockets of poverty in inner cities and ghettoes.

It is inherent in economic development that labor has to leave agriculture. It is not inevitable, however, that it has to accumulate in large cities. In fact, this accumulation, often premature, is for the most part inefficient and counterproductive for economic growth and development.

One of the reasons labor has to leave agriculture as economic development proceeds is that the demand for food increases at a slower pace than the demand for other goods and services as per capita incomes rise—the so-called Engel's Law economists like to emphasize. That structural condition makes it almost inevitable that labor has to leave agriculture as per capita incomes rise. The labor is needed to produce the other goods and services consumers demand as per capita incomes rise and is shifted in that direction by the change in relative incomes.

This process is exacerbated by the modernization of agriculture, however. That modernization typically causes productivity in the agricultural sector to rise faster than productivity in the non-farm sector, thus furthering the need to adjust labor out of the sector.

There is nothing about this process that means that labor has to accumulate in large urban centers or that it has to proceed prematurely, as it has in so many countries. The accelerated pace of urbanization since World War II has been largely due to economic policies that have discriminated against agriculture. High levels of protection for the manufacturing sector in pursuit of import-substituting industrialization, together with overvalued currencies, have shifted the domestic terms of trade against agriculture. That pushes the labor out of agriculture prematurely.

Two additional features of economic policy are important contributors to the problem. First, governments typically underinvest in the provision of education and health care for the rural population compared with the urban population. That requires that rural families migrate to urban centers to obtain education for their children and health care for their families. Second, governments typically provide

large subsidies for the location of nonfarm activities in urban centers—subsidies for public services in urban centers, large investments in urban transportation at the same time rural transportation is neglected, and fiscal incentives and subsidized credit for industrialization.

The premature migration of labor from rural areas is counterproductive in two senses. First, it drains human capital needed for economic development from the rural areas and provides it as a gift to urban centers. Second, as the labor accumulates in urban centers, it imposes large costs on those centers in the form of congestion, damage to the environment, and a rise in the cost of providing public services such as sewage and water supply. It is difficult to imagine a more counterproductive set of policies. It is also difficult to imagine a set of policies more counterproductive for promoting increases in per capita incomes in agriculture. Labor does indeed need to leave agriculture if it is to receive increases in per capita incomes. The need to migrate long distances to seek gainful employment slows that process because it is so costly and because it requires living in a strange cultural environment and away from the extended family and friends and relatives.

It is not inevitable that this process take place prematurely as it typically does. More rational trade and exchange-rate policies and less discrimination against agriculture would reduce the incentives to leave agriculture. The elimination of subsidies for urban areas would reduce the accumulation of economic activities in urban areas. And greater investments in the education of the rural population and in rural infrastructure would make it attractive for nonfarm activities to locate in rural areas.

A combination of such policies will reduce the drain of human capital from the rural areas, thus leaving it there for both the modernization of agriculture and the development of nonfarm activities. Thus the alternative employment that labor needs would be close to where it now resides.

Such efforts at rural development, which are the key to reducing and eliminating the pervasive poverty in rural areas, are central to addressing an important dimension of the food security problem. Rural areas contain a disproportionate share of poverty in most countries. Not only will this problem be addressed, but some portion of the human capital will remain in agriculture where it will contribute to the productivity-enhancing modernization of agriculture.

Concluding Comments

Three significant technological revolutions are changing the face of both national economies and the international economy of which they are a part. At the same time, they are changing the places at which economic policy making and implementation take place, and the way those processes are organized. The implications for government and governance are equally important.

As we think about the modernization of agriculture, we tend to focus our attention on promoting technological change in agriculture. The implication of the powerful forces at work in the international economy is that we need to give a great deal more attention to institutional and policy innovations. In the absence of such innovations, agricultural modernization will be restrained, and the rate of return to our investments in agricultural research and extension will be limited.

Decentralized Farmer-Owned Extension in Uganda

Silim Nahdy, Francis Byekwaso, and David Nielson

SILIM NAHDY

As the result of macroeconomic and development reforms implemented since 1987, Uganda is now recognized as one of the few countries in sub-Saharan Africa making real progress toward economic development and an assurance of social equity.

In spite of remarkable advances, however, Uganda's GDP per capita is only US$330 and at least 40 percent of the population lives in poverty. The economy remains largely dependent on donor assistance and on agriculture for both food self-sufficiency and foreign exchange earnings. Also, the economic gains have in general not been matched by social or welfare advances. Thus, although the absolute poverty rate in Uganda has declined substantially—from 56 percent in 1992 to 44 percent in 1997—not everyone has benefited. The rural poor in particular have remained outside the monetary economy, producing mainly for subsistence. Foodcrop production still accounts for 65 percent of agricultural GDP, and agriculture continues to be characterized by low productivity. The challenges of rural economic transformation and poverty eradication are thus linked to progress in the agricultural sector.

In 1997, to meet the nation's poverty and rural development challenges, the government designed the Poverty Eradication Action Plan (PEAP), a comprehensive medium-term economic development plan. The major objectives of PEAP are eradicating mass poverty, raising the incomes of smallholder farmer households, and improving the quality of life of the vast majority of the population. The primary strategy is to increase earnings from productive employment, including self-employment, with active participation by all in economic decision making. Strong emphasis continues to be placed on liberalization and privatization of goods and services delivery and on progressive commercialization of public services. PEAP has been supported by the donor community through the Highly Indebted Countries Initiative for debt forgiveness. Uganda is actively channeling these resources to social development, focusing on rural transformation and modernization of agriculture.

Agricultural transformation is being guided by the Plan for Modernisation of Agriculture (PMA), designed to move agriculture from predominantly subsis-

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tence farming to commercial farming. PMA aims to overcome the key factors undermining agricultural productivity: poor husbandry; low use of improved inputs; limited access to technical advice; poor access to credit; poor transport, communication, and marketing infrastructure; and insecure land tenure rights.

Based on these needs, five programs have been identified for development and implementation under the PMA. The principal one is the National Agricultural Advisory Services (NAADS). The rationale for NAADS is the failure of traditional extension to bring about greater productivity and expansion of agriculture, despite costly government interventions. The fundamental aim of the program is to develop a demand-driven, client oriented, and farmer-led agricultural service delivery system targeting the poor and women in particular.

Strategic Framework for NAADS

The analysis underlying the PMA suggests that the low productivity of Ugandan agriculture today is not the consequence of a lack of research or extension activity. In fact, both research and extension have been well funded in the recent past. The low productivity of Ugandan farmers stems from poorly functioning farmer-extension-research linkages and the consequent failure of the research and extension systems to effectively respond to the real needs of the farmers. Therefore the PMA gives priority to achieving greater relevance and effectiveness in both the research and extension programs. Accordingly, emphasis is placed not only on enhancing extension and research efforts but on doing so under institutional reforms that ensure effectiveness and increased responsiveness to farmers' needs, as well.

The Vision and Mission

The government's role under the PMA is to ensure that a conducive policy environment exists for private entrepreneurs to invest in the agricultural sector. For agricultural transformation, increasing farmers' access to information and knowledge and promotion of productivity-enhancing technologies are the key elements. In addition, attitudinal change by policy makers, implementers, and the farmers themselves is an important prerequisite for transformation.

The vision, mission, and strategy for agricultural extension is aligned with the PMA strategy, while at the same time embracing the overarching government policies of decentralization, liberalization, privatization, and increased public participation in determining the national destiny. Given this background, the PMA envisions that NAADS will be, "a decentralised, farmer-owned and private-sector-serviced extension contributing to the realization of the agricultural sector objectives." The mission of NAADS is, "increased farmer access to information, knowledge, and technology through an effective, efficient, sustainable, and decentralised extension with increasing private-sector involvement in line with government policy."

The Context

The main contextual issues related to the NAADS strategy are

- increasing the effectiveness, efficiency, and sustainability of the extension delivery service (including financing, private-sector participation, farmer responsiveness, decentralization, and gender sensitivity)
- increasing farmers' access to knowledge (education), information, and communication

- increased access to efficient productivity-enhancing technologies
- aligning extension to government policy, particularly privatization, liberalization, decentralization, and democratization
- creating and strengthening linkages and coordination within the overall extension services

Choice of Options

Studies in Uganda show that agricultural extension has been unfocused, that it reached few farmers, and that its messages and approaches were ineffective. Financing and delivery mechanisms were inefficient and unsustainable. Generally, the extension system was characterized by too much bureaucracy and manned by civil servants with low responsiveness to farmers' needs, and it was largely susceptible to diminished budgetary supports. The situation was aggravated by lack of financial and performance accountability and client ownership.

The NAADS strategy is premised on a comprehensive consideration of the characteristics of Uganda's farmers and on financing and delivery of extension as critical components in service provision, drawing on lessons from other countries.

Characterizing the Ugandan Farmer. The NAADS strategy reflects farmer types, status, and resource categories within three broad inter-linked groupings (fig. 1 and table 1). The main categories of farmers are subsistence farmers, market-oriented farmers, commercial farmers, a mix of subsistence and market-oriented farmers, and a mix of market-oriented and commercial farmers.

Fig. 1. Farmer categories.

The NAADS strategy aims at gradually shifting farmers from subsistence to market oriented and ultimately commercial. The strategy is evolutionary in nature, situation differentiated, gradual, and multidimensional to ensure that resource-poor farmers are served.

Extension Financing and Delivery Systems. Under the PMA, a clear distinction is made between financing extension and delivering extension as two critical components in service provision. In this case, four major models and several overlaps of service provision involving different combinations of public-sector/private-sector finance and delivery emerge. As shown in figure 2, the options for extension financing and delivery are

- private finance and public delivery
- public finance and private provision
- privately financed extension and private delivery of extension
- public finance and public delivery of extension
- private finance and a mix of private and public delivery of extension
- a mix of public and private finance but with private delivery

Table 1. Farmer definition matrix.

	Characteristic		
Variable	Subsistence	Market oriented	Commercial
Objective	Mainly for home consumption	Home consumption and market	Market
Technology	Indigenous/traditional, low input/output	Some improved technology but still low output	Improved/advanced and high output
Activities	Grow crops/livestock (staples)	Grow crops/livestock for food and cash	Specialized
Attitude	Risk averse	Cautious risk-takers	Risk takers

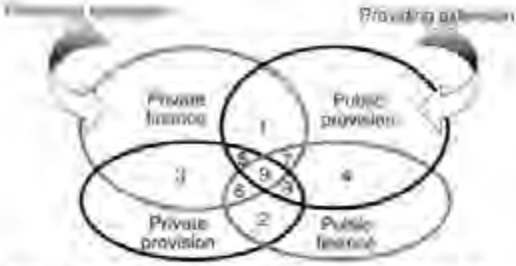

Fig. 2. Alternatives for financing and provision of extension.

- a mix of public and private finance but with public delivery
- public finance and a mix of public and private delivery of extension
- both public and private finance and both public and private delivery of extension

Table 2. Experiences with privatization and commercialization of extension in various countries.

County
New Zealand
Complete commercialization of public extension
Netherlands
Cost recovery from users
Germany
Many modes: Completely commercialized/ privatized farmer associations and voucher system
Denmark
Extension services rendered by farmers' organizations
China
Contracting subject-matter specialist by farmer groups
Ecuador
Sharecropping between farmers and extension staff for a profit
Costa Rica
Voucher system targeted at small farmers to contract private extension
Chile
Public financing and various modes of private delivery
Colombia
Public financing and various approaches of private delivery
Ethiopia
Private service centers
Turkey
Cost sharing of advisers
Kenya
Public financing and extension associated with contract out-grower schemes

The NAADS program will initially use option 2, for subsistence farmers, but will gradually promote elements of private financing as farmers become market-oriented.

Lessons from Abroad. The NAADS strategy also draws from the lessons and experiences in other countries where there has been a steady shift from public to private agricultural extension service (table 2).

Although there are some variations in extension approaches in these countries, they have several common features:

- a shift from the concept of farmers as beneficiaries to users and clients
- a shift from a system operated by public employees to that operated by private institutions
- a shift of the public sector, the provider of services, to the role of stimulating the development of a private market for extension services

The above lessons and experiences were useful in the design of NAADS.

The NAADS Program

Principles

The principles through which the NAADS is anchored into the PMA are

- empowering farmers and building demand for both research and agricultural advisory services
- targeting agricultural services to poor farmers, who constitute the majority
- mainstreaming gender issues
- deepening decentralization to bring control of services nearer to farmers
- commercialization—including intensification of productivity and specialization
- participatory processes in planning, contracting, monitoring, and evaluation
- managing natural resource productivity
- increasing institutional efficiency by contracting out services and better linkages

- harmonization of donor-supported projects with PMA principles

Farmer Empowerment. Farmers are said to be empowered when they have access to and control over structures and processes that transform their natural resource assets into outcomes that they desire. This goal is difficult to achieve in the delivery of services for individual, isolated, resource-poor farmers. Therefore one prerequisite for empowerment of farmers is to enable them to create institutions through which they can act collectively and get their voices heard in decision-making processes. Indeed, all over the world, farmers organize to manage their natural resources more effectively, to expand their access to natural resources, to gain access to services, to lobby for their needs, and to make their voices heard.

However, even when organized, poor farmers may not have the means to influence the direction of development activities implemented on their behalf. Therefore special mechanisms have to be developed to enable them determine, control, and own the development agenda. The mechanisms include their participation in planning, in procurement of goods and services, in setting of standards for quality control and regulations, and in monitoring and evaluation of development processes as well as increasing their capacity to make informed choices. Farmer empowerment under NAADS also aims to enable farmers to access information and resources to shape policies that affect them and thus have control over the provision of agricultural services. Implementation of all the components of the NAADS program will embody mechanisms of farmer empowerment.

Poverty Targeting. According to several recent studies, poverty in Uganda is a complex and multidimensional phenomenon. First, it is defined by the poor people themselves as not only "a situation of perpetual need for the daily necessities of life . . . ," but also "a feeling of powerlessness to influence the things around you." Thus, poverty has many influencing factors that are interlinked and often interdependent and include access to natural resources, human factors, financial assets, social capital, and physical infrastructure.

Second, although poverty has declined in Uganda in recent years, it is still widespread. The latest estimate (1997) of the absolute poverty rate is 44 percent. The rate varies across socioeconomic lines. For instance the rural poverty rate is estimated at 48 percent compared with an urban rate of 16 percent (Appleton 1999). The regional poverty differences are dramatic as well, ranging from 59 percent in the North to 28 percent in the Central region.

Recent reports have commonly categorized the poor into two main groups: the destitute, who have no assets, and the poor, who have limited assets, skills, and knowledge. The latter are commonly referred to as the economically active poor. Generally, the economically active poor, of which women constitute the majority, depend for most of their livelihoods on smallholder agriculture in rural areas. If assisted, the economically active poor have the potential of pulling themselves out of poverty, while the destitute need safety-net type of interventions.

Third, causes and manifestations of poverty are not uniform. Some factors are common, such as insufficient food, low crop yields, few productive assets, inadequate income for basic costs, restricted access to services, large families, lack of social support, and poor health. Others are, however, specific to a given situation, such as social or physical isolation, ethnic discrimination, low social capital, insuffi-

cient infrastructure development, and insecurity.

The factor pertinent to the conceptualization of agricultural advisory services is that, in general, limited access to services underlies the perpetuation of poverty. Therefore, interventions to address poverty by improving delivery of agricultural services must be rooted in comprehensive analysis of poverty to ensure that members of vulnerable groups—for whom subsistence agriculture tends to be the main livelihood—are empowered to participate and benefit.

Gender Mainstreaming. In Uganda, women lag behind men in education level and income. Women have limited economic opportunities due to their societal roles and responsibilities, their low social status, relationships with men, lack of ownership and access to productive assets, low participation in decision making, and high workload. Consequently women, particularly heads of households and widows have the highest vulnerability to poverty—ahead of male youth and large male-headed households. The superimposition of the devastating consequences of HIV/AIDS on these groups compounds their vulnerability.

Women in Uganda play a pivotal role in agriculture, providing most of the labor force. However, few women own or control land or other productive resources. This, coupled with women's low socioeconomic status, renders them generally unable to make key decisions about such resources, production patterns, and use of benefits accruing from farm production. Most women have remained strictly "users" of assets and productive resources where such resources exist in households. Women are still excluded from decision making for many agricultural activities.

Further, men and women have distinct roles within the farming systems. They produce different crops and livestock. Men tend to concentrate on cash crops (coffee, cotton, tobacco, and, lately, cereal production for the market), while women concentrate on the production of foodcrops mainly for family consumption (and simultaneously providing much of the labor in cash-crop production). In livestock production, women concentrate on poultry and small ruminants (mainly rabbits, pigs, goats, and sheep), while men concentrate on large stock (mainly cattle). Another significant gender dimension in agriculture in Uganda is the large and increasing number of female- and orphan-headed households, which currently constitute about one-third of all rural households as compared with 15 percent in 1991.

Fortunately, there is a strong national policy framework for, and high-level political commitment to, mainstreaming of gender issues into the national socioeconomic development agenda. The National Action Plan for Women emphasizes the need for equal opportunity for males and females, equal rights, and affirmative action to close gender gaps in all sectors including agriculture.

The PMA, which embodies the policy, framework, and strategy for transforming the agricultural sector, has superseded the 1993 Gender Policy for the agricultural sector, a state-led approach to gender mainstreaming. The PMA reconciles the 1993 Gender Policy for the agricultural sector with recent economic reforms and poverty-eradication programs. Particular to the agricultural sector are privatization, market liberalization, and decentralization. The PMA recognizes that persistent gender disparities hamper agricultural productivity, economic efficiency, and growth and that public policy can make a difference in closing the gender gap through public-sector investments in

advisory services among others.

There are, therefore, no hindrances to mainstreaming gender in the design and implementation of NAADS. In NAADS, all interventions will be gender-responsive and gender-focused so that both men and women are included.

Deepening Decentralization. According to the provisions of the Local Government Act, 1997, local governments are responsible for liaison with the central government, district-level policy issues, planning, coordination, monitoring, and implementation of development programs including those for agricultural extension. The implementation of the programs, however, is still largely controlled at the district. Consequently, the level of ownership at the grassroots' level remains low, and the rural communities' control of delivery of services is remote. Because of this, under the PMA, deepening of decentralization of service delivery has been recommended. Further devolution of functions and services by the districts to lower levels of local government is an objective that will be embodied in the NAADS program. Sub-counties will be the lead local government organs for planning, implementation, funding, monitoring, and evaluation of the NAADS program. Where necessary, the NAADS program will help sub-counties to acquire the necessary skills and enhance their capacity for managing the NAADS processes.

Commercialization. Farmers in Uganda may be divided in three broad categories. Subsistence farmers make up nearly 80 percent of the farming community. They use traditional practices to produce staples mainly for home consumption with hardly any surplus for sale. They are risk averse. Market-oriented farmers, the second group, produce both for home consumption and market and to some extent use improved methods of production. The last and smallest category is commercial farmers, who are highly specialized, utilize improved technologies, and produce purely for cash. The PMA strategy aims at gradually shifting farmers from subsistence through market-oriented production in the medium term and ultimately to commercial production in long term. As a principle therefore, the NAADS program will disaggregate the needs of the different farmer types and will have different approaches for providing advisory services.

Fostering Participation. Many past efforts in agricultural development have had limited success and long-term effectiveness because of lack of ownership by the key stakeholders—the farmers. The underlying cause has been lack of participation in the development process as a result of the communication gap between farmers and development workers. Consequently many approaches have been developed and applied for bringing the disparate voices of men and women farmers into the rural development process.

Although no approach is a panacea, it is now accepted that, if the development initiatives being undertaken for the benefit of farmers (whatever their category may be) are to lead to lasting results, farmers must be actively involved in identifying needs, setting priorities, formulating plans, and monitoring and evaluating outputs and outcomes. In addition, the participatory processes provide learning platforms for all involved. The development workers acquire better understanding of and insights into the vast wealth of what farmers know, and the farmers gain confidence in the collective power that they can wield to steer development processes in the directions of their choice.

While the NAADS program will not be

prescriptive on the approach and methodology for participation, it will embody the principle in all its process. It will also act as an environment for the evolution of appropriate participatory approaches for the unique and diverse conditions of farmers that prevail in Uganda.

Managing Natural Resource Productivity. PMA envisions profitable, competitive, dynamic, and sustainable agriculture. Explicit in this vision is a concern for sustaining the productivity of the natural resources. NAADS will reflect this concern by ensuring that the facilitatory processes—through which farmers identify their needs, and plan, monitor, and evaluate their activities—address the major factors affecting productivity of the natural resource base. This special area of concern may require strategic interventions, so NAADS will support the initiation of a special land husbandry and management strategy.

Increasing Institutional Efficiency. The transformation of farmers' livelihood assets into the outcomes that they desire takes place within institutions that may be organized or exist as sets of accepted rules. Failure to access and control institutions is a primary cause of perpetuating powerlessness among the poor and women. As a principle the NAADS will, as a first option, aim at defining new roles and functions for existing institutions to make them more responsive to the advisory services needs of poor farmers and women. Efforts will be made to minimize the proliferation of new institutions, but where necessary, new organs will be created to increase the effectiveness of farmer participation in the NAADS decision-making processes.

Privatization. In line with government policy of moving away from direct service delivery, NAADS will, as a principle, rely on the private sector as the first option for providing advisory services to farmers. Mechanisms will be developed to enable public funds to be used for procuring the services in a way that ensures that the poor and women are not marginalized. During the formative stage, capacity building will be undertaken for private institutions including NGOs and commodity associations that may wish to develop the capacity to provide extension services. The government's role will be mainly limited to establishing policies, rules and regulations, and standards and doing monitoring and evaluation. The NAADS program will contribute to activities that are relevant to helping the local governments perform these functions with respect to the advisory services.

Market Access. In the past, farmers have responded positively to government calls to increase production. More often than not, the markets have not responded to the increased production in a way that favors increased benefits for the producers. To increase productivity and profitability, advice to farmers must concern both how to produce more and how to market the produce. NAADS will as a principal require that the advice to farmers include market information. Linking farmers to markets will be one of the legitimate activities that advisers will be contracted to undertake.

Goals, Objectives, and Success Indicators

The development goal of the NAADS program is to sustainably enhance rural livelihoods by increasing agricultural productivity and profitability. The purpose is to ensure that farmers apply improved husbandry and management practices and identify and solve their technical and marketing problems using appropriate and modern knowledge and technologies.

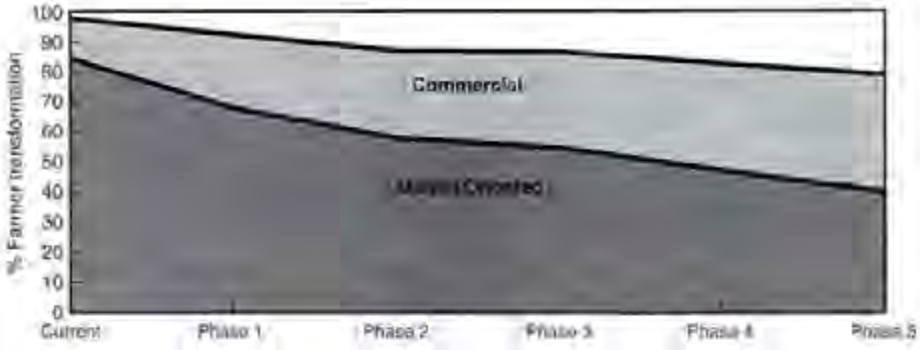

Fig. 3. Projected farmer transformation in the NAADS program.

The specific objectives are to

- increase the availability of appropriate advice and information to all the farmer types in an equitable and cost-effective manner
- make available appropriate technologies in sufficient quantities to meet identified farmer needs
- ensure the quality of advice and information provided to farmers by service providers
- enhance the capacity of private service providers to meet farmer advice and information needs
- develop appropriate farmer-controlled institutional structures and processes for managing NAADS at all levels

To fulfill the objectives within the framework of NAADS principles, the program is designed to transform long-established attitudes, structures, and practices hitherto used in the public management of the agricultural sector. In particular, the planning, implementing, monitoring, and evaluation of advisory services will be shifted to farmers, with the local governments playing a predominantly facilitatory role.

The measure of success of the strategy will be agricultural transformation, increased agricultural productivity, sustainable natural resource productivity, institutional sustainability, and increased agro-industrialization.

Agricultural transformation will be shown by rate of farmer commercialization and proportion of farm output marketed, increased specialization and use of more productive inputs, improved overall food security, increase in profitability, change in farmer attitude, and increased value adding. Specifically the proportion of subsistence farmers should decrease from the current 82 percent to 40 percent within 25 years, i.e., an average shift of about 2 percent annually (fig. 3). In addition, the proportion of commercial farmers should increase from below 5 percent to at least 20 percent over the same period.

Increased agricultural productivity will be shown by increased total factor productivity from land, labor, capital input/output, and organizational ability. This will focus on decreasing the gap between yields achieved at the research centers and those of farmers from the current 80 percent to less than 30 percent within 25 years.

Sustainable natural resource productivity and institutional sustainability will be shown by sustainable use of agricultural resources and maintenance or improvement of the natural resource base despite increased productivity and farmer transformation. It will include institutional sustainability as reflected in increased participation and financing and improved standards.

Increased agro-industrialization will be shown by meeting export and domestic requirements for tradable commodities and products.

Program Components

The NAADS program has five components. The philosophy underlying each component and the mechanisms that will be used to ensure that the NAADS basic principles are embedded within the approach used to generate the outputs are described below.

Advisory and Information Services. NAADS will support initiatives by farmers, working together in groups with their sub-county government, to contract agricultural advisers to deliver identified priority services. Matching grants will be made available from the district and national levels of government to help farmers finance the contracts. Specific activities to be funded include orientation and group mobilization, participatory planning, technical advisory services, and information and communication.

Technology Development and Linkages with Markets. NAADS will support the multiplication of technologies at sub-county and district levels. Creation of linkages among farmers, advisers, and researchers will be promoted. Farmers will have access to funds to contract researchers to work with them on technology development and adaptation and also to link with markets.

Quality Assurance. NAADS will support the establishment of a regulatory framework for service providers by setting and enforcing standards for qualification and performance.

Private-Sector Institutional Development. To accelerate the transformation of service providers, a program will be established to retrain private service providers and upgrade their skills. Leaders of farmers' organizations will be trained in management and leadership. Funds will be provided to facilitate the restructuring of the local government's human resource structure consequent to the privatization of the services.

Program Management and Monitoring. NAADS will establish public institutions at both the national and local government levels to play their statutory roles with respect to NAADS and will support their efforts. This will include monitoring and evaluation of program activities and establishment of management information systems.

Program Scope, Target Group, and Phasing

To participate in NAADS, each district and sub-county will have to satisfy established criteria and a few specific to NAADS. The services to be provided will be solicited by and based on contracts arranged at the behest of the eligible beneficiary (farmers, farmers' groups, local governments on behalf of farmer groups, and the NAADS board and executive, for national or agreed thematic interventions). Potential service providers will need to meet a set of criteria of professional competence standards.

Individual farmers can participate in NAADS in two main ways: as members of a farmers' institution (group or forums) that can be a named party to a service contract or as residents of a village, parish, or sub-county where a service provider has a contract with the sub-county to provide advisory services.

For a farmers' forum to be recognized as a representative body of farmers for NAADS purposes within the sub-county, it should be composed of representatives of farmer groups or institutions and at least 30 percent of the groups represented should be women's groups, 20 percent

youth groups, and 5 percent disabled groups.

Resource Allocation and Targeting

NAADS central government program funds will be allocated to districts, based on the consolidated farmer groups plan and budget submitted by each sub-county farmer forum.

To participate in the program, districts and sub-counties have to meet the NAADS minimum conditions, of which counterpart contributions is one. Disbursement of funds will follow the process established for the government under the Poverty Alleviation Fund projects. Sharing of NAADS funding at the national, district, and sub-county levels will utilize similar criteria of population and land area to those of other projects, but with an element of bias to the poorer areas.

Program Costs and Financing

Program funds will be disbursed predominantly to sub-county governments, which will account for approximately 77 percent, with district and national level disbursement accounting for 11 percent and 12 percent, respectively. The program cost will be financed by the government through national, district, and sub-county funding, by donor support, and by farmer contributions.

Organization and Implementation

The Ministry of Agriculture, Animal Industry, and Fisheries will have overall national responsibility for the program, with oversight by the Ministry of Finance, Planning, and Economic Development, while sub-county and district local councils and administrations will be responsible for support and supervision at their levels. Primary responsibility at the grassroots' level will be vested in farmer groups, which will be the prime clients of the advisory services, and their elected farmer forums at sub-county, district, and national levels.

The NAADS board will advise on program policy and strategy issues and help, supervise, and support the NAADS executive. The NAADS secretariat will form the program management. Since most routine management decisions and functions will be the responsibility of the appropriate farmer forum, sub-county, and district personnel, the major tasks of the secretariat will be overall planning, technical guidance and oversight of operations, and performing catalytic and promotional functions that advance program coverage and impact.

Local governments will cover most of the local administrative and regulatory aspects and support requirements for NAADS. Parish, sub-county, and district councils will be responsible, at their respective levels, for policy, assessment of effectiveness, and general oversight of NAADS, and voting of counterpart financial contributions.

Farmer institutions will be the cardinal element of the program, and their effectiveness will be the principal determinant of NAADS and PMA success. The formation of farmer groups is intended to create institutions for farmer empowerment.

Service providers may be individuals, small groups of advisers, consultancy and professional companies, parastatal agencies, academic institutions, and commercial companies. A major concern of NAADS will be to foster development of the service provider sector. Service providers will arrange and perform the advisory, research, and development services in response to the demands of farmers, sub-counties, districts, and the NAADS executive.

Legal Framework

The main legal and statutory issues relating to NAADS are resolved by the NAADS Act 2001, which renders NAADS a semi-autonomous organization under the Ministry of Agriculture, Animal Industry, and Fisheries. Key legal requirements are establishment of the NAADS board and executive as a statutory parastatal organization, recognition and registration of farmer institutions as a key step for farmers to be empowered, and tendering and contracting in which it is envisaged that contracting of service providers will be undertaken mainly at the sub-county level with decisive involvement of farmer representatives.

Implementation Mechanisms

To support the overall NAADS program, donors will pool all new resources coming on-stream through the "NAADS-earmarked" budget support. Under this arrangement, donors' funds will be merged with the government's own resources. Matching contributions from district and sub-county levels will be mandatory. NAADS program funding will be used under government procedures, legislation, and regulations. NAADS planning and budgeting process is founded on government's annual budgeting cycle. NAADS planning will build on government's planning and budgeting process.

The NAADS planning and operations structure encompasses three main categories of activities: the principal planning process from the grassroots up to national level, a liaison channel for consultation and dialogue between the different levels, and the coordination, oversight, and service contract deployment channel. The program intervention phases have been developed as follows: establishment of an interim institutional arrangement; mobilization, sensitization, and inventory taking; and trail-blazing in selected districts.

Given the hard budget constraints, the main principle guiding expansion will be to ensure that spending is cost-effective. This will be guaranteed by a system of conditionality for participation of districts and sub-counties in the NAADS program.

Financial Management and Reporting and Procurement

NAADS financial management will follow government and local government legislation and regulations, including the Local Government Financial and Accounting Regulations (1998). NAADS funding will be channeled under conditional modalities. Procurement of goods and services will be in accordance with government guidelines, subject to donor-group satisfaction with any amendments agreed that are necessary to meet NAADS requirements. The principal instruments for the provision of services and for most eligible expenditures will be contracts that are formal and legally binding, performance-determined, and time- and value-bound. The entities that will be mandated to award contracts will be farmers' forums in conjunction with sub-county or district administrations, sub-counties and districts themselves, and the NAADS executive.

Monitoring and Evaluation

The delivery of NAADS inputs and the achievement of outputs will be monitored. A logical framework has been developed that sets out the inputs, the expected outputs, and the main monitoring and evaluation indicators that will be used. It also summarizes the monitoring and evaluation process. Monitoring will

be concerned with program performance in delivery of individual services and supplies, timing and coordination of activities, and impact, as set out in the logical framework and cost tables. Monitoring will take place at four levels: in the field and in community, village, and farmer group activities; at the sub-county level; at the district level; and at the NAADS office.

Financial and Economic Cost-Benefit Analysis

Economic analysis undertaken using a sector program approach and farm-enterprise-based analysis indicate that the NAADS program is economically viable. This finding is based on advisory services contact (direct and indirect) with 40 percent of farm households in target sub-counties and an adoption rate of 50 percent by these households. As a result over 15 percent of farm households in target sub-counties would adopt improved practices, increasing productivity and returns. By year 7 of phase 1, this will involve approximately 420,000 farm households in 40 districts, with the vast majority of the beneficiaries being smallholder farmers.

NAADS is expected to generate several types of benefits. These can be summarized, by stakeholders, as follows:

The public sector will benefit from an agricultural advisory service that is more efficient and more popular than in the past.

Farmers will benefit from an agricultural advisory service that is more relevant and responsive in helping them to raise their incomes in a sustainable way through achieving greater productivity in their farming operations and becoming more active in input and output markets.

The private sector will benefit from growth in the agricultural sector as productivity increases and from opportunities for employment in rural areas as service providers.

Consumers will benefit from greater and more reliable production of food.

Rural communities and local governments will benefit from greater ownership over local programs and greater economic growth in rural communities.

Various actors will benefit from improved human resource skills developed with the program training and the strengthening of the local institutional capacity.

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MAAIF-SG 2000 Technology Transfer Program in Uganda

A. M. Foster, E. Kayaayo, and C. Ssembatya

A. M. FOSTER

In 1996 Uganda invited SG 2000 to assist its development efforts. The eradication of poverty, as articulated in the Poverty Eradication Action Plan (PEAP), is a central theme for Uganda's economic development. PEAP is based on the premise of modernizing agriculture through productivity increases for the millions of small-scale farmers who constitute more than 85 percent of Uganda's population and over 80 percent of the employed labor force. MAAIF-SG 2000's intervention was therefore designed to provide technology options that can significantly improve the livelihoods of smallholders. The Plan for Modernisation of Agriculture (PMA) envisions that the livelihoods of Uganda's 2 million rural households can be transformed through market-based productivity gains in production and agroprocessing.

The PMA's vision captures SG 2000's own vision: to establish an agricultural transfer process that will significantly increase food security and income for small-scale farmers. The MAAIF-SG 2000 program objectives are therefore to

- increase food production and reduce food losses so that small-scale farmers have a surplus to sell beyond their needs for food security
- increase productivity and diversification and sustainably raise the profitability of small-scale production
- improve market access for farm inputs by establishing a network of rural stockists
- improve produce marketing through aggregation of produce by farmers' organizations
- develop, expand, and consolidate working models of mechanisms for attaining SG 2000's objectives in partnership with other development organizations

MAAIF-SG 2000's mission is to transform Uganda's subsistence farmers into more productive, food-secure farmers who employ their capital and natural resource base in a cost-effective and sustainable manner.

To achieve its vision, mission, and objectives in a development-oriented way SG 2000 has sought to

- establish a participatory technology transfer process that is appropriate for all small-scale farmers

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Fig. 1. The SG 2000 model for intervention.

- devise mechanisms to ensure that its technology-transfer programs also help empower the poorest farmers
- work with governments and other partners to create, expand, and maintain support systems and services (conducive environment) for the economic advancement of farmers

MAAIF-SG 2000's intervention is predicated on the interdependence of farming communities, the public sector, and the private sector. SG 2000 plays a catalytic role to maximize the synergies among these partners in developing programs that can overcome inertia and trigger change in the condition of subsistence farmers (fig. 1).

Strategy for Program Development

SG 2000 developed along two main types of interventions (fig. 2). The first was to give farmers access to information and training on improved farming and post-harvest systems. The second was to provide farmers physical access to the material resources that a more intensive production approach demands. A third type of intervention—to institutionalize mechanisms that could sustain the above two services for small-scale farmers—emerged at the organizational level of farming communities, local governments, and national government. Subprograms have been developed under these three

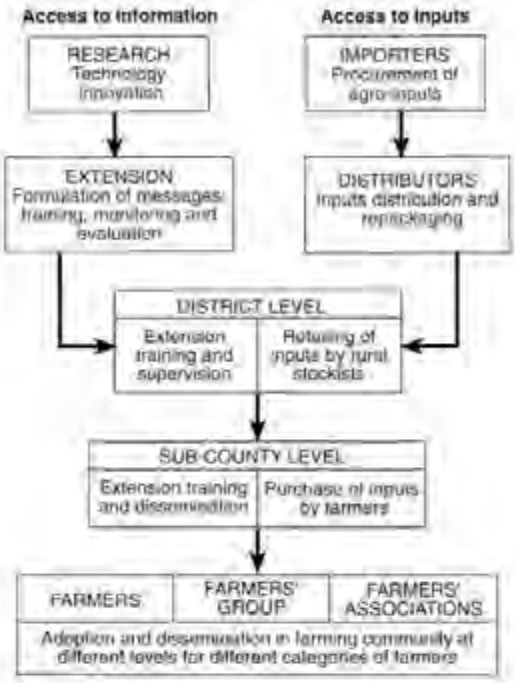

Fig. 2. Mode of public and private support to farmers.

types of interventions. The scale, scope, and emphasis of each subprogram depend on the nature of the intervention and the stage of project implementation. Initially major program resources were committed to developing production-related programs. Emphasis and program resources are now shifting toward post-harvest and capacity-building interventions in preparation for the second phase of the project cycle.

Crop Demonstrations and Farmer Training

MAAIF-SG 2000's field demonstration and training program for small-scale farmers rests on the premise that farmers are fully able to choose technology options that fit their level of resources. Farmers were therefore provided with a range of technology options for different crops adapted to different agroecological zones (table 1). Recommendations for technology options were drawn from NARO, the

Table 1. Recommended demonstration starter kits (for planting 0.1 ha).

	Starter kit				Equivalent fertilizer nutrients (kg/ha)	
	Seed		Fertilizer[a] (kg)			
Crop	Variety	Amt (kg)	DAP	Urea	N	P_2O_5
Maize	Hybrid/OP	2	5	5	30	19
Beans[b] (if sole crop)	K131/2	1	5	–	9	19
Sorghum	Landrace	3	–	5	23	–

a/ Addition of organic manure during land preparation was recommended. b/ Seeding rate reduced to give a population of 70,000 plants/ha if intercropped with maize.

national research organization. The range of technology options allowed farmers to target different levels of productivity gain for appropriate levels of investment. Figure 3 illustrates the principle of farmers making stepwise investments for progressively greater incremental gains. Researchers at NARO and Makerere University continue to work with SG 2000 to improve the specificity of recommendations for agronomic domains using on-farm trials and data collated from demonstrations.

Farmers who volunteered to demonstrate technology options for production enterprises were given advisory services through a cadre of local government extension workers. Each extension worker solicited 10 to 20 demonstration farmers in each sub-county. Volunteer farmers chose their production enterprise and also agreed to pay stockists cash in advance for the inputs used on their demonstration plots. In return, extension workers guaranteed supervision of cropping operations provided that neighboring farmers could also participate in the training sessions.

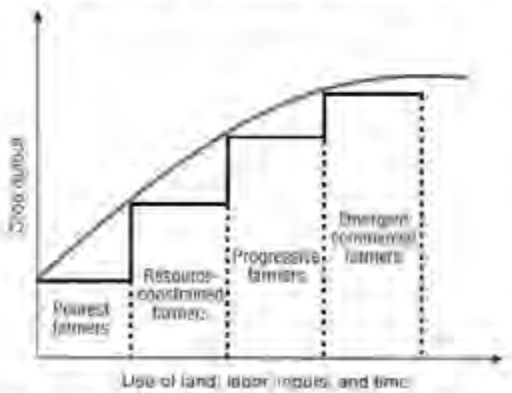

Fig. 3. Idealized illustration of farmer options for incremental productivity gains.

A network of rural stockists made it possible for farmers to purchase components of recommended technologies. The private sector was engaged to package seed and fertilizer in small quantities that exactly fit recommendations for different crop demonstration plots. Seed was made available in villages in 2-, 5-, and 10-kilogram packs, while fertilizers were made available in 1- and 5-kilogram packs. Supplementary application of organic manure on demonstration plots was also recommended.

SG 2000 required local governments to share the costs for increasing program coverage beyond 50 percent of a districts' sub-counties. District local governments were wholly responsible for extending program coverage beyond 80 percent of the sub-counties in a district. Some sub-counties were graduated after eight consecutive cropping cycles (4 years) in the crop demonstration and training program.

Farmer Participation. More than 100,000 farmers have participated in MAAIF-SG 2000 demonstration and training events since the inception of the program. About 47,000 farmers have been trained on 7,000 maize and sorghum crop demonstration plots (table 2). There have also been 3,500 demonstration plots on legume production either as sole crops in rotation with the cereals or as intercrops.

Table 2. Maize and sorghum demonstration program 1997–2000.

Year	Plots (no.)	Farmers trained (no.)	Sub-counties (no.)
		Maize	
1997	542	1,063	31
1998	1,149	8,700	106
1999	1,302	11,107	168
2000	3,661	25,948	234
Total	6,654	46,818	234
		Sorghum	
1999	42	420	5
2000	650	6,500	10
Total	692	6,920	10

At the peak of operations, 300 extension staff were assigned to supervise 234 sub-counties. Although only four of the enlisted districts achieved 100 percent coverage of their sub-counties, 44 percent of participating districts achieved 80 percent coverage of their sub-counties. Fewer sub-counties participated in the crop demonstration program in 2001 due to the graduation of some sub-counties. Nine sub-counties that have graduated are now pilot areas in the National Agricultural Advisory Services scheme for privatization of extension services in selected districts.

Nearly 35 percent of all demonstration plots involved the poorest farmers (women and youth groups). A voucher system was used to target these special interest groups. More than 94 percent of the vouchers issued were redeemed by target farmers (table 3). In 2000 the voucher-targeting scheme boosted the participation of female farmers to over 50 percent of demonstration farmers. Mobilization of savings initially increased among the women's' groups but then stagnated.

Crop Performance. Crop cutting and data analysis has so far focused mostly on the maize demonstration technologies. Improved maize production technologies consistently gave two to three times the yields of traditional methods (table 4). Productivity gains in maize ranged from 70 to 120 percent over traditional methods (table 5).

Extension workers reported greater numbers of farmers participating in field events and considerable adoption of improved technologies in project areas. This observation was supported by increased sales of improved seed and fertilizers by stockists. A commissioned survey by Nkoola Institutional Development Associates confirmed considerable farmer-to-farmer transfer of information about the improved technologies (NIDA 2000). Further adoption studies will be conducted before the first phase of the project is concluded.

Farmer-to-Farmer Seed Multiplication

SG 2000 recruited several hundred farmers in seed multiplication programs to increase availability of seeds of improved crop varieties that private companies are not producing or are producing in insufficient quantities. Legumes and

Table 3. Performance of a voucher system targeting mechanism, 2000.

District	Vouchers redeemed (no.)	Amount of actual inputs collected (kg)			
		Maize seed	Bean seed	DAP	Urea
Iganga	139	1,910	1,840	3,300	2,780
Kamuli	118	1,180	1,180	2,950	2,360
Mukono	66	602	660	1,650	1,300
Mpigi	131	1,083	1,465	3,055	2,220
Bugiri	15	150	150	375	300
Total	469	4,925	5,295	11,330	8,960

Table 4. Summary of maize demonstration plot yields (1997–2000).

Year	Districts (no.)	Plots (no.)	Demonstration yields (t/ha)			Traditional yields (t/ha)		
			Avg	Lowest	Highest	Avg	Lowest	Highest
1997	7	542	3.0	2.4	3.7	1.2	1.0	1.4
1998	14	1,149	2.9	2.0	3.4	1.2	0.7	1.8
1999	18	1,302	2.7	2.4	4.8	1.1	1.0	1.2
2000	18	3,661	2.9	1.5	3.8	1.3	0.7	1.8

Table 5. Yields and marginal rates of return (MRR) for maize technologies compared with local check (2000A season).

Varieties	DAP only [a]		DAP + urea [b]	
	Yield (t/ha)	MRR [c]	Yield (t/ha)	MRR [c]
Local check	2.1 [d]	–	2.1 [d]	–
Longe 1	2.7	0.20	3.5	0.71
Nalongo QPM	3.1	0.46	4.3	1.36
Longe 2 HB	3.4	0.51	4.3	1.02
Zimbabwe hybrid	3.8	1.99	4.9	2.15

a/ DAP (diammonium sulfate) applied at a rate equivalent to 12-53-0.

b/ DAP plus urea applied at a rate equivalent to 90-30-0.

c/ Farmgate price of maize = U Sh 120/kg (US$0.07/kg).

d/ Only manure applied on local check.

vegetatively propagated materials like cassava fall into this category because farmers maintain their own seed or planting material more effectively once they acquire an improved variety. SG 2000 also multiplied seeds of legumes to promote their use for restoring soil fertility, diversifying sources of farm income, and improving family nutritional status. SG 2000 concentrated on multiplying NARO's mosaic-resistant cassava materials in blocks within areas blighted by the mosaic virus.

SG 2000 contracted individual farmers to increase initial seed stocks of improved varieties of common beans, groundnuts, pigeon pea, mucuna, and mosaic-resistant cassava materials on the basis of a 2:1 cost recovery ratio (i.e., farmers gave back twice the quantity of seed material received). Crop varieties were selected for multiplication based on farmers' preferences, the varieties' adaptability to specific agroecological zones, and their contribution to the enrichment of farming systems.

Legumes. Farmers have produced nearly 400 tonnes of seed of assorted legumes (groundnuts, beans, pigeon pea, and mucuna) in over 2,000 seed multiplication plots (table 6). The increased availability of improved legume seed permitted an estimated 3,400 hectares of legume varieties to be planted in association with cereals, either in rotation or intercropped. The opportunity to expand the area planted to legumes is however counterbalanced by the opportunity to increase household income by selling legume seed because of a higher and more stable price.

Cassava. In several districts of north-

Table 6. Performance of seed multiplication program (1997-2000B).

Crop	Qty (kg)		Est. area planted to varieties (ha.)
	Planted	Generated	
Beans (K132, K131, Climbers)	11,422	217,500	2,417
Groundnuts (Igola 1, Igola 2, Serenut)	9,206	177,700	918
Pigeon pea (experimental varieties)	2,795	21,600	37
Mucuna	648	29,150	32
Maize (Nalongo QPM)	560	14,000	459
Rice (Upland and interspecific varieties)	80	1,800	24
Cassava (Mygera, SS4, NASE11)	4,237 [a]	25,710 [a]	1,714

a/ Measured in bags.

eastern Uganda that have been blighted by African cassava mosaic, farmers planted over 360 hectares of resistant cassava material. Resistant varieties were planted in blocks of 0.5 to 2 hectares and cumulatively produced sufficient cuttings to plant 1,800 hectares of new land in 2002. Monitoring the diffusion of materials, however, has been difficult because of informal transfers between farmers. Some materials were also lost when farmers harvested the crop for food during the dry season.

Quality Protein Maize. SG 2000 and NARO collaborated to introduce and adapt Obatanpa, Ghana's quality protein maize, in Uganda. The adapted version was released in 2000 as Nalongo (Longe-5 quality protein maize variety). SG 2000, in collaboration with Uganda Seed, produced over 14 tonnes of certified seed of Nalongo in that year (table 6). SG 2000 is now collaborating with two private seed companies, NASECO and East African Seeds, to fully commercialize production of Nalongo seed from fresh stocks of breeder and foundation seed of Obantapa.

Over 50 hectares of foundation seed were planted in the 2000A season following a schedule that should produce 1,000 tonnes of certified Nalongo seed by 2002. Protein quality is being monitored during seed production.

Promotional activities for Nalongo seed have already increased demand for it in central and eastern Uganda. East African Seeds reports that relief and NGO nutrition projects working in northern Uganda have placed significant orders for Nalongo. Several hundred farmers grew Nalongo in the 2001A season. In addition to its potential contribution to household nutrition, Nalongo is opening up market opportunities in the animal feed industry. A farmers' association (UAAFO) is considering developing a rural poultry feed processing operation using Nalongo, cassava, and fish gut as sources of raw material.

Rice. In NARO's priorities for research and development, rice has the lowest rank among cereal crops. As a source of carbohydrate for human consumption in Uganda, however, rice is second only to maize among cereals. Several thousand hectares of hydromorphic soils and much greater areas of upland soils lie underutilized in northern and eastern Uganda even though substantial amounts of rice are imported. The major barrier to increased rice production is that present varieties have low yield potential or long growth durations, which do not fit easily into existing cropping patterns and seasons.

SG 2000 began multiplying several upland rice varieties from the West Africa Rice Development Association in four districts of eastern Uganda during the 2000B season. SG 2000 is now advancing foundation seed of adapted rice varieties to registered seed at Kinawanswa—a nuclear site. Interspecific varieties of *O. sativa* X *Glaberrima* crosses (WAB56-104-improved japonica; WAB 450-11-1-P40-1-HB, and WAB450-1-b-1-HB) gave superior yield (3.5 to 3.8 t/ha) and substantially earlier maturity than UK2 and Abilony, which are the most widely grown varieties. Farmers were most impressed with the 85-day maturity of WAB450-11-1-P40-1-HB in comparison with 105 to 118 days for UK2.

More than 20 hectares of improved rice varieties are now in a second cycle of multiplication (table 6). A minimum of 40 hectares of preferred varieties will be planted for seed production in the 2001B season. An estimated 160 tonnes of improved rice seed will be sold to farmers through distributors and stockists in the 2002A season.

Table 7. Animal traction training, 2001A season.

District	Sub-counties (no.).	Farmers trained (no.)	Toolbar kits placed (no.)	Ox-carts placed (no.)	Collaborator
Tororo	6	269	95	1	Plan International
Nakasongola	4	88	37	1	
Bugiri	2	19	2	–	
Iganga	4	89	26	1	MTEA
Pallisa	4	85	7	–	
Kamwenge	3	83	10	5	
Kenjojo	1	21	1	–	
Mukono	2	60	4	–	Winrock
Kamuli	3	–	12	10	
Soroti	1	–	–	14	DFID (research)
Mabarara	2	8	2	2	
Sembabule	2	8	3	–	
Busia	2	96	4	–	Winrock
Mpigi	1	–	1	–	ARDC
Masaka	1	4	3	–	MADO
Total	38	838	219	10	

Increased Power and Labor Efficiency on Small Farms

Labor for tillage and weeding is the biggest single cost in the farming systems of Uganda. Labor costs are greatest for hand-hoe cultivation methods and least for animal traction cultivation. Animal traction can also be used to transport produce and water. SG 2000 has intensively promoted animal traction to alleviate labor constraints in rural households and reduce drudgery for rural women and children.

The animal traction training program has introduced a multipurpose tool bar suitable for plowing, ridging, and weeding operations. Training of farmers has emphasized techniques that reduce the number passes per unit area needed to complete plowing, planting, and weeding operations. Introduced techniques also focus on improving straightness of lines to permit a more even planting depth, more uniform germination, and more efficient weeding.

In 1998, SG 2000 sold 50 multipurpose tool bars to farmers with 90 percent cost recovery. The combined efforts by SG 2000, PL480 II, and Plan International have increased the animal traction training opportunities for farmers. A program to place 1,000 additional multipurpose tool bars began in 1999. So far more than 842 farmers have been trained to use 208 new animal traction-training kits (table 7). These farmers now have the capacity to annually cultivate an additional 1,350 hectares with animal traction and till land for neighbors on hire basis as well. A few of the trained farmers are now testing prototypes of modified ox carts.

With the recruitment of three full-time rural-based trainers to support a collaborative program with Plan International in Tororo, the animal traction program will expand and intensify. Three hundred farm families are being assisted in acquiring their own animals and animal traction equipment under Plan International's foster family sponsorship scheme. SG 2000 is providing technical support and training for the families. Other organizations and some local governments are to collaborating with SG 2000 in a similar vein (table 7).

Table 8. Summary of post-harvest Interventions.

Activities	1996	1997	1998	1999	2000	Total
Post-Harvest						
Silos	–	6	15	21	11	58
Drying cribs	8	18	24	17	21	88
Improved granaries	4	12	31	13	32	92
Drying floors	2	09	10	5	7	33
Training						
Artisans	7	11	21	38	–	74
Farmers	104	608	794	810	899	3,215
Agro–processing						
Groups	–	–	2	4	8	14
Fabrication						
Graters	–	–	2	2	3	7
Press	–	–	2	2	–	4
Bagging stands	–	–	–	–	2	2

Post-Harvest Improvement Program

Uganda's high average calorie intake (2,700 kcal/person/day) suggests that exceptionally attractive returns should result from investments in post-harvest interventions that reduce household food losses and increase shelf life and value of primary produce.

SG 2000 has focused its post-harvest activities on handling of grain, especially maize, and the processing of cassava. Reducing losses in the food pipeline between the field and table have been stressed. Post-harvest interventions have also been promoted as a strategy for gaining better farmgate prices.

SG 2000 introduced farmers to improved methods of post-harvest grain handling by setting up training units at farm homesteads. With the collaboration of demonstration farmers, various structures for handling different volumes of grain—suited to different categories of farmers—were introduced (table 8). Rural artisans were contracted and trained to help farmers construct storage facilities. SG 2000 shared the cost of these structures with demonstration farmers provided that neighboring farmers could participate in the training sessions.

In addition, eight pioneer groups of rural women that expressed interest in cassava processing were trained and lent the necessary equipment on cost-recovery basis.

Over 3,200 farmers have been trained using 271 assorted storage structures that were constructed at farmers' homesteads (table 8). Farmers who have larger crop yields have scaled up post-harvest structures for use as a market intervention strategy. Several groups that were trained in cassava processing are now formally registering a rural agro-processors' association that will provide further training and marketing opportunities for members. SG 2000 is helping the association to construct a one-stop center in Iganga principally for training women's groups in agro-processing. The association plans to participate in the National Agricultural Advisory Services project as service providers during the trail-blazing phase. SG 2000 will increase emphasis on agro-processing activities for rural communities in a second phase of the project.

Developing a Network of Rural Stockists

As late as 1997, Uganda had hardly any distributors of agro-chemicals or fertilizers in rural areas, and small-scale farmers

Table 9. Development of stockists 1997–2001.

Year	Districts	Work-shops	Partici-pants	Stockists trading
1997	7	2	120	65
1998	14	3	240	80
1999	18	3	400	165
2000	20	3	140	171
2001	25	1	40	220
Total	25	12	940	220

used exceptionally small quantities of purchased agricultural inputs. To encourage small rural traders to stock fertilizer and seed in their shops on a consignment basis, SG 2000 adopted a minimalist intervention approach. As their interest grew, SG 2000 helped these rural stockists to increase their sales by supporting a guarantee facility that enables stockists to secure inputs from suppliers with a 30 percent cash deposit. Stockists were also given on-the-job training in this specialized agribusiness sector. A competitive and nonmonopolistic market atmosphere was encouraged to permit unfettered growth of the most efficient operators.

Over 940 participants attended training sessions at 12 workshops. Of these, 225 rural stockists now service catchment areas in 25 districts (table 9). Twenty of these stockists have become distributors. Demand for improved seed and fertilizer has strengthened significantly and attracted several new distributors to the marketplace. Market competition has also reduced prices of fertilizers by up to 30 percent (table 10). However, fertilizer prices in Uganda are still high compared with prices in other areas. Meanwhile Uganda's fertilizer imports have risen to over 18,000 tonnes within a 3-year period. The poorest farmers now have the opportunity to restore soil fertility on their farms through application of fertilizers. Over 94 percent of the vouchers targeted to poor farmers (women and youth) were redeemed through a network of rural stockists.

Recovery of guarantees issued to stockists began at 64 percent in 1997 and increased to 95 percent by the 2000B season. The letter-of-credit facility for distributors has maintained a 100 percent recovery rate from inception through the 2000B season.

Building Farmers' Capacity to Sustain Program Interventions

Experience has shown that the gains farmers achieve through various program interventions tend to dissipate as the intensity of project activities are reduced in response to reduced country budgets. This phenomenon suggests that the sustainability of such interventions may have a dimension that goes beyond the economic viability of technologies. Indeed there is strong indication from past experience that the social fabric and infrastructure that support the continued use of such productivity-enhancing technologies may well be inadequate in many countries in Africa south of the Sahara.

SG 2000-Uganda has made some

Table 10. Average retail prices of fertilizer in Uganda, 1996–2001 (US$/50-kg bag).

					NPK			
Year	DAP	Urea	CAN	SSP	17-17-17	23-23-0	20-10-10	25-5-5+5S
1996	27.59	26.90	23.33	25.00	–	28.80	–	27.00
1997	30.77	26.92	23.33	25.00	–	28.80	27.50	27.00
1998	30.77	24.07	20.37	20.37	–	25.45	25.20	26.23
1999	38.33	21.43	18.30	16.67	22.41	23.20	24.00	21.00
2000	20.55	16.70	17.75	15.07	19.83	18.60	20.30	19.80
2001	22.00	17.00	16.00	14.50	–	–	–	–

progress in developing rural access to a growing variety of agricultural inputs that support use of improved technologies. There is however still a need to aggregate and consolidate farmers into groups that are large enough to support the cost of such services. Farming communities need a range of services to support broad-based improvement of rural livelihoods. Critical threshold numbers of regular users (farmers) are essential to sustain continued access to rural services of any kind. The low population densities in rural areas may require that demand for services within communities be consolidated around the group structure and not fragmented into a series of discrete services for numerous small groups. SG 2000 is therefore testing the concept of one-stop centers as a means to strengthen farmers' capacity to maintain access to a range of rural services including agricultural advisory services, input delivery, produce marketing, microfinance, agroprocessing, infant nutrition and daycare, community health care, and functional literacy programs for adults.

SG 2000 is helping two registered farmers' organizations to build and manage one-stop centers. Farmers' organizations are encouraged to collaborate with other development organizations to help build cooperation among multiple partners in support of each one-stop center. In this way farmers' one-stop centers can become a multipurpose facility that is owned by farmers' institutions. Farmers determine the range of services offered by a one-stop center based on a service fee for each service user. The core maintenance costs of a one-stop center will be met from membership fees.

Looking Ahead

In its second project phase, SG 2000 will focus on deepening and consolidating improvements of advisory services and organizational structures for farmers as a means of institutionalizing SG 2000 program interventions. MAAIF-SG 2000's second project phase will therefore require a more integrated effort with other development partners in support of mainstream institutional efforts that enhance advancement of small-scale farmers. The MAAIF-SG 2000 program will strive to reinforce key national programs that have been honed as instruments for poverty reduction and transforming subsistence farmers to food-secure, market-oriented producers.

Farmers' associations or organizations that operate one-stop centers could provide services to future farmers' forums in the National Agricultural Advisory Services program. They can also evolve into strong associations that can seek a direct link with the Sasakawa Africa Association. In such an event the MAAIF-SG 2000 program will have contributed to the creation of a new dynamic institutional process. MAAIF-SG 2000 will indeed have served as a means to an end and not be an end in itself.

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Discussion: Challenges to Extension Service Delivery

David Nielson

I am with the World Bank and I have been working with the Government of Uganda for close to 4 years. NAADS was conceived as a continuation of support from government to agricultural services in Uganda. More precisely, it was continuation of support to smallholder agriculture through a World Bank agricultural extension project that used a far more traditional extension approach and that had ended around 1998.

Of course, the World Bank/government program was not the only game in town, but it was a big one. At the time that program ended, there was much frustration with it, but all parties remained convince that reducing poverty in Uganda, and in rural Africa in general, depends on successful farms. That is something the Sasakawa group believes, as well as the Ministry of Agriculture and, I am certain, the World Bank, and most of the partners. Another shared conviction behind NAADS is that collective action can increase the success of small farms.

In the past decade, the World Bank alone has invested US$1 billion in agricultural extension programs in Africa. At the height of that investment something like 100,000 extensionists were supported. But, most of us in the World Bank, and many of our partners, are discouraged by the results. And not only by those programs, but by other programs as well. While there have been successes that we are proud of, no one is satisfied with the return on investment in agriculture.

Agricultural productivity in Africa has been stagnant for three decades. And labor productivity in agriculture is low. Farmers' time generates only 40 percent of what everybody else's time generates in terms of income. I do not know how it can become better—schooling is low relative to other regions, and rural schooling relative to urban schooling is even lower.

Land productivity in Africa is low relative to any other region. Rural income averages remain low. Half of Africa's people are rural, and 60 percent of the rural people in Africa—200 million people—live with less than a dollar a day.

Thus we are not satisfied. NAADS has developed out of that perspective and frustration, but with the conviction that it is important to do something to improve services to the smallholder farmers.

Another conviction that has led to the design you have heard about is that providing technology is not a full solution. We must look at a more comprehensive approach—credit, marketing, other aspects of farming, not just technology and production. A second element is that technology is not a solution in the sense that scale is a problem. Thousands of expatriates running around cannot do it. They achieved fine pockets of success, but they could not get the kind of scale we are

aiming at in order to have impact. Even 100,000 extensionists could not do it in the past decade. NAADS comes from the conviction that it is not hundreds of expatriates and thousands of extensionists—it is millions of farmers who must do it.

Finally, to ensure the sustainability of the program, a public, collective effort is needed. It cannot come from donors forever, and it cannot come from governments forever—perhaps partially, but not fully. It has to come from the users themselves.

Methodologically, there is a conviction behind NAADS that it is not technology messages that are going to do it, but rather helping farmers to become good critical thinkers about what they are doing. Similarly, demonstrations alone are not going to do it. It will come by helping farmers work toward being successful.

Institutionally, the convictions were that to be successful would require true government ownership of the program, not merely collections of projects. Institutionally, it would require farmers' ownership, not government ownership. So, rather than extensionists giving messages, there had to be advisers serving clients.

We all believed when we began working on the NAADS program that we had to move away from former models and have government ownership with Mr. Nahdy and other people having much more control over the supply side of the program. They could ensure that it would be not a collection of projects but a true government program, a single program with the flexibility to do all the things that have been done successfully on a small scale by the projects, but something that could be scaled up by the government.

In practical terms, the donors who participate in NAADS will no longer pay bills from World Bank accounts or Danida bank accounts or Dutch bank accounts. They will all put their money into a single pooled bank account of the Government of Uganda, which will go directly into the consolidated budget of the government and which will be used like any other money in the government budget. We feel that this approach will give ownership of the program to the government.

In terms of farmers' ownership, we were looking for programs where farmers would control most of the money and most of the decisions. NAADS is going to achieve that although it is still learning how to do it. For efficiency and accountability to farmers, outsourcing was a way to avoid dealing with civil servants who are not very accountable to anybody. Instead advisers will be accountable to farmers. Farmers will use the money to hire their own advisers.

If we want farmers to feel ownership, and if we want governments, local as well as national, to feel ownership, everyone should pay a share so that they feel they have the right to make decisions.

There is much to be learned from this program in terms of how resources, technical assistance, and users can work together.

Ruth Oniang'o

In his presentation, Dr. Foster placed the issue of sustainability up front. Yesterday, every group we visited in the field thanked SG 2000 for what had been done for them and asked for more. If what they are doing is paying off, they are able to generate incomes. Thus I feel that they should be able to deal by themselves with some of the things they are actually asking for. And then SG 2000 can move on and start in another country or with another community. At what stage do we decide this is sustainable and start moving on and let the farmers take off?

Dr. Foster mentioned forming networks. We have had networks before, we have had cooperatives, we have had farmers' groups, for example the dairy industry in Kenya. It worked.

About governance: we elect people to be in control, but they become another corrupt government at the central or village level. If we are going to go back to networks or cooperatives, we have to introduce transparency and accountability so that the farmer is not taken for a ride.

In my own field, nutrition, we have been reevaluating the amount of money that has been put into training nutritionists. There has been a lot of mid-level training, master's degrees, and doctorates in Africa. It has not changed a thing. African children continue to be malnourished, in spite of all the resources that have gone into training of people.

We talk of extension as a low status occupation, but it is never going to be a high status career. For me, it is not a question of status, it is a question of motivating people to establish a proper work ethic to let them enjoy what they do, even if it is sweeping the floor. Remunerate them properly, let them be proud of what they are doing in order to achieve something.

After we have trained them, where are they going to work if the salaries continue to be what they are? Are they going to continue sitting in their offices, with no transport, not even motorbikes to move to do their jobs? That is what SG 2000 has done with the extension people—made it possible for them to move to where their job is supposed to be.

Unknown speaker

There are two aspects to African agriculture. The very farmers who are having difficulty adopting improved technology in the foodcrops sector are the same ones that have made Côte d'Ivoire the number one producer of cocoa. The same can be said about coffee in Uganda. One does not need to worry about extensionists jumping up and down—the private sector is in full control.

The problem concerns foodcrops. Why? Because we have not provided adequate incentives. Tax regimes imposed on foodcrops tend to work against agriculture. Governments adopt exchange rate policies that are adverse to agriculture. Governments do not provide adequate access to markets and agro-industry, the linkages that really add value to this activity. It is not surprising that for the past 30 or 40 years African agriculture has been struggling in the foodcrops sector.

I cannot understand why adoption rates are still low on the foodcrops side, and yet the same countries where we are advocating improved extension services are doing so well on the cash crops side.

We have to address the issue more critically. In this time of globalization, this is going to be the real issue. What policies are we establishing to create incentives for foodcrops to become a profitable venture? In Canada, agriculture is a business. In the United States or Japan, it is a business. Until we can work with African governments to also make the foodcrops a profitable venture, we can do all we like with extension or with these nice programs—and I support them. One of the members of the World Bank team said that if we are really looking for the type of scale that will generate quantum jumps in the supply response, we have to look at how the food has survived, at the good and bad lessons, and what we need to do in this globalized environment.

Uganda's efforts with NAADS shows that they are trying to set a proper incentive framework. They have removed some commodity boards. They are trying to

privatize some activities, getting out of areas that can be handled by the private sector and moving into the areas where they are dealing with public goods—roads and rural infrastructure.

We tend to lump everything together and talk about African agriculture as if nothing is happening. Yet cocoa is doing well, coffee is doing well, rubber is doing well, cotton is doing well. The same farmers who showed poor adoption rates on cassava, cocoyam, and plantain are doing so well. Why? Because the incentive framework is dichotomous. Also because African governments want foreign exchange, they have put the incentive framework on things we do not eat. That is why we have food insecurity—because we are not focusing the resources on the food side. If we could adopt a more balanced approach, African agriculture would turn around.

Murtala Nyako

In my view, the extension worker should be a risk manager. He has to know what the market demands, what the customer wants. The extension worker can no longer be a general purpose agent. He has to zero on one or two commodities, know them well, advise well, and know what is going on.

Michael Foster

In SG 2000, from the beginning, farmers have paid cash upfront for whatever they have received from the program. That is basically because we have designed the packages to be affordable—less than US$8.00 to try a 0.1 hectare (0.25 acre) kit—instead of giving credit to try a 0.4 hectare (1 acre) package for US$50. So we have gone down in size and in cost of the technology itself. This means that we practically work from farmers' own savings.

One way we can build in sustainability is through the one-stop centers, by requiring farmers to pay for those services. We are already tackling that problem, and it will lead also into the issue of cash crops. Why cash crops and not foodcrops? Actually, the farmers we know do not make a distinction in their farming system. The money earned in one production system feeds into another production system. They may make money in maize and buy the sprays for their coffee, or they may make money in the coffee and buy maize seeds. There may be a point where there is a loss, and the issue is for them to identify where it is, appreciate that it is a loss, and change to something else.

We have also been trying to do is develop a rural network of agricultural input traders. But at the same time, other organizations were going around giving away inputs or giving them on a credit never to be recovered, which is the same as giving them away. This is why we developed the voucher system. Even if one is going to support a group of farmers for personal reasons, the mechanism that the distributorship established at the rural areas should not be affected. Hence, the use of vouchers allowing the distributor at the end point to still get his margin. By encouraging other organizations to do this, I think we will be able to broaden the range of services that those stockists can supply to the farming communities.

Silim Nahday

The issue of motivation has been addressed in the NAADS itself. Some of the concepts brought in are that one operates best in a private-sector mode and, thus, motivation has to be addressed.

Also the package for an extension worker or a service provider comprises the operational costs, the demonstration material costs, the mileage, the fees, etc. So

he gets paid a package instead of getting a salary and waiting for the operational costs, which never come. Therefore, the question of motivation in the NAADS is taken care of.

Regarding cash crops: in Uganda there is the concept of the traditional cash crop and the nontraditional cash crop. Actually with maize farmers can make money, but with some crops, like cotton, probably they cannot. It is a circle that complements itself, from one cash crop to another traditional crop, etc. Our training system was geared toward cash crops to supply European and American markets. The system was not well developed for the foodcrops.

In the NAADS you have to prioritize. You cannot address all the issues. The farmers must be aware that there are priorities, and extension workers must work within the priorities.

Wilberforce Kisamba-Mugerwa

In Uganda, we have 70 percent subsistence farming, and yet the policies I am trying to implement focus on privatization of the delivery of extension services.

Commodities like coffee, cocoa, tea, etc. are profitable, enabling the farmer to borrow money. All services will be readily available to the farmer because he can pay immediately.

But the bulk of subsistence farmers are not engaged in a profitable undertaking. They are the ones who need knowledge, but they cannot pay. That is why NAADS, to which we are committed for the next 15 years or so, using public fund, is designed in such a manner that this money empowers the farmers. The NAADS approach is to help farmers identify their priorities in a guided manner and have a leverage over the service provider. This is the rationale: delivering a service as a government, but empowering the farmers—in a sort of farmers' forum—with public money decentralized near to them, so that they have leverage over the service provider.

A Parliamentary Act designates a subcounty as an accounting unit, among others. However, the district hires the extension workers because at the same time we want to see that the farmers are working hand in hand with the government. We also want to provide them with an opportunity to complain if they are not satisfied with the services of the extension workers.

The farmers have to provide the terms. In fact, when we were passing the Act in the House, the question was, "what will be the terms of those service providers?" There must be some sort of contractual arrangements, so that if one of the parties breaks the contract, they lose the services.

We need time and, because we are trying to build market-oriented farming, one should identify priorities. We need to know from the farmers what market-oriented enterprises, e.g., dairy, apiary, etc., can become profitable businesses so that the right service provider is identified for the purpose.

In time, we should be able to reduce public funding and pass that charge on to the farmers. It is true also that some of these farmers will remain subsistence farmers for many reasons—some are old, others have personal problems, etc.—but we hope that this new approach will lead us into another generation.

Good governance means transparency, participation, accountability. That is what we are trying to do in Uganda, through decentralizing at the lowest administrative units: situate accountability and participation nearer to the farmers.

Addressing the Challenges of Extension Services Delivery through Responsive Extension Education

Henk C. Knipscheer, Moses M. Zinnah, and Jeff K. Mutimba

HENK C. KNIPSCHEER

During the last 30 years, agriculture in Africa has changed. Population density and population growth have increased; arable land per capita, soil quality, and tree cover have declined; and the importance of nonfarm income has risen (Kelly et al. 1995). To provide a growing urban population with enough food, farm output and productivity must be raised. Several authors (e.g., Winrock International 1997) speak of a crisis situation as an estimated 50 percent of the population in sub-Saharan Africa lives under the poverty level, 30 million children are malnourished, and food production growth rates consistently lag behind population growth rates. The problem is exacerbated by the increasingly devastating effect of HIV/AIDS and by declining donor support to the agricultural sector. HIV/AIDS severely threatens the productivity for (agricultural) goods and services, while the lack of support to agriculture is simply inexplicable.

The crisis especially affects rural women. Women in sub-Saharan Africa produce more food than men while they also carry out as much as 90 percent of the food processing and food storage. Female education and employment lags behind that of males. Added to all these challenges, the HIV/AIDS epidemic strikes hardest at the poorest quarter of the female population (World Bank 2000).

In view of the overwhelming need to improve agricultural development in Africa, the 1997 Carter Center Survey Team Report (Winrock International 1997) called for a significant increase in agricultural intensification, especially food production. The team found seven key constraints to increased agricultural productivity—macroeconomic and sector policies, agricultural extension, agricultural input supply, physical infrastructure, agricultural research, rural credit, and agricultural marketing systems. These factors are reflected in a recent study by Michigan State University (Reardon et al. 1996), as well.

This workshop places agricultural extension and extension education at the

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top of the agenda. The state of extension services in sub-Saharan Africa is poorly understood. There are many indications that public extension services are being cut back, while the impact of private extension services, including those being provided by NGOs, are still unknown. Whatever the merits of NGO programs, these organizations face the same problems as their public counterparts—principally the shortage of trained staff. Therefore, one of the challenges for rural development in sub-Saharan Africa is the training of staff to effectively deliver extension services to both male and female farmers.

Extension Services Delivery Challenges

Major challenges confronting agricultural extension services in sub-Saharan Africa today are globalization, lack of coherent policy, downsizing of the public sector, poorly trained staff, lack of dialogue between stakeholders, ineffective linkages among researchers, extension staff, and farmers, lack of effective farmers' organizations, lack of support services (other than extension), and difficulty in reaching female farmers.

Globalization

The process of globalization is unstoppable. It is not a matter of good or bad, it simply occurs and will have its impact sooner or later, probably sooner. We need to be prepared for the impact of globalization. It is, therefore, useful to consider what globalization is all about. In *The Lexus and the Olive Tree,* Friedman (1999) describes globalization as the integration of markets and technologies that enables individuals, corporations, other organizations, and nations to make decisions faster and cheaper than ever before in history. The key development that allows globalization is information technology. Friedman distinguishes six information "dimensions": political, cultural, national security, financial, technological, and environmental.

Globalization has several implications for African agricultural development. Foremost, African farmers now compete on a global marketplace—against maize farmers in the United States, soybean farmers in Brazil, and rice farmers in Asia. This is no small matter. At the same time, farmers may have access, or should have access, to global technologies. If they do not, they are likely to be left behind in an increasingly competitive marketplace. This is exactly where the extension agent comes in—he or she should be the key facilitator and be able to bring new technology options and market options to farming communities.

In this vein, van den Ban (2000) clarifies the new role for extension staff: "What farmers need is not an adviser, who gives him/her a recommendation, but a counselor who helps him/her analyze market development and consequences of various decisions: the extension agent becomes facilitator."

Agricultural Policy

National governments in Africa may not yet have fully realized the unstoppable nature of globalization. Now, more that ever before there is a need for a comprehensive national and regional agricultural policy that clearly highlights the role of agricultural extension.

A key reason it is important to devise coherent public policy on extension is that government action determines, in part, the extent to which other bodies will be willing to provide extension services (Carney 1998). Such policy should be based on African nations' common interest in competing on the global marketplace—

not against each other, but together against other continents. Such policy should address issues like the stability of exchange rates, support to agribusiness development (e.g., free access by private firms and harmonization of quality standards), reduction of taxes on agricultural exports, improvement of physical infrastructure (including port, transport, and storage facilities), improved land tenure systems (possibly with provision of better access by female farmers), improved water supply, and improved social services.

Downsizing the Public Sector

We are caught between two objectives—on one hand, we wish for fewer taxes on agricultural products without offering clear alternative ways for the government to raise revenues; on the other hand, we demand more social investments. Moreover, we demand a stable financial market with stable exchange rates. Such goals imply a balanced government budget. Therefore, many African governments are forced to downsize the public sector, including shrinking the already limited numbers of extension field staff. This trend implies an increasing role for private entities, both for-profit and not-for-profit. Also, the government has to find alternatives to the fully public funded extension system. Some possibilities are services-for-fee systems or alliances with private organizations including for-profit firms. There is a need to create alliances between public and private extension organizations.

Poorly Trained Extension Staff

The low level of education of a large proportion of extension staff as compared with their research counterparts constitutes one of the major challenges facing agricultural extension services in sub-Saharan Africa (FAO 1990, 1996, 1997; Kwarteng, Zinnah, and Ntifo-Siaw 1998, Zinnah, Steele, and Mattocks 1998; van den Ban 1997). The poor educational background of extension staff and their lack of formal in-service training opportunities hinders professional interactions with researchers. Poorly educated staff also hamper extension organizations in incorporating participatory approaches in agricultural and rural development programs (Opio-Odongo 2000).

Sulaiman and van den Ban (2000) reviewed the training of agricultural extension staff in India, and it is remarkable how similar the training problems in India are to those on the African continent. They make the following observations about extension education curricula in India:

1. The curricula do not prepare the student for change. Students are taught a static set of skills and knowledge, but they are not taught how to educate themselves and "how to learn."
2. Students are trained for a career in the public service while the public service does not offer good job opportunities anymore. As a result unemployment of graduates is increasing. New career opportunities exist in the private sector, but no effort is made to adjust the curricula accordingly.
3. Too much emphasis is given to technology delivery methodology and too little to problem identification at the grassroots' level, to bottom-up planning, and to the felt needs of potential employers.
4. Extension staff suffer from a lack of status especially relative to scientists. Consequently, extension attracts few bright students and is sometimes considered the discipline of last resort. In other words, it is not only desirable to improve the curriculum; the whole discipline needs revamping.[1]

One of the major roadblocks in remedying the poor training of extension staff is that most agricultural colleges and universities in sub-Saharan Africa have too few qualified lecturers and professors in agricultural and extension education. To produce qualified academic staff who can offer the next generation of extension staff responsive training programs (at the certificate, diploma, and degree levels), postgraduate programs (master's and doctoral degrees) must be developed in agricultural extension and related fields.

Unfortunately, the postgraduate programs and associated curricula of extension education in sub-Saharan Africa do not at present have enough resources to retrain ageing academic staff in agricultural extension nor to prepare the next generation of academic staff in agricultural extension. For most Africans who wish to study abroad as an alternative, the cost is prohibitive: US$50,000 to $75,000 per student to complete a master's degree program and US$100,000 to $150,000 or more to complete a doctoral degree program.

According to Schiebel (1999), regional cooperation in formal training could yield many benefits:

- development of joint training programs and schemes for teachers, trainers and administrators across the region as a capacity-building measure
- ensuring improved knowledge and understanding of local and neighboring cultures and history through the reform of curricula, textbooks, media education, and training
- promoting cross-border exchange of students, teachers, scientists, and administrators
- using targeted funding mechanisms that would encourage regional mobility and networking between professional bodies and other groups
- empowering local actors, especially drawing on local and regional experts in designing and implementing programs

Dialogue Between Stakeholders

The scarcity of public funds and the need to involve the private sector in agricultural change and innovation warrants an active dialogue between the stakeholders. Identifying and convening stakeholders is something any "agent of change" should be able to do, but this is a new role for extension agents. Good training programs prepare agents for this role, and any curriculum should reflect this new role. The key is that a successful agent not only supports the process of change but actually manages it. Extension agents are extension managers, and, not surprisingly, a demand-driven extension education curriculum resembles the curriculum of business administration programs (see the case study, below). Involving stakeholders in the design and implementation of training curricula is a good way to instigate or facilitate a dialogue.

Linking Researchers, Extension Staff, and Farmers

Ineffective working relationships among agricultural researchers, extension staff, and farmers are one of the most challenging problems of extension services in developing countries, especially in sub-Saharan Africa (Zinnah 1994; Kaimowitz 1990; Merril-Sands and Kiamowitz 1989; World Bank 1985). Strong and effective linkages have been hard to establish. As Merril-Sands and Kiamowitz (1989) point out, linkage problems not only reduce efficiency, they also impair

[1]It is noteworthy that the agricultural extension department at the University of Wageningen has changed its name to the Department of Innovation and Change.

performance and diminish the impact of agricultural research. The ruptures and disjunctions are more striking than the linkages or articulations. Farmers have little voice in deciding research and extension agendas. The poor working relationships between these supposedly interrelated groups lead to duplication of roles and activities and faulty understanding of farmers' real needs, which waste the scarce human and financial resources available for research and extension. There is, therefore, need for attitudinal re-reorientation so that the different actors in technology development and dissemination can begin to see each other as belonging to a system whose performance and efficiency depend on the synergy between them.

Farmers' Organizations

Strong farmer organizations that are able, motivated, and sufficiently independent to effectively represent farmers' interests are indispensable for protecting and enhancing the smallholder agricultural sector. Such organizations must also assume a major role in the implementation of the needed measures because popular participation and control of institutions and resources at the local level are crucial for both effectiveness and sustainability.

As extension services become decentralized and are increasingly managed by farmers' groups and other actors, including NGOs, it is important to have stronger and more formal farmers' organizations. These organizations will enable the farmers to

- identify their own problems and seek ways to solve them
- become more empowered and take collective actions for the common good of the organization's members
- seek ways to develop their technical and management knowledge and skills to better plan, implement, and evaluate their programs
- collectively bargain for better services from extension and related organizations and agencies, whether public or private

Currently, smallholder farmers are not well organized and lack sufficient resources, technical expertise, and political power to express demands for technologies and form linkages with research and extension agencies as full partners. They remain largely passive recipients. Researchers and extensionists take the initiative, defining the terms of the relationship and the nature of the linkages, the programs, and the outputs. Because the farmers are not organized, there are no mechanisms for accountability that ensure that agencies respond to their priority needs. Accountability can only be possible when farmers become organized and have sufficient resources and technical capacity to work as full partners with research and extension agencies.

If smallholder farmers are to enter the cash economy, they face significant challenges ranging from the provision of services to development of business skills to deal with the new circumstances. To succeed smallholders will have to forge strong links of cooperation among themselves, using all the means at their disposal—economic, organizational, and lobbying capacity.

Support Services

Agricultural extension service constitutes one of the many subsystems of the agricultural development jigsaw. It is unrealistic to expect any extension service to function effectively if other support services are weak or nonexistent. An extension service must be complemented by research and education institutions, clearly defined agricultural policy, input supply, viable credit institutions, market-

ing networks, farm-to-market roads, agroprocessing and storage facilities, and communication and information technologies. However in sub-Saharan Africa, weak support services hamper extension services delivery. Therefore, an extension service has to address these issues and facilitate solutions.

Reaching Female Farmers

The marginalization of women farmers is well documented (Lewis 1981; Poats, Schmink, and Spring 1988; Siato and Weidemann 1990; Breth 1997). Though development planners generally agree on the need for reaching women farmers, getting women to participate in mainstream agricultural programs is a major professional challenge. Examples of successful strategies and methods for reaching women farmers are rare. It is still not clear what conditions are needed to meaningfully involve women farmers in mainstream agriculture. Field efforts to reach women often seem to marginalize women even more by focusing on small and peripheral agricultural projects like poultry and vegetable production. Among the reasons for this marginalization are (1) inappropriate training of agricultural development professionals including extensionists, (2) the predominance of male extension staff (over 90% in sub-Saharan Africa), who have a bias toward male farmers, and (3) the predominance of male professional staff in colleges and universities, government agencies, and NGOs that deal with farming.

Only recently have some universities begun to treat gender issues in agriculture as part of their curricula. Public extension services still lack conviction about the need to deliberately target women farmers, assuming instead that women will be reached through the men who are usually heads of households. The word "farmer" is, therefore, often used synonymously with "man."

The challenge of reaching female farmers and increasing the number of female extension staff in sub-Saharan Africa is so broad that it cannot be adequately addressed by a single agency or institution. It requires national and international policies and approaches, particularly to promote women's education in the sciences from primary school to the tertiary level (Zinnah and Naibakelao 1999).

New Roles for Extension Agents

To highlight the new roles of extension agents (or as we prefer, change managers), it is useful to review both the individual role of extension agents in farmers' decision making and the collective role of the extension service as an organization.

According to van den Ban (1998), the extension agent (change manager) can play three roles in relation to farmers:

1. To recommend to the farmer what to decide. This is the traditional role that is also stressed in the transfer-of-technology model and the training-and-visit model. Here the extension service assumes that it knows which changes in the technology will be best for the farmers, an assumption that has proven sometimes correct and sometimes incorrect. Because farm conditions tend to be very location-specific, a general recommendation often is not suitable for a specific farm.
2. To provide information that gives farmers options. The farmer will make his or her own decision. This is also called the advisory model, although "optional model" may be a more appropriate term.
3. To facilitate a process through which farmers learn from their own experience and from those of their colleagues. This may be called the facilitator model.

These three roles are not mutually

exclusive. Extension staff are likely to play the three roles at the same time, possibly for the same group of clients. However, there are strong indications that among these three roles, the role of facilitator of change should be the dominant one. This role has implications for extension training programs. Skills like problem solving, organizing, convening, and motivating are attributes of a successful facilitator.

Similarly, a new concept of extension service (whether public or a private) needs to be developed. We propose the following definition: an extension service is a knowledge management organization whose main stock is intellectual capital and whose purpose is to introduce change for the benefit its clients. Because extension is already associated with the management of information, communication, and knowledge, it is logical to borrow from modern concepts of knowledge management and intellectual capital. Knowledge management refers to the ability of an organization to get the right information to the right person at the right time in a user-friendly manner (Rose 2000).

Recently there has been a substantial increase in attention to knowledge management because of globalization. Faster decision making implies delegation of authority. At the same time "knowledge" has been recognized as a fourth production factor in addition to the traditional three, land, labor, and capital.

In the industrialized countries there has been a shift toward firms that have a comparative advantage in intellectual assets rather than in the traditional natural resources assets (Alavi 2000). Such firms tend to specialize in knowledge-intensive products. A good case can be made that agricultural extension services are also in the business of providing knowledge-intensive products and services. Knowledge is not the same as information: it is information that has been processed in the mind of individuals through learning and thought (Alavi 2000). The total of intangible assets of a knowledge management organization is called the intellectual capital of the organization. It is more than what previously was called human capital.

Intellectual capital can be perceived as the combination or total of three types of intangibles (Rose 2000): Human capital is the total of skills, talent, knowledge, and expertise of the employees. Structural capital is the organizational ability to meet market requirements (copyrights, policies, and procedures, databases, knowledge management systems). Customer capital is the ability to maintain and expand a network of satisfied clients (goodwill).

Like human capital, intellectual capital has the capability to add value to itself to create wealth. Intellectual capital is composed of understanding, insights, and technologies that result in innovational development and the increased wealth of the organization. In a firm it manifests itself in the difference between "book value" and "market value" (Rose 2000). No wonder that some researchers view any organization as a knowledge system consisting of a set of socially enacted knowledge processes (Alavi 2000). The key is that knowledge processes do not occur automatically. The connection of those who need to know and those who possess the knowledge must be explicitly supported by the organization: it needs to be managed.

Is this not what extension services are all about? Modern firms adopt the slogan: we are a learning organization. Extension services should be learning organizations to the core. Thus, some of the questions leaders of extension organizations should ask themselves are: Is our structural capital increasing? Is our customer capital increasing? Structural capital also refers to

the ability of the organization to create knowledge, to store and retrieve knowledge, to distribute knowledge, and to apply knowledge throughout the organization. One element that has become a popular form of knowledge management systems is the creation of best-practice repositories. Another variation is the creation of best-practice teams that consist of staff with similar responsibilities and are led by functional area experts.

Viewing extension as a knowledge system fits well with the notion of agricultural knowledge and information systems for rural development (AKIS/RD) (FAO and World Bank 2000). The usefulness of the AKIS/RD concept is that it attempts to identify all sources of knowledge and information in the agricultural sector, including indigenous knowledge and farmers' experience. It also includes private firms, which are often ignored, as relevant sources of knowledge and information.

Thus, using the concept of AKIS/RD leads readily to the use of partnerships and collaboration among stakeholders. The identification of stakeholders and partners is often the first step toward in establishing a knowledge management network—a network of knowledge sources and knowledge seekers through the provision of efficient communication technologies. In the West, the intranet and Internet are important tools. Intranet facilitates communication within the organization while the Internet facilitates communication between organizations (and their staff).

The implication of the knowledge system management concept for extension training is clear: flexibility, teamwork, client orientation, innovation, and communication are key attributes of successful employees in a knowledge management organization. Winrock is currently collaborating with the Government of the Philippines to develop an "agricultural knowledge system" or, better put, a "knowledge portal" that would give access to a knowledge system.[2] The objective is clear—to provide agricultural information in a client-friendly manner.

Curriculum-Related Challenges

Making the curricula of agricultural colleges and universities more relevant to the present era is perhaps the major challenge before the extension profession in the 21st century (Sulaiman and van den Ban 2000; Zinnah and Naibakelao 1999; Zinnah, Steele, and Mattocks 1998). Reorienting the present extension curricula would require, among other things:

1. Dialogue among the main stakeholders involved in agricultural extension delivery.
2. Developing a consensus on the vision and goals of the extension system and setting up priorities for action.
3. Analyzing the training needs of extension staff (i.e., critical knowledge, skills, and attitudes) in relation to the changing public and private job market and to policy reform.
4. Helping agricultural colleges and universities make their curricula more responsive to the changing job market to reduce the discrepancy between training and the work extension staff actually do.
5. Forging strong networks among institutions and agencies, both local and foreign, that are committed to revitalizing agricultural extension curricula. This helps stakeholders to recognize an enduring and shared commitment and the need for each of them to benefit from the diverse talents, resources, experiences, and perspectives within the partnership.

[2]See the website www.pinoyfarmer.com.

6. Ability to cope with challenges.
7. Ability to identify and convene stakeholders.

What Type of Training Do Extension Staff Require?

Agricultural extension is undergoing major changes brought about by upheavals in the agricultural and rural development environment. Therefore, extension staff need different competencies than were required a decade ago. They need skills not only in science and technology, but, equally important, skills that address the community's demand for managerial, communication, and other human-relation capabilities geared toward sustainable agricultural and rural development. In some countries where extension services are being privatized, i.e., contracted out, extension agents will have to show skills in proposal development and project management. In such cases, the extension service is expected to become very oriented to output and performance.

In 1998 participants in a workshop on supervised enterprise projects, the experiential learning component of the Sasakawa Africa Fund for Extension Education program, were asked what skills trainees should learn during this phase of the training program. The resulting list was long, and it included the following skills that are generally lacking in the traditional extension education curricula (Rutatora and Mwaseba 1998):

- ability to facilitate coordination between private and public extension services
- ability to be critical and systems thinkers
- ability to work in a participatory mode of extension rather than a linear, technology-transfer mode of extension
- ability to search for information (from any source)
- ability to identify clients' needs
- ability to consult
- ability to facilitate experiential learning
- ability to judge the relevance of a project or technology
- ability to involve stakeholders
- ability to identify learning needs
- ability to communicate
- ability to keep records and report
- ability to mobilize technical and other support services
- ability to listen
- ability to mobilize political support for clients
- ability to identify opportunities for training
- ability to cope

These skills are consistent with those proposed by Antholt (1994) based on his experience in India. He argued that extension staff of the 21st century should be a cadre of professionals who can work under complex and fluid circumstances with little supervision, who can diagnose farmers' problems effectively, who are willing to listen to and learn from farmers, who can communicate effectively and work with farmers and farm groups, and who are able to present options, based on principles of science and good agricultural practices, that widen the choices available to farm families.

All of these skills require revitalization of agricultural curricula at the certificate, diploma, and degree levels. Developing these skills is difficult at the moment due to inertia in most agricultural colleges and universities in sub-Saharan Africa. These institutions often do not see the need to change their curricula. They tend to maintain the status quo—holding on to outdated curricula in the name of academic rigor or standards.

Extension Service Delivery Challenges and Tertiary Agricultural Education

By international standards, tertiary agricultural education in sub-Saharan Africa is in its infancy, dating from the late 1950s when African countries began to attain their independence. Over the years these universities and colleges have developed many academic programs at the certificate, diploma, baccalaureate, and postgraduate levels and have evolved in different ways. However, the majority of the programs currently being offered are outdated and do not adequately prepare graduates (whether as researchers, extension workers, policy makers, or administrators) to deal with the rapidly changing agricultural and rural development environment in the region. In addition, most of their training is done on campus, away from the farming environment—resulting in a huge gap between theory and practice (Zinnah et al. 2001; Maguire 2001).

Notwithstanding these shortcomings, agricultural colleges and universities in sub-Saharan Africa have an important role to play in revitalization of extension services delivery. They can play this role by offering responsive extension education programs that match the curricula with the actual work environment of extension staff. However, the process will require college and university administrators and staff who have a clear vision of the roles of extension in agricultural and rural development, as well as a commitment to developing and offering responsive training programs to respond to the vision. Moreover, they should be able to embrace systemic change, find a balance between public and private sector needs, and develop curricula that cater to the needs of new and diverse audiences, including mid-career extension staff.

In 2000, an international workshop held at the University of Cape Coast addressed the role of tertiary education in agricultural development (Kwarteng 2001). Many speakers highlighted the challenges that African universities face:

- enrollment larger that the teaching capacity of staff
- decline in quality of education
- unsustainable financial support
- difficulty in retaining the already limited numbers of qualified academic staff due to poor conditions of service
- poor linkages with future employers of students
- curricula that do not prepare graduates to deal with the changing demands of the job market
- training largely confined to campus, away from rural areas, creating a substantial gap between theory and practice
- failure to attract the best students
- agricultural education curricula that neglect important skills in group formation, leadership, conflict resolution, management of common property, problem identification, gender sensitivity, critical thinking, and listening skills
- inadequate and outdated instructional materials and equipment

These problems are exacerbated by the small size of most countries in Africa. Each one is trying to maintain its own agricultural university. In consequence, education budgets are too small to maintain an agricultural faculty, and teaching staff are almost exclusively recruited from the institution's own graduates, resulting in intellectual inbreeding.

Across the globe, agricultural institutions of higher learning are in crisis (Zinnah et al. 2001; Maguire 2001; Acker 1999; Bawden 1996; Schuh 1993). Student enrollment is declining, employment opportunities seem diminishing, and community and political support is

declining. Bawden (1996) questions whether agricultural universities will survive. He believes that one of the principal weaknesses of the traditional education system is the premise that any scientific and technical knowledge is beneficial for the students and that instilling more knowledge will result in better students (i.e., students with better job opportunities).

Because universities are institutions where scientists specialize in fragmentary knowledge and specialized research methods, the curriculum content tends to reflect those interests. Consequently, students are not exposed to skills relevant to participatory work in rural communities, to rural community development, and to multidisciplinary analysis. Moreover, the context of the classroom teaching exemplifies a one-dimensional information and knowledge flow. The extension process, however, hinges on multidirectional (farmer-scientist, farmer-farmer, private sector-farmer, etc) information and knowledge flow. It is unlikely that students will learn how to manage a multidimensional knowledge system in the traditional classroom setting.

Agriculture and rural development are, by definition, multidimensional. Bawden (1996) subscribes to the "new order" of universities as earlier advocated by Hansen (1990), and he cites Hawkesbury Agricultural College in Australia as a successful example. The main attributes of such a new order university are

- a strong mission statement that serves the society
- a primary role as a center for learning, innovation, and change (which stresses self-development, and critical thinking)
- interdisciplinary and multidisciplinary teaching teams
- cooperative learning (learning in teams, where "clients" also participate) rather than passive knowledge transfer

In a new order university, professors become "co-learning facilitators" (Bawden 1996). This changing nomenclature is similar to the change of extension agent from adviser to "change manager." Is it not logical that the teachers show roles from which their students can learn? The Sasakawa Africa Fund for Education (SAFE) program was heavily influenced by the Hawkesbury principles as the following case study makes evident.

Case Study: Strengthening Extension Education

The SAFE initiative was launched by the Sasakawa Africa Association in collaboration with Winrock International Institute for Agricultural Development in 1991. Working in partnerships with universities, colleges, public and private agencies, and NGOs within and outside Africa, SAFE facilitates the mobilization of internal and external resources, both human and financial, to help selected universities and colleges in sub-Saharan Africa to develop responsive educational programs for mid-career agricultural extension staff.

The complementary aims of the SAFE program are (1) to give training opportunities to male and female mid-career agricultural extension staff who have certificates or diplomas in agriculture and related disciplines and who are already working in the field, enabling them to improve their technical and human relations skills; (2) to reform agricultural extension curricula in selected agricultural universities and colleges, and help them acquire relevant instructional materials; (3) to foster networking among the participating agricultural universities and colleges with the aim of building strong pan-African academic partnerships for developing responsive agricultural extension training programs; (4) to train

leaders for agricultural extension organizations in sub-Saharan Africa; and (5) to bring about institutional reform within African agricultural universities and colleges—not only developing responsive agricultural extension curricula, but also reforming the institutions themselves.

Supervised Enterprise Projects

The SAFE initiative is guided by the principle of experiential learning, which is a combination of theory, experience, critical reflection, and practice (Zinnah and Mutimba 1998; Kolb 1984). Experiential learning provides learners with the opportunity to develop lifelong learning skills and builds their confidence and commitment, so that they can work with farmers in participatory ways. To nurture the philosophy of experiential learning, the SAFE initiative stresses an off-campus, farmer-focused component—the supervised enterprise project (SEP).

The innovativeness of the SAFE initiative rests largely on the SEPs. After a period of training on campus, the students conduct 5- to 8-month-long SEPs. The SEP's component differentiates the SAFE program from other programs in the participating colleges and universities. It provides opportunities for academic staff to assess the relevance and effectiveness of their teaching and to identify other opportunities for learning. It brings the college or university closer to farmers and issues pertaining to the farming sector, thereby ensuring that the curriculum remains farmer-focused. Because the SEPs are based on farm-level situations, they are inevitably multidisciplinary. The SEPs, therefore, provide an opportunity for disciplinary specialists to work together in seeking solutions to farmers' problems.

SEPs are comparable to internships in many master of business administration programs. Both are based on the principle of experimental training, i.e., training by doing. The emphasis is on the enhancement of leadership skills. Typical leaderships training includes (1) training in a cohort (peer group support and feedback),[3] (2) enhancing leadership skills such as problem solving, communication, customer service, and project management, and (3) grading performance through a combination of self-assessment and self-evaluation, peer group evaluation, client evaluation, and supervisory assessment.

The choice of topics for each SEP is highly influenced by the beneficiaries—farmers, the employer or sponsor of the student, and individual students themselves. Apart from having direct input into the design of the projects and in the testing of the technologies involved, farmers are brought in direct contact with the college or university, thereby providing them with an opportunity to influence the design of curriculum at the university.

Current Project Activities

Several universities and colleges in sub-Saharan Africa have launched SAFE-type agricultural extension training programs. These include the University of Cape Coast in Ghana (1993), Alemaya University in Ethiopia (1997), Makerere University in Uganda (1997), Sokoine University of Agriculture in Tanzania (1998), and Kwadaso Agricultural College in Ghana (2000). A number of others, including the National University of Benin, Polytechnic University of Bobo-Dioulasso in Burkina Faso, University of Mali, and Ahmadu Bello University in Nigeria, are planning to launch similar SAFE programs.

[3] See Brunche and Sullivan 1996 on the positive experience with the Kellogg Foundation National Fellowship Program.

Accomplishments of the SAFE Initiative

Among the major accomplishments of the SAFE initiative are that over 300 mid-career agricultural extension staff have completed B.Sc. degrees between 1993 and 2001 and have returned to their jobs in their home countries. Currently, more than 200 students are enrolled in the SAFE programs at the diploma, B.Sc., and M.Sc. levels in five participating universities and one agricultural college.

In addition, over three dozen individual SAFE fellows have completed B.Sc. or M.Sc. degrees at universities in sub-Saharan Africa, and three have completed Ph.D. degrees at universities outside Africa. They are more enthusiastic and better prepared to address the multitude of field conditions they encounter.

Strong formal linkages have been created among the administrators and staff of the participating universities and colleges, and private and public agricultural development agencies, including NGOs.

The SAFE initiative has also helped to bring the participating universities and colleges more into agricultural development in their respective countries, particularly through the off-campus supervised enterprise projects.

Finally, the SAFE initiative has also played a catalytic role in rekindling the debate on the importance of agricultural and extension education in rural development in sub-Saharan Africa.

Lessons Learned

By design, the SAFE program for mid-career extension professionals is meant to respond to the changing needs of farmers and extension services delivery in sub-Saharan Africa. But the experience reveals that these changes can be quite dramatic and that coping with them can present a special challenge. Planning and operating the program within a fast-changing environment has required constant review of the curricula. It is like chasing a moving target. In Uganda for example, while we have been training for the public sector, the country has been moving toward other forms of extension provision like contracting extension service providers.

These issues notwithstanding, the SAFE initiative so far has been very successful. It has clearly demonstrated that

- employers can influence the design of curricula at universities
- universities respond to well-articulated demands—contrary to the ivory tower phenomenon that usually characterizes institutions of higher learning
- mid-career extension professionals represent an neglected group of learners
- field experience can enrich curricula and teaching at universities—the programs provide unusual opportunities for university staff to learn from real life situations

These advances have been achieved by fostering dialogue between the key stakeholders, catalyzing attitudinal change, assisting in developing responsive curricula, providing basic resources to kick-start the programs, and participating in teaching and in reviewing the curricula to ensure responsiveness. These successes have created a growing interest in SAFE-type programs, and requests from universities for support are increasing. The challenge now is to start thinking about how to cope with the rising demand.

Several conditions are necessary for establishing such responsive programs:

- employers (public or private) who recognize the inadequacies of their staff and the need for extension education
- employers able to articulate their staff development needs to universities

- colleges and universities willing to embrace change and to experiment with new concepts
- administrators and staff of colleges and universities who have a clear vision of the roles of extension in agricultural and rural development and are committed to developing training programs to respond to the vision
- a neutral partner (e.g., SAA and Winrock International, in the case of the SAFE program) to catalyze linkages between stakeholders

No blueprint solution will work in all situations. However, the SAFE approach provides an adaptable framework to provide responsive training programs for extension staff.

Conclusion

It is apparent that agricultural extension services in sub-Saharan Africa face multifaceted challenges as a result of the rapidly changing dynamics of the agricultural and rural development globally and on the African continent in particular. These changes are making an already complex organization even more complex. Realistically, to overcome these challenges, deliberate changes, both short-term and long-term, must be made in the various subsystems of the agricultural knowledge and information system, including agricultural training institutions, research institutions, farmers' organizations, government agencies responsible for agricultural policy and program planning, and various services providers, including the private for-profit and not-for-profit organizations.

A major responsibility for leading change in the extension services delivery rests with agricultural training institutions. They need to develop flexible and responsive agricultural and extension education programs for the various individuals and groups within the subsystems of the agricultural knowledge and information system to enable them to better understand their new roles and responsibilities as change managers, to anticipate future changes and opportunities, and to deal with the current challenges of extension services delivery in sub-Saharan Africa.

Coherent government policy is required to respond to the pressing challenges of extension services delivery. Short and long-term policies are extremely important for nurturing the combined efforts of public and private providers of extension services to achieve sustainable agricultural and rural development in sub-Saharan Africa. Change affects every aspect of our lives. It is a difficult and sometimes costly process; it requires unprecedented cooperation from all stakeholders. But as Heller (1998, 6) aptly puts it, "change is the way to stay competitive and grow . . . seeking to anticipate and lead change is thus, paradoxically, safer as well as more adventurous."

We expect universities to show leadership. Each nation expects universities to be the first to experiment with new teaching designs, new concepts, and, yes, new partnerships and alliances. Agricultural extension services are not dead—they need to regroup, develop new mission statements and procedures, and they should take the lead in developing productive relationships with nongovernment stakeholders, with agribusinesses, and with the NGO community. To do more with fewer funds is the challenge.

The new roles of the institutions imply a new role for the agents. They are to be managers of change, facilitators, information seekers, and option providers. New skills are needed, ones that generally are not taught in traditional curricula but are often be found under the set of leadership

skills. Really, training in leadership and client-orientation is what a large part of extension training should be all about.

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Rural Business Development Fund with Emphasis on Fertilizer Stocking and Delivery

Karl H. Solberg

The Norwegian government's Strategy for Support to Private-Sector Development in Developing Countries aims at helping to increase productivity within primary industries, the industrial sector, and the service sector. Agriculture is a special target. Under the strategy, Uganda could be one of the pilot countries. The Norwegian Agency for Development Cooperation has indicated interest in establishing the Rural Business Development Fund (RBDF) in cooperation with the Uganda Ministry of Agriculture, Animal Industry, and Fisheries and Sasakawa-Global 2000.

RBDF is a response to the Government of Uganda's efforts to eradicate poverty through its Plan for Modernisation of Agriculture. The latter stresses the importance of technology-based agriculture, including the use of fertilizer, to increase productivity. The primary objective of RBDF would be to help farmers in using new technologies such as fertilizer.

Fertilizer is a powerful tool for increasing crop production. RBDF would basically make fertilizer available to farmers at an acceptable price and expand knowledge on using fertilizer in an appropriate, economic, and environmentally friendly manner.

Importance of Increased Crop Production

If utilized sustainably, Uganda's rich natural resources can be a lasting blessing for the nation. Increasing the production of food and cash crops is the foundation for national economic growth and poverty eradication. It is fundamental for the food processing industry, which significantly adds value to raw products, and it creates employment and food security. Improved foodcrop production also contributes to improved diets, reduced malnutrition, and better health in general.

Expanding production of cash crops for export will not only improve Uganda's foreign exchange reserves but will also raise smallholders' cash incomes and thereby significantly help reduce rural poverty. Increased production can, however, only be achieved through the introduction of modern farming technologies, which is a high priority of the Uganda government.

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Soil Fertility: Crucial for Increasing Production

The declining soil fertility of farmers' fields in most regions of Uganda is well documented. The Uganda Soil Fertility Initiative cites five major causes of this decline—mining of soil nutrients, water losses by run-off and evaporation, loss of soil cover by in situ destruction of vegetation and by removal of residues, accelerated loss of soil organic matter, and restricted rooting from soil compaction.

To mitigate declining soil fertility, more appropriate soil management techniques are recommended, such as in-situ biomass production and maximizing soil cover, enhancement of biological soil activity and moisture infiltration, and inclusion of legumes in crop rotations for biological nitrogen production. Recycling organic materials and household wastes would also benefit the soil nutrient status.

Supplementary inorganic fertilizer is required to further improve yields and generate farm income. This is a well-known and successful technology to lift smallholders out of their subsistence livelihoods.

Appropriate use of inorganic fertilizer, together with high yielding crop varieties, will increase yield and improve profits. But it is important for farmers to be educated in correct use of improved seed varieties and fertilizer, particularly through organized training and field demonstrations.

Availability and Pricing of Fertilizer

Uganda and its neighbors produce no inorganic fertilizer, and the consumption of fertilizer in Uganda is low even for Africa. Consumption is estimated to be less than 0.25 kg/ha, compared with about 9 kg/ha for Africa, 40 kg/ha for Latin America and Asia, and 100 kg/ha for the European Union and United States. In Uganda, fertilizer is purchased internationally, either directly or via intermediate trading companies in Kenya. Because of Uganda's geographical location, fertilizer prices are higher than prices in most other African countries, and hence consumption is low.

The fertilizer supply situation has recently improved, however. Unofficial estimates indicate that the consumption in 2000 rose to 18,000 tonnes from approximately 12,000 tonnes a year earlier. And an increasing number of importers are bringing fertilizer to Uganda through third parties in Kenya either through direct purchasing or barter.

The larger supply resulted in a significantly lower farmgate prices in Uganda. It should be noted that the reduced prices resulted from market competition without external interventions like government subsidies. This shows that competition is working. It is the only way to keep prices at a reasonable level. Competition however depends on the size of the market and the potential for profits, which determines the marketers' willingness to take risks.

Based on the prospects for agricultural modernization and increased use of fertilizer in Uganda, Norsk Hydro in Kenya has established a fertilizer depot in Kampala. This depot will improve availability of fertilizer in Uganda and encourage its use.

The improved market situation is partly due to the impressive work done in particular by SG 2000 and IDEA, a USAID project. These two projects have been instrumental in introducing modern farming technologies and have taken steps to develop a fertilizer distribution system in areas where the use of fertilizer has been demonstrated. Potential businesspersons have been selected to become input stockists. Training has been given in stock keeping and accounting, and a credit

system has been established, enabling stockists to finance initial purchases of seeds and fertilizer.

The focus on the role of local businesspersons in agricultural development was based on the conviction that demonstrating proper use of seed and fertilizer will have little effect unless inputs are made available to the farmers.

Initially the two projects imported fertilizer themselves. Such efforts were specifically targeted to areas where fertilizer was hard to obtain through commercial channels. The justification for importation ceased during 2000 because supplies became available at more acceptable prices. The effort was concentrated on foodcrops and certain parts of the country due to limited capacity. Expansion to other areas of the country and to cash crops is highly desirable. New financing sources are required as well.

Essential Training

Better knowledge of fertilizer—topics such as how to use it, its effect on soil conditions, inorganic fertilizer as a nutrient supplement to biomass, fertilizer's effect on the environment, and proper storage—is important for development of fertilizer use in Uganda. The need for such training in a country where the use of fertilizer is in its infancy is enormous. There are, for example, no written materials available for farmers that explain the type of fertilizers to be used for different crops and conditions, application methods, quantities to be used, etc. Training is urgently needed to improve the knowledge of all actors in the distribution chain, especially fertilizer stockists who play an important role in relation to farmers.

Because most local stockists are new in this business, training must be tailor-made, covering subjects like fundamental knowledge about fertilizer and its the practical use, stock keeping, financing aspects, credit, and accounting. Such training requires increased capacity, resources for printing promotional materials, and so forth.

Setting of the RBDF Project

Policy

The Uganda government is committed to providing an economic and political framework for agricultural development because agriculture is considered the backbone of the nation's economy. Among the most important indicators for poverty eradication are food security and productive employment, both of which are provided by agriculture.

Liberalization of Uganda's economy has benefited agricultural production by affecting financing and procedures for importing essential inputs as well as leading to adjusted exports restrictions.

Among the present barriers to increased production are road infrastructure, efficiency of extension services, development of small-scale enterprises, and rural credit. As farmers expand their output and begin to move from food production toward more cash crop production, increased financing will be necessary. Lack of land ownership becomes a bottleneck when farmers seek bank financing using land as security. It is important for the government to implement its plan for titling ownership of agricultural land to all citizens irrespective of gender. The government should protect farmers' investments from price regulations or other interference that might threaten agricultural development.

Relevance

The proposed RBDF project aims at reducing poverty in rural Uganda by addressing the problem of declining soil

fertility and increasing agricultural production. Few countries, if any, have achieved growth in agricultural sector without increased use of fertilizer. Organic fertilizer such as manure cannot stop declining soil fertility because the quantities available are too limited. Organic fertilizer is, however, important for maintaining the quality of the soil, and it should be given adequate attention.

The RBDF project is likely to influence more than just the farmers directly involved. Neighboring farmers will notice the effect of modern farming methods, and it is likely that they also will want to try more productive techniques. Agricultural inputs will become more easily available in rural markets, making the transition to modern farming easier for everyone.

The project is in line with the Norwegian strategy for private-sector development and poverty reduction, and it fits the Uganda government's plan to modernize the agricultural sector. Results obtained through the work of SG 2000 clearly indicate that such a project would have a direct positive impact on the quality of rural life and would be an effective way of eradicating poverty.

The proposed project goes beyond food production and food security—it aims at expanding production of cash crops. Moving from using modern technologies for food production to using modern technologies for cash crop production, as well, is a logical progression. In new areas of operation, the focus will be on food production initially but will gradually expand into cash crops. This evolution will stimulate accumulation of wealth, enabling farmers to invest in other types of enterprises beyond the concern of the day-to-day survival.

Involvement in this kind of development will require long-term commitment until all agricultural districts of Uganda are covered.

Institutional and Administrative Aspects

The Ministry of Agriculture, Animal Industry, and Fisheries (MAAIF) will be responsible for the project with SG 2000 Uganda as the executing agent.

Implementation will be guided by a steering committee appointed by MAAIF. The number of organizations and institutions represented in the committee has to be agreed on jointly by MAAIF and the Norwegian Agency for Development Cooperation.

The steering committee will approve the annual plan of operation and the project budget. It will meet twice a year to discuss progress and any changes that may be needed during the season. The executing agent will report to the steering committee semi-annually.

The steering committee will function in two ways: (1) approving proposals by the executing agency for the next season's activities within the given financial framework and (2) being briefed on the results the executing agency is achieving and contributing to nationwide dissemination of the findings and experiences.

The suggested members of the steering committee will include one representative from the following:

- MAAIF
- National Agricultural Research Organisation
- Uganda National Farmers Organisation
- fertilizer traders
- smallholder coffee and tea farmers
- rural banking sector

The executing agency will serve as the secretariat of the steering committee.

Economic Justification

The economic justification for new agriculture technologies is increased yield and an attractive market. The greatest threats to new technologies are lack of markets and low prices, something farmers in several other African countries have experienced. New technologies increase production, but farmers tend to return to old practices if the economic incentives do not meet expectations.

Surplus agricultural production in Uganda has hitherto had a national market and has also been exported to neighboring countries when prices are attractive. Even maize, which is exported to Kenya, can be considered a cash crop in Uganda. It is, however, difficult to foresee how long this market situation will prevail. Successful introduction of new technologies will significantly increase the volume of production, and this will in turn likely have impact on market prices. Overseas markets should be exploited as an important outlet for future surplus production.

It is important to note that increased foodcrop production reduces farmers' concerns about being able to feed their families. Introduction of cash crops will further raise the standard of living by providing financial flexibility that farmers have lacked before.

Socio-Economic Aspects

Fertilizer is a costly input and poor farmers may have difficulty affording sufficient amounts. To assist poor farmers, collaboration with microcredit schemes is important. If such schemes do not exist, motivating farmers to save enough to purchase fertilizers is important.

Smallholders are the primary target group of the RBDF project. Many of them are poor. A recent survey showed that the average family in areas surveyed consists of six persons, and 14.2 percent the households were female-headed and 85.8 percent were male-headed. Of the farmers in survey, 92.5 percent had formal education. Their average age was 42 years, and they had about 17 years of farming experience.

The second target group is agricultural laborers, who are poor and often illiterate. As many as 69 percent of the farmers hired labor for their maize production and 40 percent considered scarcity of labor as a constraint to increased production. Farmers are willing to pay for more labor but have difficulty locating it.

The third target group is local merchants including those running small enterprises. These businesses contribute significantly to poverty eradication by generating employment and income, and they stimulate to commercial development even at the village level. Women, who play an important role in marketing of inputs and outputs, will be given great attention in the proposed project and in the training program.

Technology

The new technologies will be demonstrated in farmers' fields, on 0.1-hectare (quarter-acre) plots. By standardizing the plot size, packages of inputs appropriate for cultivation of that area can be assembled for purchase by farmers. The maize package, for example, will consist of 2 kilograms of hybrid seed, 5 kilograms of diammonium phosphate, and 5 kilograms of urea fertilizer. Similar packages for other crops are being sold. The demonstration plots are large enough to produce a harvest that is worth taking to market if the farmer chooses.

The commercial approach makes it easier for farmers to grasp the message conveyed by the demonstrations and through contact with stockists. It is

however, important for the training to focus on the economic aspects of taking advantage of the new technologies. The new high yielding varieties are more drought-tolerant, more disease-resistant, and quicker maturing than traditional varieties.

With successful implementation of this project, the goals of improved food security and improved household income are likely to be achieved. Experience hitherto shows that the new technologies have been successful in many aspects. Apart from providing participating farmers with more economic flexibility, they also become more respected by their neighbors. Most people in the local community, including the business community, will benefit from increased agricultural activities through rising demand for goods and services.

Environmental Aspects

Use of fertilizer can affect the environment, both positively and negatively. Intensification of agriculture through the use of fertilizer may reduce the pressure for clearing new forest for agricultural cultivation. Cleared and burned forests release considerable amounts of carbon dioxide, which has pernicious environmental effects. Also, use of fertilizer may reduce the depletion of soil nutrients and help build up organic matter in the soil.

Fertilizer may increase environmental problems by polluting waterways and acidifying the soil. If the soil pH is high at the outset, the acidifying effect might not be serious. It is important that the project monitor the acidity build up in selected fields. To reduce the problem of increasing acidity, fertilizer should be used in combination with organic fertilizers such as manure, crop residues, and household waste. Organic fertilizer will, in addition, improve the physical characteristics of the soil such as water-holding capacity. Emphasis should therefore be given to both organic and inorganic fertilizers when discussing options for soil fertility management with farmers.

Potential negative effects by losses through leaching and volatilization, e.g., through overuse, poor timing of application, or use of the wrong type of fertilizer, should be addressed in the training programs for farmers. However, because current use of fertilizer is slight and because such small increases in fertilizer use are envisioned, the positive environmental effects are likely to outweigh the negative ones.

Concept

Goal and Objectives

The goal of the proposed RBDF project is to contribute to poverty eradication in Uganda.

The objectives are improved production of food and cash crops and developing an entrepreneurial attitude in the farming community. These objectives can be met by:

1. Demonstrating in farmers' fields how to use high yielding varieties of seeds, the correct use of fertilizer, and improved cultivation methods for proper conservation of the environment.
2. Training farmers in technology for preserving crops for later consumption or for sale when prices are more attractive.
3. Training farmers in economic awareness by encouraging rural savings and credit schemes. These schemes will help even poor farmers to purchase the input package required for the demonstration plot and to pay back the loan at the end of the season.
4. Encouraging the establishment of a stockists' network, which will make inputs required for crop production

readily available in local markets. Greater numbers of stockists will foster a business environment at the village level and expand opportunities for farmers to sell excess production.

Outputs

To forecast outputs of the proposed RBDF project, the field work of SG 2000 represents the best reference point. SG 2000 hired Nkoola Institutional Development Associates (NIDA) to study the profitability and competitiveness of the recommended improved varieties of maize and groundnuts, to assess the profitability of the recommended fertilizer applications, and to assess the benefits of the SG 2000 interventions.

NIDA's findings indicate that using fertilizer and high yielding crop varieties gives significantly higher yields. This matches farmers' evaluations. Maize yield varied from 3.0 to 4.2 t/ha depending on varieties used, compared with an average yield of 2.0 t/ha for the local varieties. Variation across districts can be explained by differences in soil moisture and initial soil nutrient status. The findings demonstrate the need for having different fertilizer recommendations (packages) for different districts.

The profitability of producing maize with new technologies was good. Different maize varieties were assessed and a sample of four returned U Sh 3.15, U Sh 2.36, U Sh 2.02, and U Sh 1.71 per shilling invested.

Similar results were found for groundnuts. Attractive economic returns were demonstrated by using fertilizer, plant protection, and disease-tolerant varieties. One shilling invested in a high yielding variety combined with fertilizer gave a return of U Sh 3.50. In another example, where plant protection was included, the return was U Sh 5.40 per shilling invested. These figures are well above the minimum acceptable marginal rate of return, ranging between 0.5 to 1.0.

Other benefits from adoption of recommended practices are improved food security (cited by 96% of the farmers) and enhanced household income (cited by 85%).

Farmers have peace of mind when they know that they can pay medical bills and have enough food for their family. These farmers, who have great respect in the community, said that the income enabled them to meet day-to-day household cash obligations with less difficulty. They are able to pay school fees for their children, some have improved their houses, and a number have been able to cultivate larger pieces of land because they have cash to pay for hiring oxen or labor. The money from maize has helped some farmers start small businesses while others have acquired oxen and implements like the ox-plow.

Budget

The proposed budget for the RBDF project is shown in table 1.

Table 1. Proposed RBDF budget (US$000).

Item	First year	Each of 4 years	Total
Farmers training (demo plots)	51.4	51.4	257.0
Training of stockists	31.2	31.2	156.0
Guarantee scheme	364.0	36.4	509.6
Seminars and printing material	22.0	22.0	110.0
Development fund	100.0	150.0	700.0
Total	568.6	291.0	1,732.6

Cooperating Partners

SG 2000 will be the executing agency for the proposed project, which will supplement SG 2000's ongoing field work and allow expansion into new areas.

Collaboration with local stockists is important. Stockists are crucial for providing agricultural inputs and serving as partners in marketing products.

Another partner is the National Agricultural Advisory Services (NAADS). Its mandate is to build up agriculture services nationwide. It will be important for the RBDF to work closely with NAADS from the start. The RBDF project lifetime is limited. At termination, farmers will have to run the business by themselves. If farmers have established fruitful cooperation with NAADS, the fundamental services they require will, it is hoped, be maintained without interruption.

Because credit is vital for this type of project and because the credit arrangements, sooner or later, must be taken over by local banks and other types of credit institutions, close cooperation with such institutions is also essential from the outset. Similarly cooperation with microcredit schemes that help farmers meet their needs for short-term credit is important.

Components

Farmer Training

Training will be based on practical implementation and demonstration of the new technologies on 0.1-hectare plots for a variety of food and cash crops, e.g., maize, beans, groundnuts, sorghum, potatoes, bananas, and coffee, in a number districts. Among the subjects to be focused on will be yield increases, labor-saving techniques, and estimation of the economic results.

The use of demonstration plots will imply the use of agricultural inputs. The plots are large enough (0.1 ha) to enable farmers to realistically gauge the benefit and costs associated with each agricultural enterprise they undertake. The plots will also demonstrate how to manage factors that influence yield increase and profits on farms.

This nationwide demonstration program will

- increase food production
- provide training and seed capital for poor male and female farmers
- generate demand for fertilizer, seeds, and tools needed for agricultural intensification
- help village stockists to build up inventory and gain customers as they sell more starter packages to new demonstration farmers and other adopters

The training will take place throughout the season from planting, weeding, and harvesting to processing. Trained extension workers and approved NGOs will do the training. Through active participation, farmers will own the program and thereby ensure sustainability.

Key elements of the training:

1. It will demonstrate proper agronomic practices using maize and beans as initial crops. Basic application of fertilizer at planting will be demonstrated in combination with maintenance of soil organic matter.
2. It will be field based, initially as group discussions, but also on an individual basis insofar as resources and capacity permit.
3. It will use brochures and posters covering various crops.
4. It will take place from planting through all stages of growth, harvesting, processing, storage, and discussion of marketing strategies.
5. It will include simple techniques for analyzing return on investments. Farmers

will be encouraged to keep individual record books on costs and income from sale of products.

Retailer Training

An extensive network of rural stockists will be needed to service an expanded on-farm demonstration program in many new districts. Servicing farmers through a private network of rural stockists will help to ensure sustainability of the demonstration program and promote adoption among farmers.

Training rural stockists is a crucial part of the proposed RBDF project. Small emerging entrepreneurs need training to improve their knowledge of marketing agricultural inputs, to enhance their analytical thinking, planning, and decision-making skills, and to meet the challenges of an open and competitive markets.

The stockist training will focus on

- input marketing, covering fertilizers, seed, and plant protection
- dealer networks
- field warehousing and distribution channels
- principles of marketing
- marketing and pricing strategies
- advertising
- sales promotion and field extension
- market information
- role of the input stockist in the production chain
- record keeping
- principles of business

However, recruiting suitable candidates capable of starting business enterprises in rural areas is not simple. Several measures can reduce the risks connected to the start up of new stockists. First, candidates should have a good reputation, particularly in areas with good potential for food and cash crop production Second, candidates should be interested helping the project promote demonstration packages and deliver brochures and posters for various crops. Third, candidates should be prepared to follow up contacts with farmers during the season and assist in formulating strategies for output marketing. Finally, candidates should be prepared to introduce simple techniques for analyzing returns on investments in order to be able to justify the investment plan.

Credit Guarantee Scheme

Lack of capital is a major impediment to developing the stockist trade. Consequently, a short-term credit-guarantee facility, similar to the one introduced by SG 2000 and IDEA will be a centerpiece of the RBDF project. The credit guarantee scheme will allow distributors to supply goods to stockists with reduced financial risks.

Stockists will be required to make a down payment of 30 percent of the value of each consignment of goods collected. Stockists will complete payment of the remaining 70 percent after selling the goods to farmers. RBDF will not be liable for any credit that stockists extend to farmers. Any distributor can benefit from the credit guarantee facility for not more than 3 years.

The credit guarantee scheme will help develop a stockist network in rural areas, and it will also provide the distributors with extra financial capacity to maintain stocks of essential inputs in anticipation of the peak periods of demand. Experience has shown that lack of credit prevents distributors from maintaining stocks.

The RBDF project executors will keep records of distributors' performance in the credit guarantee scheme. These records will represent valuable information for banks and other credit institutions when they take over the credit responsibility

from the project. Such information may help build confidence in the relationship from distributors or stockists and local lending institutions.

Comments on Critical Aspects

Training

Uganda's latest Poverty Status Report concludes that education and agricultural productivity are positively correlated. From 1992 to 2000, 1 additional year of schooling was associated with a 5 percent growth in agricultural production. Education also increased nonfarm enterprises development as well. The report does not, however, indicate the type of schooling.

In Uganda's Plan for Modernisation of Agriculture (PMA), education is given attention as a measure to achieve targets from the university level down to primary school. But a weakness of the plan is that vocational training of farmers in farming as a business is not mentioned. If building a national network of farmers' vocational training schools is overlooked, the development of agriculture will in the long run come to a standstill or take unforeseen and unfortunate directions.

It seems naive to believe that agriculture can contribute to national economic growth and poverty eradication without having operators (farmers) who know their profession both in theory and in practice. Most farmers are smallholders at the subsistence level and many are illiterate. The PMA implies that these resource-poor smallholders will (1) lift themselves to a level above the poverty line by increasing production and thereby generating more income and (2) collectively be the backbone for the national economic growth and development in general.

To put this responsibility on the shoulders of poor and illiterate farmers appears dubious, unless simultaneously a nationwide system for upgrading their knowledge and skill in farming is established. All types of development are based on knowledge and appropriate skill, and farming is no exception.

It is a mistake to believe that supporting the extension service will compensate for lack of training and education in farming. Farming is not merely cultivation of the soil and growing food and cash crops, it is also a question of taking leadership in developing the sector in a way that serves the interest of the farmers and society.

A modern farm is in fact a complicated business. Parts of it can be compared with other types of business, but modern agriculture requires knowledge in a broad range of subjects, such as short- and long-term planning of operations, biology, soil and plants including organic and inorganic fertilizers, irrigation, animal husbandry, pasture management, treatment of milk, fruit growing, horticulture, farming systems and cultivation skills including inter-cropping, farm forestry and agroforestry, water catchment management in dry areas, pest control, handling and maintenance of tools, buildings and machines, harvesting, storage, accounting, economic evaluation and economic planning, marketing, management of labor, and participation in building cooperatives.

The modern era poses new challenges for farming communities in developed as well as developing countries, characterized by world-wide market liberalization. The history of Western agricultural development is, however, a good baseline for those who seek new models for agricultural development in developing countries.

In the West, agriculture has developed to an incredible level. In Norway it was

based on three main pillars. The first pillar was a network of vocational training schools that the government established for farmers throughout Norway. The idea was rooted in the belief that knowledge was fundamental for development of this sector. Those attending the vocational training schools were not only pioneers in agricultural development in their communities, they also became community leaders and politicians. The training made them respected and able to operate in public meetings and as leaders of communities and organizations. As such they played an important role to ensure that agricultural development was placed on the agenda wherever appropriate. As politicians, they had great influence, even up to the Parliament. Farming became a recognized and respected profession, with proud, knowledgeable, and self-confident operators.

The second pillar was the development of farmers' cooperatives, established by the farmers themselves. This crucial element in the development endeavor required trained and educated people who saw the need for organizing farmers in associations or cooperatives. Representatives of the cooperatives took responsibility, on behalf of the farmers, acting as agents for the purchase of inputs, marketing, negotiation with government on the pricing of farm products, and establishing local processing industries (dairies, abattoirs, etc.). The processing industries, owned by the cooperatives—and in fact owned by the farmers—ensured stable sale of farm products at acceptable prices. By selecting the leaders themselves, the farmers were confident that their own organization had genuine interest in developing the sector and helping farmers.

The third pillar was the development of close cooperation between the government and the farmers' cooperatives, at the national level, in formulating strategies for the sector development, including pricing of the farm products. This type of cooperation could only occur by having educated farmers in key positions at different political levels in the country. Subsidies were agreed on and instituted to ensure a certain level of income for the farmers. Many years ago, the Parliament even decided that the income for an average farmer should match the income of an average worker in industry.

None of these pillars are present in Uganda. Vocational training and education of farmers hardly exists, there are few effective farmers' cooperatives, and there is no mechanism or official forum where representatives of farmers can meet the government regarding strategies for sector development including pricing of farm products.

Market liberalization has been introduced in Uganda, and the government's role and responsibility for the agricultural sector is limited. Much responsibility has been passed to the private sector without defining government measures for ensuring that the private sector operates properly. Subsidies are banned even at the initial stage of agricultural development in contrast with the Western world where subsidies are still widely used to keep the agricultural sector attractive. Products from a developing country like Uganda will likely face severe challenges in penetrating the international market because of unfair competition due to subsidies.

The European Community, and also Norway, are considering abandoning duties and taxes on agricultural products originating in the least-developed countries. If this happens, it will help developing countries in international trade.

The training program described for the RBDF project seems appropriate as a

short-term intervention. It takes time to establish government vocational training schools. But in the long run, macroeconomic factors will make project-based training insufficient for developing the sector according to intentions in the PMA.

It is tempting to suggest that the project consider including adult formal education for a selected group of farmers in the training program. This type of training could be organized in cooperation with NAADS at the agricultural development centers, or NGOs, or other appropriate institutions. The baseline should be the need for knowledge in modern farming including accounting and training in leadership, management related to establishing farmers cooperatives, etc. Monitoring the performance of the participants throughout the project period will give some idea of the output of this particular training. It is well known in adult education that students interested in improving their own businesses are highly motivated, which is an attractive situation for effective learning.

Credit

Access to credit institutions is fundamental for any development effort and not least for agricultural development. Credit schemes in Uganda, having mainly been directed to urban areas, have often failed, justifying a cautious approach by credit institutions. International experience shows that successful microfinance institutions have required subsidies for a time.

The Uganda government is establishing a framework for microfinance institutions to serve the poor in rural areas. The cabinet has approved the policy framework and the draft bill is in the Parliament.

The concept of the RBDF project is to assist the business community initially with a guarantee scheme in order to help farmers get inputs when needed. But the credit scheme is not directed to farmers, only to distributors and local stockists. That is a weakness in the project because some farmers will have problems in raising cash to purchase the package of seeds and fertilizer.

Without such a guarantee scheme, the project will fail. Furthermore, it would be strategically wise to encourage the microfinance institutions to establish branches in areas where the project operates. Doing so will help farmers overcome their difficulties finding cash when they need to purchase inputs or to make other types of minor investments. The repayment schedule should be timed to fit the harvest season, when the farmers get money from sale of products.

Almost as important as credit institutions is the opportunity for saving money in banks and institutions. Farmers are hesitant to hand over money to others because of numerous unfortunate experiences. But saving has to be encouraged, particularly because it is not frequently practiced and people are not always familiar with the mechanisms for saving. It will help those who prefer to set aside money instead of being dependent on credit institutions every time cash is needed. Savings will also earn interest, and this has to be seen by the bank or the saving institution as an advantage, contrary to credits where the clients have to pay a high interest for the loan. It is important to build a positive attitude and realistic view among farmers about savings and credit opportunities.

In connection with establishing cooperatives, the possibility of offering financial services like savings and credits should be carefully considered. Farmers might more easily adapt themselves to the habit of saving and credits if their own cooperative is the responsible institution.

The proposed guarantee scheme for distributors and stockists is adapted to the prevailing situation, but it will last only for a few years. Thereafter banks and other credit institutions must take over this task.

Building up serious credit and savings institutions in the areas of project operation is a big challenge for the project staff. Initially these institutions may have problems because the volume of capital in circulation may be too small to justify their operation. Close monitoring and cooperation is necessary to see that these institutions do not terminate the services because of a year of negative results. A long-term perspective is mandatory, and to overcome initial problems even subsidies should be considered. Farmer-owned cooperative financing services may have a better chance to survive than private institutions. The project's responsibility is apparent because sustaining the activities built up by the project depends on developing a lasting solution to financing mechanisms.

Thus the project should give particular attention to credit and savings as the lifeblood for achieving sustained development. Cooperation with banks and credit institutions and establishment of savings and credit cooperatives should be a priority from the beginning.

Cooperation with NAADS

Agricultural extension in Uganda can be characterized by lack of resources, low frequency of visits to farmers, and advice that lacks a coherent direction and often fails to address key problems. During the formulation of the PMA, a Presidential Directive authorized recruiting new graduate extension workers at the subcounty level. The aim was to bring new energy into the extension service. But the effect of recruiting young graduates, without adequate resources and a "home" for instilling motivation and knowledge may be modest.

Agricultural extension is a profession in itself, requiring broad-based experience and specific knowledge in accordance with farmers' needs. And the needs vary from one area to another and from farmer to farmer. Extension has had a significant impact on the farm productivity, particularly through promoting the optimal use of fertilizer. The more frequent the visits, the better the results.

The new National Agricultural Advisory Services (NAADS) will begin as a pilot project (trailblazing period) in a few districts. This new model is founded on the idea that the services will be contracted by farmers' groups and will be tailored to the needs of the farmers in the specific area of operation or to a specific production system. The strategic framework has been approved by the Cabinet and the NAADS Organisation Bill has been submitted to the Parliament.

The NAADS' concept implies, in short, that the farmers have to be organized, literate, and competent in formulating their needs, in working out and understanding contracts, and in accounting and administration of contracts. The contracts will principally be tendered, and this is another big challenge. However, the transition to a new system will take several years to cover the whole country, and the farmers therefore have time to be prepared for the new model.

In the meantime, projects in many areas have to be more or less self-sufficient with extension workers to achieve targets. But this is not satisfactory for the sustainability of projects. The lifetime of a project is limited—it is vital to find ways to ensure that introduced technologies are maintained after the project terminates. The proposed RBDF project suggests

identifying extension workers in the areas of operation and including them in teamwork from the beginning. They will need both on-the-job training and formal training in extension work per se. Communication skills, which are important for gaining farmers' trust and confidence, are absent in the curricula of most colleges and universities.

Makerere University has established a center for specialized training in agricultural extension. Cooperation with Makerere should be tried out. The Norwegian Agency for Development Cooperation has granted a substantial amount of money for this center, and utilizing it for that purpose would be appropriate.

The RBDF project could also approach the NAADS secretariat to establish formal cooperation in order to obtain funding for extension staff (to be contracted by farmers) and to offer participation in testing models for practical extension work, if this is of interest.

To summarize, agriculture extension in Uganda today is rather weak. A new model is being launched by the government. It will, however, take many years before the new model is operational throughout the country, and its success will appear first after several years of trying and failing. A professionally competent extension service is, on the other hand, important for agricultural development. It cannot be neglected when embarking on a field project that aims to increase productivity and improve income. Based on the requirement for sustainability, the project should from the beginning establish cooperation with present extension workers in the specific areas of operation and with NAADS in an attempt to initiate fruitful cooperation.

Marketing and the Role of Stockists

In the agricultural sector, marketing means provision of inputs and sale of farm products. For both purposes, the local business community plays an important role. Initially there is no alternative to using local stockists as traders and collaborators for agricultural sector development. Most communities have local dealers who have access to larger markets. Many have their own transport or cooperate with others who have transport. Increased volume of trade means improved profit, and since trade is their livelihood, local stockists would not be hesitant to cooperate.

Local stockists are, on the other hand, perhaps not very familiar with trading agricultural inputs and farm products. Table 2 indicates some problems that may arise when seeking cooperation. Possible solutions require a rather comprehensive action program in which training is one component.

Table 2. Problems and suggested solutions in building stockist networks.

Problem	Suggested solution
Lack of entrepreneurial skills	Train dealers in business management
Lack of operational capital	Provision of short-term loans
Poor output marketing	Produce for target/contract market
Undeveloped horizontal and vertical linkages	Establish a rural stockists' network
Small volume and fragmented market	Encourage more aggressive promotion
Poor information flow	Use mass media to advertise
Unreliable supplies at peak periods	Encourage importers to stock early in depots
Sale of expired or low grade products	A more vigilant national regulatory body
Price fluctuation	Early purchases from best world markets
Lack of competent technical adviser	Hire competent technical advisers

Promoting competition among stockists is important. When just one controls the market, there is always temptation to exploit clients. It is therefore crucial to select stockists who are prepared to become serious partners in agricultural development. Ability to gain the confidence and trust of farmers is an essential criterion when selecting stockists because honesty is a must to reach set targets.

The following are some guidelines for commencing cooperation with stockists.

1. Potential stockists are invited for meetings with importers and distributors of agricultural inputs.
2. The business of marketing inputs is explained to stockists to stimulate their interest further.
3. Volunteer stockists are then briefed on contractual obligations, delivery mechanism, and payment methods.
4. Stockists, importers, and distributors negotiate margins and sign dealership agreements that are witnessed by the project staff.
5. The project stands as guarantor for stockists for an initial period of 2 years, but with performance reviews after each season.
6. The project staff continuously train stockists and distributors on product knowledge and inspect their shops.

Marketing of farm products is another challenge to local stockists, which is more difficult than provision of inputs. The question is whether the local stockists initially can take this responsibility, or what options actually prevail for the farmers to sell their products? An ultimate goal would be that the farmers' cooperatives take the responsibility for buying farm products, whether for local processing industries, consumption, preliminary storage, or for sale overseas.

Future development of the agricultural sector will depend on the availability of markets for farm products and pricing. This part of agricultural development needs skilled specialists who act on behalf of the farmers. If marketing is done by the farmers' cooperatives, the surplus from trading can be plowed back to the owners, increasing farmers' incomes. In production and trading of farm products, farmers retain the smallest part of the price consumers pay for the products. The largest profit goes to the traders. Trading of farm products is therefore a big challenge to farmers' cooperatives in order to gain something from it to the benefit of the farmers.

Increased production has no meaning unless the markets are prepared to buy the products at an acceptable price. A likely scenario in Uganda is that the prices will go down and that farmers' profits will decline. This is, of course, to the advantage of the consumers, and also in line with the PMA (which predicts cheaper products for consumers) and a natural consequence of the liberalized market. Farm communities will be challenged by lower prices. One answer would be to invest in mechanization and produce more per person. By doing so, the farmers will, in spite of lower prices, be able to retain higher profits and raise their standard of living.

Again, training and education of farmers is fundamental for coping with all challenges modernization of agriculture brings about. Those representing farmers must have respect and knowledge, which education gives, and experience and strength, which only cooperatives with a large number of members can give. Both a short-term and long-term development perspective should constitute the baseline for all types of operations. In a world of stiff competition, it will be valuable for farmers to possess their own capacity to analyze situations, e.g., cost elements in

production and marketing, options for rationalization, and alternative profitable enterprises.

To summarize, the future of agricultural in Uganda will depend on a cadre of trained farmers who can take responsibility for developing this sector, including trading of farm products and running processing industries in partnership with other business communities. It is only the farmers themselves who should, or can, develop this sector, and not government, bureaucrats or business people living somewhere else.

Unless the farmers are educated and collectively strong, they will be losers and remain poor "slaves" in a rich society.

So Much Progress in Agriculture and Finance, So Little in Rural Credit: Proposals for Constructive Engagement

J. D. Von Pischke

Why has formal finance for small farmers in poor and middle-income countries evolved so little while agricultural technology and financial markets generally have been radically transformed over the last 30 or so years? In this paper, this question is explored by briefly noting fundamental changes that have occurred in agriculture and finance during this period and by examining why rural credit has seen so little innovation. The unfortunate past role of donor agencies is recounted as a basis for revisions that might permit their constructive reengagement. The primary focus of this paper is small farm credit and formal financial institutions, which are clearly defined concerns of development assistance and public policy.

Changes in Agriculture

Agriculture has experienced a Green Revolution. The revolution resulted from great scientific breakthroughs in breeding high yielding varieties of basic cereals. The new strains were developed experimentally and adapted to commercial farming on both a large and a small scale, and also to some subsistence farms. Countries such as India that despaired of being self-sufficient in staple cereals no longer have to be concerned about this problem in normal years.

One motivating force behind the development of new crop varieties was the prospect that population growth would outstrip agricultural productivity. Another was the formation of institutions that led scientific innovation, notably the international agricultural research centers, many of which were funded initially by the Ford and Rockefeller foundations and later through the Consultative Group for International Agricultural Research.

Other institutions that made this revolution possible were commercial growers and marketers of improved seeds, input suppliers, NGOs and other promoters of better plant husbandry, government agencies having a degree of control that required their permission for the use of new material, and others involved in creation and operation of the infrastructure that supports local, national, and international food systems. Curiously, little empirical work has been done on the contribution of credit to the Green Revolution. It is difficult to know to what extent it contributed to farmers' capacity to grow new varieties that required greater expenditure on inputs.

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Changes in Finance

Finance likewise experienced a revolution, one that has been more disorderly than that based on plant science. The essence of the changes in finance can be summarized quite simply: Before, everyone knew that finance was all about money. Now, everyone knows that finance is all about risk.

The revolution in finance was driven by deregulation. The pressures for deregulation were varied, but they led to a consensus that the old order was inefficient in enabling finance to do what finance is supposed to do. In rich countries, Depression-era controls and comfortable, club-like ways of doing business were slowly imploding amid consumer impatience and efforts within the finance industry to realize economies of scale and scope. In poor and middle-income countries, the problems were more apparent because large government credit institutions were so pathetically dysfunctional.[1]

But what is finance supposed to do? Finance can contribute to growth and reduce poverty when it (1) transfers purchasing power from uses with low marginal returns to uses with high marginal returns, (2) contributes to more efficient inter-temporal decisions (i.e., trade-offs between the present and future) about saving, accumulation of assets, and investment, (3) facilitates the management of liquidity and the accumulation of stores of value, and (4) offers better ways to deal with risk (Gonzalez-Vega 1998, 15). The trick is to work with the powerful forces of markets to achieve these benefits, not to work against them.[2]

Financial Liberalization and Development

The argument for financial liberalization in developing countries was made in especially forceful terms by development assistance agencies with the approval of the international financial community. The argument was based on the fact that the financial sectors of poor and middle-income countries were too small, from a development perspective, in that they failed to contribute sufficiently to economic growth (Shaw 1973; McKinnon 1973). Such financial sectors were "repressed" by interest rate controls, by credit quotas imposed on lending institutions, by officially subsidized directed lending for "priority sectors" as defined in national economic plans, by barriers to entry into the financial sector and hence a lack of competition, and by high reserve requirements imposed on commercial banks, which restricted their loanable funds and hence their capacity to stimulate growth. In addition, exchange controls produced distorted economic incentives, perpetuating inefficient investment and capital flight. In contrast to what finance is supposed to do, financial repression did not permit efficiency in resource allocation or in management of liquidity and risk.

Liberalization followed, often through structural adjustment facilities accepted by poor and middle-income countries in exchange for funds from institutions such as the World Bank. Interest rates were freed, exchange controls were phased out, credit quotas were dismantled, directed credit was diminished, laws governing provision of financial services were reformed, and reserve requirements were reduced. Results were mixed, but things could only have worsened without these reforms.

Policy makers' realizations that led to liberalization also precipitated an abrupt cessation of the huge lines of official credit and some of the grants from development assistance agencies that had funded state-owned agricultural and industrial development banks in poor

and middle-income countries. In an economic sense this halt was required because of the massively inefficient use of such funds by these politicized state-owned institutions. Their transaction costs internally and for small borrowers were often high, and their loan recovery rates were usually low. Many of the purposes they had financed under priority sector-planning directives were terrible money losers. Political control and low interest rates gave well-connected loan applicants an incentive to borrow and gave lenders an incentive to economize their costs and efforts by making larger loans rather than smaller ones.[3]

Defenders of these government entities cited social priorities and national planning objectives. Some donor agency officials noted pragmatically that relationships should continue with these institutions "because they are there," and no substitutes were likely to be found. But the context of the argument shifted away from objectives and toward performance. "Rent seeking" was a new economic term applied to this sort of behavior. "Governance" was introduced as a code word for corruption, which previously was off limits in the vocabulary of official development assistance. The New Institutional Economics, which sees economic behavior as responses to incentives, came along to explain why state-owned financial institutions were unlikely to be efficient under any likely set of circumstances in most middle-income and poor countries: basically, tendencies toward wrong owners, wrong managers, wrong sources of funding, wrong pricing, wrong personnel practices, etc.—in sum, bad governance in the fuller sense of the word. Institutions in rich countries have also become subjected to this critical analytical framework.

An Opportunity Foregone: Designing the Better Credit Project

But in a technical sense the abrupt cessation of support for industrial and agricultural credit by development assistance agencies was unfortunate: it foreclosed any attempt to design better credit projects. Possibly the structural problems of the old state-owned credit institutions were simply overwhelming, precluding all reasonable possibilities of reform along a smooth path. At the same time, microfinance arrived on the scene, partly as a response to financial liberalization. It essentially filled the credit project vacuum facing donor agencies and offered exciting new ways of lending to the poor while advancing the feminist agenda and free enterprise. It also gave development assistance agencies a means of becoming involved in the promotion of savings by the poor, which has proceeded slowly. "Microfinance," referring to very small loans, savings, and other financial services useful to the poor, has become common usage and a staple in development assistance.

It is now clear that any efforts to provide rural credit on a large and sustainable scale in poor and middle-income countries will have to be based on sustainable financial institutions. This realization is a result of financial liberalization, the lessons of the microfinance revolution, and the prospect that subsidy dependence

[1] Of course, a few developing countries had effective state-owned banks: the Bank for Agriculture and Agricultural Cooperatives in Thailand and Bank Rakyat Indonesia's village units are classic examples.

[2] As a financial analyst in the World Bank, I envied our irrigation engineers. No one ever asked them to design a project in which water was expected to flow uphill under its own force.

[3] Claudio Gonzalez-Vega (1984) argued that the lower the repressed interest rate, relative to a market rate, the greater the concentration of loans in fewer hands and the larger the size of these loans. He called these relationships "the Iron Law of Interest Rate Restrictions."

Table 1. Traditional farm budget.

Line	Category[a]	Without project	With project
A	+ Produce (t)	5	10
B	– Produce consumed on farm (t)	2	2
C	= Marketed produce (t)	3	8
D	x Farmgate price ($/t)	400	400
E	= Total farm cash receipts ($)	1,200	3,200
F	– Purchased inputs ($)	200	1,000
G	= Net benefits before financing ($)	1,000	2,200

a/ Dollar sign indicates currency (not necessarily U.S. dollars).

is a loser's game in the long run because political priorities inevitably change and budgets get squeezed. Sustainability means that lenders have to recover their costs through interest income and fees. Because of location, unit costs, and risk, the costs of rural lending are "high" and interest rates will likewise have to be "high" on farm loans.

Designing Better Rural Credit Projects

The farm-level implementation of traditional rural credit projects fostered by development assistance agencies was customarily designed around farm or enterprise models or budgets. By the mid-1980s these analytical and planning tools were used to quantify expected results from improved inputs and practices on a "with and without project" basis (Gittinger 1982). The difference between "with and without" was the incremental gain expected from the credit-supported activity.

Table 1 shows a highly simplified "with and without" scenario for a farm that has a single crop, "produce." The project more than doubles net benefits before financing, from $1,000 to $2,200 (line G). This results from an increase in purchased inputs, which were $200 without the project and $1,000 with the project (line F). The additional purchased inputs were the tangible basis for more productive agriculture, such as fertilizers, improved seeds, plant protection materials, and often a changed cropping pattern. Through extension, complementary efforts were made to improve husbandry—the intangible element.

These financial models used market prices at the farmgate. The prices were then recast in economic analysis using "economic" or scarcity prices that would correct the effects of overvalued exchange rates, monopolies, taxes, and other distortions. For basic grains, meat, dairy products, and industrial crops, world prices were used. In other cases alternative measures of opportunity costs were applied. This permitted calculation of an economic rate of return "to the economy" to justify or reject a proposed attempt at innovation. To attempt to ensure that projects would promote economic efficiency, the decision to support a particular activity was based primarily on economic prices rather than only on financial prices in local currency. Because national economic planning created massive distortions, an economic focus made some sense. With liberalization and more respect for markets as engines of resource allocation, economic analysis is no longer so useful.

The financial analysis applied to credit projects was subordinated to the economic analysis and never fully met reasonable commercial criteria. Two major omissions were senior claims and risk.

Senior Claims

Senior claims are priorities that the borrower regards as being more important than repaying the loan. Would the loan produce a sufficient increase in production to cover senior claims and also debt service? In small-scale lending these claims commonly include social obligations, school fees, other expenditures required for the survival of the business or the household and those expenditures required from anyone who wanted to be a good citizen of his or her village or a dependable member of an extended family. In other words, a lender cannot reasonably expect to recover a loan that would be crowded out by senior claims. Many agricultural extension officers that I have met on World Bank farm credit missions were able to quantify typical senior claims quite easily.

Table 2 expands Table 1 to accommodate senior claims. Senior claims (line H) of $500 without the project increase to $600 with the project, reflecting the household's improved situation. Funds available to repay the loan increase from $500 to $1,600 (line I). Without the project the farm receives no loan, but with the project a loan of $800 is given (line J), equal to the incremental cash costs with the project versus without the project (line F).

Risk

Risk was incorporated through sensitivity analysis that made arbitrary adjustments to projected incomes and revenues. For example, what would happen to the rate of return if the enterprise or farmer's income fell by 10 percent or if costs rose by 20 percent? This mechanical approach avoided the usual financial concern: "What is most likely to go wrong with this deal?" And after that is explored, what is the next most serious threat, and so on. In my experience, farmers and extension agents often have a fairly good sense of risks and a rough feel for their financial impacts.

Donors' calculations assumed a normal year or sometimes an even better-than-normal year if optimism on crop yields and prices would help justify an activity that might otherwise be only marginally acceptable. In economic analysis the normal year may be an acceptable analytical device. Bad, average, and good years average out to the normal year, and their sequence is unpredictable. Would it be wise to delay a project's implementation if it were suspected that the first year would be a bad year, lowering the project's economic return? Clearly not, if the occurrence of a bad year is not very predictable.

Table 2. Farm budget incorporating senior claims.

Line	Category[a]	Without project	With project
A	+ Produce (t)	5	10
B	– Produce consumed on farm (t)	2	2
C	= Marketed produce (t)	3	8
D	x Farmgate price ($/t)	400	400
E	= Total farm cash receipts ($)	1,200	3,200
F	– Purchased inputs ($)	200	1,000
G	= Net benefits before financing ($)	1,000	2,200
H	– Senior claims ($)	500	600
I	= Repayment capacity = uncommitted cash flow ($)	500	1,600
J	Loan receipts ($)	0	800

[a] Dollar sign indicates currency (not necessarily U.S. dollars).

However, the path so brightly illuminated by economic analysis turned out to be a blind alley for finance. In financial analysis, the "normal year" was a fatal analytical simplification. Farmers received loans that in theory could be repaid in a normal year. But would these be difficult to repay in a bad year when yields or prices worked against the farmer? As any farmer knows, bad years are common and frequent. Would there be sufficient income in a bad year to repay the loan? If not, arrears would accumulate.

Table 3 shows the simplified farm budget adjusted for senior claims and risk. Risk is introduced as the bad year. Produce yields fall by half (line A for the bad year), but farmgate prices (line D) increase because of the scarcity caused by crop failure. Purchased inputs (line F) decline because less labor and fewer sacks are used. Uncommitted cash flow is only $150 (line I). This could support a loan of 125 (line J), which with a 20 percent interest charge would consume all of the $150 available (line K), leaving the household with no discretionary income (line L) in the bad year.

If the lender were lending only against the uncommitted cash flow in a bad year, loan size would be $125. Clearly, this would not finance much of the incremental cash costs of $800 (line F)—assuming that the loan was made at planting when it was not possible to foresee that the year would be a bad one. This does not preclude a loan as long as the lender has a realistic plan to deal with the bad year. The plan may include things that the farmer could do to repay in spite of adversity. The plan may require a reduction in the expenditure for purchased inputs, which would lower yields and change the with-versus-without scenarios. It is precisely these sorts of calculations and questions that are required to manage risk, and they were largely absent from credit project design.

Risk management also has to respond to the fact that credit is most useful to the farmer in the season following the bad year. The bad year reduces farm income, straining the household's resource base. It is precisely in this situation that a lender must be prepared to provide additional funding in order to maintain a relationship with the borrower. Is it wise to provide additional funds to a borrower who is already in arrears? It is when it reduces the loss for the lender. The lender's response would depend upon the strength of the relationship and the borrower's surplus available in the season following the bad year. Could the debt

Table 3. Farm budget incorporating senior claims and risk.

Line	Category[a]	Without project	With project	
			Normal year	Bad year
A	+ Produce (t)	5	10	5
B	– Produce consumed on farm (t)	2	2	2
C	= Marketed produce (t)	3	8	3
D	x Farmgate price ($/t)	400	400	550
E	= Total farm cash receipts ($)	1,200	3,200	1,650
F	– Purchased inputs ($)	200	1,000	900
G	= Net benefits before financing ($)	1,000	2,200	750
H	– Senior claims ($)	500	600	600
I	= Repayment capacity = uncommitted cash flow ($)	500	1,600	150
J	Loan receipts ($)	0	800	125
K	Debt service (loan receipts plus 20% interest) ($)	0	960	150
L	Net benefits after financing ($)	500	640	0

a/ Dollar sign indicates currency (not necessarily U.S. dollars).

accumulated over two seasons be repaid at the end of the second season? What if two bad years occur in succession?

Low loan recoveries in the bad year may deplete the liquidity of the lender, especially given covariance in agricultural risk. What sources of funding could the lender rely on to get things moving after the bad year? In designing credit projects, donors never specifically addressed this issue, because donors' credit lines and government budget funds were frequently viewed as a continuous source of liquidity.

High Levels of Financing

Another unresolved question involving risk was the appropriate proportion of credit financing. The basic financial consideration is that credit is meant to be repaid, i.e., to constitute a steady or predictable flow from the borrower to the lender, while the owner's stake or contribution is meant to bear risk, i.e., to vary. Farm budgets showed the incremental cash costs of the activity to be supported by credit. What portion of these costs could reasonably be funded by a loan? Considering senior claims and the risk of bad years, what amount could the borrower repay without suffering a burden? What portion of incremental cash costs should the borrower contribute from his own funds, based on the riskiness of the venture?

The usual practice in project design was to offer a relatively large loan, equal to 75 to 100 percent of the incremental cash costs. This element was entirely arbitrary. It was based on the assumption that without a high level of financing the innovation being financed would not be implemented because the farmer lacked the funds required to cover the difference between the loan amount and the incremental cash costs. At times the loan was even larger than the incremental cash costs, on the assumption that the household would not otherwise have the funds to get through the season leading to harvest.

These approaches also helped donors move more funds than would have been possible using realistic assumptions. Ministries of agriculture never complained about farmers' loan repayment rates, and the state-owned banks just down the road from the ministry were seldom in a position to protest and had few incentives to do so. No candidate for public office was ever elected by promising that he would make defaulters pay up. In fact, candidates in several countries campaigned on the promise that loans from state-owned banks would be forgiven. Opportunism was built into these systems from the farm level through the government level to the donor level.

The next question was, what proportion of incremental farm income resulting from the loan-financed enterprise could be expected to be available for repayment in the normal year? Would it be realistic to expect that, say 40 percent, of incremental gross income would in fact be returned to the lender in a normal year? This issue is closely related to senior claims and the dynamics of risk discussed above. Project design and evaluation did little to address this issue although it was a topic of discussion. One concern was that when the repayment obligation is so large that the borrower concludes he is working for the lender rather than for himself, the borrower's incentives to work hard are diminished, as would occur under a poorly structured sharecropping contract.

In summary, any advances in agricultural finance would at a minimum have to deal with these technical issues: senior claims, real risk at the level of the borrower, and appropriate levels of financing.

Barriers to Agricultural and Rural Credit

Going beyond the problems arising from senior claims, real risk and appropriate financing, several other issues would have to be addressed to establish viable agricultural lending systems. These can be organized under two headings: regulatory barriers and cost considerations.

Government Failures Creating Regulatory Barriers

Interest Rates. Low interest rates (rates that failed to cover lenders' costs) were one reason why it was impossible to create sustainable agricultural finance institutions prior to the widespread liberalization of financial markets that started in the 1980s. With liberalization, interest rate ceilings were usually abandoned, making microfinance possible. Microfinance institutions are commonly considered efficient when their annual administrative and bad debt costs do not exceed 20 percent of their average loan portfolio. This means that their break-even interest rates are well above 20 percent. Adding funding costs, inflation, and efforts to support institutional growth through profits, annual interest rates of 40 percent on micro loans are not unusual.

A few countries, however, still have interest rate ceilings that limit microfinance or make it unsustainable within their borders. Would these ceilings also affect agricultural and rural lending? The possibility that at least some small farmers in poor and middle-income countries may be willing and able, at cost-covering interest rates, to service debt obtained from formal financial institutions has never been fully tested on a large scale because little such lending has been done. However, by the end of the 1980s, it was clear that interest costs were usually a very small proportion of a farmer's total costs. It also seemed probable that if a farmer could double yields by using credit to purchase modern inputs—an assumption incorporated in some farm budgets used in the old-style farm credit projects—the burden posed by cost-covering interest rates would be relatively small.

Overall, low returns to agriculture may be more of a binding constraint to borrowing than interest costs. But growers of high value crops and those who can obtain high incremental returns from credit for inputs may be able to accommodate cost-covering interest rates. These are possibilities that seem worth pursuing, except where the government's interest rate ceilings are inconsistent with rural development.

Restricting Interaction with Customers. In some countries regulations require banking offices to be built to certain construction standards to guard against theft, to be open throughout the week, and to offer a variety of services. These regulations preclude the use of conveniently located agencies that are open only on market days, during harvest, or at other times when it is most convenient for rural borrowers to repay their loans.

In some countries formal financial institutions are not permitted to use ambulatory collectors: bank staff or agents cannot go to their clients to collect loan repayments or deposits. This policy may make it more difficult to serve clients and to recover loans.

Competition. In some countries foreign ownership of financial institutions is forbidden, which may reduce competition and hence innovation in finance. This regulation may not be a constraint if foreign institutions or local ones with foreign equity participation lack interest in rural credit for other reasons. In other cases the minimum capital requirements for a new institution are quite high and

are designed to discourage the formation of small banks, which regulators view as inefficient or as unlikely to be able to diversify risk sufficiently. Yet, small banks could be a source of rural credit.

Collateral. In many countries banking authorities require most types of loans to be collateralized with real (tangible) property having a value that would permit loan recovery through repossession. The microfinance revolution would not have been possible if traditional forms of collateral were required, and this factor deserves to be seriously reviewed in rural credit strategies. At the same time, many types of assets may not qualify as collateral because the legal (i.e., government) infrastructure for registration and enforcement of claims does not exist or can be used only at costs that are prohibitively high for small credit transactions. In effect, the poor have many tangible assets, but because those assets are not recognized by the government's legal system they cannot be used as a basis for creditworthiness (De Soto 2000).

Supervisory Discretion. Bank examiners may interpret regulations more strictly or in a different way from that which was presumably intended when the regulations were drafted (Vogel 1998). Such misinterpretation can stifle innovation and reduce bankers' willingness to make loans that they regard as having acceptable levels of risk but that would subject them to additional reporting requirements or unusually intensive oversight or that would require them to create reserves that diminish their current profits. ATM may commonly mean "automatic teller machine," but for bankers it also covers "aggravation, time, and money."

One aspect of agricultural lending in microfinance institutions in Latin America is that portfolio performance is more variable than the usual microlending to traders. Because of seasonality, agricultural loans tend to fall due in clusters, such as just after harvest. These loans may have a single maturity, while loans made to traders may fall due in weekly or monthly installments because the trader's stock turns over on a short cycle. Hence, agricultural loan arrears tend to cluster, as well. Rapid increases in arrears as agricultural loans fall due simultaneously may attract special attention by regulators, even though these arrears are reduced to normal levels within several months. Bankers who wish to avoid this uncertainty and having to make special explanations to examiners about a routine aspect of rural lending may make fewer such loans, limiting rural lending as part of their portfolio diversification strategies.

Rush to Regulate. Over the last 15 years, there has been a concerted movement in development assistance and bank regulatory circles to standardize banking regulation internationally. This effort has been criticized in the context of rich countries (Don't start 2001) as regulators rush into areas that are not well understood.

Lots of technical assistance has been provided to middle-income and poor countries for drafting and enforcing regulations, which in France, Japan, Sweden, and the United States apparently did not stop crises during the last 25 years. In a number of instances, the rush to regulate has simply involved the wholesale transfer of regulations from rich countries to those not so rich.[4] While in some instances, this "assistance" may be effective, in others it may not, because imported regulations may be rejected or become unlikely to be enforced and because they may stifle attempts at innovation that could be useful in a poor

[4] A World Bank colleague once informed me that "some rule is better than none," with respect to the application to poor countries of presumably good rules for rich countries.

or middle-income country. Poor drafting demonstrated by tortured grammar and stylistic inconsistencies reflects the degree of thought that has accompanied this transfer in the worst cases where regulations are in English.

The more important concern, of course, is whether the potential impact that led a rich country's government to adopt a restriction to control a banking risk that it regarded as unacceptable would also pose a material threat in middle-income or poor countries and whether there would not be alternative ways of managing this risk in such countries. Moreover, are governments that are relatively relaxed about enforcing rules likely to be good at prudential regulation of financial institutions? If a parking fine is negotiable, what should we expect in the long run from more subtle and complex forms of regulation? Little experimentation seems to have occurred in addressing these questions.

Rural credit, agricultural credit, and microfinance are more difficult than mainstream finance. They may therefore be more easily penalized by requirements that are helpful in mainstream finance but are not necessarily so in these much different corners of the market.

Cost Considerations

The most obvious features of rural lending are that clients are usually spread over broad areas, rather than being concentrated geographically, and that some may be inaccessible at certain times of the year such as during seasonal rains. Often this means that it is not possible for loan officers to go on foot or by bicycle or motorcycle to keep in touch with their borrowers. As a result, the cost of dealing with these clients is higher than serving those in urban areas. This may prompt lenders to deal only with larger rural borrowers, with those who have enterprises such as poultry that yield cash periodically throughout the year, or with those who have enterprises with lengthy harvesting or producing periods such as dairying and tea. Farmers who have irrigation that makes multiple cropping feasible throughout much of the year may also be viewed as good lending risks.

Periodicity of Cash Flow. Cost considerations also include risk. Another dimension of the seasonal clustering of agricultural loan maturities is the way late payments affect portfolio quality. A loan to a trader, as noted above, can be based on a relatively steady cash flow, which often include seasonal peaks related to the agricultural and religious calendars. Such loans have frequent installments, which create frequent but small opportunities for clients to fall into arrears and for frequent and small corrective actions by the lender. Arrears can likewise be recovered frequently because income flow is normally continuous.

If agricultural loans have single maturities following harvests, the lender's chances of recovering arrears decline over time. The lender has a window of time after harvest in which the loan can be collected. If repayment is not made, the lender's next opportunity to collect may be following the next harvest, by which time additional debt may have been incurred to finance that season's production. Thus, the simple fact of seasonality increases the risks of agricultural lending, regardless of the underlying risks of crop failure.

Classic Commercial Banking. Another cost factor arises from seasonality and liquidity management. In one sense, seasonal credit is the classic form of banking facility. A loan is made at one time of the year and recovered at another. The borrower's ability to "clean up" the loan, repaying in full and on time, provides an indication of financial perfor-

mance and capacity that is greatly comforting to a lender and provides a basis for continuing the relationship with the borrower.

Ideally, the lender would prefer to construct a portfolio including different types of clients that results in a series of such loans maturing throughout the year, within the lender's funding capacity, which may also vary seasonally. Such a series would enable the lender to fund new loans with repayments of maturing loans, simplifying cash management through steady turnover. The quest for steady turnover arises because the lender normally makes more money on lending than on investing in government securities or through the interbank market. Seasonal variations in loans outstanding affect the lender's income. Why would a lender want to engage in seasonal lending if the option of having a portfolio with little seasonal variation were available?

Diversification is one reason. Another reason is the possibility of constructing a portfolio of several categories of seasonal loans having peaks and troughs that would offset each other, allowing the lender to be fully loaned up most of the year. Within agriculture alone, it may be possible to construct such a portfolio. The seasonal cycle would begin with credit to input suppliers to finance their inventory of supplies that will be bought by farmers. Farmers then obtain credit to pay input suppliers, who then retire their outstanding loans. Farmers sell their harvests to buyers who obtain credit to pay for their purchases. Buyers' liquidation of the stocks completes the cycle.

Finally, the assurance of access to seasonal refinancing would ease the lender's funding problem. Central banks in rich countries have traditionally offered seasonal facilities, and international commercial banks have also been active, dating back to British overseas banks that financed crops in colonial Africa and Asia. Through the early part of the 20th century, British banks made huge seasonal loans to the American market in connection with U.S. grain exports. As a developing country, the United States lacked the banking capacity to fund this business at competitive interest rates.

Agrarian Structure. Agricultural development is a road with dangerous curves. In contrast to many other industries, agricultural development has only two certainties: cheaper food and fewer farmers. These effects occur because of economies in production and because of a finite demand for agricultural products. The result is that many farmers are usually under pressure: some at the margin are forced out of business every season.

Exit from agriculture may be graceful in those cases where farmers decide to lease their land to others rather than work it themselves, where farm land can be sold for urban development, where other employment is available and farming can become a part-time pursuit, and where the younger generation is no longer interested in farming and the farm business passes with the older generation. In other cases the exit is anything but graceful and creates great pain for families and social disruption for rural communities.[5]

As farming becomes more specialized, moving from subsistence production to commercial agriculture, farm debt assumes new dimensions. Leaving aside the less predictable changes in agricultural subsidies, the most frequent event that triggers involuntary exit from farming in developed countries is default on loans. This relentless pressure creates a special

[5] In developing countries rural stress leads to migration to cities. In the USA several recent books have highlighted the dynamics of being forced off the land where agriculture is highly productive (Dudley 2000; Dyer 1997; Stock 1996).

challenge for lenders, especially when the bankers are part of the rural community and are forced to cut off lending to family after family. Nonfarm businesses come and go, and their owners generally find alternative employment. Farming may be different: in the United States, for example, operators of once-prosperous family farms are less likely to find new employment, or if they do, the adjustment to off-farm employment may be at a much greater psychological cost. In poor countries the alternative opportunities may be fewer, and becoming landless can be devastating.

However, surviving farmers are often stable members of the local community. They tend to stay in the same business for years, they cannot disappear easily in attempts to evade obligations, and they may be more willing to keep promises than the more transient inhabitants of urban areas. They can be good clients for bankers.

Proposals for Agricultural Finance Renewal

The lessons of the recent past suggest that any renewed efforts to stimulate agricultural credit must deal with loan structure, legal and regulatory dimensions, pricing of financial services to cover their costs, and some direct government intervention. In poor and middle-income countries where the flexibility required cannot be achieved or is highly unlikely, new initiatives are unlikely to be worthwhile.

Institution Building for Sustainable Finance

How can effective financial institutions be created to serve rural and agricultural households? Donors have a potentially important role to play, but one that is greatly different from that of the past. Previously, donors supplied funds, established special facilities in state-owned and cooperative banks, provided an analytical framework to justify credit decisions, set up special units within institutions to do their bidding, offered training, and supplied hardware such as vehicles and computers. Suitable new approaches that are emerging from microfinance and small enterprise credit in poor and middle-income countries are to work with lenders that have commercial objectives, provide operating subsidies that accelerate these lenders' sustainability, promote investment in lending institutions by those in a position to provide good governance, and support research on rural finance, risk, and household behavior.

Funding lending is not necessarily a good idea when it carries conditions and expectations that may be anti-developmental. An example is a project that a multilateral donor agency was designing for an African country in 2001. It appeared that the project would specify interest rates that are not cost-covering, perpetuating dependency and opportunism while postponing efforts to achieve sustainability. Farmers may want to borrow every season, so why not work now to develop sustainable systems that will be able to serve them every season?

On a larger scale, a generic danger of donor-supported ventures is that "pilot projects" are not really possible. A pilot project in rural credit requires 3 to 5 years or more to produce useful results, given the agricultural production cycle and the requirement that a bad year has to be endured and managed before it is possible to declare victory for an innovative model. Early signs of success from new approaches launched cascades of donor funding (e.g., integrated rural development projects, minimum package credit projects, and a host of other initiatives from the past) before it was possible to

understand the dynamics of the basic financial problem, which is risk. The need for the Heavily Indebted Poor Countries Initiative[6] is a monument to premature and inappropriate funding by donor agencies from the 1970s onward.

It is unlikely that donors' and governments' incentives would be any different today, although donors' funding capacity may be somewhat reduced for other reasons. So, it is reasonable to assume that major donor involvement would lead once again to unsustainable results. Likewise, state-owned banks are unlikely to be effective in most cases. Direct government involvement in rural credit is an incredible temptation because so much of the population is rural. History suggests that the greater the direct involvement, the worse the results for sustainable finance will be, again with some exceptions such as wealthy countries that can more or less afford massive subsidies to the agricultural sector because it is a relatively small part of the national economy.

Institution building and related governance problems are becoming of greater interest in the debate about development. A classic work on development finance (Krahnen and Schmidt 1994) applies the New Institutional Economics: efficient provision of finance to the poor requires incentives that are compatible with a commitment to the poor and also with institutional sustainability. The subject is so broad and complex that little can be said here other than noting that a basic difference between industrialized countries and others is institutions. Institutions in rich countries sort of work: parliaments are sort of representative, elections are sort of fair, bureaucracies are sort of helpful, regulation is sort of even-handed, markets are sort of efficient, justice is sort of impartial and sort of accessible, schooling is sort of relevant to life, money is sort of stable, contracts are sort of enforceable, property rights are sort of respected, etc. From this perspective, the challenge is precisely the creation of institutions of development that sort of work for large numbers of people. In other words, institution building is more than important: it is the key to development (Powelson 1994).

Effective institutions work to create sustainable links with clients because these are the lifeblood of commercial transactions. Old clients are cheaper to serve than new applicants. Creating these relationships requires respect and also flexibility. This approach also solves a problem that eluded past designs that ignored senior claims. By being a dependable supplier of funds, an institution levers its way up through the claims on their borrowers. The farmer attaches great importance to repaying scrupulously in order to maintain a valued relationship.

Building institutions is costly, arduous, and easily thrown off track by deviations from the two main objectives: serving the target group and maintaining a commercial perspective. Donors can help by providing operating subsidies that accelerate sustainability. The institution's business plan should specify how long it should take to break even financially. During this period management costs, staff training, and construction or improvement of premises can usefully be supported by donors. Funding for lending or for the minimum capital requirement for a new institution ideally should come from owners with commercial objectives who can provide good governance.

[5] An international effort to provide debt relief to the world's poorest, most heavily indebted countries, launched by the World Bank and International Monetary Fund in 1996.

Lending Technologies

While institution building is the more interesting and important topic, the purpose of this paper is to discuss technical possibilities for sustainable rural and agricultural finance. Three possibilities are proposed here. The first deals with large farms, the second deals with rural households with diversified sources of income, and the third visits the tied credit transactions that are a mainstay of agricultural finance in many countries. (Agriculture organized on an industrial scale is not treated here, because well-managed plantations and similar enterprises usually have access to financial markets using standard financial models for credit decision making.)

Large Farms. A revised approach based on farm or enterprise budgets is probably feasible for large farms, defined simply as those holdings that produce on a sufficient scale to make it reasonable to identify the farm as a business separate from the operator's household. The revisions required to overcome the shortcomings of the old donor-driven approach are (1) concentrate on the financial rather than the economic results at the level of the individual loan, (2) incorporate senior claims in the analysis if the owner does not have assets that would otherwise be liquidated routinely to meet such claims, (3) base credit strategy on the bad agricultural year, and (4) ensure that loan recovery does not require an unreasonable sacrifice on the part of the borrower in a bad year, but (5) devise ways that make it safe to provide more funding than that based on the bad year. The common thread is that liquidity must be sufficient at the times when it is most useful in the parts of the system where it is most useful. Sources of liquidity must be identified precisely. Charts showing flows and simple mathematical models of flows are an essential part of this process.

Rural Households with Diversified Sources of Income. A major advance that has occurred in farm credit for smallholders is the adaptation of the IPC lending technology for agriculture. IPC (Internationale Projekt Consult GmbH) is a Frankfurt-based microfinance consulting firm that has helped commercial banks to "downscale" into microcredit, that has assisted the "upgrading" of NGOs to become formal financial institutions, and that has pioneered the formation of new banks that provide financial services to micro and small entrepreneurs in such poor and middle-income countries as Russia, Ukraine, Kosovo, Albania, Haiti, Ghana, and Mozambique. (The author is the Washington representative of IPC.)

IPC-assisted institutions in Bolivia (Caja Los Andes) and El Salvador (Financiera Calpia) have developed agricultural lending portfolios. These efforts were pioneered by Juan Buchenau and recently extended to FEFAD Bank in Albania by Andrew Graham. They involve a pilot year or two, basically for training loan officers who are familiar with microfinance and who may also have some background in farming or agricultural science. During the start-up stage, the number of borrowers is usually quite small, possibly from 15 to 40 participants.

Twenty percent or more of the portfolios of Caja Los Andes and Financiera Calpia is rural or for agriculture, and in each institution the quality of the portfolio of agricultural loans is roughly identical to the quality of the overall portfolio. This means that arrears over 30 days are normally less than 5 percent and never more than 10 percent, measured on an "at risk" basis[7] and annual charge-offs are always less than 5 percent of the average portfolio, civil wars and natural disasters excluded.

The IPC model basically lends against household income "without the loan." This is just the opposite of the old farm budget-based approach that lends against projected incremental income from the supplies or assets that are designated as being funded by the loan. The without-the-loan approach is clearly more conservative but lowers the risk that the farm household will become overindebted and hence unable to establish long-term relationships with dependable lenders.

Given the diversity of income sources that many rural households have, there is arguably some capacity to service debt at current levels of income. An appropriate lending technology enables this capacity to be tapped to obtain debt. The amount of debt that could be managed would presumably expand over time as more funds are available to the household. However, there is usually a limit because few small farm businesses become medium- or large-scale activities.

This approach uses household budgets for the cropping season or year to determine how much repayment capacity exists without the loan and to determine the timing of income and expenses. Repayments may be freely structured, depending on the household's cash flow. Some borrowers may do best with a lump sum repayment at some point following harvest. Some may find it more convenient to repay through a combination of modest monthly installments followed by a much larger repayment following the harvest. There are other possibilities as well.

Loan officers visit the applicant's farm to verify assets and cash on hand and to obtain additional information required by the lender. The legal regime determines the collateral that is pledged. In many places the resale value of the collateral is not tightly tied to loan size. Rather, "value in use" is intended to provide an incentive to repay. Loss of the collateral would cause the borrower inconvenience or psychological pain. A TV set in Latin America on the eve of the World Cup is an example of this kind of collateral. A bicycle, bed, or tools could be others.

One concern that remains is the importance and role of the link between the loan and the purpose for which it is supposed to be used. Linking the loan to the crop may tempt the borrower to refuse to repay the loan if the crop fails. Linking the loan to household income makes this excuse less tenable.

Tied Credit. While financial institutions are generally reluctant to lend to agriculture, especially small operations, much credit flows through input supply and marketing mechanisms. These sources include cooperatives, but a much larger volume of the lending is informal—credit from suppliers and advances from buyers.

Informal credit from suppliers and buyers is sometimes regarded as exploitive, but it is common in many countries and the broader context is often not considered. Borrowers may be able to obtain more credit through these channels because the loan may cover the entire purchase. However, the loan is restricted to financing items that the supplier handles, which may be only a portion of the inputs the farmer wants to buy. On the other hand, a commercial lender would usually insist that borrowers also commit some of their own funds to the loan-funded activity. Suppliers or buyers may be more generous about loan size because their relationship with the borrowers includes a profit from the sale of the input or harvest. Bankers may not have such a

[7] "Portfolio at risk" is defined to include the entire balance of any loan having amounts that have fallen due but which remain unpaid after their due date. For example, if a loan has 10 installments and the first installment is not paid on time, the entire loan is treated as being in arrears until repayments are received that make the loan current.

cushion. Also, suppliers may be able to obtain economies of scope and scale, such as offering to deliver the inputs to the farm or to a location near the farm and offering their clients goods and services other than farm inputs. But local suppliers' capacity to provide credit may be limited by their own capital, which may be modest. These crosscurrents suggest that more empirical research on trade credit could be useful.

The interest rate is usually not specified in tied transactions. In donor-supported projects in some countries, such as Malawi, the cash and the credit prices of inputs were specified, permitting the farmer to see the difference in money terms and choose accordingly. In other countries it may be customary to charge interest on the credit price, which is higher than the cash price.

Some critics ask whether tied credit inhibits on-farm diversification. If a loan can be obtained only for the inputs used for a certain crop or only at a time when certain crops are planted, does the household sacrifice its capacity to diversify its activities, over time and across risks? Other observers argue that household income is fungible and that many households have the flexibility to juggle resources to obtain results that approach the technically optimal, not much constrained by finance.

Excluding credit to cooperatives, development assistance funds have not been widely used to support the trade. Why have funds not been made available to some part of the financing and refinancing chain? This chain may begin with a central bank's lending to commercial banks and other financial institutions to fund wholesalers who in turn fund retailers who provide inputs on credit to farmers. This type of facility would work through existing commercial channels, which presumably could be quite economical. Because of their nature, tied relationships tend to be the most natural vehicle for credit to agriculture in many countries. If they are regarded as exploitive, what can be done to introduce competition? Support for and improvements in tied credit relationships may be the most effective means of assisting larger numbers of farmers through credit.

Concluding Remarks

Development finance provides lots of lessons, but many fewer "lessons learned." The opportunity to resume support for agricultural and rural credit should be tempered by the errors of the past. Primary concerns are respect for risk and for realistic analytical models. New approaches should concentrate on institution building, which includes the search for and development of appropriate lending technologies and efforts to reduce costs and barriers. Lessons learned and examples from microfinance—including the quest for sustainability, use of subsidies to accelerate institutional development, and the role of governance—permit cautious optimism for a new rural finance.

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Microfinance Innovations in the Gulf of Guinea Region

Pierre Markowski

There is no more doubt in most people's minds that microfinance is a powerful approach for reaching the rural poor and a powerful tool for supporting agricultural development. The question is how to make this engine work so that it will deliver all its gleaming promises?

This paper addresses four main issues: First, who are the various providers of rural finance in Africa and what services can they offer to the economically active rural poor? Second, how can microfinance contribute to improving food security? Third, what innovative policies, strategies, and tools can be used to improve access to financial services for the rural poor in a sustainable manner? Fourth, what can we learn from West Africa's diverse experiences in delivering rural financial services?

The Purpose of Microfinance: Banking the Poor

Most of the world's poor consist of microentrepreneurs who are engaged in agricultural production on small farms. Providing financial services to this diverse group of rural poor is challenging for several reasons: they are vastly spread geographically, making service delivery and information collection costly; transportation and communication facilities are weak; production is weather-dependent and risky; farmers all want to borrow at the same time; many of the poor are illiterate; and the poor have few assets to propose as collateral for loans. As a result, rural clients usually turn to locally based informal sources such as family, friends, or moneylenders, who lend only small amounts for short periods of time and at rates that are higher than those of the formal sources.

The task of providing rural finance at a reasonable cost has been neither straightforward nor easy. Until the 1980s state-run agricultural development banks in many developing countries took the lead in providing credit to rural areas. However, their performance was handicapped by severe shortcomings including an excessive dependence on concessionary funds, pervasive political patronage, and a lack of incentives to do business with the poor. Past policy neglected to provide savings services, and much of the emphasis was put on "giving and forgiving" loans.

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In the 1980s and 1990s, the approach to development finance underwent a major transformation. Many public development banks were closed or restructured. Microfinance began to emerge. Sustainability and maximum outreach to poor clients became the core principles for donors and governments.

The success of some microenterprise credit programs led to bold experiments with product design, delivery methods, and institutional structures, performed mainly by practitioners in developing countries. These experiments resulted in the emergence of microfinance institutions, i.e., specialized financial institutions that serve the poor.

Looking for Good Governance

Many microfinance institutions are member-based institutions, including credit-oriented NGOs, solidarity credit groups, village banks, rural banks, and credit unions (*coopératives d'épargne et de crédit*). These institutions have several advantages: members have clear-cut rights and responsibilities, a strong sense of ownership is maintained, participation of users is likely to be high and democratic, and repayment rates are higher.

A major drawback is that members generally have little prior experience in managing financial institutions, so that training and skill development is usually required. Also, internal checks and balances must be established to avoid any misappropriation of funds by fraudulent managers. All of those issues can be lumped together as "governance" problems. Unfortunately, microfinance institutions often have weak boards and dominant executive directors. Board members do not assume responsibility for identifying strategic priorities and addressing organizational issues—as they should.

Balancing the Social and Economic Missions

Microfinance institutions have a dual mission: a social mission and a commercial mission. Their social mission is to provide financial services to large numbers of low-income persons to improve their welfare. Their commercial mission is to provide those financial services in a financially viable manner. In reality, most microfinance institutions are struggling to fulfill their dual missions. They are especially vulnerable if they do not set interest rates high enough to cover costs and if they are not managed as businesses.

Today most microfinance institutions are small, unprofitable, and operate without proper systems to reduce risk exposure. The Consultative Group to Assist the Poorest estimates that at present only about 5 percent of microfinance institutions worldwide are financially sustainable, i.e., they do not depend on subsidies or concessional loans for their operation.

Serving the Rural Poor: Coping with Needs and Rights

Many people think too much funding is going into microfinance these days. However, many of the poor in Africa still lack access to financial services. Demand for microcredit far outstrips supply in sub-Saharan Africa. According to some estimates, only 3 percent of families wanting a loan are actually served (table 1).

Field studies demonstrate that there is not just a need for financial services, but also a demand from the rural poor for loans and deposit facilities—for a reliable place to put their small savings. We must reckon that the rural poor are willing to pay for services that are tuned to their demands, not to our development priorities. This shift from credit-led to demand-led services means a much more respect-

Table 1. Demand/supply gap in microcredit in sub-Saharan Africa.

Population (no.)	440 million
Poor[a] (no.)	270 million
Poor families[b] (no.)	54 million
Families with potential demand[c] (no.)	27 million
Average loan per family (US$)	200
Theoretical demand for loans (US$)	5,400 million
Current microfinance portfolio[d] (US$)	150 million

a/ Income of US$2 a day per person or less. b/ Average family size of five. c/ Half the poor families can use a microloan. d/ Based on inventory of 180 organizations and international agencies.

Source: CARE USA.

ful interaction with the rural poor because we take their concerns and priorities seriously. At the same time, it means we make them more responsible for their financial obligations.

Insufficient access to capital forces the poor to engage in less-productive farm and nonfarm enterprises, thus foregoing income. In addition, it limits poor households' ability to cushion themselves against adverse fluctuations in their incomes and in their basic needs for food, shelter, clothing, education, and medical services. By opening up opportunities, microfinance services enhance poor people's right to work and be independent.

The economic environment within which a microfinance institution operates is critical to its success. Without the infrastructure and access to markets that allows the households to sell the goods and services they produce, there is little scope for microenterprise development, and thus poverty alleviation. When investments in infrastructure are lacking, returns to microfinance will be small.

Keep in mind that microfinance interventions, however well designed, still do not meet the needs of the very poor and the destitute. There is increasing recognition that they fail to attract the bottom 15 percent of the population. Income transfers, such as subsidies and food-for-work and similar programs are needed if these vulnerable groups are not to be even further marginalized. Microfinance is a solution to many, but not all, of the problems faced by the poor.

Microfinance and Food Security

Achieving household food security remains a critical objective of rural development. In principal this goal can be reached by increasing farm productivity and off-farm income. But that is not sufficient to ensure household food security. In effect, many poor households face transitory food insecurity, even if, on average, over several years, their incomes are sufficient to provide a sustainable standard of living.

Access to financial services can increase households' food security through four pathways: First, households may be more inclined to adopt more risky, but more profitable, income-generating activities. Second, households may reduce their holdings of traditional assets (jewelry, staple food, livestock), which have lower returns because they are exposed to risks such as theft, loss, or disease. Third, households may reduce the level of credit they obtain at high costs from informal sources. Fourth, households may less often face distress sales of productive assets (land, livestock, and seeds) at low prices.

Microfinance services can help the poor avoid serious shortfalls in their consumption and therefore increase their capacity to bear risks. This, in turn, can favor the adoption of new technology.

Designing Quality Financial Services for the Poor

When designing services for the poor, microfinance institutions must look at both the savings and the credit aspects of financial intermediation. The rural poor place great value on savings services.

Moreover, mobilization of local savings gives microfinance institutions a reliable, inexpensive, and sustainable source of funds for on-lending. Well-designed savings services therefore are an indispensable element of a successful microfinance institution.

On the credit side, innovations in collateral substitutes can greatly improve access of the poor who generally lack assets suitable for traditional collateral. The 1980s and 1990s witnessed considerable development in the concept of group-based liability, i.e., making use of social networks to trigger positive peer solidarity and to lower the costs associated with small loans.

There remains scope for finding new collateral substitutes in individual-based lending too. Physical assets can be used, such as prized durable assets like TVs or radios. In Mali, for example, CAECE (Caisse Associative d'Epargne et de Crédit des Entrepreneurs et Commerçants de Bamako) has been successful in delivering medium-sized loans to individual entrepreneurs by using physical assets as collateral along with a policy of strict enforcement through deeds authenticated by a notary. Moral guarantors, cosigning by spouses, public announcements of defaults, and sanction by village elders can also be used to increase the pressure to repay.

Introducing incentive systems for the staffs of microfinance institutions can also improve loan portfolio performance. CAECE employs a formula that enables loan officers and other staff to increase their salary by up to 30 percent depending on their performance in the areas of loan volume, loan repayment, and savings mobilization.

Overall, one should always remember that the single most effective deterrent for defaulters is the prospect of losing access to financial services - that is, access to repeat loans and savings facilities.

Promoting Linkages for Enhanced Microfinance Delivery

Considering the various constraints to making financial services accessible to large numbers of people in rural areas, it is obvious that new strategies and tools are needed. A few innovations in microfinance programs have been introduced in the Gulf of Guinea region in recent years.

Reaching Out to Capital Funds

A major constraint microfinance institutions face is insufficient funding to develop their lending activities and increase their outreach. There are limits to the mobilization of savings, especially in poor rural areas. Moreover, most donor agencies have decreased their subsidized loan funds in recent years. Gaining access to capital has become a priority for microfinance institution managers. This is all the more important considering that scale is a key factor in achieving operational and financial sustainability.

There are basically two windows for channeling capital funds to needy microfinance institutions. One is establishing links with the formal banking system. Surprisingly, many commercial banks in developing countries are beginning to examine the microfinance market. Stiff banking competition has forced some to diversify into new markets. Some seek to improve their public image. Others are attracted by the reported profits of successful microenterprise banks and financial NGOs in other countries.

To enter the microfinance market, commercial banks either create branches targeting the poor, a move referred to as "downscaling," or they act as wholesalers to selected microfinance institutions.

providing commercial loans at competitive rates for on-lending to microfinance clients. In the latter case, the bank avoids the trouble of assessing, monitoring, and collecting microloans from a myriad of clients by delegating those responsibilities to the microfinance institution.

In the second window, funds are made available to microfinance institutions by specialized investment funds that are created to address this need. A number of NGOs and for-profit organizations have taken up this initiative and offer loan funds to their partner microfinance institutions. CARE, for example, is now creating its own capital fund. Most organizations use similar approaches to accessing capital, including debt, equity, certificates of deposits, and loan guarantees.

To get a better grasp of the importance of such facilities, let us consider some examples from the Gulf of Guinea region. Ghana has 110 rural banks established to serve local communities. Although the network of rural banks has the broadest outreach in the country, barely 5 to 10 percent of their loan portfolio goes to agriculture because of Central Bank regulations. The Central Bank requires rural banks to keep 62 percent of their liquidity in cash and treasury bills. Whatever is left goes to salaried workers, which are fully secure. Consequently demand for loans by small-scale farmers and other self-employed entrepreneurs is simply not addressed.

In response to this problem, CARE has negotiated an innovative loan fund agreement with Merchant Bank, a local commercial bank, to use rural banks as a pass-through for lending to small-scale farmers within their catchment areas. CARE's role consists of strengthening the capacity of selected rural banks and monitoring farmers' groups that access the loans.

In Benin, the Financial Bank has set up a microfinance division called Finadev, which is responsible for refinancing microfinance institutions. CARE has assisted a number of microfinance institutions in accessing this facility. Finadev currently has an outstanding portfolio of US$4 million with seven local microfinance institutions.

In Togo, WAGES and Timpac (Tous Impliqués dans la Mobilisation des ressources locales et la Promotion des Actions Communautaires) count among the most mature microfinance institutions in West Africa, with more than 15,000 women clients in Lomé and the northern savanna region. Both microfinance institutions started as CARE projects in the early 1990s, and they obtained NGO status to continue their operations after CARE funding was terminated. Between them, Timpac and WAGES will need aboutUS$1 million in capital funds over the next 2 years to be able to meet loan demands from existing and potential members. They are now exploring a variety of funding sources, including commercial banks, the credit union network, and donor agencies such as the United Nations Capital Development Fund.

Reaching Down to Traditional Schemes

The possibility of establishing links with informal financial networks also needs to be evaluated. Agricultural producers in Africa are serviced by a rich array of informal lenders known for their effective, yet simple and flexible services. These long-standing arrangements include savings clubs, tontines, and rotating savings and credit associations.

Susu collectors operate throughout Ghana (and many other African countries) as independent financial agents. They provide mobile savings collection services

for small-scale entrepreneurs who cannot leave their wares and go to the bank. It is estimated that over 90 percent of their clientele are women entrepreneurs, including retailers, wholesalers, chop bar keepers, street hawkers, artisans, hairdressers, dressmakers, food processors, etc. The susu services are also used by many salaried workers, teachers, small shop owners, and others in the formal sector.

The traditional susu collector is an individual, usually male, who operates within a defined catchment area—a local market, a suburb or along a busy commercial street—with a large number of clients (typically 250 to 300). The main service provided by susu collectors is savings mobilization. Daily contributions from clients may vary from US$0.15 to $15.00. At the end of a cycle, usually 30 days, the accumulated savings are paid to the client less 1 day's deposit as commission.

In recent years, many formal financial institutions—mostly rural banks—have developed collaborative arrangements with susu collectors. Collaboration has allowed for more transparency and security with clients' deposits and dramatically improved the liquidity position of the rural banks. At the same time, susu clients have been able to access loans from the banks for, typically, an amount up to three times their savings. This is a "win-win" situation.

Promoting Village-Level Services

The International Fund for Agricultural Development (IFAD) has been promoting self-managed financial services associations to develop cost-effective delivery of financial services to the village level. The concept was introduced into IFAD projects in South Africa, Guinea, and Congo-Brazzaville starting in 1994. It was recently introduced in Benin under the PAGER and Promic projects, which promote rural income-generating activities.

Financial services associations (ASF) are initiated, owned, and operated by the villagers themselves. After the decision to form an ASF is taken, villagers are invited to join by buying shares (priced at about US$4 in Benin). The return the shareholder receives on the investment is based on the profits generated by the ASF and is paid out in the form of a dividend. The capital accumulated by selling shares is used to make loans to the ASF members at interest rates determined by the members themselves. Loan terms are short, 1 to 3 months.

The financial base of an ASF scheme must be entirely community based, with no external injections of capital. This limitation ensures that members clearly perceive themselves as the owners of the ASF and that borrowers fully realize that nonrepayment will cause damage to their neighbors and relatives. There are currently 66 ASFs in Benin with 15,000 members and total capital of US$160,000. The overall loan recovery rate stands at around 90 percent.

In Niger, CARE has developed the MMD project, a concept similar to the ASF. MMD stands for *mata masu dubara*, which is Hausa and translates roughly as "women on the move." Over an 8-month training period, groups of 25 to 30 women learn how to manage and use weekly contributions to make loans to one another. These loans allow the members to meet their small, short-term financial needs for income-generating activities, social obligations, and emergencies without having to borrow from a moneylender, take an expensive supplier advance or rely on relatives. Like the ASF concept, the beauty of the MMD approach is that no external funds are given to the groups.

Over the last 10 years, CARE has helped create 4,800 groups with 140,000 members in more than 1,600 villages spread across Niger. This means the program is reaching 5 percent of Niger's adult female population and 15 percent of Niger's villages. These women are collectively mobilizing over US$2 million annually from weekly deposits of US$0.05 to $0.60 per member.

In Ghana, CARE is now implementing the MMD approach in the Greater Accra region on a pilot basis. The project's focus is on young active people—street vendors, market women, shoeshine boys, truck pushers, women porters, and other microentrepreneurs. It remains to be seen whether the MMD concept can work in an environment so radically different from the quiet and isolated villages of Niger.

Sharing Client Risk Information

One exciting new venture in microfinance is the creation of credit bureaus to share client risk information. The idea is to provide a powerful screening tool for microfinance institutions as well as to prevent overborrowing and multi-borrowing by clients. Participating microfinance institutions submit monthly borrower information to the credit bureau. At the time of assessing a loan application, loan officers can question the database and learn the client's credit history, current level of debt, and repayment record. The routine use of the database by microfinance institutions dramatically alters portfolio risk and streamlines the loan approval process.

In Benin, a number of large microfinance institutions have gotten together to establish a national credit bureau or *centrale des risques*. CARE has supported this initiative in the start-up phase by hiring staff to develop the required software and set up the database. Participating microfinance institutions are creating an association to run the system on their own.

Networking

One way to improve customer confidence and bring more stability and depth to financial services is to develop a strong apex organization. Because of covariant risk and strong seasonality in production, microfinance institutions whose operations are geographically diversified are also better able to manage risks and cash flow compared with institutions that have a localized clientele.

The Ghana Cooperative Credit Union Association (CUA) is the apex organization for 225 workplace, community, and parish primary credit unions. There are 70,000 members (33% female) who include salaried workers, farmers, traders, and the self-employed in both urban and rural areas. CUA has been supported by the Canadian Cooperative Association for 8 years and has now reached 100 percent self-sufficiency.

CUA provides financial services to the primary credit unions in the following areas:

- training of board, committees, and staff
- preparation of business plans
- assistance for computerization
- external audits
- financial intermediation through a central finance facility
- a risk insurance program
- a deposit guarantee fund (which is in the initial phases)

In Benin and Togo, credit unions have also set up apex bodies with central finance facilities (or *caisses centrales*) for inter-lending. However, the two networks—Fececam and FUCEC—have experienced serious difficulties due in part to poor portfolio management.

Another mechanism for strengthening

the microfinance industry is establishing a sectoral association of microfinance institutions that can represent their concerns and interests. Two examples in the Gulf of Guinea region are the Ghana's MicroFinance Institutions Network and its equivalent in Benin, Consortium Alafia. Such associations can play a meaningful role in negotiating changes to the regulatory framework, providing training to industry members, and collecting information about the industry's performance.

Merging Forces

When CARE was approached by CUA about assisting credit unions with new product development, we soon discovered that many credit unions were small and that their outreach was restricted by common bond. In a small rural town such as Techiman, there were no less than 10 credit unions, most of them with fewer than 200 members and located on the same street. Therefore, it was agreed with CUA that CARE would help the town's credit unions amalgamate into a unified credit union, as a preliminary step to strengthen their operational base and to increase the scope of their financial services.

The feasibility study is now completed and the merging process will be completed before in 2000. The new unified Techiman Credit Union will have 2,500 members—half of them women—with cumulated savings of US$150,000 and a net income of US$30,000 in the last financial year. Amalgamation will make computerization viable and will allow better qualified staff to be recruited. Governance should also improve through the election of directors who will be the cream of the existing boards. Last but not least, portfolio risk will be reduced thanks to the diversification of membership.

Increasing Efficiency and Outreach of Microfinance Services

Rating Microfinance Institutions' Performance

Microfinance institutions should establish and operationalize a system for monitoring and evaluating their performance. CARE has been using Girafe, a rating tool developed by Paris-based PlaNet Finance, in evaluations of 15 microfinance institutions in Ghana, Togo, and Benin in the past 2 years. The rating tool looks at all aspects of microfinance institution operations—governance, information systems, risks, activities and loans, funding, and efficiency and profitability (hence the name, Girafe).

Rating reports have many potential users. Donors can refer to them to evaluate the capacity of the microfinance institution before program implementation or the progress of the institution after program completion. Banks and investment funds can use them to assess lending risk. Shareholders can read them to know more about their institution's strengths and weaknesses. Managers and senior staff can learn in what areas they need to improve.

For example, Girafe ratings of six rural banks in Ghana—which are available on PlaNet Finance's web site—have brought to light many operational weaknesses, among them low technical and managerial skills of board members, lack of internal control and audit systems, lack of knowledge of microfinance best practices, and absence of management information systems. Based on those findings, CARE has been able to design a capacity-building program adapted to the rural banks' needs.

Assessing Clients' Needs

A close understanding of demand patterns and preferences of rural households is essential for innovation. Gaining this understanding requires a combination of research and continuous action-oriented interaction between microfinance institutions' managers and their clients.

One key step is an in-depth market study. The information collected should include the size and schedule of loan demands, the repayment capacity of potential borrowers, and the accessibility and terms of other sources of financial services.

CARE has sponsored client-focused market surveys for rural banks in Ghana using the IKM tool developed by PlaNet Finance. This tool has also been used by three microfinance institutions in Benin (Fenacrep, PADME, and Finadev).

Evaluating Loan Applications

The Palm Pilot is a popular hand-held computer useful for keeping track of appointments and phone numbers. A less well known potential use of the Palm Pilot is by a microfinance institutions' loan officers. The technology allows for registering clients' information for quick referral by loan officers while they are working in the field. Field officers can retrieve the client's profile, process loan applications, check on payment schedules, disburse and collect cash, all on the spot. Every transaction and decision is recorded on the Palm Pilot and can be transferred to the microfinance institution's main computer files when the field officer returns to the office. In other words, the Palm Pilot is a tool well adapted to the delivery of doorstep microfinance services. It retails for about US$300. CARE has supported a trial of the Palm Pilot in Benin, and the results have conclusively shown that the investment is worthwhile.

Testing New Products

Poor harvests, bad health, and other emergencies put considerable stress on the food security and livelihood of the poor. Hence insurance products are highly valued.

Rural households are vulnerable to exposure to risks and are also required to cover significant social costs, such as funeral expenses, which are culturally important and economically significant. Insurance is a promising response to this customer need.

At present, most households in Africa do not buy insurance for a variety of reasons such as that people are unaware of the availability of insurance, that insurance products are not well designed for them, that people can not afford to buy currently available services, and that people consider insurance schemes dubious because of the well-known inefficiencies and delays in claim processing.

Rural banks in Ghana have expressed increasing interest in offering insurance products—life, health, and property insurance—to their clients, but they have little capacity or experience in product research, innovation, and testing markets. CARE has proposed to build this capacity through an action-research pilot project for which funding is now pending.

Inventory credit is another exciting product. TechnoServe, a U.S.-based NGO, has pioneered the use of inventory credit as a means for increasing small-scale farmers' incomes. To meet immediate cash needs, small-scale farmers must often sell their produce shortly after harvest, when market prices are at their lowest. Without adequate storage facilities and access to loan funds, they are unable to hold their crops for later sale during the "lean season" when prices are much higher.

Inventory credit entails the use of stored goods as collateral for loans and

can, therefore, be applied to any durable or storable product. In Ghana, Techno-Serve has applied the use of inventory credit for grain marketing, particularly maize and rice. The price of maize during the lean season is typically 75 to 250 percent higher than the price at harvest time. The amount of credit provided by local banks is pegged to a proportion of the current market value of the stored grain, usually between 70 and 80 percent of the prevailing market price. This limits the lender's risk should the price not rise as anticipated.

On average in a period of 5 years, farmers participating in the program have increased their net income by 36 percent over what they would have earned had they sold their maize immediately after the harvest. Perhaps more significantly, the scheme has achieved a 100 percent repayment rate.

Another product that has proven to be very much in demand is Credit with Education, which has been promoted by Freedom from Hunger, another US-based NGO. Field officers travel on motorbikes to remote villages in rural areas where they set up and coach groups of 30 women through regular weekly meetings. Group members go through various cycles of loans, which must be repaid over a period of 4 months. Initial loan amounts of US$50 are gradually increased up to US$250. The originality of Credit with Education resides in the fact that, as the name indicates, field officers use group meetings to educate members not only on managing their income-generating activities but also on reproductive health, child nutrition, and other matters of importance for their well-being.

Credit with Education is successfully used as a leading financial product by more than 60 credit unions in Mali and Burkina Faso, as well as a number of rural banks in Ghana. In Burkina Faso, where Credit with Education is known as *caisses villageoises*, 30,000 women participate.

Linking microfinance products to the promotion of social issues is an area much open to further development. In Ghana, CARE and a local rural bank are planning to set up a special window for providing savings and credit facilities to young people who are targeted within a HIV-prevention program. This initiative has emerged from discussion groups in which poverty and lack of economic opportunities have been singled out as key factors in the spread of AIDS.

Monitoring and Tracking Loan Portfolio

As microfinance institutions develop new microfinance products and expand credit to an ever-increasing number of clients, establishing adequate computerized management information systems (MIS) quickly becomes urgent. Unfortunately, this is seldom easy to do. Although off-the-shelf MIS software, such as the Loan Performer software developed by a small firm in Uganda, is available, these products usually offer no quick fix, in part because local technical support is not available. Most micro-finance institutions find that they must custom design their MIS.

Ghanaian microfinance institutions provide examples for the two paths to MIS development—off-the-shelf and custom design. The larger and more sophisticated credit unions have recognized that computerization of their operations is an important step in their development. The Credit Union Association (CUA) has identified a single software supplier to facilitate the capability of linking all credit unions into a single national system. CUA has purchased licenses from DBS in South Africa and implemented the eMerge

integrated banking software in 25 credit unions, with good results so far.

In contrast, a number of rural banks have elected to develop custom-made software to computerize their operations. They have hired a local consulting firm that has developed the software from scratch. This has been a difficult process so far. The banks are being used more or less as guinea pigs as the consultants go through a learning process. However, technical problems have not been the dominant factor in the computerization process. Rather, experience has shown that commitment from the banks' managers and staff has been the major factor in getting the job done.

Measuring Impact

It is widely presumed that microfinance is an effective tool for poverty alleviation. This presumption has, in fact, fuelled much of the support for allocating increasing amounts of public resources to the microfinance sector. Hence, assessing and monitoring the impact of microfinance institutions on the livelihoods of the poor as well as examining their cost-effectiveness relative to other poverty-alleviation measures is of interest not only to policy analysts, but also to backers and managers of microfinance institutions.

Extensive research has been carried out over the past few years to develop cost-effective methodologies for assessing the impact of microfinance services. Among the leaders in that area are the SEEP Network and the AIMS Project.

In Togo, the NGO Timpac has recently designed a 150-question survey that has been addressed to 1,000 women, both clients and nonclients of the program. The survey will allow Timpac to refine its financial services, develop well-focused training programs, and better target potential clients. Timpac intends to carry out such surveys every second year to track changes in the women's household livelihood security.

Concluding Remarks

Often, microfinance development has followed what we could call the McDonald approach. A practice successfully developed in one country is upgraded to "best practice" and subsequently replicated with donor support in other countries. Of course, the composition and size of the hamburger has to be adjusted to the local taste. Local staff has to be trained for the management and the cooking, and, by their own initiative, they may add some African spices, but the basic concept and ingredients come from elsewhere. Such an approach is sometimes viewed with uneasiness, but we should also consider that the rural poor—even if they do not eat hamburgers—are hungry for financial services and cannot wait for the emergence of more authentic types of models.

Whether innovations that have been implemented by various microfinance institutions in the Gulf of Guinea region can be successfully replicated in other African countries is debatable, but at least this paper will provide some food for thought.

Changing Environment, Land Tenure, and Agricultural Performance in Africa

Kaori Izumi

Historically, the land question preoccupied colonial regimes in most of Africa. It was an urgent issue in the white settler areas, but it was also central to promote cash crop production in African reserves. In the late 1940s and 1950s, colonial governments attempted to modernize African agriculture through creation of "Yeoman farmers" (Peters 2000). In the 1960s and 1970s, after most African countries had gained their independence, land issues were once again on policy agendas. Since the 1980s, there has been renewed interest in land tenure in Africa as a result of a changing socioeconomic and political environment.

The kinds of land tenure and the nature of land reform have geographical variations, reflecting the differing historical, socio-political, and economic settings of nations. In Latin America and Asia where land ownership was highly skewed, the land reform was classical land redistribution from the wealthy to the poor and from landlords to tenants. In most African countries where land reform has been initiated, it has been tenure reform, i.e., conversion of customary land tenure to individualized or formalized land tenure, with some exceptions.[1]

The revival of land reform in Africa since 1980 is closely linked to global macroeconomic policy and to promotion of efficient commercial agriculture and private investment in the agricultural sector. Individualization of land was considered to be a necessary step to achieve economic development in Africa. The impact of individualization and titling on agricultural performance has been one of the central issues of land tenure in Africa and the subject of a number of empirical studies. The findings of these studies refuted the conventional theory of individualization and titling of land, and instead a new evolutionary theory of land rights was developed. This evolutionary theory emphasizes the adaptability and flexibility of indigenous African land tenure.

This paper discusses land tenure reform in Africa in the changing environ-

[1] For instance in Zimbabwe, South Africa, and Namibia, where skewed land distribution existed along racial lines, tenure reform was combined with land redistribution and resettlement. And in Mozambique, community land rights were recognized with a possibility of group registration.

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ment in particular since 1980s, the relation between land tenure and agricultural performance both at theoretical and empirical levels, the need to further develop policy options for land tenure reform, and the shortcomings of tenure reform as a means to improve agricultural performance.

The Revival of Land Issues in Africa

Since the 1990s, land issues have been back on the agenda in many African countries as a result of the changing socioeconomic environment that has resulted from increasing population pressure and land scarcity, commercialization of agriculture, urbanization, and globalization. One of the most important factors that revived land issues in policy debates was the structural adjustment programs instituted in most African countries after 1980. The structural adjustment programs established an agenda for economic liberalization intended to create favorable conditions for private investment and the integration of African economies into the world market (World Bank 1989). In the agricultural sector, the structural adjustment programs encouraged private investment in agriculture and a gradual change of indigenous land tenure toward individualized land tenure.

Economically, private interests in land have increased under the transition from state-controlled economies to liberalized economies, which provided new opportunities for both domestic and foreign private investment. Politically, the promotion of "civil society" and multi-party systems provided positive conditions for liberalization and privatization. Land has become an important resource for investment, which has sometimes led to conflicts between different land uses by various socioeconomic actors. While socio-economic conditions were rapidly changing, indigenous tenure weakened in the face of emerging conflicts, failing to regulate and enforce norms and rules that previously governed the land. In war-torn countries such as Mozambique, Angola, and Rwanda, the return of refugees necessitated resettlement programs.

African governments felt the need for land reform to meet different objectives, but most commonly to provide room for individualized or formalized land tenure. Land commissions were set up in Botswana, Tanzania, Zimbabwe, Mozambique, and Malawi, and new land policies were enacted in Zimbabwe, Tanzania, and Namibia. Initiatives for the development of new land laws were also undertaken in Niger, Ethiopia, Mozambique, Tanzania, Uganda, and South Africa.[2]

Evolution of Land Tenure in Asia

The form of tenure institutions and its relation to agricultural performance in African countries has long been a central concern of economists. Conventional views of the relation between land tenure and agricultural intensification assumed that increasing population pressure and land scarcity lead to evolution from a communal or collective property regime to a more privatized property regime. The underlying assumption is that more precise private ownership of land and title will encourage farmers to invest in the land and to adopt intensive agricultural practices and technological innovations, thus contributing further to efficient use of scarce land.

Historically, the evolution of indigenous land tenure to private property regimes has taken considerable time because it is a process of gradual adaptation to a changing environment. For instance, the conversion of communal land into private property in England in

the 18th century was induced by the disequilibrium between the fixed institutional rent and higher economic rents expected from adoption of new technology (Ruttan and Hayami 1984). In 19th-century Thailand, property rights in land emerged as a response to increasing demand for rice as a result of the opening of international trade. In the Tokugawa period (1603-1867) in Japan, population growth and technological change enabled intensive farming, which provided a basis for conversion to a modern private property system in the Meiji period (1886–1912). In the Philippines in the 1970s, a change in resource endowment and technical changes, i.e., expansion of irrigation systems and introduction of high-yielding varieties, led to a change in land tenure and labor relations (Hayami and Kikuchi 1981).

In the development of property rights to land in 19th- and 20th-century Asian countries, i.e., Thailand, Burma, the Philippines, and India, favorable terms of trade, increased population pressure, and expansion of land-intensive crop production are associated with a rise in real land prices, which in turn are associated with an increase in the demand for more precise and more secure land rights (Feeny 1988, 298). Political changes, ideology, conventional wisdom, transaction costs, and the demand for institutional change also played an important role in the development of property rights in Asia (Feeny 1988, 298).

Land reform in post-World War II Japan is often considered one of the few successes. It should be noted that land reform in Japan to redistribute land to former tenants was followed by a green revolution in the 1950s. It was a combination of land tenure reform and technological innovation as well as the macroeconomic conditions at that time that contributed to a drastic growth in agricultural production by small-scale farmers. Historically, therefore, the evolution of land tenure and state intervention in land reform were possible because certain conditions, e.g., technological change, provision of support services, and favorable market and macroeconomic conditions, were present.

Individualization, Registration, and Titling of Land in Africa

In the 1980s, the replacement of indigenous land tenure with individualized tenure and individualization, titling, and registration of land was considered to be a necessary condition to encourage efficient use of land and to increase agricultural productivity in Africa. Eicher and Baker (1982) expressed this view:

> Until recently, most studies of land tenure in sub-Saharan Africa concluded that communal land tenure institutions were flexible and not an immediate constraint on increasing agricultural production. The token priority given to research on land tenure over the past 20 years was justified in light of the large amount of idle land available in almost all countries. However, the view that land tenure problems are not a constraint on production is outdated. Land tenure and land use policy issues will be of strategic importance in the 1980s and the 1990s as the frontier phase is exhausted and the intensification of agriculture proceeds.

Also, in a paper presented at a World Bank agricultural sector symposium, Falloux (1987) argued, "African countries

[2] In Ethiopia, land reform for land redistribution was conducted in Amhara regional state in 1996. In Zimbabwe, the struggle over land is intensifying, and the government recently proposed a new land bill (Havnevik 1997). In Botswana, a presidential commission was appointed to investigate land problems especially in peri-urban areas. An initiative for land reform was recently taken in Namibia and South Africa. In Niger, a new land law, the Rural Code, was enacted in 1986, which resulted in increasing contestation between formal and state institutions, undermining the political legitimacy of the state (Lund 1997).

are at a turning point in terms of land management between traditional extensive systems and new intensive ones . . ." and require "a total drafting of their land laws, which have become inconsistent and ultimately ill-adapted to the actual situation in the fields."

In conventional economic theory, efficient resource allocation by individual agents requires both tradable land property and development of a land market. In the first place, viewing land as a commodity is necessary for efficient allocation of land to the most efficient user through markets, facilitating investment and use of credit. Individualization, titling, and registration of land title were assumed to increase tenure security of the landholder by providing a clear definition of private property and formalization of land title, thereby reducing the economic costs of litigation.

Second, individualization increases investment by improving tenure security and reducing transaction costs. Greater tenure security raises expected investment returns, thereby increasing the demand for capital for fixed-place investment. The supply price of credit decreases because the cost of lending is reduced by the improved credit-worthiness of projects and the higher collateral value, and both supply and demand effects increase investment.

Third, individualization will cause a land market to emerge. Through a land market, land will be transferred to the most efficient user of land from less productive users. In this model, African indigenous land tenure is referred to as "communal," and it is considered to be a barrier for economic development. Therefore, a change in land tenure from communal to individualized tenure is a prerequisite for agricultural development (Johnson 1972, 276). Conventional economic theory considered indigenous land tenure as static and unable to develop toward individualization on its own, and it argued that indigenous land tenure should be replaced by individualized tenure. It also emphasized that the state should actively facilitate the process of change from indigenous to individualized tenure.

Empirical experiences show, however, that where land sale exists, purchased lands are often not used for agricultural production, but for nonagricultural activities and for speculation (Haugerud 1983; Barrows and Roth 1990). One reason is that land is a necessary but not a sufficient condition for agricultural credit, and banks usually demand salaried employment as proof of credit-worthiness (Okoth-Ogendo 1976; Shipton 1988). Much of the credit acquired against land as collateral is used for nonagricultural purposes, and lending agencies have had great difficulty in foreclosing land mortgages (Shipton 1988). In addition, a limited supply of credit in general constrains smallholders' access to credit (Gibbon and Havnevik 1993).

Individualization and titling of land do not necessarily lead to spontaneous registration of land title (Shipton 1988).[3] In Ghana, Rwanda, Kenya, Uganda, and Senegal, no correlation was observed between individualization and titling of land and use of credit, agricultural investment, or agricultural productivity. Several studies showed that insecure land tenure was not a cause of agricultural inefficiency (Barrows and Roth 1990; Migot-Adholla et al. 1991; Bruce and Migot-Adholla 1994; Golan 1994; Roth, Unruh, and Barrows 1994). Therefore, a correlation between individualization and titling of land and agricultural performance has not been empirically confirmed.

Contradicting conventional notions about the shortcoming of indigenous land tenure, there is a growing consensus that indigenous land tenure was flexible,

equitable, and provided more security (Bruce 1988; Malton 1994, 66). Even under communal ownership, cultivation and management remained with individual households, and Africans exercised more than use rights such as the rights to control, manage, transfer, and even sell under certain restrictions (Feder and Noronha 1987; Wily 1988; Illife 1979). Indigenous land laws usually provided some restrictions to prohibit land from being permanently transferred to those outside the lineage. Introduction of a formal system, instead of providing more security, often led to straddling of formal and informal tenure institutions (Berry 1994; Lund 1995, 1997) and conflicts between two different sets of legal rights (Mackenzie 1993; Noronha 1985).[4] If a piece of land that has been formally registered gets reallocated through indigenous tenure without the change in the ownership being registered, the land could be bought and sold without the knowledge of its actual user (Coldham 1979).

Furthermore, it is generally perceived that individualization and titling of customary tenure discriminately influenced land rights of different social groups, providing more security to one group while reducing the security of others, often leading to accumulation of land by formal rights holders and the privileged and dispossession of informal rights holders and the poor (Atwood 1990, 663-4; Platteau 1996; Roth, Unruh, and Barrows 1994, Haugerud 1983; Goheen 1988; Eyzaguirre 1988; Carter, Wiebe, and Blarel 1994, 165).[5] It is widely documented that land often accumulates in the hands of those who have contacts with bureaucracy, knowledge and resources to acquire land, and land title (Platteau 1996; Roth, Unruh, and Barrows 1994; Haugerud 1983; Goheen 1988; Eyzaguirre 1988; Carter, Wiebe, and Blarel 1994, 165).

Recently Hunt (2001) revisited the theory of individualization and titling of land in Africa. She suggested that the impact of titling was not as simple as previously argued and that various factors should be taken into consideration within a specific context when the impact of titling programs is assessed. According to Hunt, three groups of factors determine the outcomes of land privatization and titling programs:

- preexisting production systems and production potential
- adjudication criteria and procedures
- the design of support institutions intended to sustain the new tenure system and to enable farmers to benefit from it

Referring to a study on eastern Kenya, Hunt (2001) suggests that the analyses of the impacts of externally promoted adjudication of individual land rights and of land titling need to draw a clearer distinction between negative impacts that are inherent in tenure systems based on individual tenure and those that stem from specific adjudication criteria and procedures or from the design of supporting institutions.

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[4] In Kenya, in 1992, 7 years after land registration had been completed in the Kenyamkago sample area in Nyanza Province, fewer than 3% of the 896 registered land titles were listed as having been mortgaged for loans. In the South Nyanza District as a whole, after more than a decade of registration of the most fertile parts of the district, less than 1% of the households had received loans from the Agricultural Finance Corporation, the statutory body responsible for the government's land-secured lending (Shipton 1988).

[5] In Niger, the introduction of the Rural Code increased land disputes because it gave people the opportunity to straddle formal and informal institutions (Lund 1995, 1997). In Tanzania, a number of disputes emerged where demarcation was carried out (Sendalo 1990). In Kenya, land that was once consolidated and registered started to be fragmented after the death of the owner without formal registration. This formal registry does not reflect the practice on the ground, and traditional rights of access and inheritance continue to determine the actual land tenure in Kenya (Okello Oguttu 1976; Coldham 1979).

[6] In 1982 in the Kenyamkago area of Kenya, the top 25% of the registered land-owners owned 53.5% of the total hectares, while the bottom 25% owned 6.1% (Shipton 1988).

Hunt points out that although land reform is under way in many African countries, there have been few policy options in tenure reform other than individualization and titling. Thus, there is a need to explore various policy options for tenure reform, taking into consideration the existing conditions of the country and local communities. Simultaneously, it is important to acknowledge that there are factors other than tenure security that are essential for agricultural development, such as informal credit, availability of technology, training and extension services, access to road and market, and agrarian structure (Hunter and Mabbs-Zeno 1986; Pinkney and Kimuyu 1994; Roth, Unruh, and Barrows 1994; Golan 1994).

The Evolutionary Theory of Land Rights in Africa

Based on empirical evidence on individualization and titling of African land tenure, a new theory of Africa land tenure has emerged. It stresses that indigenous land tenure in Africa has been evolving on its own toward individualization. According to this evolutionary theory, existing land tenure in African countries has evolved and adapted to changing conditions such as introduction of cash crop production, increasing population pressure, commercialization of agriculture, and change in land use (Aunt, Rutman, and Barber 1979; Bruce 1986, 1988; Atwood 1990; Feder and Naronha 1987; Downs and Reyna 1988; Hunter and Mabbs-Zeno 1986).

According to Bruce (1988, 33), "The changes that have taken place have often not required radical revision of older tenure arrangements, nor have they often involved a conscious decision by the community: Instead, change has come in an unfolding of the internal logic of indigenous tenure systems in response for new circumstances." The task of the government is to support a change under way, facilitating "a transition caused by fundamental economic forces" (Bruce 1986, 51).

The evolutionary theory was further elaborated as the evolutionary theory of land rights in Africa, a new institutional economic theory on evolution of land tenure (Feeny 1988).[6] According to the theory, land tenure evolves spontaneously toward individualization and formalized private property systems, responding to increasing population pressure and commercialization. It presumes a unified evolutionary path of institutional change in land tenure toward individualization, which is assumed to be more efficient than indigenous African land tenure.

In this theory, establishment of property rights on land is not necessary while land is abundant. But as land becomes scarce, uncertainties of land rights occur and land disputes increase. The increase in land disputes raises litigation costs, which causes efficiency losses in the economy, and in response to these changing conditions, more efficient tenure institutions evolve (Platteau 1996).

One problem with the evolutionary theory of land rights is the pace of evolution. In nature, the process of natural selection proceeds slowly over a long time. A stable environment is necessary for a natural selection of superior characteristics, but such a gradual process can be disturbed or totally disrupted if large, sudden change occurs (Hodgson 1988, 141).[7]

In the application of a natural model to institutional change in human society, what do such large and rapid changes imply about the evolutionary process of institutions? In Japan and the Philippines, where the old land tenure systems were adjusted to changing circumstances and

finally replaced by new systems, the processes took place over two centuries (Hayami and Kikuchi 1981). In Thailand, major changes in institutions began in the early 19th century, and usufruct rights were changed by the enactment of a new land law in 1954. By the late 1960s, only 12 percent of the total land had full title whereas 65 percent had no formal legal documentation at all (Feeny 1988, 285-286).

These examples indicate that institutional changes usually take a long time. Then what are the likely consequences when there is a large and rapid change that disturbs a long process of gradual transformation of indigenous tenure on its own? Will the existing land tenure still adapt itself to such changes, leading to the emergence of a more efficient tenure institution or will it be totally disrupted, leading to extinction as happens in the natural world? There are situations in which indigenous tenure institutions have collapsed, become distorted, or become inappropriate due to the impacts of major civil disturbance or past government policy (Hunt 2001). The consequence of changing macroeconomic conditions has also weakened the capacity of indigenous land tenure to adapt to changing conditions. Additionally, if indeed customary tenure had been so adaptive to demands, why has there been a downward trend in most indicators of economic development and an apparent crisis in Africa's agricultural systems (Peters 2000)? These questions need to be examined and answered both at empirical and theoretical levels.

Conclusion

It could be concluded that there seems to be no clear empirical correlation between land tenure security and agricultural performance and that land tenure security is a necessary but not sufficient condition for agricultural intensification, improved agricultural productivity, and economic development. Evolution of land tenure itself is unlikely to lead to agricultural intensification and improved production. There are factors other than tenure security that are essential for promoting agricultural development.

Land tenure reform itself is expensive and complex and requires efficient and capable government institutions to deliver policy and to enforce land laws.

Actual implementation of tenure reform also demands not only substantial financial resources but also a high level of technical and administrative capacity within government institutions. Land reform in most African countries has so far been focused on policy and legal reform, physical movement of people for resettlement, and establishment of other institutional reforms at various levels. What has been missing is specific agricultural policy and programs that are linked to land tenure reform. If tenure reform is to contribute to agricultural intensification and improved agricultural performance, it is time to explore more sophisticated but pragmatic policy options that take into account local and country-specific conditions. It is also time to go beyond limited debates on tenure reform and agricultural performance to reconsider land reform policy within a broader context of the development path in Africa.

Finally, because the land issue is becoming an increasingly political issue in Africa today, there is an urgent need to

[6] Feeny (1988) applied a theory of induced institutional change to land tenure in developing countries in general, though his empirical materials are exclusively from Asia. Bruce (1986, 1988), among others, applied evolutionary theory of land tenure to African contexts.

[7] "Small variations in the environment may ensure that the more adaptive species prosper, but a big change, such as the proposed meteorite which suddenly altered the Earth's climate and wiped out the highly successful dinosaurs, can entirely disrupt the process of 'natural selection'" (Hodgson 1988, 141).

resolve land questions peacefully. Despite the recognition that resolving land issues is important for economic and political stability in the region, donor support to land reform in Africa has been rather limited. Further delay in the resolution of the land question may lead to further economic decline in the region as a whole. Therefore, substantial donor support must be mobilized for a comprehensive land reform program in the coming decade to promote political stability and agricultural development in Africa.

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Tanzania: Soil Fertility Recapitalization and Agricultural Intensification

Simon Muro and Jorge A. Muñoz

JORGE A. MUÑOZ

Because most smallholder farmers in Tanzania employ low input/low output agricultural systems, the nation suffers from progressive degradation of soil resources and a stagnant agricultural system. The result is a vicious circle of poverty, resource degradation, and food insecurity.

To address these problems, the Government of Tanzania is launching the Soil Fertility Recapitalization and Agricultural Intensification Project. The project will identify key constraints through an integrated and participatory approach, it will prioritize farmers' needs, and it will develop strategies and technical solutions for overcoming the constraints.

Strategic Context

The project is an integral part of a broader rural development strategy being completed by government. The overall objective of the rural development strategy is to eradicate poverty through multi-sector interventions in agriculture, roads, water, education, health, and local government reforms. The project will also be a key instrument for implementing the soil fertility initiative.

The project aims to intensify agricultural production through

- improved land and crop husbandry practices
- increased access to and utilization of agricultural inputs and support services
- enhanced private participation in input and output markets
- an improved policy environment that facilitates trade between regions and across international boundaries

The project will be implemented in the context of important reforms under consideration by the government, which include

- grain marketing policy
- local farm output taxes and levies
- land policy
- inputs policies
- disposition of state-owned assets

relevant to the development of input and output markets.

Principles and Objectives

The project design has been based on three key principles that should also guide project implementation

- empowering rural communities and farmer groups to make decisions regard-

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ing sustainable technology and service delivery

- strengthening the decentralization process at the district level
- enhancing the performance of key rural markets

Empowering Rural Communities

The mechanisms for empowering rural communities will be participatory planning and development of strategies to address the issues farmers and rural communities consider to be of high priority. Organized farmers' groups and village councils will be primarily responsible for implementing small-scale investment activities envisioned by the project, including planning of subprojects, implementation of technical recommendations, local procurement of inputs, and contracting service providers.

The greater responsibilities of the beneficiaries will be coupled with direct transfers of financial resources to them on a matching-grant basis to increase their bargaining power and implementation capacity.

The mechanisms for community-driven development will be phased in to allow for improvements as the project is implemented. For example, an inputs voucher scheme will be introduced with a few farmer groups initially and then gradually expanded as lessons are learned during the first year of implementation.

Strengthening Decentralization

Implementation will be largely at the district and village levels. Most investment funds and capacity-building resources will be channeled directly to districts and then onward to villages and farmer groups.

Districts will have significant flexibility in proposing the use of project resources. They will be encouraged to develop their own strategies and plans for addressing the issues raised by rural communities and farmer groups.

Improving Rural Markets

The selection of service providers and the provision of inputs at all levels of project implementation will be accomplished through transparent, competitive, and participatory approaches. For example, at the district level, the provision of extension services will not be limited to public extension agents. Local NGOs or other private providers will be allowed to compete for certain project resources, at the request of farmers or in conjunction with priorities they identify. In addition, the principle will be honored by increased self-regulation within the private sector and the development of specialized capabilities within the input/output marketing chain.

Components

The project will have four components: soil fertility recapitalization, agricultural intensification, inputs and outputs markets, and institutional strengthening and capacity building.

Soil Fertility Recapitalization

Soil is the most fundamental resource in agriculture. Plants draw nutrients from the soil they grow in. If farmers do not restore the nutrients that are lost by harvest removals, leaching, and erosion, the productive capacity of soils is gradually lost. Farmers have identified soil "exhaustion" as one of the main reasons for declining yields.

The project will support activities aimed at

- arresting soil erosion
- building up organic matter in the soil
- enhancing soil and water conservation
- improving crop practices

- improving the physical and biological structure of the soils
- improving soil rooting depth and permeability
- recapitalizing the phosphorus status of phosphorus-deficient soils

In addition, rural communities will have access to technical assistance in support of collective activities, such as contour terracing and aforestation, that are aimed at using soil and water resources in a more sustainable manner.

The village will be the focus for problem identification and implementation activities, while the district will be the center point for strategic planning and budgeting of interventions.

Considerable training will be needed to build local capacity and promote attitudinal changes, especially in the extension services that formerly were trained in top-down approaches. Competition from private providers such as NGOs will be encouraged.

Agricultural Intensification

Low crop yields in Tanzania result largely from the use of inappropriate crop management practices including low quality seeds, poor plant nutrition, and inappropriate crop rotation practices (particularly the absence of legumes).

Increased agricultural productivity and rural incomes must come mainly as a result of agricultural intensification. This is the only viable way to enhance food security, reduce poverty, and protect and improve the rural resource base.

The project will provide support for the formulation of agroecological zone–specific technological recommendations based on both socioeconomic and agronomic considerations. The recommendations will be updated through a participatory process involving farmers, researchers, extension agents, and other stakeholders (such as NGO staff, private-sector representatives, and district staff) and disseminated to farmers.

The project will promote integrated crop management practices such as

- appropriate land husbandry practices
- use of best available crop varieties and management practices that ensure proper rates, dates, and methods of seeding
- integrated pest management
- efficient soil and moisture management practices, including conservation tillage
- judicious application both organic and inorganic sources of plant nutrients
- improvements in post-harvest practices to reduce crop losses and extend the marketing season

To improve the delivery of technologies, both extension staff and farmers will undergo extensive training to upgrade their capacities in participatory planning approaches, marketing and profitability analysis, and participatory technology development and dissemination. In addition, farmer groups will be empowered with financial resources to facilitate their access to markets and services.

Inputs and Outputs Markets

Fertilizer prices can be reduced through innovative mechanisms that take advantage of economies of scale in importing and efficiency gains in the supply chain.

The proposed project will also promote several measures for the production and marketing of better quality seeds.

The project will support activities aimed at enhancing the bargaining capacity of farmers in input and output markets through implementation of an inputs voucher scheme, an improved market information system, and demand-driven marketing infrastructure investment subprojects at the village and district level.

The voucher will be an instrument to enhance the purchasing power of beneficiaries (to buy agricultural inputs) and to build their savings to finance future purchases. To qualify, a recipient would have to be members of a farmers' organization. They would contribute half the value of the voucher and would redeem vouchers as a group with qualified private retailers or dealers. After harvest, participants would save the full value of the voucher in order to qualify for another voucher the following year.

Participants would be eligible to receive vouchers for 2 consecutive years after which they would be expected to purchase inputs from private suppliers without vouchers.

Institutional Strengthening and Capacity Building

The project will strengthen the institutional and human capacity to address the challenges of rural development and provide capacity for project implementation at the local, regional, and national levels, among both public- and private-sector service providers.

Cost, Financing, and Institutional Arrangements

The total project cost is estimated to be US$96 million over 5 years. The World Bank would contribute about US$64 million, beneficiaries would contribute about US$29 million, and the government about US$3 million.

Project implementation and management would be largely at the district level. A district management team would be responsible for translating the project concepts and strategies into activities and results.

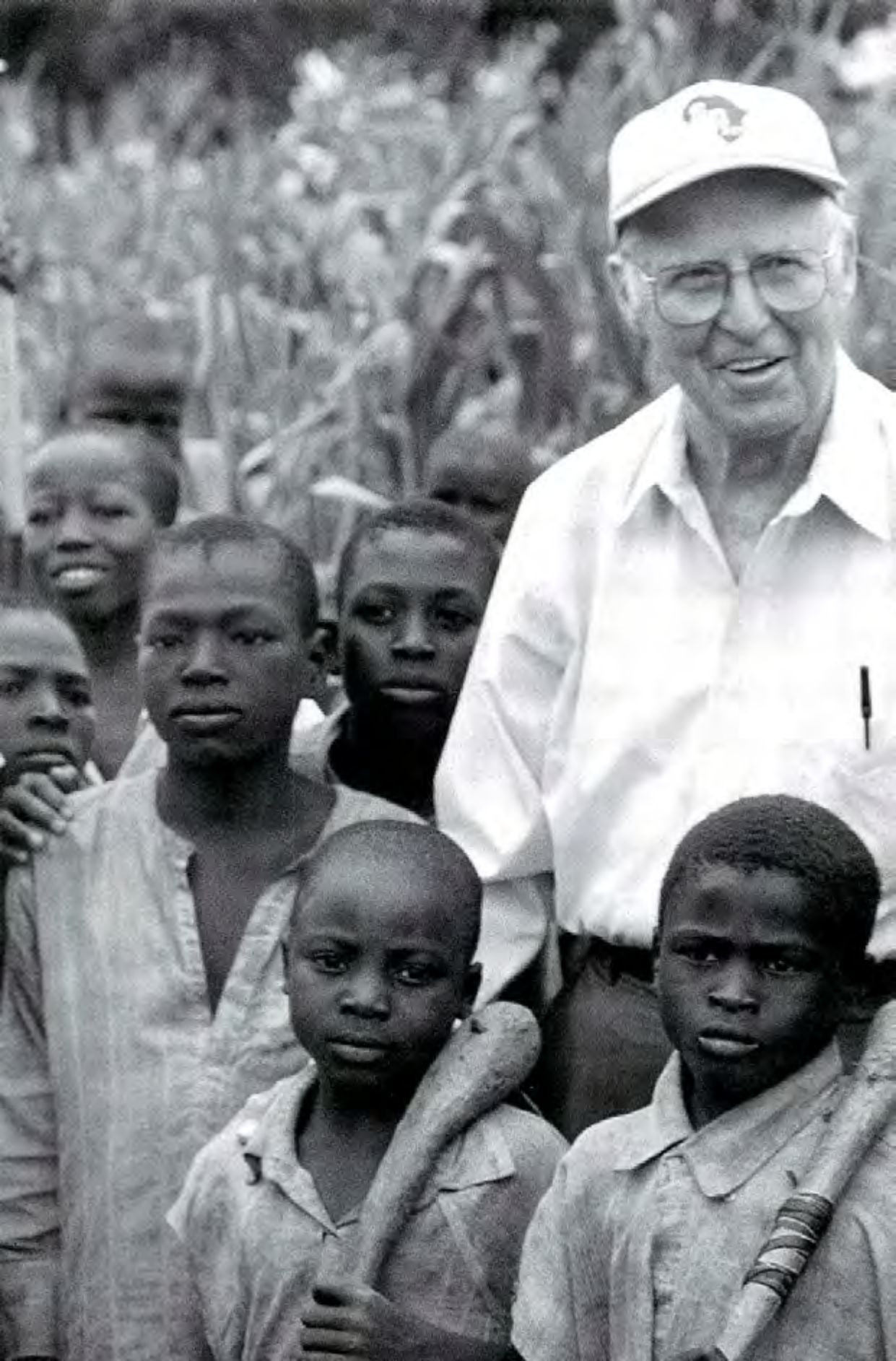
Districts would be incorporated in a phased manner, starting with about 15 in the first year, and village coverage would increase from about 120 the first year to about 1,200 by the fifth year.

At the national level, a project coordination unit would have overall responsibility for project management and coordination. The project coordination unit would report to a steering committee comprising all the key line and technical ministries.

Project resources would be transferred to the districts in the form of block grants, part of which would, in turn, be transferred to project beneficiaries for specific activities.

The Way Forward

During 2001, the government expects to complete project preparation and the World Bank expects to complete its appraisal. Formal negotiations between the government and the World Bank would immediately follow, and the project should become effective by the end of the year.



Agroprocessing: Adding Value to Food Production

Ruth Oniang'o

The current food crises in Africa underscore the importance of promoting food production and reducing post-harvest losses as well as vigorously promoting food processing. The lack of enlightened problem-solving innovation in the agricultural and agro-industrial sector, and therefore the slow pace of needed technological change, has led to a widespread stagnation and even decline in both crop yields and diversification of high quality food products.

Many attempts to address the problem of food insecurity in Africa have had limited success. Often the target beneficiaries of projects have been inadequately taken into account in designing the projects, or projects were promoted without adequate infrastructure and institutional support. Where relevant results exist that can be implemented, the private sector often fails to invest in the commercial translation of the results into innovative processes or products due in part to lack of information on the economic viability of these innovations or technologies, on associated technical assistance, and on the key role of the extension service in the implementation process.

Collective efforts to deal with food security are articulated in the programs of some African intergovernmental institutions, such as the African Regional Centre for Technology, based in Dakar; the African Regional Centre for Engineering Design and Manufacturing, based in Ibadan, Nigeria; and SG 2000. They support national initiatives in the design, development, and testing of technologies suitable for the development objectives of the countries of the continent (Randforum 1995). While these institutions have produced research results in some crucial fields, they have been decidedly less successful in moving the results and prototypes for technological cooperation and exchange of information within the continent. This inadequacy has led to wasteful duplication of efforts, missed opportunities, or lack of information packages on viable innovations. Appropriate packages seldom are available in a suitable and user-friendly format.

A traditional definition of the agroprocessing industry refers to the subset of manufacturing that processes raw materi-

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als and intermediate products derived from the agricultural sector (National Academy of Sciences 1978). Agroprocessing thus means transforming products originating from agriculture, forestry, and fisheries into more suitable products. Indeed, a large part of agricultural production undergoes some degree of transformation between harvesting and final use.

The technologies of industries that use agricultural, fishery, and forest products as raw materials are diverse. They range from simple preservation (such as sun drying) and operations closely related to harvesting and production to modern, capital-intensive methods of producing such articles as textiles, pulp, and paper (National Academy of Sciences 1978; Ogunrinade, Oniang'o, and May 1999; Ndure et al. 1999; Alexandratos 1995; FAO 1996; McDowell 1984; UNCTAD 1996).

In most rural and urban communities in Africa, thousands of tonnes of cereals, grain legumes, starchy roots and tubers, seeds, fruits, and vegetables are processed into different types of foodstuffs and beverages for immediate home consumption or for sale. Even then, much work goes to waste due to poor infrastructure and inadequate capability to process all produce.

There are two main reasons for processing food items. First, fresh items from the farm are liable to perish and go to waste before they can be eaten or sold. Second, most processing techniques add significant value to the foodstuff because they convert the raw materials into ready-to-use products. The treatment may improve the flavor and texture of food in some way. For example, fish may be smoked and green plantain may be sun-dried, transforming them into forms that people prefer. The treatment may also improve their palatability (Randforum 1995) and other value characteristics.

Agriculture and industry have traditionally been viewed as two separate sectors in terms of their characteristics and their role in economic growth. Agriculture has been considered the hallmark of the first stage of development, while the degree of industrialization has been taken to be the most relevant indicator of a country's progress along the development path. Moreover, the proper strategy for growth has often been conceived as one of a more-or-less gradual shift from agriculture to industry, with the burden on agriculture to finance the shift in the first stage. This view, clearly, no longer appears to be appropriate. On the one hand, the role of agriculture in development has been reappraised and revalued from the point of view of its contribution to industrialization and its importance for harmonious development and political and economic stability. On the other hand, agriculture itself has become a form of industry, as technology, vertical integration, marketing, and consumer preferences have evolved along lines that closely follow the profile of comparable industrial sectors, often of notable complexity and richness in both variety and scope. This has meant that the deployment of resources in agriculture has become increasingly responsive to market forces and increasingly integrated in the network of industrial interdependencies (Ogunrinade, Oniang'o, and May 1999; Alexandratos 1995; FAO 1996; FAO/Netherlands Conference on Agriculture and the Environment 1991; McDowell 1984; UNCTAD 1996; Ndure et al. 1999).

Agricultural products are shaped by technologies of growing complexity, and they incorporate the results of major research and development efforts as well as increasingly sophisticated individual and collective preferences regarding

nutrition, health, and the environment. While it is usually possible to distinguish the phase of production of raw materials from the processing and transformation phase, this distinction is often blurred by the complexity of technology and the extent of vertical integration: the industrialization of agriculture and development of agroprocessing industries is thus a joint process that is generating an entirely new type of industrial sector.

Types of Agroprocessing

Agroprocessing includes both the food and nonfood components. The two can coexist in an environment of agricultural diversity. Usually, however, the two industries operate completely separately from each other. Food industries are much more homogeneous and easier to classify than the nonfood industries since the former's products all have the same end use. Most preservation techniques, for example, are similar over a whole range of perishable food products, whether they are fruit, vegetables, milk, meat, or fish. In fact, the processing of the more perishable food products is to a large extent for preservation and not necessarily to transform them into more acceptable products (National Academy of Sciences 1978).

Nonfood industries on the other hand are more diverse and their products have a wide variety of end uses. Almost all nonfood agricultural products require a high degree of processing. Much more markedly than with the food industries, there is usually a definite sequence of operations, leading through various intermediate products before reaching the final product. Because of the value added at each of these successive stages of processing, the proportion of the total cost represented by the original raw material diminishes steadily. A further feature of the nonfood industries is increased use of synthetic and other artificial substitutes (especially fibers) in combination with natural raw materials.

Another useful classification of the agroprocessing industry is in upstream and downstream industries. Upstream industries are engaged in the initial or primary processing of agricultural commodities. Examples are rice and flour milling, leather tanning, cotton ginning, oil pressing, saw milling, and fish canning. Downstream industries undertake further manufacturing operations on intermediate products made from agricultural materials. Examples are bread, biscuit, and noodle making, textile spinning and weaving, paper production, clothing and footwear manufacturing, and rubber manufacturing (National Academy of Sciences. 1978; Alexandratos 1995; FAO 1996).

A further specification is related to the nature of the production process, which can range from craft to industrial organization. For example, in some developing countries the same product may be produced both by handloom weavers working in their own homes and by large textile factories that have sophisticated machinery and complex systems of organization and that produce a range of industrial products for the domestic and external markets. In such cases, it can be misleading to define the agroprocessing industry merely on the basis of the goods produced because only the second method of production mentioned has industrial characteristics.

Today, however, it is becoming even more difficult to provide a precise demarcation of what should be considered an agro-industrial activity. The impact of innovative processes and new technologies suggests a widening of the range of agro-industrial inputs that could be considered, including biotechnological and synthetic products, for example. This

implies that agro-industry today continues to process simple agricultural goods while also transforming highly sophisticated industrial inputs that are often the result of considerable investments in research, technology, and innovation. Corresponding to this growing complexity of inputs is an increasing range of transformation processes, characterized by physical and chemical alteration and aimed at improving the marketability of raw materials according to the final end use.

All these factors—the growing complexity of inputs, the impact of innovation processes and new technologies, and the sophistication and the growing range of the transformation processes—make it increasingly difficult to draw a clear distinction between what should be considered strictly industrial and what can be classified as agro-industry (National Academy of Sciences 1978; Ogunrinade, Oniang'o, and May 1999; McDowell 1984).

According to the United Nations' International Standard Industrial Classification of All Economic Activities, which is quite rigid but useful for statistical purposes, agro-industrial production is present in many manufacturing sectors: manufacture of food, beverages, and tobacco; textile, wearing apparel, and leather industries; manufacture of wood and wood products, including furniture; and manufacture of paper and paper products (Ogunrinade, Oniang'o, and May 1999; Alexandratos 1995; FAO 1996; FAO/Netherlands Conference on Agriculture and the Environment 1991; McDowell 1984; UNCTAD 1996; Ndure et al. 1999).

Developmental Role of the Agroprocessing Industry

Theoretical and empirical studies of the structural changes that accompany the development process have revealed a number of patterns. The most basic is a secular decline in the importance of the agricultural sector relative to nonagricultural sectors as per capita income increases. This relative decline is observed as a fall in the share of agriculture in value added, employment, trade, and per capita consumption. This trend is accompanied by a drop in the value share of primary agricultural production of the final product and by a corresponding increase in agroprocessing value added (Ogunrinade, Oniang'o, and May 1999; Alexandratos 1995; FAO 1996; Ndure et al. 1999).

These observations have emanated from the popular prescription that development necessarily involves a transfer of resources out of agriculture and that this is largely coterminous with industrial development. Increasingly, however, the development debate is focusing on the far more relevant issue of how the agricultural sector can make an optimum contribution to the overall process of economic growth. This question can be asked both about the size and functioning of the agricultural sector itself and about its links with the rest of the economy. More specifically, it can be argued that the development of agro-industry, for those countries with a comparative advantage in the agricultural sector, may contribute to achieving the proper balance between agriculture and industry.

A precise theoretical rationale for emphasizing the role of agro-industry during the process of development is provided by Hirschman's linkage hypothesis (1958), which postulates that the best development path lies in selecting those activities where progress will induce further progress elsewhere. Thus, an activity that shows a high degree of interdependence, as measured by the proportion of output sold to or purchased from other industries, can provide a strong

stimulus to economic growth. Agro-industry, therefore, can play a important role in accelerating economic activity (FAO/Netherlands Conference on Agriculture and the Environment 1991; McDowell 1984; UNCTAD 1996; Ndure et al. 1999).

Agroprocessing in Africa Today

Let us now turn specifically to the food sector. Study of some African countries' food policies has revealed that there is a wide range of agroprocessing activities, which make a major contribution not only to the manufacturing sector but also to the development of national economies as a whole. The earlier discussion covered both food and nonfood agro-industries and showed that a lot can be borrowed from the way the nonfood sector in agroprocessing has gone about its work. In fact, the principles are basically the same. If the principles employed in the development of nonfood agroprocessing are applied in the food sector, there is no reason why success can not be realized.

Zimbabwe, Kenya, and Ghana present a diverse picture of present agroprocessing in Africa.

Zimbabwe

In Zimbabwe, large firms based in the main urban centers dominate agroprocessing, but small operators based mostly at growth points and in small urban centers are beginning to make inroads into certain agroprocessing activities (Randforum 1995). Food industrial projects are predominant within the foodstuff subsector. A wide range of agroprocessing activities have been established at growth points. They include grain milling, peanut-butter processing, oil expelling and processing, honey processing, livestock products processing, manufacture of animal feeds, and baking The most common are bakeries, grain milling, and oil expelling, while processing peanut butter and honey processing occur in only a few growth points (Randforum 1995). Livestock processing, in particular beef processing, is an activity that is confined to single butcheries that slaughter and sell meat as opposed to industrial processes with several distribution outlets. The manufacture of animal feed is not common although the potential for oil expellers and grain millers to utilize by-products for feed manufacturing appears to be quite high.

Agro-industrial manufacturing is dominated by a few large firms, which in most cases produce over 80 percent of marketed output (Randforum 1995). The ability of small producers to capture market share from large enterprises should be based on efficiency of production and the competitiveness of small producers relative to large companies.

The potential for small enterprises lies in their locational advantage—they are closer to the source of the raw materials (Randforum 1995; Ogunrinade, Oniang'o, and May 1999). In addition, an important aspect for the rapid development of agro-industries within rural growth points is the market opportunities created by a certain minimum level of demand within the local community.

While it is possible for small rural agroprocessing enterprises to establish themselves by competing for urban markets, these markets are already well served by the large-scale agro-industries. By being in rural growth points and near raw materials, rural agroprocessing enterprises have leverage for penetrating markets beyond the immediate neighborhood, including urban areas.

Kenya

When designing strategies to spur agricultural growth, policy makers in

Kenya face a number of binding constraints, such as shortage of high and medium quality land and the enormous cost of large-scale irrigation. Hence Kenya's agro-industrial policy is based on intensification of production on existing land and the establishment of rural agro-industry. In this context, and while agriculture is the mainstay of Kenya's economy, the country is not self-sufficient in food and offers substantial scope for improved productivity. Intensified irrigation and enhanced value-added in food processing are both key targets of Kenya's agro-industrial policy.

Ghana

Ghana has no official rural agro-industrial policy as such. The immediate post-independence policy was based on state-led development strategy. Rural areas were seen as producers of agricultural raw materials to feed modern agro-industries located largely in urban areas. In rural areas, only artisanal processing for the local market or household consumption existed. Even though the emphasis on state-led development changed after 1966, there was no change in either attitude or policy toward rural agroprocessing. Processing of agricultural products was to continue to be done in urban areas by state or privately owned factories (Randforum 1995).

The initial phases of the structural adjustment program emphasized macro-economic stabilized and export-led growth. Ghana's major exports are agricultural products, and most of them are exported unprocessed or processed only at the primary level. Recently, however, as a result of concern about the social costs of structural adjustment programs, which appear to negate the positive impact initially intended, development of small rural agro-industries is being encouraged. The promotion of these industries is done mostly by voluntary groups or NGOs, the donor community, and some government agencies under the Program of Action to Mitigate the Social Costs of Adjustment. A large number of processing activities take place throughout the country for a wide variety of foodcrops such as cassava, oil palm, coconut, groundnut, and sheanut. Machinery is sometimes used to reduce drudgery and introduce efficiency. Women play a central role in food-processing activities, often operating through organized groups that integrate production and processing activities. However, they do not normally undertake marketing functions as organized groups. There is a total lack of data about rural agro-industries at the district, regional, and national levels (Randforum 1995; Ogunrinade, Oniang'o, and May 1999).

Potential for Agro-Industry in Africa

The potential for agro-industrial development in most developing countries is related to the relative abundance of agricultural raw materials and low-cost labor. The most suitable industries under such conditions are indeed those that make relatively intensive use of these abundant raw materials and unskilled labor and less-intensive use of presumably scarce capital and skilled labor (FAO/Netherlands Conference on Agriculture and the Environment 1991; McDowell 1984).

Many of the industries that use agricultural raw materials in fact have characteristics that make them particularly suitable for the circumstances of many developing countries. Where the raw material represents a large proportion of total costs, its ready availability at a reasonable cost can often offset such disadvantages as a lack of infrastructure or skilled labor

(Alexandratos 1995; FAO 1996; FAO/Netherlands Conference on Agriculture and the Environment 1991; McDowell 1984; Ndure et al. 1999). Furthermore, for many agro-industries, a small plant may be economically efficient, which is another important factor in developing countries where the domestic market is limited by low purchasing power and sometimes by the small size of the market itself.

Various potentials for value added in the processing and manufacturing of major food products in Africa have been identified. Such potentials, if well exploited, could serve as a basis for alleviating food insecurity on the continent.

Adding Commercial Value to Raw or Semi-Processed Food Products

Over the last 60 years, with few exceptions, profits in the food business have been in the value added by processing (industrial or artisanal) and not in the value of raw material (commodity) (Randforum 1995). This phenomenon has had consequences far beyond the specific case of Africa and has provoked crises affecting agriculture in both the developed and less-developed parts of the world. Africa with its limited processing infrastructure has suffered particularly.

The price of most raw materials fluctuates according to the law of supply and demand, and it is more or less uncontrollable, especially at the producer level. Producers are not marketers; therefore, marketing middlemen intrude, and without a policy and a level playing field, the producers lose out. To increase the value of the produce, the only solution lies in value-added processing.

In the overwhelming majority of the Third World food-producing countries, food destined for export is processed just enough to make it transportable and less perishable. For examples, dry coffee beans (after an important basic processing step) packed properly have a useful life of 2 to 3 years. Raw coffee cherries, in contrast, would not last more than 24 hours. On other hand, bananas do not receive any transformation—they are shipped unripe (green) because they continue to mature during transportation (Randforum 1995).

The advantages of processing food products at origin beyond that first necessary step are threefold: First, processing permits the reduction or suppression of imports of the same processed produce. All African countries import foods of various kinds that are used by more-or-less important strata of the population, a direct function of their purchasing power. The situation, however, is illogical if the raw material originates in the very country that imports the finished product, usually at a high premium. In 1993, when Cameroonian robusta coffee was exported for approximately US$0.30/kg of raw product to be processed in Spain or France, it was imported for US$2.20/kg, a seven-fold increase, and retailed for US$4.00/kg. Granted that the cost of transformation and packaging accounted for approximately one-third of the retail price. But more than 60 percent of the import price covered round-trip transportation and remuneration of intermediaries. This is superfluous from a producer's point of view. In Togo, which has no cocoa transformation industry, a 100-gram chocolate bar is five times as expensive as in Côte d'Ivoire, which can transform its own cocoa (Randforum 1995). Such examples are found all over Africa.

Second, processing creates income by increasing exports to consuming countries, thus easing the import of any scarce staple foods. Exporting processed food instead of the "rawest possible suitable for transportation" permits the exporter to receive as payment the transformation's

value-added on top of the price for the raw material. One attractive factor for the African food processor is the lower cost of wages, which can both constitute an opportunity to boost profits and an incentive to dedicate special care and money to quality control and marketing. But this makes sense only if such products can enter the export market or high value local markets.

Third, processing increases food exports to other African countries, thus fulfilling their needs, enhancing intra-African trade, and increasing the continent's autonomy and self-reliance. All African nations need to import various kinds of processed foods. Until now, however, because of shortage of regional supplies, they have tended to import from Europe or North America. Recently, Asian countries, especially China, Taiwan, the Philippines, and Vietnam, have made inroads into this market and so have some dynamic elements of the former USSR (Randforum 1995; Ogunrinade, Oniang'o, and May 1999).

Nutrition

In Africa, malnutrition continues to kill millions of children, acts as a catalyst to various childhood diseases, exacerbates rates of illiteracy and unemployment, and impedes overall socioeconomic progress (ACC/SCN 1997). Faced with alarmingly high rates of malnutrition, African countries should be committed to improving the social well-being of their citizens. There could be no better time for addressing the food and nutrition insecurity in the region. There is growing recognition of the impact and multiple benefits of improved nutrition on human well-being and sustained socioeconomic development. Simple, appropriate, and cost-effective strategies for reducing malnutrition should be used.

Over the past 15 years, no progress seems to have been made in reducing the prevalence of malnutrition in sub-Saharan Africa. In fact, there is an indication that the nutrition situation has worsened because of population growth (Graham 1988) and policy failures.

A third of the world's maternal deaths occur in sub-Saharan Africa (Murray and Lopez 1996). An alarming number of babies are born with low birthweight, 40 percent of the children are stunted, and 1 out of 10 children suffer from acute malnutrition (Graham 1988). The high proportion of low birthweight infants is largely attributable to maternal nutrition before and during pregnancy, and intrauterine growth retardation—the predominant cause of low birthweight in developing countries—is an important cause of stunting (Graham 1988).

Micronutrient deficiencies are widespread. An estimated 42 percent of African women as a whole, half of all pregnant women, and a third of children under the age of 5 are anemic (Graham 1988), and over 1 million children between the ages of 0 and 4 are affected by vitamin A deficiency (Dixon 1982).

Raising the Nutritional Value of Existing Food Products. Certain transformations will increase the total nutritional value of the resulting food products through a more complete use of available foodstuffs. Some food products are incompletely taken advantage of in their basic state because they cannot be collected, distributed, or consumed because of tradition, lack of taste, or perishability and therefore waste. For example, a pig's head, tail, feet, and tongue, which are all considered to be a delicacy in France, are totally unsuitable for the U.S market (Randforum 1995). But once ground and reshaped, they constitute a substantial percentage of meat found in U.S. hotdogs and other sausages. The

example is of course culturally unsuitable for Africa, where little pork is produced and especially for Muslim areas. However there are comparable applications for other foods that are suitable for Africa.

Manufacturing Cheese Instead of Consuming Milk. Conversion of milk into cheese has a number of attractive features. First, depending on the factors measured, 100 grams of cheese are two to five times more nutritious than 100 grams of milk. Second, the manufacture of cheese uses resources otherwise wasted. Third, cheese conservation is infinitely longer than milk's. Fourth, manufacture of cheese allows milk's benefits to reach people located further away. Fifth, the fermentation process, which occurs during the manufacture of cheese, creates bacteria with antibiotic properties, said to cure many ailments. Finally, all technologies involved cheese production are fairly simple, do not require large capital input, and can provide modest employment opportunities (Randforum 1995).

In two projects, one in Mali and one in southern Algeria, nomad cattle breeders that manufacture and store cheese, then sell it as they go to the markets or visit villages and towns. The projects do not use industrial fixed installations, but rather artisanal techniques. Six other projects in Ethiopia, Burundi, Mali, Rwanda, and Tanzania, manufacture in six plants and sell within radiuses of 5 to 50 kilometers. Many other such manufacturers exist in rural Africa, although none are large enough to supply large cities where it cheese is practically unavailable, except for prohibitively expensive imported products. Other projects that are purely African exist in Botswana and Zimbabwe and seem promising in the same direction (Randforum 1995; Ogunrinade, Oniang'o, and May 1999).

In Kenya, cheese and yogurt plants are small and privately owned. With an adequate injection of resources into such projects, they could be expanded and adopted by farmers in the rural areas who at present sell fresh milk at a throw-away price due to its perishability compounded by their poverty.

Creating a Different Food Industry

Creating a different food industry involves taking an existing food product a step further. Instead of improving the consumable state of a product, the goal is to create a completely different food item using the original product as the starting medium. Optimally, the new item will have a much higher nutritional value per unit, it will grow or multiply rapidly, or it will present another similar advantage, making it a better or more diversified food product.

One example is rearing small animals. In Zimbabwe, along the Limpopo River, rabbits are bred on a diet of maize, cornhusks, and green tobacco leaves. Excluding the greens and foliage, which are not fit for human consumption, the rate of conversion is 4 kilograms of grain per kilogram of meat. The main advantage of producing rabbit meat, as opposed to chicken, is the remarkable fertility and reproduction rate of rabbits (Randforum 1995).

Another example is a farm near N'kongsamba, Cameroon, that traditionally breeds chicken, but in two stages (Randforum 1995; Ogunrinade, Oniang'o, and May 1999). The farm is essentially a boarding house for chicks between hatching and the age at which they are delivered to the regular clients who raise them until they are sold or eaten. The farm is special inasmuch as it does not produce a "ready-to-eat" product. Also it is technologically advanced to the point of having artificial hatcheries and feed supplements.

However, it still uses a lot of cereals that otherwise could be consumed as flour by humans. This is, therefore, a transformation from vegetable protein into animal proteins and fats.

Use of By-Products

The by-products of existing food resources may be used for other industries, thus generating extra cash to import staple foods. A pernicious effect of colonization in modern times was to spread the wasteful habits prevailing in the North and assigning one specific role to each item. For instance, poultry is considered to be solely for eating or maybe getting eggs. This constitutes a tremendous waste and loss of opportunities that countries in Asia are quick to grab: Vietnam is exporting leather jackets (Randforum 1995; Ogunrinade, Oniang'o, and May 1999), while the Philippines has an industry of "natural" brushes made of animal hair ranging from nail cleaners to paint brushes for walls. The opportunities are endless and their economic sense has to be assessed against each country's conditions (Randforum 1995; Ogunrinade, Oniang'o, and May 1999).

Eastern Congo (Kivu area) has established a secondary activity as a by-product of its fruit production: papaya and other fruits such as mango contain papain, an enzyme with well-established digestive properties. Pharmacies and healthfood stores in the United States sell pure papain pills. Papain differs from other enzymes in fruits and vegetables in that a synthetic substitute exists but cannot be produced cheaper than the natural one (Randforum 1995; Ogunrinade, Oniang'o, and May 1999).

Other enzymes (pepsins) are in theory collectable from plants and trees without damaging the fruit itself, thus permitting the export of both products. In this case, however, the process is unfortunately not competitive with manufacturing synthetic substitutes.

An untapped opportunity for Africa is the utilization of whey. Whey, the liquid residual of cheese and casein manufacture, is one of the biggest reservoirs of food protein that remains outside human consumption channels. A large proportion of total whey supplies is wasted. Traditionally, whey has been considered an undesirable element, of little interest at best, and costly to get rid of at worst. Whey commonly was dumped in waterways, a particularly damaging practice from an environmental viewpoint. It is estimated that a cheese factory producing 250,000 liters of whey per day can pollute as much water as a city of 50,000 inhabitants. Sometimes whey is fed to calves or pigs as a supplement to their normal diet.

With the development of the cheese industry, it became evident that traditional practices were insufficient to cope with the problem of whey disposal. Anti-pollution regulations were introduced in countries where whey is more abundantly produced, thus obliging cheese manufacturers to process their whey or to install their own sewage facilities, at a negative unit return. As the former was the lesser of two evils, the industry increased its efforts to develop existing facilities, particularly for drying, as well as trying to find new uses for whey. Whey-powder production, mainly for feed uses, emerged as the most economic solution and, indeed, this industry has expanded considerably over the past decades. At the same time, whey began entering food consumption as an ingredient for a wide variety of products, particularly fruit-flavored beverages (originally Swiss Rivella) with a high nutritional content and even "whey champagne" and soft drinks produced on a commercial scale in some Eastern

European countries.

Although dumping whey into waterways remains a serious problem in some countries, this practice has been reduced in industrialized countries, thanks to the tightening of anti-pollution measures. These measures have also contributed to intensifying research into alternative uses of whey—an example of how encouragement and regulation can induce industries themselves to turn polluting wastage into profit (National Academy of Sciences 1978; Alexandratos 1995; FAO 1996; FAO/Netherlands Conference on Agriculture and the Environment 1991; McDowell 1984; Ndure et al. 1999).

Substituting Local Products for Imports

Substituting local products for imported ones results in improved acceptability of the products and as a result reduces imports and boosts exports. One justification is, therefore, that it decreases the burden of food imports in the balance of payments: many basic foods such as bread have existed centuries before colonization and the beginning of imports. They used, therefore, to be exclusively local products. Colonization increased the production of wheat with no obvious nutritional advantage. This did not present any drawback as long as Africa was self-sufficient in its food production, which it was in the 1960s. In 1983 Africa's imports of wheat were 17 million tonnes, in 1988 they were 20 million tonnes, and in 1993 around 25 million tonnes. Many types of edible flour may be used to make bread and some of them have higher nutritional values than flour from wheat. Sorghum, maize, millet, cassava, and rice all produce flour equivalents that can be added to wheat flour at proportions of up to 25 to 30 percent (Randforum 1995). Also, as a region, Africa is self-sufficient in those crops so wheat imports could be drastically reduced without changing eating habits much.

Finally, the new products created through these changes, if introduced and marketed cleverly in developed countries, can be turned into profitable exports.

In Rwanda in 1992, the Boulangerie Communale de Butare (a cooperative bakery) started replacing 20 to 25 percent of their wheat flour with grated and dried sweetpotato. Trials with the bread were successful. People liked it and bought it apparently until the prices were adjusted downward to fairly reflect the lower cost and until the flour substitution became widely known (Randforum 1995).

Creating Food Products for Export

African producers hold a large potential for profit in designing "food for export." This option does not directly address Africa's self-feeding needs, but is worth mentioning because it deals with food production and constitutes a cash generator.

Food products specifically for export (Randforum 1995) are of three types. One is food products resulting from changes made in order to incorporate more domestic and less imported components. A second type is those incorporating purely local products that do not exist in countries of the North and that are considered a curiosity, a special delicacy, or an exotic and exceptional product. A third type is products that target those in wealthy consuming countries who desire natural or organic foods. Here, it is not so much the product that is new, but the method of production. There is now considerable demand for agricultural products free of additives, pesticides, and fertilizer, and Africa is as good a breeding ground as others.

Tapping Unexploited Natural Food Resources

To develop food resources not yet exploited, the first step has to be their identification, followed by feasibility and economic worth studies. Depending on the outcome and the sophistication of the technologies involved, cooperation with companies from the industrialized world will range from superfluous, to conceivable, to necessary. Among the potential projects are the exploitation of the honeybee, which is ever present in the "bee belt," a large area sandwiched between Mauritania and Congo, and the diffusion of mineral water available from springs in approximately half of Africa's countries (Randforum 1995; National Academy of Sciences 1978; Ogunrinade, Oniang'o, and May 1999).

Popularization of Products

To accelerate the development of agroprocessing, aggressive promotion of products both in the local and international market is a prerequisite. The following measures may be required:

- restriction of direct foreign investment to allow selective development of local capacity
- regulation of imports and local absorption
- special tax incentives to enterprises producing and distributing value-added products
- organizing exhibitions and demonstrations both locally and abroad

The government should offer subsidies to the local producers so that the products may be more affordable.

Gender Dimensions

Women in Africa are the backbone of food security. Without their contributions in food processing and marketing, the problems of food insecurity and malnutrition would be worse than they are today.

Many attempts to promote improved methods of food handling, storage, and primary processing have failed because they have been planned without consideration of consumers' ability to pay for the value added. More important, such attempts have often ignored women.

Although estimates vary, women grow at least half of the world's food thus dominating the nutrition process of their households and communities (Snider, Berry, and Mavima 1996). Food processing and preparation information should be relevant to the needs of the users and in this case, women. These needs are likely to be influenced, among other social factors, by the gender of the farmers or users. Although rural women are likely to work at the center of the production process, their role is "too invisible" to those who design and develop agricultural information (Gabriel 1993).

Gender Barriers in Extension and Training

Extension messages that ignore the unique role, responsibilities, and workloads of women farmers are inappropriate for them. According to *Women, Agriculture, and Development* (FAO 1995a), the focus of extension in Africa is commercial crops, which are traditionally grown by men, rather than food and subsistence crops, which are the primary concern of women farmers and the key to food security. Women working in agriculture generally undertake extremely diverse activities and so require a wider range of information and training than men. Most extension programs lack the breadth of content needed to interest or benefit large numbers of women (Lockheed, Jamison, and Lau 1980; Jamison and Lau 1982; Hertz 1980; World Bank 1991; Saito 1994, 60 n. 15; FAO 1995a; Subbarao and Raney

1995; Lim 1996).

The failure of governments and donors to provide women with agricultural inputs and support services causes considerable agricultural productivity and output losses. Although in recent years women's access to extension services has improved, extension contact has had a less significant impact on women's output than it has had on men's. These disappointing results point to the need for strategies to improve not only the quantity but also the quality of extension packages for female farmers.

Improving Extension Services for Women

Several strategies or combinations of strategies can dramatically improve the quality of extension services for women and increase the number of female participants. Often, relatively simple and cost-effective adjustments to extension services and delivery mechanisms can yield enormous gains.

Women farmers are by no means a homogeneous group. They represent different socioeconomic situations with different extension needs. The nature and extent of their involvement in agriculture certainly varies greatly from region to region. However, regardless of these variations, there is hardly an agricultural activity in which women are not heavily involved.

Within the agricultural sector, there is no doubt that the returns from investing in women are high. Since education, extension, and training are all mutually supportive and key contributing factors to agricultural productivity, efforts to assist rural women and improve their opportunities should concurrently focus on all of these areas. Educated women have a foundation for further technical training and are better equipped to seek out and obtain credit and other resources. Women who have access to extension services are more receptive to new technologies and are more likely to adopt environmentally sustainable farming techniques. Trained women are in a better position to pass on useful information to other women, thereby diffusing relevant technical information. The link between education and training and extension for female farmers and higher economic productivity and output underscores the value of investing in women (Bhattarai 1989; FAO 1995a; World Bank 1995). During the past decade, structural reform programs have justifiably called for the elimination of government subsidies, taxes, regulations, and inefficient state enterprises that distort markets. However, intervention is called for to improve market performance and social welfare where underinvestment occurs owing to market failure or distortions.

If subsidized extension services are to continue, they must be directed at the farmers who have the greatest impact on global and household food security, i.e., women farmers. To do this, more contact is needed with women farmers and the quality of this contact must be improved. Both of these objectives can be accomplished by increasing the proportion of women agents, sensitizing and training male agents, and having both male and female agents provide information relevant to women farmers. In addition, access to complementary inputs, credit, and technology is vital for realizing production gains. The mode of delivery of extension services to women also needs to be considered. Often the more challenging and expensive mode of taking the services right to the homes of the women is likely to be more effective.

Some specific recommendations for improving extension for women:

1. Increase the number of female agents by recruiting more and providing them with access to training, resources, and logistical support equal to those of male agents.
2. Increase the pool of women qualified to provide extension by promoting the teaching of science and technical subjects to females, targeting females for intake into agricultural colleges, and providing more facilities for them at such colleges.
3. Retrain and redeploy female agents—for example home economists or rural development staff—to provide agricultural extension. In Nigeria, for example, home economists (who had detailed knowledge of rural women and were farmers in their spare time) were successfully transferred to an extension service. This involved little additional cost, since they were already on the government payroll (FAO 1995b; World Bank 1995).
4. Increase the number of women contacted by specifying targets. In Burkina Faso, as a result of measures to target women farmers, the number of women directly contacted by extension agents rose from 15,000 to 299,000.
5. Adjust the selection procedures or criteria for "contact farmers" so more women qualify for extension services. In Kenya, for example, agents were encouraged to accept contacts with the wives of men who were identified as contacts but worked away from the farm or farmed only part-time.
6. Provide extension services to women's groups where it is more efficient than individual contact or where women indicate a preference for group extension. In Kenya, studies estimate that group extension can reach twice as many farmers at the same cost as individual extension (FAO 1995b).
7. Make more efficient use of scarce female agents by having them introduce women's groups to the extension system and services as well as the male extension agent assigned to the area.
8. Improve the content of extension services to women farmers by ensuring that they receive agricultural information and that messages and recommendations are relevant to women's production activities. Improve farm technology to make it more appropriate for women.
9. Adjust the timing and location of extension meetings and training sessions so that they are convenient for women (e.g., meetings held in the evenings and sited at markets or grain mills). Shorter modules and mobile training units brought to the villages can also help.
10. Train and sensitize male extension agents to work with women farmers. Male agents should have technical training in women's activities and crops and training to help them work with women. As an example, male agents in Nigeria met regularly with female subject-matter specialists to discuss extension messages from the perspective of women farmers.
11. Offer incentives to encourage extension agents to meet with female farmers. In Nigeria, donor support for women and positive feedback made extension agents feel that, by extending their services to female farmers, they were part of an effective, groundbreaking strategy (FAO 1995b; World Bank 1995).
12. Diagnose and identify women's extension needs by collecting and analyzing gender-disaggregated data and use this information to plan and implement policies and interventions.
13. Monitor and evaluate extension programs with feedback from the participants and gender-sensitive extension agents to ensure that the programs are helping women farmers as intended.

Challenges in Food Processing in Africa

The problem of diffusion and commercialization of food production and processing technologies has generated considerable interest and, therefore, has been the subject of workshops, expert group meetings, and seminars in Africa and elsewhere. The challenges of food processing in Africa are many and complex.

Natural science and technology policies, insofar as they exist in African countries, emphasize the supply side of the creative aspects of science and technology in terms of education and training, but the demand side and its linkage with society are hardly mentioned. Perhaps the most serious problem is that indigenous entrepreneurs generally believe that the best markets for acquiring the relevant technologies are outside Africa (McDowell 1984).

Infrastructure

Most African countries have poor transport networks, which hinder access to agricultural producing areas. As a result, considerable amounts of farm produce goes to waste. The problem is most serious during the rainy season when roads are often impassable.

In general, countries in Africa lack the infrastructure necessary to effectively transport, store, refine, preserve, distribute, and market foodstuffs. Consequently, post-harvest losses range from 20 percent to more than 50 percent. Wasted food reflects loss of critically needed nutrients and vital, costly, auxiliary inputs throughout the food chain (McDowell 1984).

The food chain in Africa has been tackled piecemeal, with overemphasis on some segments and token attention to others. Any strategy to overcome limitations in the quantity and quality of food must address six distinct but highly interrelated, critically linked components: production, transport, storage, processing, marketing, and consumption. There needs to be a balance in these components, otherwise problems will prevail (National Academy of Sciences 1978; McDowell 1984).

Energy Costs

The prohibitively high cost and short supply of energy are bottlenecks to development of a viable and modern food-processing sector in many African countries. Although firewood is the most readily available form of energy, its continued use leads to depletion of forests and attendant environmental problems. The scarcity of fuel puts an extra burden on women who already spend hours and much personal energy looking for firewood.

Most industrial development including the food industry requires an assured and safe form of energy. The best option for Africa is tapping solar energy, which is renewable and readily available (McDowell 1984; Food and Drug Administration n.d.).

Water Constraints

Water, a limited resource in the horn of Africa, but also untapped in areas where it exists in abundance, is a key commodity in food production, processing, and preparation. Many parts of Africa experience torrential rain, which is left to run off, along with soil and gravel, into rivers and oceans. It could instead be harvested for more effective use. Water scarcity leads to unsanitary conditions, thus putting foods at risk of contamination. Even with adequate water availability, sound personal hygiene and environmental sanitary practices should be observed to prevent waterborne diseases and to minimize possible contamination of food systems.

Clearly, without a reliable, safe water supply, food industry growth on the continent will remain an illusion (McDowell 1984).

Other Constraints

Other constraints associated with the slow diffusion of agroprocessing in Africa include

- lack of a package of incentives to encourage the productive sector to train professionals, and ultimately become involved in risky ventures such as commercializing indigenous innovations and inventions
- poor technical performance of delivery systems and weak technical extension services
- lack of an industrial culture, and hence the need to create a culture for turning out well-designed products that are competitive in the marketplace
- scarcity of skilled personnel
- inadequate facilities for engineering, design, and manufacturing
- lack of an enabling environment within which any inventor or innovator can operate (Randforum 1995; McDowell 1984; Food and Drug Administration n.d.).

Role of Governmental and Nongovernmental Organizations

A number of stakeholders are key to the success of various stages along the food chain.

Governments

A good government is concerned about the health of its people because only healthy people can build a nation, reflect the socioeconomic status of a nation, and reduce government delivery costs. It is possible to have abundant food production and yet be food insecure especially if post-harvest losses are large.

To ensure that food products of local industries compete effectively in world trade and to provide quality goods for local consumers, governments should encourage and help local industries go into partnership with international organizations to help improve the quality and safety of their food products (Ogunrinade, Oniang'o and May 1999).

The current food production crisis is partly due to avoidable losses that occur during storage. To reduce food losses, governments should establish post-harvest development units with the following objectives (Randforum 1995; Ogunrinade, Oniang'o and May 1999):

- to improve the diets of the people by raising the nutritional quality of food through agroprocessing
- to improve the quality of food by enhancing its handling, transportation, processing, and storage
- to increase the income-generating capacities of farmers through adoption of improved grain storage technologies and by facilitating links to markets
- to introduce mechanization into the processing system using appropriate technology
- to empower small-scale farming communities
- to help rural communities establish agro-industries for income generation and employment
- to train extension staff in the use of improved post-harvest technologies

The state should, therefore, strengthen the civil society by providing an enabling environment. Institutions at the local level need support from the government to enable them to participate more effectively in value-adding activities. There is increasing recognition that managing the transition from exporting raw or semi-processed produce to value-added products should become the new central organizing principal. Toward this end,

governments must take the following steps:

First, provide communities and individuals with access to financial resources and incentives for food processing. This includes access to loan and credit facilities, not limited by their lack of collateral but reliant on their record of repayment.

Second, provide tax breaks and subsidies. Well-designed packages of economic incentives can increase the motivation of local communities to improve on food processing.

Third, help by guaranteeing low-interest lines of credit for urban and rural community organizations, farmers associations, small businesses, and individuals.

Fourth, raise the awareness of communities and institutions at all relevant levels about policies related to food processing, gain acceptance of those policies, and train communities for participation in food processing programs.

Fifth, review expenditures as well as policies on tax revenue, external trade, and payments for their effects on the economy, food production, and local communities.

Finally, seriously carry out regulatory responsibilities to protect both the local producer and consumer, while at the same time soliciting international trade. The government should also ensure the existence of adequate infrastructure through construction and maintenance of roads and communication, power provision, and security assurance.

Governments need to provide an enabling environment in which private industry, consumer groups, researchers, NGOs, and traders, can operate.

International Organizations and Donors

International organizations and donors have an important role to play in the initiation and implementation of policy reforms in Africa. Their direct involvement through technical assistance, training programs, and policy dialogues will go a long way in establishment of sustainable and regenerative food systems. Donors and development partners can help promote agroprocessing and consequently food security in many ways:

1. Initiate economic policy reforms in agriculture. Policy dialogues are thought to be politically preferable because they involve less interference and recognize the ability of government to undertake independent action.
2. Improve infrastructure, especially transport, storage, and information collection and dissemination. Although infrastructural improvement remains the responsibility of the state, self-help schemes could be sparked by the provision of technical assistance at community levels. Project-based support is still necessary in the area of infrastructure. Improvements in rural roads, new and more reliable sources of energy, development of small-scale irrigation schemes, and expansion of agricultural extension services are critical for increased agricultural productivity and processing.
3. Support agricultural marketing channels by strengthening voluntary cooperatives in marketing skills, financing, and training. Aid to cooperative societies dealing with value-adding activities should come from nongovernment sources to avoid excessive state regulation. In addition to supporting cooperatives, donor assistance should be directed at expanding the ability of private traders to handle bulk volumes to promote economies of scale.
4. Support human capacity development. Training and technical assistance are crucial, but should be directed toward building of local capacity.

Consumer Groups

People's participation coupled with the institutional development of local actors is an internationally recognized requirement for sustainable development. The role of consumer groups in food processing needs to be recognized and translated into practice. Consumer groups must be allowed to form and manage themselves because people's own experience, knowledge, practice, and creativity are important forces for social change. Consumer participation in collective empowerment, including that of families and households, is an important prerequisite for improving food production and processing. Genuine participation of all people, particularly the poor and the marginalized, in decisions and actions that are of concern to them will improve self-reliance.

Consumers need to empower themselves to advance their common interest through self-help activities initially, but also through their enhanced capacity to influence the social decisions that affect their lives. Consumer participation and empowerment enable people to identify their food security problems easily, to come up with more viable solutions, and then to implement and evaluate interventions using their own resources. Empowering consumers to take charge of their own lives and to make communities more responsible for their food security will in turn make governments listen to their concerns.

Packaging and Labeling

Packaging is essential to protect food against environmental pollution as the food moves all the way from bulk storage to single-serving containers. Packaging can determine the success or failure of a product (Ogunrinade, Oniang'o and May 1999). There is need to develop and make available affordable and durable packaging material. Despite modern methods of packaging, storing, and distributing food products, most foods remain subject to attack by insects, with the exception of canned and frozen goods (Mullen and Highland 1984.). Studies of insect control in packaged foods must include investigations of packaging materials used in modern food storage and distribution (National Academy of Sciences 1978; Mullen 1994).

Tests for insect penetration and close attention to good seals, closures, and overwraps in the development of new packaging materials will maximize protection of food from insects and dirt. This is of particular importance in the current environment of consumerism where the producer or packager is held responsible for the quality of the packaged food they produce. A careful selection of packaging materials is essential to preserve the quality roots and tubers, cereals, fruits, and vegetables. Current environmental concerns demand that the focus should be on recyclable packaging materials (Ogunrinade, Oniang'o and May 1999).

Packaging and labeling should be part of a quality assurance program. One of the first items that influence the consumer is the appearance of the package and the label. Two basic packages are typically necessary for food products. The primary package encloses the food and has direct contact with the product. A film, jar, bottle, carton, or box are common primary packages. The secondary package is used to assemble multiple packaged food items for shipment. The shipper or secondary package provides protection, reduces handling of individual bottles or cartons, and is necessary for efficient movement of goods to the consumer. Some packaged foods, particularly microwaveable products, have three package components: the pouch, the carton, and the shipping case

(Food and Drug Administration n.d.).

Packaging must be selected or designed based upon the particular food item. Fresh fruits and vegetables require packaging that provides protection while allowing airflow for proper cooling and respiration. Dairy products require packaging to inhibit light penetration and excessive oxygen because of the potential for flavor defects due to oxidation, rancidity, or the absorption of foreign flavors.

Package graphics, by words or pictures, define the contents and serve as point of purchase information. The law requires product name, ingredient statement, and manufacturing or distribution location to be on the package. Government regulations list many requirements for packaging and even extend to specifying the size or type of printing. Pictures or other graphics are optional and serve to inform the consumer. Overall graphics must represent the contents of the container so that mislabeling or misbranding does not occur. Some typical package and label defects are smears, scuffs, color variations, broken seals, leaks, short fill, and product infestation or spoilage. The defects can be found in both single unit packs and multi-packs (shippers).

It is to a food processor's advantage to develop packaging and label specifications along the same format as ingredient specifications.

Materials of construction are particularly important where direct contact with the food is involved. Certain chemicals or foreign materials from packaging materials can contaminate the food product (Food and Drug Administration n.d.). The packaging material must meet FDA or U.S. Department of Agriculture requirements, or both. It is important to use a reputable packaging supplier. The manufacturer of the package is the main source for package specifications. Local distributors can obtain the needed information from the manufacturer.

The dimensions of the package, both inner and outer, are defined to prevent problems such as under- or over-fill, shifting within the package, spillage, or of the container.

The strength of the container and the seals or the fit of the lid are important considerations. Failure of these items can result in crushing, breakage, or spillage. Most important is the potential for physical or microbiological contamination when a poor seal or improperly fitting cap is a package defect.

Meeting Export Quality Standards

According to FAO, the problems of food quality and safety hamper the growth of agroprocessing in Africa and are creating consumer concerns in the world market. There are indications that food products from Africa are being rejected due to food quality and safety issues. Products rejected range from fruits and vegetables to fish products. Among the reasons for rejection are contamination with pathogenic bacteria and pesticide residues, failure to meet safety regulations for low-acid canned foods, and presence of nonpermitted food additives.

The World Health Organization (WHO) estimates that hundreds of millions of people worldwide annually suffer from diseases caused by contaminated food. With international food trade growing to more than US$400 billion per year and expected to grow further, the ramifications of lack of international controls and monitoring of food safety are clearly apparent. FAO called upon countries to participate fully in the work of the FAO, WHO, and Codex Alimentarius Commission. To protect the health of consumers and to ensure fair practices in

food trade, the Codex Alimentarius Commission has established international standards, residue limits, recommendations, and guidelines for foods (Food and Drug Administration n.d.).

A key tool for ensuring quality in a finished processed food will be the product standard document. Product standards define the food by physical, chemical, and microbiological characteristics. Appearance, aroma, flavor, and texture can and should also be considered for product standards.

Physical characteristics include size, shape, dimensions, weight, volume, count per package or container, or any other special features that define the particular food. Moisture, fat, protein, ash, fiber, and carbohydrates are the basic chemical characteristics. Additional chemical criterion such as salt, sodium, cholesterol, etc., are used to chemically define food products. Chemical standards are necessary when using nutritional labeling or making label claims for low sodium, higher fiber, or other nutritional factors (Food and Drug Administration n.d.).

Microbiological standards will be dependent upon the specific food item. First consider food poisoning organisms when developing product standards for a quality control program. Food safety is the responsibility of the processor. If the food product will support the growth of a potential food poisoning organism, the particular organism should be identified in the critical standards category as opposed to a major or minor standard. Some typical food poisoning organisms are *Salmonella, Clostridium, Staphylococcus aureus,* and *Clostridium perfringens.* Other microbiological tests such as standard plate count or yeast and mold plate count may be appropriate for classification as major or minor standards. For many products, especially those subjected to cooking or other thermal processes, Coliforms and *E. coli* analyses may be used to show and control post-process contamination of cooked foods. Microorganisms that can cause food spoilage in a particular food product should be considered. Yeast and mold counts are essential to control programs involving food items with low or restricted moisture levels like flour or cereals. A simple standard plate count is always a good general indicator for tracking bacterial quality and should be considered at least a minor criterion (Food and Drug Administration n.d.).

The sensory properties of a food product are key to consumer acceptance. Flavor, texture, aroma, and appearance are criteria that should be defined to assure that the product meets design expectations. Qualitative measures of sensory properties can be costly due to requirements for sophisticated equipment. Qualitative testing using taste panels is an alternative to quantitative measurements. It is advisable to make sensory evaluation for flavor, odor, and texture part of a quality control program (Food and Drug Administration n.d.; Rust and Olson 1987).

Conclusion and Recommendations

Among the above seven potential areas, six already have applications in Africa and operate efficiently. There is evidence that no African country is deprived of all these potentials at the same time, which means that some action is possible and advisable everywhere. Africa is fortunate in having young and educated elite able to undertake these actions, and what may be lacking in financing and technical assistance is available through banks and international organizations.

Africa cannot sit back and hope that its people's health can be safeguarded by

others. Its markets are being flooded by truly substandard goods from elsewhere. Kenya, for example, has had to respond to rumors of irradiated milk from Ukraine and to the bovine spongiform encephalopathy problem.

Cutting post-harvest losses through agroprocessing is of paramount importance if Africa is to avoid food shortages. A holistic approach should be advocated as tackling the food chain piecemeal only works to create confusion. Research groups and higher learning institutions should interact with each other and with rural communities to preserve perishable commodities close to the point of production, thereby alleviating unemployment in the rural areas, reducing poverty and micronutrient deficiencies, and benefiting women who are largely involved in food processing. The marketing of such products needs to be addressed concurrently.

Field officers and new recruits need to be trained in marketing, post-harvest handling, basic agroprocessing, and agribusiness so that they are able, for example, to advise farmers on improved storage techniques.

Rural-based food processing can create employment and thus reduce poverty and undernutrition in these areas. Women would benefit greatly since they play a dominant role in such activities and have been harshly affected by current economic reforms. Some specific activities could include breeding crops for both yield and good storing qualities, the development of improved drying technologies that are affordable and culturally acceptable, and launching an education campaign at the community level that promotes ways of preserving different types of food and that emphasizes that cleanliness can provide the cheapest, most effective, and least polluting way of preventing pests and microbial contamination of food.

Clearly without a credible and safe food system, food insecurity will continue; also, liberalized trade and globalization will exclude the countries of sub-Saharan Africa whose economies are largely driven by agriculture.

Without much question, agricultural research and technology development institutions, which are often well funded, have a responsibility to ensure that they transfer results from their many years of hard work to the next level: agroprocessing.

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Introducing Improved Agroprocessing Equipment in Sub-Saharan Africa: The SAA/IITA Experience

L. Halos-Kim and T. Mado

L. HALOS-KIM

The aim of the SAA/IITA Agroprocessing Project, which started in 1993 in Ghana and Benin, is to identify and disseminate appropriate agroprocessing to rural processors. SAA's interest is to promote IITA's improved agroprocessing technologies, primarily focusing on *gari*[1] processing as an income-earning activity for women. More broadly, the project is intended to help rural women's groups develop new income-earning opportunities through small food-processing enterprises. IITA provides technical backstopping to the project. The project collaborates with government agencies and other organizations that are interested in improving postharvest systems. The stakeholders maintain close communication and share information and resources.

IITA is responsible for technology development, and it spearheads the training courses on development, fabrication, and servicing of selected agroprocessing technologies. SAA staff and the collaborating partners are responsible for promoting the technologies through demonstrations and by developing partnerships and linkages with the appropriate sectors to make technologies accessible to the end-users. They also organize and provide training on management of the technologies.

In Ghana, SAA and IITA work with the Ministry of Agriculture through the Agricultural Engineering Services Division, Women in Agricultural Development, and the Ghana Regional Appropriate Technology and Industrial Services Foundation. In Benin, SAA and IITA work with the Direction de la Formation Opérationelle et de la Vulgarization of the Ministry of Rural Development.

Local manufacturers are also important partners in the project. They fabricate the equipment, make it available locally, and provide the services needed to maintain the equipment. Their commercial activities give farmers and agroprocessors access to industrial products and services at each location.

The farmers and agroprocessors who are the ultimate beneficiaries of the project influence the development of rural agroprocessing enterprises and support

[1] Gari, a popular food product in West Africa, is grated, fermented, and roasted cassava.

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the manufacturing industry while increasing their own capacity. Their participation and feedback on utility, adequacy, and profitability of the technologies are valuable guides for adapting the technology to the local environment. The various potential users (individuals, private entrepreneurs, women's groups, and community organizations) are encouraged to take part in demonstrations and field testing. Their participation can stimulate their interest in investing in the technology.

Elements of the Project

The links between agriculture and industry in Africa tend to be weak. Most metal workshops (manufacturers) are located in urban areas while most farmers and agroprocessors are in rural areas. Farmers do not have contact with the manufacturers and are unaware of the kinds of technologies available. The gap between farmers and manufacturers obstructs the integrated business development interests of both parties. The SAA/IITA project aims to fill this gap by providing training and information on agroprocessing technology opportunities.

Training

Training is provided to development and extension workers—to enable them manage the project and sustain the technologies—as well as to end-users. Different types of training are conducted for various groups of beneficiaries.

Personnel who are responsible for demonstrating the technologies and training operators are trained on design, development, and management of improved agroprocessing technologies. They are also expected to monitor the sustainability of the technologies in the transition from a project-base to a processor- or farmer-managed system. The training imparts basic understanding of strategies for technology generation and transfer, design features, and management aspects of the technologies. The training is given as an intensive specialized course as well as through continued participation in the project activities.

For local manufacturers, training on manufacturing of agroprocessing equipment is intended to enable them to meet the demand for improved agroprocessing equipment. Because of the importance of after-sales service and quality control to sustain the functionality of the processing equipment, servicing is now integrated in the training program for manufacturers. Also, quality-control teams are being organized and mobilized by participating manufacturers in an effort to maintain a high standard of equipment being delivered.

The training has been decentralized and conducted in-country. This encourages the use of locally available materials and services, reducing manufacturing costs and eliminating importation costs, thus making the technologies more affordable.

The third type of training is intended to enable operators, farmers, and agroprocessors to optimize the utilization of the technologies and enhance the value of their investment. This training includes actual operation of the equipment, analyses of advantages and disadvantages of the technologies, and tips for successful agro-enterprise management. Trained extension workers and the manufacturers usually conduct this type of training. Consequently, the extension workers increase their contacts with farmers and agroprocessors, which improves their credibility. For the manufacturers, training customers serves as part of their product promotion and after-sales services.

Field Demonstrations

Field demonstrations expose potential users and policy makers to new options for handling and processing farm produce. As part of the demonstration, farmers and processors are encouraged to operate the equipment, giving them hands-on exposure to the technologies. Extension workers and manufacturers who attend the demonstration get an opportunity to directly hear farmers' and agroprocessors' views on the suitability of the technologies. Information on users' perceptions of design and performance is also communicated back to the designer, who uses the feedback to improve the technologies. Involving policy makers and development agencies in demonstrations expands awareness of the technologies, which could lead to broader support for funding, adoption, and implementation.

Model Processing Centers

In addition to demonstrations, model processing centers established in Ghana and Benin showcase improved agroprocessing technologies and their benefits. The Ghana site is Abodom Bomso Village, Eastern Region. In Benin the center is located in Agodenou Village, Atlantic Region. In both villages, farmers grow and process mainly cassava, maize, palm oil, and rice. Production is at subsistence level. One reason for the subsistence production is lack of capacity for processing any increases in the volume of production. The nearest markets are at least 2 kilometers away.

The set-up of each center is based on system dynamic in which factors affecting and affected by the technologies are present. Unlike field demonstrations, which are done periodically, the processing center operates under actual circumstances affecting operation efficiency, management, and profitability. Each

Fig. 1. Left, the wet-type grinder with stationary stone disc fixed by three pairs of bolts and nuts. Right, the modified model with stationary stone disc fixed to the cover.

center also serves as training venue for researchers and extension workers and gathers additional information on utilization potentials and constraints, which is used to fine-tune the technologies.

The centers were established with the participation of both farmers and agroprocessors. The sites were selected on the basis of crops and cropping patterns, volume of production, nature of crop processing and utilization, accessibility to markets, availability of extension services, and potential for commercial activities and market expansion.

Cassava-processing equipment was packaged for both sites to enable them produce gari initially, then flour and starch. For maize and bean processing, the wet-type grinder (fig. 1) and polishers were added. Other equipment was added as the processors begin to relate their output to system efficiency.

Multilateral Information Exchange

Technology development and technology transfer take time and require agen-

cies involved to exchange information to optimize utilization of their limited resources. One key goal of the SAA/IITA project is to build a consensus that developing an agroprocessing industry must be a joint effort of several stakeholders, each having a unique and complementary role. Collaborating institutions come together and share their resources. This linkage also promotes exchange of information and prevents duplication of development efforts, resulting in more efficient project management.

NGOs and other development organizations in each country can contact the SAA/IITA project for information on types of equipment available and where they can be purchased. These organizations participate in demonstrations and request assistance for training on operating and managing the technologies. Sometimes, funds may be channeled through the SAA/IITA project to assist women's groups or organizations they work with.

Project Evaluation and Impact Indicators

Over the last 7 years, the SAA/IITA project has disseminated many types of equipment for processing farm produce in Ghana and Benin. The demand, sales, and utilization of locally manufactured agroprocessing equipment has been increasing. But the progress of the project is seen not only sales by trained manufacturers but also in closer links among the various stakeholders. The smooth implementation of the project results from stakeholders who know their roles and responsibilities. Table 1 shows an example of this linkage in training and field demonstrations.

Capacity Building

A notable accomplishment of the project is building up the capability of the partners and strengthening the human resource base in each country, recognizing the differing comparative advantages of the local partners in dealing directly with the end-users. Trained staff of participating national agencies and other development programs are now able to organize effective field demonstrations and conduct training courses on technology operation and management. Several adoption decisions in each country resulted from recommendations of the trained staff. They also participate in designing and carrying out surveys to assess the impact of the project.

Table 1. Role sharing among stakeholders of the SAA/IITA agroprocessing project.

Stakeholder	Extensionist training	Manufacturer training	User training	Field demonstration and product promotion
Ministry of Agriculture	Staff appointment as counterpart		Field activity planning and coordination	Field activity planning and coordination
Ministry of Industry	Staff appointment as counterpart		Field activity planning and coordination	Field activity planning and coordination
Metal workshops and manufacturers		Selection of staff Cost sharing	Customer service	Production, quality control; promotion, and marketing
Farmers and agroprocessors			Technology utilization	Feedback
IITA	Trainer	Trainer		Technology design, testing, and adaptation Quality control
SAA	Coordination and funding	Coordination and funding	Feedback	Funding

The increasing demand for improved agroprocessing equipment in different parts of Africa requires involving and mobilizing of local manufacturers. Another output of the project is training of manufacturers and coordinating their activities so that the technologies are supplied with the right quality. The after-sales service component of the training makes the manufacturing industry more viable and attractive, overcoming one of the drawbacks of imported equipment: the availability of spare parts and services.

In-country training courses have broadened the geographic area in which users can obtain equipment locally and be assured that repair and maintenance services are available. Three manufacturers in Ghana and Benin report that since they participated in the project, fabricating agroprocessing equipment has become their main business activity and source of income.

Manufacturers' Network

The vision shared by the project collaborators is to develop local training capability to reduce project costs and strengthen the local stakeholders. Manufacturers are trained to understand the design features of the equipment so that they can do some local adaptation. Their training also focuses on quality control and after-sales service more than skill development. The project encourages manufacturers to accept the costs of demonstrations as part of their promotional activities. Operator training should in fact be considered part of manufacturers' care. Manufacturers need to evolve their concept of business operations to include the cost of operators' training as a means of maintaining good relations with customers.

Collaborating manufacturers in Ghana and Benin (table 2) are forming a network. The network will enhance their capabilities on the basis of complementarity of roles in the supply of demanded equipment while maintaining competitiveness, a driving factor in producing high quality products.

In Ghana, the SAA/IITA project has trained technicians (and their clients) of the Intermediate Technology Transfer Units (ITTU) operating under the Ghana Regional Appropriate Technology Industrial Services Foundation (Gratis). The regional branches of ITTUs could facilitate technology transfer, which is one of their operational mandates. The Executive Director of Gratis has pledged support for the technology transfer initiative of the project and is mobilizing the quality control fronts in all ITTUs so that equipment is fabricated as specified. ITTUs are directly linked to private manufacturers (as clients) by providing training, and therefore they are also qualified to participate in the project.

In Benin, Réseau des Fabricants de Materiels de Transformation des Produits Agricoles, a network formed by the alliance of four collaborating manufacturers (Cobemag, Camemec, CFTS, and Apromah) has won the recognition of the government to operate officially to supply the demand for improved agroprocessing equipment. The network has been registered under the Ministry of Trade and Industry. One network activity embodied in the bylaws is the establishment of storage for spare parts that will be accessible to the members of the network and users. Availability of spare parts is essential for sustainability of the equipment.

The activities of the SAA/IITA project have now moved beyond Benin and Ghana. After an initial set of agroprocessing equipment (grater, chipper, and multicrop thresher) was demonstrated and purchased from manufacturers in

Table 2. Collaborating manufacturers in Benin and Ghana.

Company	Location	Institution type	Equipment adopted
BENIN			
Apromah (Association pour la Promotion des Materiels Agro-Alimentaires et Hydrauliques)	Bohicon	Semi-private/ cooperative	Wet-type grinder, oil press, grater, double-screw press
Camamec (Construction-Ajustage-Menuiserie Métallique et Cloutérie)	Sari Godomey	Private	Grater, double-screw press, in-field cart, multicrop thresher, chipper, wet-type grinder
CFTS (Center de Formation Technique Mgr. Steinmetz)	Ouidah	Government	Grater, double-screw press, multicrop thresher, wet-type grinder
Cobemag (Coopérative Béninoise de Matériel Agricole)	Parakou	Semi-private/ cooperative	Multicrop thresher, grain cleaner/ sorter, grater, double-screw press, rice mill
GHANA			
ITTU-Gratis Foundation (Intermediate Technology Transfer Units—Ghana Regional Appropriate Technology Services)	Tema[a]	Foundation[b]	Multicrop thresher, grain cleaner/ sorter, grater, chipping machine, palm-oil digester/kernel cracker
Entesel (Engineering and Technical Services, Ltd.)	Tema	Private	Multicrop thresher, grain cleaner/ sorter, in-field cart, chipping machine, wet-type grinder, palm-oil digester
RTSC (Rural Technology Service Center)	Mampong Techiman	Private[c]	Grater, double-screw press, bagging stand, fermentation rack, sifter, chipping machine
ETHIOPIA			
NRC (National Research Center, Agr. Mechanization Research Div.)	Nazareth	Government	Multicrop thresher, grinder, pulverizer
Tibebu Metal Work	Awasa	Private (trained by NRC)	Multicrop thresher
MALI			
IMAF (Industrie Mali Flexible)	Bamako	Government	Multicrop thresher, grain cleaner/ sorter
MOZAMBIQUE			
Agro-Alfa SARL (Agr. Tools and Equipment Rural Assistance Metal Works)	Maputo	Private	Grater, double-screw press, chipping machine, cassava mash sifter
KANES Alfaias Agricolas	Sari Maputo	Private	Grater, double-screw press, chipping machine
TOGO			
Famezio (Fabrication Metallique de Zio)	Tsevie	Private	Grater, double-screw press, chipping machine, multicrop thresher
UGANDA			
Ageco (Afro General Engineers and Contractors)	Iganga	Private	Grater, double-screw press, fermentation rack, cassava mash and gari sifter
Asatri (Agricultural Engineering Appropriate Technology Research Institute)	Kampala	Government	Chipping machine, wet-type grinder
NVTI (Nakawa Vocational Training Institute)	Kampala	Government[c]	Chipping machine, wet-type grinder, gari frying stove
Tonnet Enterprises	Kampala	Private	Grater, double-screw press, fermentation rack, cassava mash and gari sifter

a/ Eight regional ITTUs participating. b/ Formerly government. c/ IFAD-supported project. d/ Supported by Japan International Cooperation Agency.

Benin and Ghana, several West African countries (Togo, Guinea, Mali, and Burkina Faso) asked the project to train their manufacturers. And in the last 2 years, project activities have spread to East Africa (Ethiopia, Uganda, and Mozambique). Project staff trained extension officers and women's groups in improved techniques for processing gari and trained local manufacturers in fabrication and servicing of equipment. Collaborating manufacturers in these countries (table 2) have reported initial sales of the grater, chipper, and thresher (fig. 2).

The role of government entities is more explicit in providing follow-up training on fabrication and maintenance of the equipment. They also have an important role in advising on policies affecting the availability of improved technologies to the end users. The role of private entrepreneurs is to provide farmers and agroprocessors direct access to agroprocessing equipment, and they benefit most through their increasing productivity and income from sales of equipment.

Several manufacturers have fabricated machines although they have not received training through the project. For example, Senagri (Sahel Energie Environnement Agriculture), a private manufacturer in Bamako, and Selam Engineering and Vocational Center, an NGO operating in Addis Ababa, have attempted to replicate the multicrop thresher. Selam reported sales of about 40 units in Ethiopia and is collaborating with the project to develop a cart for transporting the thresher. Their interest in the project is being tapped for future collaborative work.

Increasing the participation of the private firms has been difficult. In countries where the industrial sector is undergoing rapid privatization, companies have difficulty obtaining low interest loans or support for training, and heavy taxes are being levied on their products. Private agro-metal manufacturers in addition are generally small—quite often they have fewer than 10 workers, many of whom lack formal technical qualifications. Sending their staff for training to improve skill and competency is difficult to do because the absence of the staff could cripple their business. Also because their operating funds are very limited, they are reluctant to take the risk of building machines to use for promotional activities. The SAA/IITA project however continues to encourage their participation through training and linking them to potential customers.

Fig. 2. Multicrop thresher with cleaning mechanism modified from the original model (inset, top left).

Adapting Agroprocessing Equipment to the Local Environment

Most of the agroprocessing equipment introduced by the project was selected from technologies developed at IITA. The technologies feature simple design that allows easy operation, maintenance, and replicability. They are also adapted for multicrop application to fit the needs of small farms that cultivate several crops at the same time. Another advantage of IITA designs is portability, which makes them suitable for women. Mobile equipment is easy to move around when there is need to expand the business area. Also, mobile equipment reduces the need to invest in

farm structures because the equipment can be easily accommodated in existing farmhouses or processing centers.

Looking at the market and the potential to generate income, the project chose to focus on the cassava-processing package (grater, chipper, press, fermenting racks, sifter, and improved stove), grain thresher and mill, wet-type grinder, and palm-oil processing machines.

A gap between rated and actual field capacities of agroprocessing equipment was observed. As operators gain experience, however, the field capacity of the equipment rises. To improve operating efficiency, operators usually are given more intensive training. But sometimes the equipment or a component part must be modified to correct reported malfunctions—feedback plays and important role in technology design and adoption. Some of these cases are summarized in table 3.

The grater, which has a rated capacity of 800 to 1,000 kg/hr, was adopted readily by women's groups. After the first year of use, the utilization rate increased to around 60 percent. Women were found to have abandoned their traditional method

Table 3. Rated capacity, field capacities, and acceptability of agroprocessing equipment introduced in Ghana and Benin.

Type	Rated capacity	Field capacity		Acceptability/users' comments	Modifications/other comments
		Start	After 1 year		
Grater: Engine-driven with option for mobility	800–1,000 kg/hr	240–300 kg/hr	720–800 kg/hr	Very good Skill needed for engine operation	Development of bagging stand to ease collection of grated mash and starch
Cassava mash sifter	1 bag (60 kg)/hr	1–2 bags/hr	1–2 bags/hr	Liked very much Very useful and durable High initial cost	Size of sifting box changed to fit standard cut of wire mesh
Chipping machine				Good	Chipping plate molds designed for local supply
manual	Up to 200 kg/hr	60–100 kg/hr	Verifying	Chips dry faster Chipping plate to	
engine-driven	Up to 1,000 kg/hr	Verifying	Verifying	replace worn out ones not easily available	Simplified fabrication by using cast aluminum feed cup and chipping plate holder
Multicrop thresher	Up to 1,000 kg/hr	400–600 kg/hr	Up to 800 kg/hr	Versatile machine Pegs twist quickly Separate cleaner is cumbersome	Threshing drum rings and pegs were reinforced Incorporated cleaning system
Wet-type grinder	Up to 50 kg/hr,wet material	Up to 20 kg/hr,	Verifying	Fine grinding but slow Product recovery high Cumbersome to adjust and clean	Redesigning the cover plate with the fixed grinding stone New design of feed auger increased capacity
Auger-type grain polisher	120 kg/hr	Verifying	Verifying	Efficient for palm-oil digesting Could also crack palm-kernels	Interchangeable auger designed for palm-oil digesting and palm-kernel cracking
Converted[a] to					
Palm-oil digester	Verifying	Verifying	Verifying	Increase capacity	Shafting redesigned for ease in replacing auger
Palm-kernel cracker	250 kg/hr	Verifying	Verifying	Needs an efficient oil press	

a/ By users.

Fig. 3. The wet-type grinder (left) used in the production of sheanut butter. Sheanut is first passed through the crusher (right) developed by Cobemag, Benin.

(manual rasping and pressing with boulders). The increasing utilization was observed to be the result of more farmers growing cassava and more land planted to cassava.

In grain-producing regions, the thresher coupled with a grain cleaner/sorter (fig. 2) was widely demonstrated, but only recently did it become popular, particularly for maize shelling. The introduction of the thresher in Benin inspired farmers to grow more Obatanpa, a variety of quality protein maize. When Obatanpa was introduced, the farmers appreciated the good quality and high yield but were disappointed to find it hard to shell. They now recognize that the thresher can solve that problem. The impact of the technology on the adoption of quality protein maize will be verified. In Ghana, the thresher was not popular for de-husking maize, because the maize husk is used as food wrapper.

Despite interest, the initial thresher was not adopted widely, because the users found the separate cleaning mechanism cumbersome and slow. This led to the development of the thresher with a cleaning mechanism, which is now generating demand very quickly.

The wet-type grinder (fig. 1) was introduced to do most grinding required in African food preparations such as *agi* and *mawe* (from maize) and soymilk (from soybeans). Agroprocessors were slow to accept the machine at first. They felt that its capacity was low and that it was cumbersome to adjust and clean. The machine was modified so that the stationary disc is now fixed with the cover. This change eliminates the tedious loosening and tightening of bolts and nuts, particularly when cleaning and the requirement that the grinding mechanism be kept dry before storage.

Once the problems were corrected, the machine gained acceptance and the users were able to find other applications such as grinding sheanuts or groundnuts for oil production. Sheanut and groundnut processors claim a 20 percent gain in oil production over the traditional method. A soymilk processor in Ghana claims that with the grinder, he has doubled his soymilk recovery compared with his old system.

In Benin, Cobemag added a sheanut-crusher component to the wet-type grinder using one engine drive (fig. 3). The larger processing capacity increased sales of the equipment to sheanut processors. This is an example of how manufacturers are able to make adaptations that satisfy the customers and improve revenues.

When the auger-type grain polisher was demonstrated for rice milling and polishing, the users found it tedious because it has no cleaning mechanism. The users, however, discovered that the polisher was useful for palm-oil digesting and palm-kernel cracking. Feedback of this information resulted in the design of removable and interchangeable augers for grain polishing and palm-kernel cracking and for palm-oil digesting (fig. 4).

In Ghana, in 1998 and early 1999,

Fig. 4. Left, the grain polisher turned palm oil digester/kernel cracker. Top, augers for grain polishing and kernel cracking (at left) and for palm oil digesting.

several polishers were bought and heavily used (10 to 14 hr/day). Users reported that the auger wore out frequently, and the time needed to change the auger component delayed their operations. Consequently, the shaft was redesigned to ease replacement at minimum cost. And requests for greater machine capacity are being given attention.

Adoption of Agroprocessing Equipment

In preparation for a rigorous impact assessment, the project is carrying out a survey to locate agroprocessing equipment that has been fabricated and sold by trained manufacturers. The survey will also determine the extent to which project is affecting the ownership and management of the equipment that could relate to who actually benefits from the process and the sustainability of the system.

The first part of the survey included only the more mechanized machines—the grater, wet-type grinder, palm-oil digester, and multicrop thresher—which involve high investment costs but have capability to generate income.

It has been found that some entrepreneurs are already adopting the technology and that management of the technologies is mainly in the hands of these users. Partial results (table 4) indicated that the grater and the multicrop thresher are commonly owned by processor groups (usually women) and are either bought through loans or acquired as a gift from development organizations. Normally the group hires an operator, and the machine is used to process the produce of the members and at times used to provide service to nonmembers. Group ownership allows the users to invest collectively and benefit from it.

The wet-type grinder and the palm-oil digester have been adopted by individual entrepreneurs or family businesses for processing their own produce and servic-

Table 4. Type of ownership of different agroprocessing equipment by sampled buyers in Ghana and Benin (partial results, 2000).

	Individual ownership[a]		Group ownership[b]		Institutional ownership[c]	
Equipment	Ghana	Benin	Ghana	Benin	Ghana	Benin
Grater	11	20	12	36	7	2
Wet-type grinder	–	8	4	1	1	–
Palm-oil digester	7	3	5	–	1	–
Multicrop thresher	1	6	1	10	–	1

a/ Includes family enterprise. b/ Women or community groups. c/ NGOs, universities, etc.

ing others in their villages. Institutions such as NGOs and universities that have adopted the machine have a three-fold objective: to generate income, to provide service to the community, and to demonstrate improved agroprocessing operations and train agroprocessors.

The level of adoption of the technologies is encouraging. One contributing factor is the awareness created by the activities of the project and the linkages created between technology users, manufacturers, and potential funding organizations.

Information on operation, repair, and maintenance problems reported by users, such as access to services and lack of training on proper operation and management of the equipment, is helping the project team reorient its training strategy. The survey results also underscore the importance of regular monitoring visits, particularly by manufacturers to check the condition of the machines and provide necessary repairs and services. Because some machines are being moved from one site to another because of availability of raw materials, reconciling manufacturers' sales records with utilization records can be difficult. The initial survey turned up only about 90 percent of the reported buyers.

System Efficiency, Profitability, and Social Implications

Some cases of group processing were analyzed for profitability and their implications for technology development and transfer.

Feedback from end-users in the model processing centers in Ghana and Benin shows that processing losses for cassava were reduced by 54 percent within the first 12 months after the improved technologies were introduced and saved as much as 75 percent of the labor required for processing. The reduction in losses is equivalent to a yield gain of 500 kilograms per tonne of field yield. Time saved through the improved technologies resulted in more intensive farming and processing activities in the succeeding cropping season, increasing the productivity of growers' limited land holdings.

Analysis of the cassava-processing package used by women's groups in Dogbo Village, Benin, indicated that even at 30 percent utilization, the gari-processing enterprise has a benefit-cost ratio of 1.43. The women are now using the facility for the production of starch (tapioca). Higher benefit-cost values are expected from the other villages because of increasing utilization rates.

Women from Agodenou Village, Benin, reported that they decided to plant more cassava and process more cassava to gari so that they have larger stocks to market when prices are higher. Using the machines, they also claim to recover 4 to 6 percent more gari, and they say the quality (dryness, color, and uniformity of grits) is superior to that of gari produced by traditional methods. Moreover, the women report that the high quality of gari they produce draws customers to the village, saving the women the time and transport cost that they would otherwise expend taking their products to local markets for sale.

The system efficiency of other equipment is difficult to assess because the adoption is partial. For example, the palm-oil digesting capacity has now increased significantly only to be delayed in pressing. In sheanut oil processing, use of the wet grinder has increased the production of sheanut butter, but cracking of shells remains a bottleneck. Similarly, the adoption of the thresher is constrained by the type of cleaning system.

It has also been found that adapting

existing processing systems is more acceptable because people are used to it, as in the case of gari fryers or stoves. The advantages and disadvantages of these technologies compared with the existing system are readily recognizable.

Spreading Out

The impact of the agroprocessing project in Ghana and Benin is seen in the number of machines fabricated and sold by collaborating manufacturers and the increase in new manufacturers who have expressed interest in fabricating the equipment.

On request of governments and NGOs, the project has been extending its activities to other countries in East and West Africa where SG 2000 currently operates, and where demand for improved agroprocessing equipment already exists: Guinea, Côte d'Ivoire, Burkina Faso, Ghana, Togo, Benin, Mali, Niger, Nigeria, Cameroon, Ethiopia, Uganda, Kenya, Tanzania, Zambia, Zimbabwe, Malawi, and Mozambique. The SG 2000 projects in Ethiopia, Uganda, Malawi, and Guinea have already integrated agroprocessing into their programs, and they collaborate closely with the SAA/IITA project.

Although limited by funding, the project's approach is to continue to train development staff, extension staff, and manufacturers. The development and extension staff learn project objectives, strategies, and activities, allowing them to develop projects suitable for their countries. Support for training on manufacturing, operation, and maintenance management is done through the cooperation of local metal workshops selected from recommendations of the collaborating development and extension programs.

The cassava-processing package has been adopted in almost all countries reporting. The thresher has been adopted in countries where sorghum, millet, and maize are major crops. Between 1995 and 1997, countries that had no trained manufacturers imported equipment from Ghana and Benin. The numbers of countries importing is expected to decrease as the project responds to requests for training local artisans in manufacturing the equipment. The project stresses the importance of quality control so that agroprocessing equipment delivered can be utilized to its full capacity.

Identifying Gaps and Assessing Impact

The questions in front of us are:

1. What benefits have farmers and processors gained from using improved agroprocessing techniques?
2. Are national and other development programs ready to take up the challenge with less external funding?

The SAA/IITA project demonstrates how promoting agroprocessing leads to higher sustainable incomes for farmers, agroprocessors, and manufacturers. The project also shows that collaborative efforts by different agencies can bring improved agroprocessing technologies to target beneficiaries and that working together reduces costs because it eliminates duplication of effort and waste of resources. The project also directly addresses specific issues raised by target beneficiaries and guides them to appropriate sources of information and possible links to relevant projects and funding institutions.

National programs have an obligation to improve access to technological advances in their area of responsibility. They should undertake strong initiatives in striving to meet national goals for food availability and sufficiency. These efforts should include promotion of agroprocessing enterprises that cut across

different sectors. The government should be committed to supporting the program and providing incentives to allied industries through, for example, legislation on importation of machinery or control of market prices both for raw materials and products.

Investments in agroprocessing projects are justified because improving this sector of the production continuum contributes to sustainability, food security, and poverty alleviation as indicated by the results of the SAA/IITA agroprocessing project. Work to translate these impacts into quantifiable indicators is continuing. The results of impact assessment will help to identify gaps in the development, introduction, and utilization of improved agroprocessing technologies in sub-Saharan Africa.

Working with the Private Sector to Create Rural Economic Growth: Two Case Studies

Steven Londner and Mary Ellen Mulholland

SUSAN ROSENSTEIN

In a recent paper, Wolgin (2001) concludes:

> In the medium and long term the only solution to the hunger problem in Africa is reducing poverty. While hunger has a number of proximate causes such as poor health, crop failures, lack of nutritional information, conflict, etc., almost all of these proximate causes stem from one core issue—poverty. . . . Cutting hunger can only be accomplished by reducing poverty; and poverty reduction depends on rapid agricultural-led growth.

TechnoServe agrees. It works to develop profitable growth-oriented businesses that foster agriculture-led, broad-based economic growth. TechnoServe provides business development services to private-sector clients ranging from individual entrepreneurs to commercial cooperatives to large export-oriented companies. Clients are chosen based on projections of their ability to increase the incomes of the rural poor, create employment, and generate profits that will lead to new investments for further growth.

TechnoServe concentrates on clients that produce and sell high-value-added agricultural products. TechnoServe has come to recognize that within basic commodity markets one is forced to compete on price. Given Africa's disadvantages in infrastructure, the industrialized world's persistent agricultural subsidies, and global trends, it is difficult to see a commercial future in smallholder production of bulk undifferentiated commodities.

But, regardless of the product, developing businesses with the poor is not easy. Poverty is a complex syndrome for several reasons. First, the poor lack not only assets with which they can mobilize financial resources[1] but also access to credit—and to safe opportunities to save. Second, the poor have little formal education and virtually no experience with modern organizational and management systems. Third, the poor operate in an information-poor environment that limits their knowledge of market opportunities and production alternatives. Finally, as price-takers in

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what are typically volatile primary product markets, they have little motivation to adopt new productive technologies. The result is that poor rural producers are severely limited, both individually and collectively, in their abilities to meet the needs of an increasingly demanding, competitive, and global marketplace.

TechnoServe works to overcome these inherent constraints by building sustainable relationships—based on mutual commercial advantage—between rural producers and major commercial entities representing their immediate market. These larger commercial partners *do* have the expertise, and the access to capital and information, to be savvy and successful in the marketplace, though they sometimes need limited assistance, especially in identifying export markets.

Is this vision of partnering between the rural poor and the commercial sector utopian? No, as the following case studies show, it is happening. Is it a panacea? Again, no. This is not a formula that can work across the board:

1. TechnoServe carefully analyzes local, regional, and international markets to identify products and industries that have clear market opportunities and that offer the potential for growth and significant developmental impact. Many do not.
2. TechnoServe chooses its commercial partners based on their capacity and their commitment to invest in small-scale suppliers and build long-term commercial relationships with them, recognizing it is in their own competitive interests. Many firms are not interested.
3. If small-scale producers are to be true partners in these commercial ventures, they must be organized, well-led, and willing to invest. Little is possible in the absence of strong grassroots organizations.

When these ingredients can be brought together, a great deal is possible, as shown in the following examples of TechnoServe business development activities that link rural producers to larger commercial entities, to their mutual benefit.

The Siongiroi Dairy Plant, Kenya

For more than 70 years, the parastatal Kenyan Cooperative Creameries monopolized Kenya's formal dairy industry. At its peak in the 1980s, the cooperative was the sole authorized buyer of milk from the nation's dairy producers, and it operated 11 milk cooling and processing plants with daily throughput of 1.2 million liters.

Market liberalization in the 1990s led to the rapid demise of Kenyan Cooperative Creameries. Along the way, tens of thousands of milk producers were left without outlets for their product or were unpaid for milk they continued to supply. By 1998 the entire production chain collapsed—only 30,000 to 40,000 liters of milk per day were being received and processed. The result was urban shortages coupled with high on-farm waste, production decreases, and mismanaged and genetically deteriorating herds. The entire formal industry seemed threatened.

Today's picture, while still transitional, is much brighter. Market deregulation seems to be working—a competitive private dairy industry is emerging and holds promise for those able to differentiate and efficiently deliver their product or service. But the process is slow.

Both helping and hindering this transition, the dairy industry in Kenya continues to be dominated by small producers and traditional marketing channels. It is estimated that at least 80 percent of Kenya's daily milk production of 6.8 million liters is not processed. This

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Ali Fernando de Soto has noted (*The Economist*, March 29, 2001), while the poor often have assets, because they lack formal title they cannot use the assets as collateral to raise cash.

milk is consumed on farm, sold or traded to neighbors, or cheaply sold to informal middlemen ("hawkers"), who transport the milk to nearby towns for resale, untested and unprocessed.

This market structure presents a tremendous opportunity. Much of the urban consuming public is willing to pay a premium for hygienic, high-quality, and conveniently packaged milk and other dairy products. The major constraint to developing this market is managing and aggregating the supply of a high-quality raw product from its many small-scale suppliers.

For small producers to invest in and benefit from high-quality dairy production, they must have access to a dependable and discerning market that is willing to pay for quality. The processor faces high costs from the collection and transport of a geographically dispersed supply base and from wastage due to low quality milk. In its analysis of the dairy industry, TechnoServe saw this as a "win-win" opportunity for both the private processor and the small farmer.

A model solution to this has been the development of the Siongiroi Dairy Plant (SDP) and its contractual linkage for supplying tested and bulked chilled milk to Spin Knit, Ltd., a privately held company that is now Kenya's second largest milk pasteurizer, with a daily capacity of some 100,000 liters.

The SDP is owned by Siongiroi Cooperative Society, located in Siongiroi Division of Bomet District in Rift Valley Province. The cooperative draws its 2,000 members from the division's 10,000 or more small farmers, who typically farm 2 to 4 hectares focused on maize, dairy, and other livestock. The cooperative was established in 1996 to market livestock products. TechnoServe guided the cooperative's leadership in the analysis that led to the decision to build the facility and has assisted in its execution.

The SDP milk bulking and chilling facility is located within the market center of Siongiroi town (population: 2,000). It is the only bulking and cooling plant in the Siongiroi Division. At the heart of the SDP operation are modern stainless steel bulk cooling tanks. Funding for the initial premises (a leased building) came from share capital contributed by cooperative members. Initial plant equipment was financed by Tetra Pak, Ltd., a leading manufacturer of dairy equipment. During the third quarter of SDP operations, TechnoServe negotiated the lease of an additional cooling tank from Spin Knit.

The plant began operation in 1998, managed by TechnoServe, under contract to the cooperative to recruit and train staff and develop and install operating and management systems. Within a year TechnoServe ceded management responsibilities to a professional manager reporting to the cooperative's management committee.

As conceptualized and realized, the overall development activity includes herd improvement and animal husbandry components, provided by TechnoServe's external partners—American Breeder Services, a leading international genetics firm, and Heifer Project International, a U.S. NGO focused on animal husbandry. Our shared medium-term goal is to build a private-sector supporting infrastructure capable of maintaining and building upon the program's short-term achievements. Key to this was developing a contractual relationship between SDP and a major processor.

The Dairy Division of Spin Knit was created in 1993 in response to the opportunities stemming from Kenya's deregulation of the dairy industry. In 1998 Spin Knit was seeking new sources of large

Table 1. Financial returns from the Siongiroi Dairy Plant (K Sh 000) (1 K Sh = US$0.0127).

	1998/9 (16 months)	2000	2001 (1st qtr)
Purchases from producers	56,293	45,425	8,049
Gross revenues	84,106	52,541	10,093
Net profits	238	772	493
Total assets	4,868	10,881	11,720
Return on total assets	3.6%	7.1%	16.5%

volume/high quality milk to supply its new processing plant in Nairobi.

Under the resulting contract with the Siongiroi Cooperative Society, over 6 million liters of milk were purchased from small-scale producers from 1998 through 2000. Even in 2000, a serious drought year, the cooperative's plant was still able to operate at 66 percent of its 12,500-liter daily capacity and turn a solid profit. Recent financial returns from the dairy plant are shown in table 1.

The plant currently receives milk once a day from hundreds of individual farmers, who supply 30 percent of the plant's intake. Private transporters, independent businessmen who were aided in developing a commercial service to deliver farmers' milk to the plant, bring in the balance from distances up to 25 kilometers. A Spin Knit tank truck arrives daily to collect the tested and cooled milk and to transport it, ready for processing, to its plant in Nairobi. Based on its success to date, SDP is expanding its capacity to 19,000 liters per day.

Table 2 paints an extraordinary picture of a transformed community. Notably, the changes listed occurred during a period of national economic stagnation and in the absence of any other major local factors.

Increased incomes and opportunity have expanded the demand for dairy-related products and services, such as medications, feed supplements, and artificial insemination services, as well as for a wide range of general consumer goods and services. Early indications are that human nutrition is improving—consumption of fresh produce, meat, and poultry is increasing.

The rapid consolidation of the dairy processing industry has increased the vulnerability of SDP to possible shifts in strategy or price manipulation by the few remaining commercial buyers of bulk chilled milk. Spin Knit itself is in the early stages of establishing its own small bulking and chilling stations in other areas. With TechnoServe's help, SDP is

Table 2. Social indicators of change in Siongiroi.

Indicator	1998	Feb 2001
Schools	1	3
Uniform suppliers	0	6
Restaurants	2	8
Butchers	3	13
Grocers	7	16[a]
Pharmacies	0	3
Farmers regularly selling milk	200	2,460
Private milk transport businessmen	2	11
Vet supply/AI services	4	16
Hardware shops and mechanics	4	22
SDP direct employees	0	18

a/ Open air market established during last year.

Fig. 1. The Sweet Mozambique label.

analyzing the possibilities for forward integration—expanding its business to include milk processing. To prepare for possible rapid decision making and action, the company is converting itself into a limited liability company, based on equity participation of Heifer Project International, a member of the technical assistance team.

Rebuilding Mozambique's Tropical Fruit Industry

Prior to declaring independence from Portugal in 1975, Mozambique produced most of the tropical fruit, and much of the subtropical fruit, commercially traded in southern Africa. The long civil war that followed independence resulted in the loss of this major production base. Since the end of the civil war in 1992, little had been accomplished, until recently, in rehabilitating this once vibrant industry.

Through a series of industry and market analyses conducted in 1998 and 1999, TechnoServe concluded that the time was right for Mozambique to redevelop its tropical fruit industry. Discussions in 1999 with the leadership of the quiescent National Banana Producers and Exporters Association (APEB) confirmed their interest in resurrecting their organization and their commercial businesses. In fact, many members had already begun rehabilitating the plantations and were selling in the local market.

TechnoServe reached out to its international corporate partners for help. McKinsey & Company, a leading management consulting firm, provided pro bono assistance in developing an overall industry strategy. Young & Rubicam, a major marketing consulting firm, provided pro bono guidance on how to differentiate products in the marketplace and attain a quality premium by developing brand identity. It designed the Sweet Mozambique brand and label (fig. 1) for TechnoServe.

Bananas were selected as an entry point because:

- The crop is broadly known to both smallholder and commercial producers.
- Bananas are easy to produce.
- The crop's year-round production leads

Table 3. Mozambique fruit industry strategy.

Phase I (Years 1–2)
Produce and supply premium quality bananas to domestic and South African markets. The markets are large—in Maputo alone, consumption nears 50,000 tonnes per year; the South African market is 250,000 tonnes. Establish a private research and training farm to improve production and post-harvest systems for commercial and smallholder producers.
Phase II (Years 3–4)
Expand banana exports to other regional and overseas markets. One focus will be the Middle East—TechnoServe's research shows that Mozambique can be competitive there in both quality and price.
Phase III (Years 5–10)
Expand into production of seasonal tropical fruits. Once regular market and client relationships are established in the Middle East for year-round production of bananas, adding more seasonal products will be easier. Of particular interest are high value opportunities in such crops as mangos (especially the Alphonse variety), litchis, and limes. Mozambique enjoys seasons counter-cyclical to major Asian weather patterns, creating the potential for fresh fruit exports to major Indian Rim and Asian markets.

to dependable cash-flow and strong business relationships.

- The marketplace recognizes and pays for quality.
- Mozambique is the only regional producer capable of commercial production of the Cavendish variety wanted by area consumers.

Table 3 outlines the Mozambique fruit industry strategy. In 1999, as a first step, TechnoServe helped APEB establish a division called Frutas de Manica, which was designed to help smallholders in Manica Province produce high-quality bananas and to buy the bananas for resale to domestic and South African markets. Frutas de Manica applies modern methods, including specialized harvest procedures, anti-fungal washing, and natural plant ripening agents, to bring to market a blemish-free, evenly matured, and uncontaminated banana. Under contract with APEB, TechnoServe manages Frutas de Manica and sells its bananas in wholesale and retail markets under TechnoServe's Sweet Mozambique label, along with the production from APEB members' private farms.

All purchasing from small-scale producers in a given area is planned in advance. Special efforts are made to include influential local growers as a way to gain credibility and broad participation. Thus far, supplying farmers have shown little interest in creating a formal organization. Accordingly, there are no written contracts. However, prices are agreed in advance, as are clear quality and grading standards.

Due to production limitations, sales to date have only been in the domestic market. Frutas de Manica is now producing sufficient export-grade bananas (16 tonnes for sale in June 2001, increasing to 50 tonnes per month by the end of the year) to carry out tests in the South African market. Discussions are under way with major South African supermarkets. TechnoServe intends to do test marketing in two to three stores of a major chain, assessing packaging, customer acceptance, reliability, etc. The supermarket chain will be one that focuses on high quality fresh produce and specialty foods and that sells under the brand of its suppliers—therefore the Sweet Mozambique brand would be used. Depending on the results, we will expand contacts with other major chains. Table 4 shows projected financial returns.

APEB's profits from Frutas de Manica are being used to develop the Banana Production Training and Research Center in Mafavuca, 60 kilometers west of Maputo, on 100 hectares of irrigable land granted for this purpose by the government. Through Frutas de Manica and APEB, smallholders will receive training in both technical and business best practices. They will also be given the opportunity to diversify their production to include the higher value fruits destined for regional and international markets.

Based on achievements to date and established investment plans, TechnoServe projects the following results by 2006:

1. Fruit will become Mozambique's

Table 4. Projected results of banana sales by Frutas de Manica (Mt millions) (Mt 1 million = US$59).

	2001	2002
Purchases from producers	528.3	804.2
Gross revenues	3,036.9	4,493.1
Net profits	260.0	1,039.0
Total assets	1,404.7	2,340.0
Return on total assets	19.1%	44.4%

second most important export, after prawns.

2. Seven thousand rural workers will be employed, at salaries that average over twice the minimum wage.
3. Annual family cash incomes of the rural poor will increase US$3.6 million, moving on average from US$120 to US$480 for 10,000 smallholder fruit producers.

A truly competitive fruit export industry is important to the development of a commercial market for fruits that do not meet the stringent quality characteristics demanded for fresh fruit exports. Based on the changing tariff regimes being implemented under the Southern African Development Community and the U.S. African Growth and Opportunity Act, TechnoServe sees a potential for developing a processed fruit and juice industry, which will be explored in coming years.

Literature Cited

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Task Forces Reports

Task forces constitute an important component of each workshop. They allow the participants to interact and share knowledge, experience, and opinions.

The task forces were organized around five topics:

- challenges to rural governance
- extension services delivery
- input services delivery
- agriculture intensification and diversification
- agroprocessing

The task force on challenges to rural governance attracted so many participants that it had to be split in two. The groups retained the same agenda but reached different conclusions.

Challenges to Rural Governance I

Rapporteur: Hans Holmén, Director of Studies, Department of Geography, Linkoping University, Sweden.

There are two major components to rural governance in Africa: (1) development has been hampered by urban bias and top-down planning, and (2) the majority of the population lives in rural areas.

Rural governance can be defined as a process in which, insofar as possible, the central government creates an enabling environment for rural communities to take control of their own resources development. But how much local or rural control is possible in an era of globalization?

Decentralization

The group defined decentralization as a process of transferring decision-making power from central to local levels—a devolution of power including financial power.

Based on recent experiences, decentralization appears to support basic freedoms and enhance incentives and motivation. It brings services nearer to the people and contributes to creating a spirit of ownership. Therefore decentralization is important for local capacity-building, provided it goes hand in hand with financial devolution. It ensures more responsible extension services, allows two-way communication, and promotes local organizations such as cooperatives and farmers' associations. However, not everything can be decentralized and, when it happens, it has to take place in partnership with central governments.

The group recommends:

1. Direct career orientation should not be linked to the capital but rather integrated into rural communities and towns.
2. International NGOs should also decentralize by having offices in Africa rather than Rome, New York, or Tokyo.
3. Aid organizations should buy grain in surplus areas of Africa to supply deficit or disaster areas—not in the United States.
4. The scope of SG 2000 should go beyond production, storage, processing, marketing, etc.

Privatization

Privatization is often part of decentralization, but it is not the same thing. The group defined privatization as a process of transferring control and management of the provision of goods and services from the public sector to the private sector.

Transfer of ownership from the public to private sector is accomplished by selling public property or enterprises. Of course, land titles or land-use rights are also reissued in the name of private individuals or enterprises.

Transfer of management is accomplished by contracting private entrepreneurs to manage and operate certain undertakings while ownership remains with public authorities, e.g., a tender to operate a business or service for a limited period of time.

The lessons learned are that privatization should be encouraged and that the private sector is often more effective and competition is mostly good. But, in fact, privatization often leaves much to be desired. It can lead to nepotism, embezzlement, and private monopolies.

The group agreed that some goods and services should remain in the public sector, e.g., seed and extension, because the private sector is interested only in the most profitable regions and sectors of the economy. Remote, sparsely populated areas and localities are of no interest. Certain services will not be provided and the poor will be neglected. It leads to a uneven development both geographically and socially.

The group recommends that governments and donors facilitate private-sector activities. Governments can created the right conditions through legislation, investment in infrastructure, and regional planning. Extension, microcredit organizations, and private banks can help by providing advice to agriculture. NGOs, such as TechnoServe, can help access external markets and improve business profitability. SG 2000 should lobby against Western protectionism and subsidies to Western agriculture. SG 2000 should also commission a study on how best to reduce the prices of agricultural inputs in both the short and long term.

NGOs can also put pressure on companies that produce inputs like fertilizers and agro-chemicals to lower their prices, create markets for Africa, and promote the use of organic manure—animal dung, compost, and green manure.

One should not forget, however, that peace and political stability are essential for decentralization, privatization, and economic growth.

Urbanization

Urbanization can be seen as de-ruralization or de-agrarianization. Urbanization is a process of societal transformation under which a greater proportion of the population comes to live in towns and cities. If it is a transformation, it is not necessarily a translocation. Urban activities—commerce, planning, administration, communication—attract people living in rural zones because they are perceived as a more "modern" environment. Also, they propose a different life-style, etc. There is good and bad in this pattern.

To counter the drive to the city, one could think of dispersed urbanization, decentralized rural towns, regional planning, etc.

Globalization

The group defined globalization as a process of enhanced integration and increased interdependence of societies on a world scale. It involves more frequent political, economic, technological, social, and cultural interactions between a locality and the rest of the world (the best

examples being information and communication). The process is unequal both in time and space.

Globalization and internationalization occur at the same time. The distinction between the two processes is that internationalization occurs between governments. It may mean the transfer of power to higher-order political bodies, such as the European Union, the United Nations, etc. It is the opposite of devolution or decentralization.

Globalization, in contrast, is nongovernmental. The "rolling back of the state" also happens in the industrialized countries. Structural adjustment programs are everywhere. Globalization arrives hand in hand with transnational companies. They have global strategies, they are gigantic. Economically they are larger than many countries. There is a strong element of remote control in these corporations. There is no transparency, and although they can use the whole globe as their playing field, there is also a centralization of power. The question is whether there is too much or too little globalization.

On the other hand, it is not so easy to place NGOs. They are present in all aspects of life from bringing disaster relief to global networking for alternatives. They are also part of globalization.

In the group's view, the impact of globalization is negative so far.

African countries should strengthen their own regional and trans-African organizations such as ECOWAS, East African Community, SADC, COMESA, IGAD, etc. to address the negative effects of globalization together. They should also establish a database on excess production of food to overcome food deficits. So there are still many roles for central governments to fulfill. At the same time we are back to the first question? How much room is there for rural governance in an era of globalization?

Challenges to Rural Governance II

Rapporteur: Peter Ngatagize, Resource Person, Plan for Modernisation of Agriculture, Ministry of Finance, Planning, and Economic Development, Uganda.

The task force viewed the purpose of rural governance as improving livelihoods in relation to accessibility to better services, food security, and wealth creation and accumulation; enhancing social relations, social capital, and social responsibilities; and reducing vulnerability.

How then do decentralization, privatization, urbanization, and globalization impinge on rural governance?

Decentralization

Decentralization improves efficiency in service delivery and empowers citizens by allowing them more scope for making choices.

The outcome of decentralization is affected by limitations in financial resources and human and social capital, by reluctance of the center to let go of resources and political power, and by imbalances in resource endowment.

In Uganda where there has been good political will and commitment at the highest level of government, the experience with decentralization has been positive. In Nigeria, the civil war was essentially contained by movement to decentralization. In Ethiopia, experience has been less positive because the elites have resisted the program. There is wide disparity in resource endowment between the decentralized units.

The coping mechanisms the group identified were

- political will and commitment
- matching mandates and responsibili-

ties with resources
- building capacities at all levels
- ensuring that representation at the center reflects the national character
- minimizing administrative costs
- providing mechanisms for resource mobilization and allocation in light of disparities in resource endowment

Privatization

Privatization enhances resource allocation, accelerates the evolution of market-oriented agriculture, and reduces the burden on public institutions, allowing them to focus on provision of public goods.

The effects of privatization are limited by failure to demarcate the boundaries between provisions for charity and those for wealth creation or development, by political interference in deliberate efforts to empower private entrepreneurs, by a weak private-sector base, by lack of a conducive macroeconomic environment, by evolution of monopolies, and by protection of social interests.

Positive experiences with privatization have occurred in Uganda with telecommunication and coffee marketing.

The group suggested mechanisms for coping with privatization:
- undertaking a deliberate sequencing of the implementation process
- delineating public- and private-sector roles
- prioritizing public-sector roles given the resource constraints
- demarcating the boundary lines for charity (poorest of the poor) and creation of wealth (investment and development)
- involving all stakeholders
- building the requisite capacity at all levels (central and private-sector level)
- establishing appropriate institutions and the necessary legal and regulatory frameworks

Urbanization

The advantages of urbanization are central availability of social services and larger markets for agricultural products.

The task force envisioned two scenarios. In scenario 1, people live in the rural area because the opportunities for social services (education, health, etc.) and employment are limited. Production tools are rudimentary, yields are low, market opportunities limited, and therefore incomes are low for both households and local governments. People have limited political power, and therefore limited resources flow from the center.

Consequences are a brain drain from rural areas, an explosion of slums because most immigrants are illiterate and lack skills, and rising insecurity, with effects on national security.

In scenario 2, urbanization arises from the desire to provide social services efficiently supported by labor movement from rural areas due to increased efficiency and productivity. Urban areas provide a market for food and other agricultural products. Many agriculturally related off-farm enterprises provide further employment.

The coping mechanisms are to modernize agriculture (increase productivity and market access, reduce drudgery, etc), to invest in social services (education, health, infrastructure) in rural areas, and to empower the rural areas with political and financial resources.

Globalization

Globalization is a consequence of advances in telecommunication, transportation, and information technology. It has led to new economic and financial rules of the game in which the referee (the developed world) is also a player. It reduces functions of the state leading to "open regionalism," and it results in cultural

transformation driven by economic transformation.

The coping mechanisms the group identified with respect to trade were

- developing the requisite institutions to ensure that product grades and standards are met
- developing the capacity to market the right volumes on a sustainable basis to meet market demands
- ensuring export competitiveness by adopting improved technologies, using irrigation, and adopting risk-reducing interventions
- developing grassroots organizations
- providing incentives for investments in rural areas

Way Forward

Policy makers must appreciate that decentralization, privatization, urbanization, and globalization are partly a result of the advances in transportation, communication, and information technology. Moreover, policy makers must develop coping mechanisms and institutionalize these mechanisms. Coping mechanisms include

- ensuring political will and commitment
- providing well-researched information and policy options to the leadership
- clearly delineating stakeholder roles
- developing partnerships among stakeholders based on mutual respect
- developing the requisite capacities at all levels (center, local government, and community level)
- establishing safety nets for the poorest of the poor
- actively supporting the private sector
- creating a conducive macroeconomic environment (security, laws, institutions, interest rates, inflation)

Extension Delivery System

Rapporteur: Daniel Kisauzi, Managing Director, Nkoola Institutional Management Associates, Kampala.

The assignment of this task force was to discuss the lessons learned, experiences, and good practices in the area of extension services delivery. It was also asked to recommend practical policy options and decisions to be taken to meet the challenges in the changing environment.

The task force undertook an assessment of the situation, looking at the key problems and the constraints, and it looked at the enabling conditions, particularly the policies and the institutions.

Why Extension Services Still Matter

The group proposed many reasons that extension services still matter. First, the environment is changing. New technology is being generated continuously, and technology is more knowledge-intensive, e.g., integrated pest management. At the same time, new farmers are continuously emerging, and farmers' needs are changing. They face problems that are becoming more complex. Finally, land is a limited resource, which creates a need for new ways of agriculture.

Second, extension is still needed because it works if it is supported and done right. There are many success stories. SG 2000 success stories abound. To make extension services work better, the new opportunities offered by the advances in information and communication technology should be seized, as the Philippines has done.

Also, there is much nostalgia about past extension work. Reasons are not given why it worked, but there is evidence that it worked in Zimbabwe, in Malawi, and even in Uganda.

Third, there is still work to be done. Farmers' attitudes still need to be trans-

formed to a mode that looks outside tradition for improvements. Farmers have knowledge, but they have been relying on us up to this point. They need to become more independent.

In addition, most farmers have not yet been reached. In Uganda 75 percent of the farmers are subsistence producers, and so far extension services have not reached all of them. Yet these are the ones from whom the push is going to come.

Also, productivity is still low, knowledge is low, skills are low; on the contrary food insecurity and poverty are high.

Effects of the Changing Environment

The task force agreed that the environment for delivering extension services is being changed by liberalization, decentralization, and privatization, and by farmer empowerment, which arises from farmers' increased participation, associated with the democratization processes.

The task force felt that while these factors have impacted agricultural advisory services, they have tended to be introduced as a package, and therefore that impact is difficult to disaggregate.

It was also noted that these factors impact in different ways in different countries, but where extension services have been reformed to adjust to these factors, it appears that the impacts will be positive.

The group felt that the delivery of extension services will have to change in the environment created by these factors. Whether by design or by default, these factors are going to impact on the delivery of advisory services.

There was recognition in the group that, in some countries, there is no baseline for measuring impacts because in the past delivery of advisory services had tended to be ad hoc. Examples are Guinea and Mali.

The group observed that the full impact of these factors has not yet been felt, and therefore there is a need to continuously monitor the impacts arising from them.

The group identified several other factors to which it was not able to assign—for lack of a better word—impacts, i.e., globalization, acceleration of technology change, HIV/AIDS, climate change, and insecurity in a number of countries.

The impacts of these factors on agricultural extension services will pose new challenges, create new demands, and in some cases new opportunities that will lead to a need for qualitative and quantitative adjustments in advisory services.

Advances in information and communication technology, in particular, were noted as being changes in environment that will impact advisory services. Advances in information and communication technology have a potential for increasing efficiency and effectiveness of extension delivery, particularly for farmers where the infrastructure exists. There was a Philippines story to illustrate this.

Difficulties

The group found it easy to identify difficulties facing extension services delivery. First, there are the difficulties associated with the farmers themselves. Illiteracy and language barriers create difficulties in interactions with farmers. But there are examples of the impacts of primary education that have influenced the development of agriculture. Other farmer-based difficulties are their conservativeness or a risk averseness, and, in this market-oriented era, farmers' lack of business orientation.

Second, the group recognized important difficulties in the delivery of extension services and felt that there should be major efforts to adjust extension ap-

proaches. Some difficulties affecting delivery:

- reaching the majority of farmers, given that there is not going to be an explosion in the number of extension services providers
- developing an effective partnership with the farmers
- increasing the numbers of female extension workers
- interesting girls in agriculture
- targeting women
- demonstrating short-term impact of extension, which is relevant for the sustainability of extension
- introducing business orientation
- removing crop-bias from extension, i.e., extension tends to ignore livestock, fish, and trees in some countries
- knowing how far to push the farmer who is operating on one-tenth hectare
- scaling up from demonstrations, for example in SG 2000
- dealing with the explosion of market information demand by farmers in a liberalized environment
- sustaining service delivery

Third, there are institutionally based difficulties, particularly the creation of institutions with the specialization of extension services providers, making agriculture training more practical, institutionalizing extension within ministries of agriculture, building linkages and partnerships, especially with farmers, and creating institutional and incentive frameworks that will put the farmers in the driving seat in the future.

Performance evaluation was of great concern to the group, as well as attaching incentives to performance.

There was also a feeling that extension services in some countries have difficulty, maintaining an appropriate age structure. In some countries, a 45-year-old is considered ancient and due for replacement.

Improving Effectiveness

With a liberalized, democratized, decentralized government, the improvement of extension services delivery will require

- empowerment of farmers to demand and control services
- training of service providers
- a conducive policy environment
- clear and focused programs
- effective supervision of extension services
- political support
- rewards for performance, but not by removing workers from what they do best and putting them in the ministries
- institutionalizing extension services in countries where they continue to operate like ad hoc projects of the ministries
- introducing "professionalism" to extension, including ethics for advisers
- appropriate institutions for professional growth
- introducing "professionalism" to farming, e.g., Danida's efforts to create professional farmers in Uganda
- improved linkages and partnerships
- approaches that address farmers' livelihood needs in a holistic way, but allow for access to specialized advice
- placing resources near the farmers and advisers
- developing farmers' institutions

New Approaches

The key elements of emerging approaches to extension services delivery include

- integrating and coordinating NGO initiatives within government programs (SG 2000 was an example)
- privatization of delivery, an emerging approach illustrated by Uganda
- farmers' control of services, again an approach that Uganda is attempting
- taking resources near to the farmers

- decentralization as exemplified in Malawi and Ethiopia
- sharing of costs by all stakeholders
- contracting of private services using public funds, as in Uganda
- common approaches by donors to support extension services, as in Uganda

Introducing and Sustaining Emerging Approaches

The group makes the following recommendations on introducing and sustaining these emerging approaches:

- do not be dogmatic
- pick elements that suit your environment
- develop the farmers' capacity to own the services
- enhance farmers' participation
- support private-sector development
- involve local governments
- build lesson-learning into the processes

Priorities

As priorities for agricultural extension at present, the group recommended:

- capacity development
- reorientation of service delivery to meet the new demands
- development of farmers' institutions
- creating an appropriate institutional framework

Input Delivery Services

Rapporteur: Paul Kibwika, Lecturer, Faculty of Agriculture, Agricultural Extension Education, Makerere University, Uganda.

One important assumption we made was that there must be peace, stability, and good governance. It may be a dangerous assumption, but we had to take this stance for our discussion to be meaningful.

Environment

The enabling environment includes both macroeconomic policies and sectoral policies and regulations. These components will enable the market for input delivery to function. This will also facilitate the supply of farm inputs to enable production, so as to improve marketing and processing of farm products.

The facilitating institutions should include policy, laws, finance, market information, grades and standards, markets, transfer of technologies, education, and research. All these components should be in place to make sure that the market operates, i.e., that there is demand and supply.

Also, there should be facilitating services, which include transport, storage, processing, packaging, importation, exportation, advertising equipment, communications, and in some instances energy as well.

When all these exist, the demand pulls on the inputs, originating from the users. In turn, it should lead the farmers to increased farm outputs and income.

Recommendations for Interventions

The objective is to rapidly establish a competitive inputs market. A competitive market is essential for efficient delivery of inputs. Among the priority actions that need to be taken are (1) increase government commitment to facilitate the development of the inputs sector and (2) establish competitive market networks for integrated inputs, products, and credit supplies. To accomplish this:

- improve output marketing
- grant technical and managerial support to entrepreneurs so that they can do their jobs efficiently
- facilitate farmers' access to seasonal credits
- improve market information and communication as a public good for all
- extensively use appropriate mass media for education so that people can

utilize the information available
- enforce appropriate regulations for seed, fertilizer, and crop protection products
- develop and enforce appropriate output regulations to make sure that everybody can compete fairly
- act in international and regional markets to facilitate free trade between countries and redistribution of goods and services within the region

Priorities

Priorities we suggest for implementing this plan are as follows.

We need to focus on crops showing the highest potential, which will give incentives for market participation. A crop must have a market if it is going to stimulate demand for inputs. So high value crops, e.g., fruits and vegetable systems in peri-urban areas, would be a priority, because farmers have to realize a profit on an input if they are going to use it.

We also need a vertically integrated input supply system for cash crops to begin to expand to the foodcrops subsector. We need to start with cash crops and then expand input use to the foodcrops. If you do not have the money you cannot grow the food.

We recommend intensifying technology generation and transfer to farmers by committed stakeholders such as indigenous and international NGOs, the private sector, and SG 2000. The issue of private extension was also emphasized.

Procurement and Distribution Costs. We also need planning to reduce the high costs of input procurement and distribution. Among the options are regional procurement or companies buying in bulk.

Demand forecasts would help dealers know what quantities will be required for the next season or year.

We need to remove restrictive product specification and registration processes to benefit from larger markets through regional registry harmonization. Many products are basically the same, but because of small differences in formulation, they fall under restrictive laws, and this prevents the users from being able to select from a wide range of competing products.

Excessive port charges and tariffs should be removed to make inputs more affordable to the poor farmers.

Banking and letters of credit requirements should be facilitated to ease the process of procurement and also the delivery of the inputs.

Restrictive barriers to regional trade (e.g., bulk orders) should be removed. These barriers across borders often make little sense. Abolishing them would facilitate better service to the users of inputs.

Donor-financed input aid should be integrated into the market economy. Donors might bring in inputs as emergency resources, for example, to be distributed free. However, care needs to be taken to avoid disrupting the whole system because private companies dealing in the same inputs are also present.

Integrated Input Markets. A specific activity of the implementation plan should be to facilitate the development of private integrated input market networks by
- considering, together, the needs of farmers, private marketing firms, and entrepreneurs
- facilitating access to procurement and distribution of credit for entrepreneurs to enable them to promote and deliver the inputs
- training entrepreneurs and farmers in business planning, management, marketing, technology, etc.
- providing market information (de-

mand forecasts, prevailing prices, new advances, etc.) to help farmers respond to new technologies

- using mass media as a marketing tool to reach a wider public

Recommendations: Institutional Roles

We also have recommendations on the role of NGOs, governments, donors, and the private sector:

NGOs. When NGOs are engaged in relief distribution of seed and fertilizer, it should be a short-term arrangement, not a long-term way of delivering free inputs. For unserved farmers such as those in very remote areas, NGOs should serve as substitute input supply sources. NGOs should educate farmers on agronomic and husbandry practices, better seed or stock selection, storage, processing, and value-added (as examples we are thinking of Winrock, CARE, SG 2000, Commutech). Finally, NGOs can fill an important role as financial intermediaries through credit guarantees, e.g., CARE/Zimbabwe, TechnoServe/Ghana, etc.

Public Sector. Governments should

- strengthen human capacity through training
- provide a regulatory framework to encourage investments
- analyze input subsectors in collaboration with stakeholders to identify and remove constraints limiting full functioning of the private sector
- provide timely and accurate market intelligence
- provide key rural infrastructure, e.g., feeder roads, storage
- play a critical role to meet the needs of input-insecure farmers (e.g., disaster relief)
- assist the private sector in providing credit and financial services
- develop human and legal frameworks to evaluate options for use of genetically modified organisms

Donors. The donors should

- help governments analyze the macroeconomic and agricultural subsectors to guide priority programs
- provide technical and financial support for regulatory and policy reform
- provide technical assistance to both the public and private sectors to increase analytical and managerial capacity
- facilitate regional cooperation for harmonization of input policies
- encourage and finance the formation and empowerment of farmers' groups and trade associations as new agents of change

Private Sector. The private sector should

- meet market demand and engage in fair trade practices
- do research to produce, promote, and distribute improved agricultural inputs
- promote private-sector extension of improved products and practices
- promote stakeholder partnerships

Agricultural Intensification and Diversification

Rapporteur: Epharim Nkonya, Project Leader, Policies for Improved Land Management, International Food Policy Research Institute, Kampala.

Why do we want intensification and diversification? There are four major issues. One is population increase, which has placed pressure on land resources, which, in turn, has caused severe land degradation. The second one is the poverty reduction. We believe that by intensifying agriculture we are addressing the problems of the majority of the agricultural producers. Third, agricultural intensification and diversification should lead to the preservation of the forests and biodiversity. Last, but not least, agriculture is an important source of foreign currency for poor countries. Because agriculture is the backbone of our small economies,

there is a great need for intensifying and diversifying.

In the process of intensification and diversification, we need to be efficient. We asked, how can we make agriculture more efficient? Government commitment to developing the agricultural sector can be increased in several ways.

Investing in Agriculture. Government budget allocations in the agricultural sector are low, about 10 percent. Governments should look into this to increase the efficiency of production.

Stabilizing Prices and Enforcing Fair Pricing Policies. Agriculture is probably the most risky enterprise in our economies, and prices fluctuate. Governments should look for ways to stabilize prices to make agricultural production less risky and more profitable.

Reducing Interest Rates. At present, when credit is available, it is expensive. Interest rates are in the range of 20 to 30 percent, although the inflation rate has been decreasing since liberalization. That means that credit is not available to the majority of farmers because of its cost.

Safe and Secure Land Tenure. Land should be made accessible, for ownership, to vulnerable groups like women. Women do the bulk of the farming, and they need policies giving them access to land ownership.

Water Use Policy. Water use includes irrigation and water rights from resources such as rivers. It should allow farmers to alleviate the risks involved in production due to unstable and unreliable rainfall. It should be addressed in such a way that irrigation is possible for all.

Organizing. Farmers should be assisted in the creation of associations, which can help in negotiating prices, marketing, and even production. Farmers can help each other in the delivery of inputs as well as in marketing their products.

Changing Environment

We looked at several issues that affect agricultural intensification and diversification.

Globalization. The farmers should be efficient in their production so that they are in a position to compete with the rest of the world. This is not easy given the circumstances in Africa: high taxes, lack of infrastructure, and other drawbacks.

Also, infant industries are negatively affected. In Africa's small economies, the industries are young and need protection of some sort, at the beginning at least, so they can stabilize and develop. Without protection they can only bow to a lot of well-experienced and well-staffed multinational companies brought in by globalization. The growth of the infant industries in our small countries will be problematic.

HIV/AIDS. The scourge of the HIV pandemic greatly affects the work force.

Trade Liberalization. Trade liberalization has changed the whole context of development. Due to increasing production, output prices have decreased. At the same time, input prices have been rising because of the removal of subsidies and other structural factors.

Donors' Priorities. Less donor support for research and extension has affected technology generation and dissemination.

Macroeconomic Recommendations

Interest Rates. Governments need to reexamine interest rates and align them with inflation. Even if the credits are mainly provided by private banks and microfinance institutions, governments still retain control because the central banks determine interest rates.

Markets. Government should promote regional and international markets.

Private Research and Extension. Government budgets for research and extension

are diminishing. Governments cannot assume the costs, and the donor community has also reduced the allocations to both research and extension. Good examples of what can be done come from Tanzania, which has privatized the tea research and is now privatizing coffee research. We believe that this is the way forward with caution.

Research and Extension in the Public Sector. Research and extension services for foodcrops should remain in the hands of the government. Indeed, foodcrops are being produced by poor farmers, and more than 50 percent of the food is consumed at home. Moreover, the marketing system is poor.

Input Delivery. Governments should ensure timely delivery of inputs.

HIV/AIDS. Extension agents should be involved in creating awareness of the HIV/AIDS campaigns.

Microeconomic Recommendations

Agriculture can be profitable by

- being efficient
- having safe, clean, and adequate storage facilities
- enjoying fair market and prices
- overcoming the information gap between the output traders and the farmers
- organizing farmers into groups
- bringing business management to microenterprises and farmers
- giving more importance to processing, which will create rural employment and at the same time generate income for the rural population
- including business management in the SAFE curriculum

Challenges to Diversification and Intensification

We have identified several challenges to diversification and intensification:

Viable Farm Size. Farms need to be larger to benefit from economies of scale. Present farms cannot be profitable. They are too small, due to fragmentation.

Population Growth. Population is increasing faster than food production.

Poor Technology. Many farmers use rudimentary technology. For example, they are still using the hand-hoe as they have since the beginning of agriculture.

Farm Enterprises. Most farmers depend on primary food production.

Infrastructure. Infrastructure is poor.

Services. Enabling services are inadequate or nonexistent.

Training. Farmers need to learn good farming practices and gain artisanal skills. Farmers are jacks of all trades. They carve, they weave, etc. They should be helped to get started, become equipped, etc.

Education. Extension should be working hand in hand with the health authorities, especially in HIV/AIDS problems.

Public and private sectors also need to collaborate in intensifying agriculture, as in the delivery of seeds for example. Hybrids can be sold by the private sector, but for the open-pollinated and self-pollinated varieties, the private sector may not do a good job. The informal seed sector can perhaps do a better job.

Setting Priorities

The short-term priorities we identified were

- price stabilization
- lowering of interest rates
- increasing agricultural budgets

The long-term priorities were

- increasing the farm size to a viable level
- halting population growth
- developing small-scale agriculture
- encouraging farm-level food processing

Agroprocessing and the Changing Environment

Rapporteur: Leonides Halos-Kim, Research (Postharvest) Specialist, International Institute of Tropical Agriculture, Ibadan, Nigeria.

Preharvest technology (improved varieties, research, extension, and irrigation) is necessary for economic growth in the agricultural sector while postharvest technology (storage, processing, and marketing infrastructure) is the sufficient condition for sustainable agricultural growth.

To transform subsistence farming to commercial agriculture, a postharvest component is a necessary element. Farmers' inputs are expensive only if they do not have good production and if they do not get good prices for what they produce. Improving agroprocessing is the way to make farming a profitable business. It is a tool for modernizing agriculture.

Issues and Constraints

High Level of Postharvest Losses. Postharvest losses have been estimated to represent up to 40 percent of production. When farmers employ low-input, low-output technology, there is no economic sense in adopting improved technologies. Postharvest technology drives the growth of the agricultural sector—improved preharvest technology has been promoted for 30 years with some progress, but there is much more to be done. The immediate concerns are to reduce food losses, to generate and increase farmers' income, and to improve food security.

Agroprocessing Machinery and Food Insecurity. Agroprocessing transforms crops to more durable, marketable, and consumable products. Most farmers and agroprocessors use traditional methods that are cumbersome and require time. This has discouraged them from producing more. Therefore despite the campaigns for increasing food production there is still food deficiency.

Product Innovations. Because of the limited forms into which crops are processed and presented, the market is limited. To increase demand for a crop, transformation and packaging are necessary, as happened with millet in Uganda. New and novel uses of crops should be found such as cassava flour for alcohol, biscuits, and breads; sorghum for beer; high quality millet; and other uses in food and feed industries.

Consumers Preferences. Processors need to be aware of the food preferences of different consumers and supply them accordingly.

Training Research and Extension Staff in Agroprocessing. Educational curricula should be reviewed and modified to emphasize agroprocessing as a field of specialization. There is a need to strengthen the capacity of the local institutions to make technology adaptations. The involvement of the private sector, agricultural universities, intermediate schools, and agro-industry is vital.

There is also a need to retrain extension staff (engineers and food technologists, not agronomists) to handle the dissemination of agroprocessing technologies.

Agroprocessing Database. Although other countries have advanced in agroprocessing technologies, African nations are lagging behind. Information on these technologies is inadequate. Building a mechanism for disseminating agricultural information will help to uncover techniques that could facilitate research, development, and extension of appropriate agroprocessing technologies in the region. Market research is needed to adapt new technologies.

Some Lessons Learned

During the last few decades, some institutions have begun to deal with improving the postharvest system and, recently, to focus on commercializing agroprocessing. Some results indicate that there is much to be gained when proper machinery and incentives are in place.

Cassava Project. In Nigeria, linking agriculture to industry after importation of industrial raw material was banned encouraged the adoption of new cassava varieties and improved productivity, creating employment and increasing farmers' incomes.

Introducing Soybeans. In Guinea, demonstrating the potential uses of soybean led to immediate adoption of this new crop.

Cassava Processing. In Guinea, improved equipment has facilitated processing, increased capacity, and boosted incomes.

Millet Processing. In Uganda, processing and packaging have made millet attractive to consumers, revitalizing production of a crop that has high nutritional value.

The SAA-IITA Agroprocessing Project. Providing improved technologies contributes to sustainable livelihoods for farmers, agroprocessors, and manufacturers. Processing is a useful link in the production-consumption/marketing continuum involving the agricultural and industrial sectors.

Cooperative Storage. In Ghana, Ethiopia, and Cameroon, cooperative storage (inventory credit) and marketing centers have enabled farmers to minimize risks of losses while waiting for seasonally depressed prices to rise. It also facilitates financing.

Addressing the Changing Environment

Immediate action is needed to keep agroprocessing abreast of the changing environment and to transform agriculture to a profitable business.

Globalization. Globalization generates challenges and also offers opportunities. Increasing urbanization and immigration create a critical mass that demands high quality and convenient processed products. This increasing demand for quality standards so that African agricultural produce and products can compete on the world market requires concentrated efforts among African countries for quality inspection.

The capacity of the standards boards (packaging, standards of measure) must be strengthened, and capacity in lobbying at the regional level in world trade must be developed.

Immediate action could be for African countries to promote their products within their territories, but also in countries where they have diplomatic representation. They will need to identify potential demand for their products and negotiate to remove the barriers preventing them from entering markets. It is important to have agricultural attachés in embassies.

Depreciation of Local Currency. Agroprocessing entails substantial capital investment in raw materials and machinery. Importing machinery and raw materials for food processing can be a significant drain on foreign exchange. When the local currency is depreciating, the cost of acquisitions can become prohibitive. Identifying local sources of raw materials and machinery will encourage use of crops in food, feed, and industrial products. To offset the negative effect of importation on the industry, African governments should invest on projects that

- provide tax relief (tax holidays) on agricultural equipment, implements, and spare parts
- allocate resources for local develop-

ment of appropriate technology, extension, and training

- support investment in storage, processing, and marketing infrastructure
- provide complementary investments that support agriculture: supply of water, rural electrification, and intermediate means of transport necessary in agroprocessing

Decentralization. Agricultural produce is bulky and produces a lot of by-products. Agroprocessing facilities should be located near producing areas to reduce transportation costs and to be able to dispose of by-products readily. Decentralization could increase processing capacity, minimize the transport requirement for bulky materials, and reduce urban migration through creation of income-generating activities in rural areas. Efficient linkage to market is however essential. In many countries, poor road networks hinder the delivery of goods and services to where they are demanded. Rural transportation and roads must be improved.

Increasing Pressure on Land. As population increases, there is less and less land available for cultivation. With decreasing land resources, food availability can be augmented by boosting productivity through efficient processing and by reducing post-harvest losses. Improved agroprocessing techniques and technologies need to be identified and disseminated.

Recommendations

The foregoing suggests some areas that need immediate attention and action by the authorities. To make them operational, the task force members recommend the following:

Governments should give the agricultural sector high priority under dynamic leadership. Enabling policies and infrastructures should exist. Full authority should be granted to and exercised by those concerned with the necessary human and financial resources.

Agriculture-related industries should be under the ministry of agriculture. Often, agroprocessing is under the ministry of industry. This has contributed to unfavorable perceptions of the performance of the agricultural sector because the commercial profitability of agroprocessing is associated with the ministry of industry.

The group felt that agro-industries, including agroprocessing, should be under the ministry of agriculture, which can understand its requisites. Agricultural educational institutions should also be under the management of the ministry of agriculture where technical expertise is available. This ministry could have a significant influence on the curricula by putting emphasis on enhancing indigenous postharvest technologies.

Countries should develop policies that encourage joint ventures with foreign investors. Although local production should be encouraged, the agroprocessing industry in Africa is still young and needs to learn from more advanced countries. Their resources and experiences should help develop a system appropriate for African conditions to enhance the capacity of local entrepreneurship.

Build awareness of the importance of agroprocessing through national and regional fairs. Identifying appropriate technologies and demonstrating them will promote awareness of improved systems and will increase adoption. This should be done at the national level to promote utilization of the technologies and at the regional level to share information and experiences among countries.

The task force members strongly recommend that the topic of the next CASIN workshop be on agroprocessing to

sensitize the stakeholders on the roles and the available technologies.

Strengthen campaigns for the adoption of appropriate agroprocessing technologies. Campaigns to increase the adoption of technologies should be given more importance. This requires collaboration among the stakeholders sharing resources and benefiting from the project. The support of government and NGOs is vital. SG 2000 country projects have an important role to play in the initial stage because of their direct link with the national programs and the beneficiaries. They also have the capacity to mobilize resources as they continue to promote increased food production in sub-Saharan Africa. It is recommended that all SG 2000 country projects adopt and support the agroprocessing project.

Discussion of Task Forces Report

Challenges to Rural Governance

Mwesigye Runumi: Our biggest challenge is how to do what needs to be done? However, one must underline the importance of political good will for whatever is to be done. Uganda has had many success stories, but when you trace their routes, they all lead to the political leadership of this country. There are so many problems we are likely to face along the way in decentralization, privatization, etc., that if the political commitment is not there, not much can be done. Political leaders also need to provide the vision. Implementation itself is left to the stakeholders and, I would suggest, the ministries of agriculture together with some lobbying organizations.

They should proceed by elaborating clear data-backed policy statements. If they fail to prepare documents, the politicians will not be convinced to take the crucial decisions. There should be demonstrations of what needs to be done rather than talking about it so that the policy makers are converted to believe in the direction to be taken.

Robert Havener: It is exactly in that mode that the agenda for the SG 2000 program was set. It was the belief that unless senior policy makers were serious about development, there was little that outsiders or outside money can do to facilitate that process. This idea has guided the SG 2000 board and staff in the selection of countries in which to become involved, i.e., their perception about the senior leaders' serious commitment to the development process.

Unknown speaker: For decentralization, equitable distribution of the resources should be emphasized. We may have to establish rules. How much will go to central government, and what revenue should be centrally collected? How much is to go to the county and the sub-county? Then attention should go to the mobilization of resources.

Robert Havener: Yes, there is little merit in decentralization of so-called power without decentralization of real power, including the power to raise, receive, and expend money.

Marco Quiñones: Also, there is little meaning in decentralization if one is not able to put capacity at the grassroots' level to administer the new powers that have been transferred to them. In Tanzania, for instance, although the government is decentralizing and there is much enthusiasm at district level, a tremendous gap in capacity exists for planning, implementation, and follow-ups.

Extension Delivery System

Unknown speaker: One should be concerned about who actually plays what role in extension. There is room for

Robert Havener chaired this session.

participation by all the stakeholders, but I would like to see extension services that are not propaganda machines, not sales promotion agents, but rather a service that helps farmers to reach a decision in a private, competitive environment. This is a critical issue. Otherwise there is the risk of having sales promotion in the form of extension, and this will really cloud the decisions of farmers in choosing among various offers available on the market.

Input Delivery Services

Ruth Oniang'o: I did not hear anything about insurance. There are situations where farmers may lose their whole crop or all their animals, or where cooperatives may lose the money that has been collected for farmers. Without insurance, farmers may never be able to recover.

Paul Kibwika (Rapporteur): We were faced with so many components that could be added to the list of the inputs (for example labels on inputs) that we had to draw a boundary around what the task force could achieve within the allotted time. But, definitely, I think that insurance needs to be considered.

Robert Havener: Unavailablity of insurance is one of those things that causes governments to make bad decisions. They get in the business of giving loans, etc. when a good insurance scheme would be much preferable. They are difficult to design and implement, but it is an important subject.

Takele Gebre: The role of strong, viable, dependent farmers' organizations was not mentioned as engine of a good input supply delivery.

Paul Kibwika: That came out strongly in our discussion but during the presentation, I did not have time to elaborate. In Uganda, the National Farmers Association has made great strides in improving input delivery. For example, they lobbied the government to waive certain taxes on some inputs, and they are lobbying for the waiving of some duties on agricultural machinery, spare parts.

Agricultural Intensification and Diversification

Unknown speaker: We really wanted to focus on intensification from the point of view of getting more output per unit area of land, per unit animal, per unit investment, whether in input, in time, or in space. Looking at the level of application of technology on African farms today, there is a wide gap between what is supplied and what is available even from our national research institutions. Intensification would emphasize that the African farmers should be mobilized to produce more. In fact the continent could be food self-sufficient on a land area far smaller than is the case now. This has wide ranging implications in terms of future, environment, sustainability, etc. Of course, you cannot get more without investing in new seeds or fertilizers, pesticides, etc.

Unknown speaker: I understand that some maize farmers in Zimbabwe get up to 15 t/ha whereas here, from what I can see, farmers are getting perhaps 1.5 to 2 t/ha. Intensification has to be geared toward maximum utilization of that particular land instead of opening more land. The present land size may be quite adequate.

Diversification means that there is no point having so much maize when the land can be used for something else. Diversification has to be governed by market demand. Also, diversification may mean multiple crops.

Perhaps we should start growing cotton and give the maize to the cattle to eat. The most important thing here is that each agricultural unit and each commodity requires a technological product package in terms of how much water is

supplied, how much fertilizer, how much chemical if any. What type of fertilizer? Especially with globalization, there are fertilizers that cannot even be used on certain commodities. So you need people to sell the commodities to other parts of the world. You need to know the whole package of production.

Murtala Nyako: Improve extension delivery, improve fertilizers and chemicals, but lastly improve harvest techniques. There is a big difference in quality if I harvest my mango in Nigeria before 8 a.m. or if I harvest it in the afternoon. If I take it straight to the cool crusher room, the quality will be different. If I harvest it in the afternoon, the mango will be hot and it cannot be crushed before it begins to decay.

Agroprocessing and the Changing Environment

Unknown speaker: Within the agroprocessing task force, we had a strong feeling about the whole issue of post-harvest technology. For the past 30 years, much of the emphasis from the development community has been on preharvest technology. Particularly because of globalization, which imposes high quality standards on agriculture, we believe it is time to shift emphasis to post-harvest technology and market access.

We also believe that post-harvest technology and improved markets access form the engine of a growing agricultural sector. We have ample empirical evidence to support that, e.g., the cassava revolution in Nigeria and rice in Guinea.

One of the strong recommendations we are making is that the theme of the next of these annual workshops be "Promotion of Post-Harvest Technology and Improved Market Access for African Agriculture." We further suggest, that to enliven the workshop, a fair be considered in which different countries could present some of their indigenous agroprocessing equipment that has been enhanced on the basis of traditional assets. There could even be an award for the best products for the indigenous base that has most contributed to the alleviation of poverty.

We feel that this could replace the field trips because we have seen enough. It is time to start showing how the output end of the continuum is working.

CLOSING REMARKS

Globalization, Institutional Change, and Food Security

G. Edward Schuh

In this workshop's opening session, Ayako Sono, chairperson of the Nippon Foundation, commented that food availability is essential to the dignity of all people. That was a powerful way of calling attention to the importance of the subject that has brought us together from all over the world. Chairperson Sono went on to say that after food came education. That is the next point I want to take up.

Yohei Sasakawa, president of the Nippon Foundation, noted in his remarks that the security of human resources is the basis of development. Food security is obviously the key to human survival and thus to the maintenance of our stock of human resources. However, his insightful comment can easily be extended to include education and health care as well.

Finally, President Museveni called our attention to the importance of literacy skills in promoting economic development. That is another implicit appeal for formal schooling and education.

I cite these three comments for two reasons. First, it enables me to emphasize that food security is a poverty issue, not inherently a food production issue. Participants were mostly in agreement on that proposition during the workshop. The point is worth stressing, however, because poverty alleviation is an important key to the human dignity Mrs. Sono referred to.

Second, when we think about poverty alleviation, we know that investments in human capital are the critical issue. Human capital takes many forms: knowledge, technology, institutional arrangements, education, health care, and nutrition, for example. What struck me about the workshop deliberations was that we gave little attention to education at the primary and secondary levels or to health care. These are vital inputs to the modernization of agriculture and to the development process. I hope we can return to these issues in future workshops.

Let me now turn to four themes that emerged in our deliberations: globalization, partnerships and self-help, institutions and policy, and economic integration. These issues constitute an impressive story of how new technology beyond the farm level, at which we tend to focus, is transforming the world in which we operate.

G. Edward Schuh is Regents Professor of International Economic Policy, University of Minnesota, and Orville and Jane Freeman Professor of International Trade and Investment Policy, University of Minnesota. Amy Wenner assisted with data collection.

Globalization

I want to call attention to some significant features of the globalization process. First, it should be noted that this is not the first wave of globalization the world has experienced. There was an earlier wave from about 1880 to the mid-1920s, driven by technological developments similar to those we have experienced recently.

Second, the recent process of globalization has been driven by technological revolutions in transportation, communications, and information technology. These three technological breakthroughs have dramatically lowered the costs of economic transactions and have greatly expanded the scope of markets as the means to organize economic resources.

Third, society is not likely to give up the benefits of these technologies as sources of increased per capita incomes. Hence, the notion that globalization might be shut down, or reversed, just isn't going to happen. To the contrary, the process is likely to become more extensive and more complex. We will be dealing with this process, and its consequences, increasingly as we move into the future.

Fourth, globalization—rooted in these three technological revolutions—is having a profound impact on the world in which we live. It opens enormous opportunities for expanded markets and for the international division of labor. It is dramatically changing where economic policy making and implementation take place, with significant implications for governance, sovereignty, and economic organization. And it is the impetus behind the drive for privatization and increased dependence on markets as the means to organize resources.

The current tendency is to emphasize the negative aspects of globalization. I want to point to some of the positive benefits that go beyond the obvious gains from international trade, which will be discussed later.

First, a more open international economy enables us to make more efficient use of the world's resources. That helps to raise per capita incomes generally in the world, which is an important key to addressing the food security problem.

Second, globalization and the three technological revolutions driving it have forced institutional changes at all levels of our national and international economies. These changes include the shift upward to international institutions of much policy making and implementation; the decentralization of another part of policy making and implementation to state and local levels, together with governance; and the drive for privatization and increased reliance on markets.

These institutional changes create a bewildering and rapidly changing world in which we have to address the challenge of agricultural and economic development. At the same time, these changes are essentially a search for economic efficiency. Thus, they are another important source of increases in per capita incomes—diffuse as they might be.

Partnerships and Self-Help

Another issue that arose in many of the papers and presentations we had was partnerships and self-help. Yohei Sasakawa called attention to the significance of partnerships in his opening remarks when he referred to the importance of the private, public, and international organizations working together.

Many participants commented on the set of tables that I distributed, which cover the countries in which SG 2000 operates (Tables 1 to 5). The tables show, among other things, how relatively insignificant foreign aid is in most of the countries. It is not that the aid is not well-intentioned,

nor that it is used inefficiently. Instead, the point is that the amount is so small that it cannot contribute significantly to economic development. Even if the social rate of return to such investments is as high as 20 percent, when applied to an investment of, say US$25 per capita, the contribution to incomes is indeed modest.

Two important issues surface from these tables. First, most of the resources for economic development must come from domestic sources or from international financial markets. Domestically, that means that much more attention should be given to developing true financial intermediaries to mobilize domestic savings and to devising efficient fiscal policies to capture resources for the public

Table 1. Agriculture as a percentage of GDP, 1990–99. Agriculture remains important in these economies. In some, it accounts for more than 40 percent of GDP. If data on the agricultural labor force as a share of the total labor force were available, the proportions would be even higher.

Year	Benin	Burkina Faso	Ethiopia	Ghana	Guinea	Mali	Mozambique	Nigeria	Tanzania	Togo	Uganda
90	36	31	46	45	23	44	34	32	42	34	53
91	36	33	56	46	23	43	31	30	44	33	49
92	36	32	60	45	22	44	29	23	45	35	48
93	34	34	56	37	23	42	26	24	45	44	48
94	34	32	49	38	21	42	28	28	42	35	46
95	34	32	49	39	21	44	35	31	44	38	45
96	38	33	49	39	21	47	34	30	44	41	41
97	38	30	48	36	22	40	31	32	43	42	38
98	39	30	48	36	23	42	31	37	40	39	41
99	38	30	49	36	23	41	30	n.a.	40	41	40

n.a. = Data not available.

Source: *2001 World development indicators CD-ROM*, World Bank.

Table 2. Total foreign aid per capita (current US$), 1990–99. Foreign aid data—reported as official development assistance—exclude such things as the assistance from international foundations. Nevertheless, the data show how relatively insignificant international assistance is as a means to raising per capita incomes. Moreover much of this money goes for food aid, an important part of which should be treated as a consumption item, not an investment. Although international assistance can be strategically very important, this table makes clear that much of the resources to promote economic development must ultimately come from domestic sources. That suggests the importance of establishing true financial intermediaries to mobilize domestic savings, of attracting foreign savings for domestic investment, and of instituting appropriate fiscal policies to collect revenue for investing in domestic institutions.

Year	Benin	Burkina Faso	Ethiopia	Ghana	Guinea	Mali	Mozambique	Nigeria	Tanzania	Togo	Uganda
90	28.53	22.94	9.68	45.02	59.60	29.43	50.20	3.87	46.43	49.61	46.43
91[a]	6.32	6.61	0.36	6.29	9.51	7.56	6.09	0.23	6.71	5.41	6.71
92	37.77	24.66	10.08	49.98	47.98	24.36	109.59	5.28	34.76	40.55	34.76
93	39.78	31.98	16.58	34.65	33.58	32.96	61.56	2.92	44.92	1.51	44.92
94	39.77	32.23	9.21	29.10	24.70	45.14	62.24	0.75	21.20	3.69	21.20
95	52.30	36.67	11.06	42.44	28.41	37.31	38.87	0.26	14.90	30.30	14.90
96	34.21	21.27	9.86	40.84	32.03	33.13	39.39	0.38	18.85	38.28	18.85
97	25.40	26.74	9.57	21.02	56.80	35.48	47.99	0.11	29.82	27.20	29.82
98	28.56	27.60	22.58	34.97	34.24	38.52	47.52	0.31	28.04	27.12	28.04
99	14.43	16.46	1.20	9.10	7.41	13.80	10.52	0.11	5.09	7.32	5.09

a/ Anomalously low values for 1991 are unexplained by the source of these data.

Source: Population data from *2001 World development indicators CD-ROM*, World Bank. Aid data from *International development statistics CD-ROM*, Development Assistance Committee (OECD).

Table 3. Agricultural foreign aid per capita (current US$), 1990–99. International assistance for agriculture is a relatively small share of total foreign assistance, despite the importance of agriculture in the national economy. Considering that rural poverty accounts for a large share of total poverty, the disparity is even greater, especially in light of the rhetoric from the international community about the urgent need to address the poverty issue.

Year	Benin	Burkina Faso	Ethiopia	Ghana	Guinea	Mali	Mozambique	Nigeria	Tanzania	Togo	Uganda
90	3.19	8.08	3.63	4.43	18.76	14.04	15.45	0.21	15.07	9.70	9.23
91	0.00	0.25	0.00	0.10	0.67	3.09	0.64	0.07	0.35	2.15	0.19
92	3.17	7.81	1.22	13.55	8.82	5.67	6.85	0.31	6.52	2.42	2.93
93	2.02	10.90	1.43	2.15	10.72	6.87	7.51	0.24	4.86	0.27	3.49
94	3.33	5.56	2.48	6.97	4.39	11.72	5.30	0.26	2.23	2.39	7.09
95	6.30	4.59	3.82	2.26	8.14	4.09	4.73	0.00	2.17	3.29	1.53
96	6.05	4.90	2.62	1.29	10.56	6.07	7.75	0.00	2.66	4.85	1.88
97	6.17	9.53	1.16	5.54	4.26	6.98	3.12	0.02	4.96	7.14	2.12
98	4.16	2.47	2.92	1.50	5.00	4.39	4.86	0.01	2.45	2.35	2.26
99	0.72	1.38	0.13	0.56	1.69	4.35	0.32	0.00	0.10	0.06	0.15

Source: Population data from *2001 World development indicators CD-ROM*, World Bank. Aid data from *International development statistics CD-ROM*, Development Assistance Committee (OECD).

Table 4. Economic indicators, 1990–99. Foreign debt as a share of gross national income (GNI)[a] is an overwhelming problem in some countries. Also evident is the extent to which debt service absorbs revenue from exports, leaving little for the acquisition of modern inputs and other factors needed for economic growth and development.

Year	GNI/capita (current US$)	Net current transfers[b] (% of GDP)	Share of GNI (%) Debt	Share of GNI (%) Debt service	Debt service (% of exports)	Share of GDP (%) Exports	Share of GDP (%) Imports
				Benin			
90	360	5.3	72	2.1	8	14	26
91	380	7.6	72	1.7	5	16	28
92	370	10.2	87	1.8	4	15	29
93	380	6.3	70	1.6	5	14	28
94	340	7.1	109	2.8	6	20	30
95	350	6.0	82	2.5	7	20	33
96	350	3.4	74	2.1	6	16	30
97	380	3.5	77	2.6	9	16	29
98	380	3.8	72	2.7	9	17	28
99	380	4.7	72	3.0	11	17	28
				Burkina Faso			
90	290	12.0	30	1.2	7	13	26
91	320	11.3	35	1.7	10	12	27
92	290	17.0	52	1.7	7	10	24
93	240	15.8	55	1.9	9	12	26
94	210	13.8	61	2.4	12	13	26
95	220	11.2	54	2.1	11	13	28
96	240	7.8	51	1.9	12	11	29
97	240	6.2	55	2.2	14	11	28
98	240	7.2	55	2.1	11	14	31
99	240	5.5	59	2.5	16	11	29
				Ethiopia			
90	160	3.2	127	3.5	35	8	12
91	120	4.3	173	2.6	25	6	13
92	110	6.7	169	2.0	24	4	11
93	120	5.7	158	1.5	18	8	17
94	110	6.8	209	2.3	20	10	20
95	110	7.9	180	2.7	19	14	22
96	110	7.4	169	5.8	42	13	28

continued

Table 4 (continued).

Year	GNI/capita (current US$)	Net current transfers[b] (% of GDP)	Share of GNI (%) Debt	Share of GNI (%) Debt service	Debt service (% of exports)	Share of GDP (%) Exports	Share of GDP (%) Imports
97	110	4.1	160	1.6	10	16	26
98	100	5.3	159	1.8	11	16	28
99	100	4.7	87	2.5	17	14	29
				Ghana			
90	390	7.0	67	6.4	37	17	26
91	410	6.4	68	4.7	27	17	26
92	430	7.3	72	5.1	28	17	29
93	420	8.7	84	5.3	25	18	34
94	370	8.7	103	6.9	26	22	34
95	370	8.1	94	6.4	25	24	33
96	380	6.9	94	7.1	27	32	40
97	390	8.1	93	8.2	33	32	53
98	390	9.8	94	7.9	22	34	47
99	400	8.0	91	6.9	20	34	50
				Guinea			
90	460	2.5	93	6.3	20	31	31
91	470	2.9	92	4.8	16	23	23
92	520	4.0	84	2.8	13	19	26
93	540	6.0	89	2.6	11	20	26
94	550	6.1	92	2.9	14	22	26
95	560	4.8	90	4.9	25	21	24
96	580	2.7	86	3.0	15	19	24
97	560	3.1	96	4.2	21	20	23
98	520	3.4	103	4.6	20	23	25
99	490	2.3	103	3.9	16	21	24
				Mali			
90	270	9.3	103	2.8	12	17	34
91	270	10.8	107	1.9	8	18	35
92	320	10.6	102	2.1	10	15	33
93	300	8.6	108	2.9	13	16	31
94	250	13.6	155	5.1	17	23	43
95	250	8.9	122	3.6	13	21	36
96	240	7.5	117	4.5	18	20	36
97	260	5.1	130	3.5	11	26	37
98	250	n.a.	126	3.2	11	24	34
99	240	n.a.	126	4.2	14	25	36
				Mozambique			
90	170	17.8	197	3.3	26	8	36
91	170	20.1	202	3.5	23	11	38
92	140	25.5	289	4.7	23	14	47
93	140	23.9	271	6.4	33	13	48
94	140	24.9	352	6.0	31	14	48
95	140	14.2	338	7.4	34	15	40
96	160	7.8	278	5.2	26	12	35
97	180	8.9	229	3.1	18	11	28
98	210	8.0	225	2.8	18	10	27
99	220	n.a.	187	3.3	20	12	38
				Nigeria			
90	270	0.3	131	13.0	23	43	29
91	270	2.7	135	11.8	22	37	31
92	290	2.3	98	12.6	29	42	40
93	240	3.8	62	7.8	12	47	50
94	220	2.1	155	8.8	18	42	41
95	210	2.8	132	7.1	14	44	42
96	240	2.7	95	7.6	14	48	27

continued

Table 4 (continued).

Year	GNI/capita (current US$)	Net current transfers[b] (% of GDP)	Share of GNI (%) Debt	Share of GNI (%) Debt service	Debt service (% of exports)	Share of GDP (%) Exports	Share of GDP (%) Imports
97	270	5.3	84	4.2	8	45	38
98	260	4.9	104	4.5	11	33	38
99	260	3.7	93	2.9	6	36	42
				Tanzania			
90	190	13.2	158	4.4	33	13	38
91	180	9.5	137	4.3	40	10	34
92	170	13.4	151	5.3	40	12	39
93	170	12.0	166	5.2	27	18	48
94	160	8.0	166	4.2	19	21	44
95	160	7.5	144	4.5	18	24	42
96	190	6.7	115	4.3	19	20	32
97	210	5.2	94	2.2	13	16	28
98	240	6.5	89	2.9	21	13	27
99	260	6.1	91	2.2	16	13	28
				Togo			
90	430	8.1	80	5.4	12	34	45
91	430	6.9	85	3.4	8	33	42
92	440	5.3	80	2.2	6	27	36
93	340	5.1	106	2.2	7	24	32
94	320	8.2	155	2.5	5	30	34
95	310	9.0	116	2.3	6	32	37
96	320	5.8	102	4.0	10	31	39
97	350	6.6	90	3.8	10	33	41
98	320	6.3	104	2.9	8	32	43
99	310	n.a.	109	2.9	8	30	40
				Uganda			
90	340	1.8	61	3.4	59	7	19
91	260	2.4	85	4.6	74	8	22
92	200	4.8	106	4.1	57	9	24
93	190	3.4	96	5.0	65	7	21
94	190	7.6	86	3.8	43	9	19
95	250	5.7	63	2.4	20	12	21
96	290	7.0	61	2.5	20	12	23
97	320	5.1	62	2.5	18	13	21
98	310	8.0	59	2.4	24	10	20
99	320	5.8	64	2.9	24	11	23

n.a. = Data not available.

a/ Revised accounting for what formerly was called gross national product. b/ Official transfers such as aid, as well as private transfers including labor remittances from workers abroad.

Source: *2001 World development indicators CD-ROM*, World Bank.

sector. This is a critical issue, and one that ministers of agriculture and others concerned with agriculture should all work toward.

To mobilize savings from the international economy, policy makers and the private sector must turn to international financial markets. If developing countries hope to catch up with the now-developed countries, they need to access this pool of savings. The key to doing that will be sound domestic policy plus efforts to raise productivity. Although relying on foreign sources of funds for development purposes may be unpleasant to some, policy makers have to recognize that foreign aid is not likely to be forthcoming in the amounts that can contribute significantly to the economic development of their countries.

The second issue I want to stress is the importance of deleting the concept of for-

Table 5. Exports and imports (US$ millions), 1990–99. Data on exports and imports allow verification of whether the share of export earnings going to debt service declined because of an increase in exports or for some other reason. The data show the importance of increasing exports and of international trade and exchange-rate policies. Export earnings are needed to service the debt and to provide the means of importing the inputs and services required to further economic growth and development. This further emphasizes the importance of increased competitiveness through productivity-enhancing investments in agriculture and the importance of regional economic integration.

	Benin		Burkina Faso		Ethiopia		Ghana		Guinea		Mali	
Year	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
90	376	492	367	776	676	1,140	990	1,624	841	1,114	442	889
91	544	902	354	760	547	1,304	1,108	1,782	847	1,224	466	900
92	535	774	323	686	459	1,166	1,115	1,962	685	1,060	470	1,011
93	578	769	312	707	514	1,366	1,220	2,297	767	1,010	477	898
94	559	655	281	521	563	1,187	1,397	2,123	975	1,131	413	816
95	638	926	345	691	809	1,356	1,596	2,263	713	1,109	538	1,040
96	690	806	331	762	825	1,462	1,750	2,557	773	1,053	532	1,001
97	565	795	310	694	1,040	1,716	1,682	2,781	748	955	654	959
98	588	808	412	832	1,060	1,742	2,558	3,672	813	1,088	663	969
99	568	636	334	789	944	1,956	2,599	3,985	818	1,032	656	888

Table 5 (continued).

	Mozambique		Nigeria		Tanzania		Togo		Uganda	
Year	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
90	300	1,164	14,761	9,858	544	1,665	696	912	246	753
91	365	1,211	13,351	12,893	513	1,722	661	912	202	792
92	362	1,214	13,000	11,485	584	1,913	580	809	199	672
93	372	1,321	11,130	12,723	787	2,194	375	521	242	746
94	395	1,427	9,879	12,504	969	1,906	408	545	344	913
95	470	1,254	12,443	15,820	1,297	2,281	473	713	683	1,457
96	540	1,186	16,965	14,409	1,422	2,272	602	841	747	1,668
97	572	1,181	16,252	17,617	1,254	2,130	546	762	863	1,706
98	577	1,320	10,188	16,001	1180	2,527	541	770	676	1,922
99	624	1,819	14,095	14,881	1,246	2,373	521	759	776	1,897

Source: *2001 World development indicators CD-ROM*, World Bank.

eign aid from our lexicon. In its place we should put the concept of international collaboration or cooperation. The notion of foreign aid is demeaning to the recipient, for it connotes a patron-client relationship. More important, foreign aid creates an inappropriate mind-set in the donor countries. It implies that specialists in those countries know how to do it, when in fact they have no monopoly on knowledge.

The SC 2000 program has been articulated as a program of cooperation from the beginning, and it is becoming increasingly collaborative in nature as it evolves. The collaborative research support programs of the U.S. Agency for International Development are similarly articulated and implemented. The advantages of such cooperation and collaboration is that both sides learn from them and that both sides further develop their own human capital.

A related issue is that the donor countries should address issues and problems that are in their own interest. If they should do so, a larger flow of resources will be forthcoming for cooperation and collaboration.

There are many levels at which cooperation and collaboration can be sought. In addition to the developed country/developing country relationship, there is a great deal to be gained from collaboration

and partnerships among countries within sub-Saharan Africa, a point that has been emphasized at this workshop. And beyond that, cooperation among the private sector, the public or government sector, and universities within individual countries has a great deal of potential. I am struck, in particular, at the lack of attention given in the region to universities as sources of knowledge, but that is perhaps a personal bias of mine.

Institutions and Policy

A great deal of attention has been given at this workshop to institutions and policy. I would like to put some emphasis on these issues, with some comments that may help clarify how we might more effectively think about them.

Let me start with the simple proposition that the introduction of new production technology into agriculture is the critical element in providing food security. I believe there was general agreement on that proposition during the workshop. The new technology is productivity-enhancing and thus increases the supply of food. The increased supply of food raises per capita incomes throughout society, and especially among the poor. These increases in per capita incomes are the key element to attaining food security for all.

The important related point, however, is that new production technology doesn't just fall from the sky. It has to be produced in research institutions, and it has to be extended through private and public extension systems. In addition, farmers need to develop their cognitive and literacy skills through education institutions if they are to be able to decode the new knowledge imbedded in the production technology.

At a somewhat different level, the new production technology will not be adopted unless it is privately profitable. The problem in today's complex world is that the price incentives are for the most part shaped by international trade and exchange-rate policies. These macroeconomic policies often seem far removed from the modernization of agriculture. However, they are critical to the adoption of the new technology.

That point underscores the high degree of complementarity between science and technology policy, on the one side, and economic policy, on the other side. Hence, at the same time we are making technological innovations, we typically need to be making institutional innovations—the essence of policy reform. For example, as new technological innovations come along, we need true financial intermediaries to mobilize investment funds to finance their adoption. New, improved land tenure arrangements, intellectual rights, water management systems, food processing, new fertilizer delivery systems, and so on also become necessary. The important point is that without these institutional and policy developments, the process of technological modernization will not go far.

Another example of such a relationship is the biosafety regulations that have emerged in various countries in response to advances with biotechnology. Some features of these regulations seem to be appropriate, but other aspects seem to be driven either by protectionist interests or Luddite fears. These regulations may impede the adoption of much needed technology in poverty-stricken regions of the world, such as in sub-Saharan Africa and parts of Asia. They deserve our considerable attention immediately.

In the context of the larger need for institutional innovation in response to developments in technology, let me also direct your attention to the workshop paper by Knipscheer, Zinnah, and

Mutimba. They call for redefining the extension services as a knowledge management system whose main stock is intellectual capital. This is an important concept, and it indicates how changing technological and economic conditions must be reflected in changes in institutional innovations. This concept is a direct reflection of the burgeoning of new knowledge from multiple sources.

Economic Integration

In the opening session, President Museveni, among other things, stated the important proposition that international trade must be a part of sustained food security. Let me stress a couple of points in that regard. First, at times during the workshop we confused self-reliance with self-sufficiency. The search for self-sufficiency as the basis for food security is surely misguided. It is simply too costly, and wastes too many scarce resources. A nation should use its scarce development resources to realize its comparative advantage, and then trade for what it produces less efficiently. Note that that proposition is just as important for fertilizer and other modern inputs as it is for food.

Second international trade can be as important as an engine of economic growth and development as is the modernization of agriculture. International trade is especially critical for small economies, and most sub-Saharan African countries have small economies. Adam Smith recognized this point hundreds of years ago. He emphasized the division of labor and specialization among the members of the labor force as the source of economic growth, but he noted that this process is limited by the extent of the market as measured by the size of the economy. The significance of this concept is that at the time he wrote there were few other sources of economic growth, and certainly not new technology on the scale we now have.

This basic idea has been revitalized by modern economists and recast in the context of specialization and division of labor among economic sectors. The important proposition that comes from these insights is that to the extent a country is willing to specialize and engage in international trade, there is no limit to its economic growth potential—an enormously uplifting idea. As we address the issue of food security and recognize its basis in poverty alleviation, we need to give more attention to international trade and to being competitive in international markets.

Two additional comments might be made on this issue. First, sub-Saharan African countries are sorely deficient in the physical infrastructure of transportation and communications needed for a modern economy. In agricultural modernization, the transportation inputs needed for production are crucial due to the geographic dispersal of the sector. It is especially true if exports are to become more important, as they must if agriculture is going to contribute to economic growth and development.

Second, diversification and niche-filling are critical elements of becoming more active in international markets. The tendency is to think of traditional export crops such as coffee, cocoa, and cotton when talking about exports. In today's world there is a need to concentrate on feed grains, livestock, specialty crops, and value-added crops. In fact, the main contribution of value-added crops is specifically in this area.

Concluding Comments

We live in a world of incredible change, especially in the economic and institu-

tional dimension of our reality. We need to think differently about our agricultural development efforts, and in particular we need to take account of the rapid realignment of policy making institutions that is taking place and its implications for technology diffusion. Those who think in terms of what the world once was like are sure to be condemned to failure.

The gap in level of technological achievement between the developed and developing countries, and in their level of per capita incomes, is growing ever wider. Countries that lag in the development process have certain advantages, for they can draw on much of the new knowledge generated in the more developed countries and can adopt much of the new technology developed in those countries. However, if the countries lagging in the development process are truly to catch up, they must proceed at a faster pace than the now-developed countries. To do that they must abandon the shibboleths of the past and pull themselves to the frontier of knowledge. That will require the cooperation of all of us.

Closing Session

Israel Kibirige Sebunya

Her Excellency the Vice-President, Dr. Wandira Speziosa Kazibwe, has entrusted me with the task of closing this workshop on her behalf.

During the field visits, some of you joined the vice president in visiting her constituency in Iganga District to see a women's cassava-processing group, an irrigation scheme owned by Iganga Youth and women's groups, a local input stockist, a one-stop center, and SG 2000 activities. These are but a few of the Sasakawa innovations in this country that are changing the farmers' old practices to modern technologies.

Dr. Kazibwe is particularly happy that you spent the last 3 days deliberating issues pertaining to food security. The right to food is a fundamental one. Through your direct interactions with the various stakeholders—from the farm level to government policy makers—and thanks to your involvement in the papers presented during this workshop, she is sure that you have been exposed to the basic challenges of food security and Uganda's natural resource base, thus, enriching your capacity to identify the appropriate strategies for addressing these challenges.

The Government of Uganda's Plan for Modernisation of Agriculture has driven the process of transforming subsistence farmers to market-oriented farmers.

Dr. Kazibwe was the minister of agriculture for 4 years, and during her term, we created a framework around which tangible projects to change farmers' productivity were adopted. She has been at the forefront of this effort at the policy and field level in partnership with SG 2000. Through her office, we have successfully launched a pilot voucher system that targets rural women. We have also begun water production schemes for training rural youth. The results clearly show that Africa's food security can be transformed rapidly. She urges other donors and would-be partners to expand on these efforts so that we can scale up the impact collectively.

The strategies developed by this workshop to confront food security challenges should form a foundation for tackling the hunger that has long loomed across Africa.

The vice president is heartened by the presence of seven ministers here today. It signifies the commitment of African governments to ensure food security and the welfare of the people. She is looking forward to the impact of the African Green Revolution, which, it is hoped, will be spearheaded by SG 2000.

With these few remarks, the vice president sends her greetings. She is delighted that you spent this time here in Kampala, and she hopes that you will come again.

Israel Kibirige Sebunya is Minister of State for Agriculture, Uganda.

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African Food Security in a Changing Environment: Sharing Good Practices and Experiences, held in Kampala, Uganda, June 6–9, 2001.

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