

INSTITUTIONS AND THE AFRICAN FARMER

Carl K. Eicher

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Issues in Agriculture 14

CARL K. EICHER



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Issues in Agriculture is an evolving series on topics connected with agricultural research and development. The series is published by the Secretariat of the Consultative Group on International Agricultural Research (CGIAR) as a contribution to informed discussion on issues that affect agriculture. The opinions expressed in this series are those of the authors and do not necessarily reflect a consensus of views within the CGIAR System.

About the Consultative Group on International Agricultural Research (CGIAR)

The CGIAR is a unique global partnership with a compelling worldwide agenda. Established in the early 1970s, the CGIAR works to promote food security, poverty eradication, and the sound management of natural resources throughout the developing world. It is the largest scientific network of its kind.

CGIAR pursues these objectives through the activities of 16 international research centers. CGIAR Members—58 industrial and developing countries, private foundations, and regional and international organizations—provide vital financing, technical support, and strategic direction. A host of other public and private organizations work with the CGIAR as donors, research associates, and advisors.

The need for a special partnership within the agricultural research community focused on fighting hunger and poverty through productivity-oriented research was first recognized in the late 1960s, in response to the specter of widespread famine in parts of Asia. Leaders from 18 international organizations, foundations, and concerned governments formally joined together in 1971 as the first Members of the CGIAR. Through their continuing support, hundreds of new wheat and rice varieties were developed, released, and planted in developing countries, adding an estimated US\$50 billion to the value of world food supplies over two decades.

To build on these achievements, new CGIAR Centers were founded to work with national research institutions in pioneering improvements in other key food crops, such as legumes, roots, tubers and other cereals, and to concentrate on better management of livestock. Centers were established to work on the problems of dry, semi-arid, and tropical regions, and to conduct research on forestry, agroforestry, water management, fisheries and marine resources. Centers were also set up to analyze national and international food policies, and to build the capacity of agricultural research at the national level.

Today, 16 CGIAR Centers around the world are harnessing cutting-edge knowledge to help meet the world's enormous food needs—with a steadfast allegiance to scientific excellence and the public welfare. The advances made through CGIAR research are international public goods; new plant varieties, pest control methods, and resource management technologies are available free to all interested parties.

CGIAR's Mission: *To contribute to food security and poverty eradication in developing countries through research, partnership, capacity building, and policy support, promoting sustainable agricultural development based on the environmentally sound management of natural resources."*

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Abstract: Getting African agriculture moving is the most complex and demanding task facing policymakers, agricultural scientists, and donors over the coming 25 years. This publication, based on the text of a presentation given at the CIMMYT Economics Program's third Distinguished Economist lecture, examines Africa's empty harvest in historical perspective and analyzes the failure of agricultural institutions imported from other continents (e.g., T&V extension and the land grant university model). The author argues that there is an urgent need for African agriculturalists to experiment with different agricultural institutions and to craft national "agricultural knowledge triangles" that include research, extension, and agricultural higher education. Africa's universities are the weak link in the agricultural knowledge triangle. The lecture then analyzes the reasons underlying the erosion in the capacity of Africa's faculties of agriculture to offer high quality graduate training in agriculture. Taking the long view of building sustainable agricultural institutions, the author outlines eight challenging puzzles that require debate and further study: creating a good institutional environment; crafting agricultural knowledge triangles; the case for long-term scientific assistance; the expanded aid agenda; changing roles of public and private institutions and NGOs; institution building versus marginalist approaches; strategic issues in improving the quality of graduate education; and "whither the CGIAR."

Acronyms and Abbreviations

ACBI	African Capacity Building Initiative
AERC	African Economic Research Consortium (Nairobi)
AIDS	Auto Immune Deficiency Syndrome
AKIS	Agricultural Knowledge Information System
ASARECA	Association for Strengthening Agricultural Research in Eastern and Central Africa
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo (International Maize and Wheat Improvement Center)
CORAF	Conférence des responsables de recherche agronomique en Afrique de l'Ouest et du Centre
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic Product
GNP	Gross National Product
ICW	International Centers Week
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IRD	Integrated Rural Development
ISNAR	International Service for National Agricultural Research
KARI	Kenya Agricultural Research Institute
NARI	National Agricultural Research Institute
NARS	National Agricultural Research System
NGO	Non-governmental Organization
OAU	Organization of African Unity
R&D	Research and Development
SACCAR	Southern African Centre for Cooperation in Agricultural and Natural Resources Research and Training
SADC	Southern Africa Development Community
SPAAR	Special Program for African Agricultural Research
T&V	Training and Visit (extension model)
UDP	University Development Program
USAID	US Agency for International Development
USDA	US Department of Agriculture
WARDA	West Africa Rice Development Association

Institutions and the African Farmer

CARL K. EICHER

We have to work with some hope that there is a new generation, a group of survivors who have learned something from the disaster.

– Chinua Achebe, 1979

African hunger and famine have lost their shock value, but not their impact. People are hungry. AIDS has joined famine as a silent killer. And after 40 years of independence, African leaders and Africa's institutions have failed their people. Donors and academics share this onus. Indeed, prospects appear bleak in a land of promise.

Africa is muddling through, ill-prepared to cope with the awesome task of dealing simultaneously with short-term food emergencies and the long-term challenge of feeding an extra half billion people over the next 20 to 25 years. Afro-pessimism has spread like a plague across the continent, invading the spirit of Africans and undermining the resolve of academics and foreign aid workers. Africa's chronic food crisis engulfs the continent like harmattan dust from the Sahara. To be sure, the harmattan will return every year, but there is no valid reason why Africa's agricultural crisis cannot be solved.

The primary cause of Africa's underdevelopment is a seamless web of internal and external factors rather than a single source such as colonialism, geography, a lack of technology, corruption, or the exploitative economic policies of both the North and the South. At the dawn of independence in the late 1950s and early 1960s, industrial fundamentalism ruled the day. Agriculture was viewed as a backward sector with slim prospects of becoming the motor of

development. It was assumed that industry could be developed in isolation from agriculture and that rapid industrialization would enable new nations to leapfrog over the agrarian stage and catch up with industrial nations by the year 2000. Industrialization, however, has failed to materialize and the continent is mired in an agrarian stage of development with two-thirds of its people deriving their livelihood from agriculture and the rural economy.

Africa's empty harvest of food crops and the loss of markets for some of its traditional export crops represent a tragedy in a land of agricultural potential and a continent of hard-working people with a thirst for education, healthy babies, and a better life. Many countries in Africa have enormous physical potential to produce food and traditional agricultural exports for themselves, neighboring countries, and international markets. But Africa's vast agricultural potential is not being tapped. Tapping this potential is a major challenge for the African scientific community and the CGIAR system.¹ Unfortunately, the recent report by the expert panel on the future of the CGIAR does not shed much light on Africa's agrarian crisis (CGIAR 1998). The report, prepared under the leadership of Maurice Strong, devotes one of its 29 recommendations to the African crisis. However, the Africa recommendation consists of eight banal "assignments" to CGIAR centers without either identifying which center activities should be shelved in order to finance an expanded program in Africa or, alternatively, citing a source of additional financial resources for the proposed assignments.²

¹ *The CGIAR is an umbrella organization that oversees the work of the 16 international agricultural research centers.*

² *Africa Recommendation: "The Panel recommends a special collaborative focus on Africa that incorporates the following elements . . . (1) Promote national/regional consultative processes for agricultural research and development; (2) Set up an African Capacity Building Initiative for Sustainable Food Security as a major inter-Center initiative; (3) Set up a task force to develop a special focused program for African food security; (4) Launch a well-planned Lab to Land Program; (5) Develop research programs in urban and peri-urban agriculture; (6) Emphasize modern ecological farming methods; (7) Set priorities on staple or relevant food crops; and (8) Promote partnerships between strong NARS from various parts of the world and strategic African NARS" (CGIAR 1998).*

Africa is also facing human capital degradation and institutional decay arising from the AIDS pandemic, the decline in the quality of its universities, and the on-going brain drain (African Development Bank 1998). Currently, most of the 48 nations in sub-Saharan Africa do not possess the political commitment and the minimum threshold of scientific capacity to benefit from, and contribute to, the information and biotechnology revolutions that are now being thrust upon Africa (Maredia and Erbisich 1998). Although there is much palaver in donor circles about capacity building in Africa, many key players such as the CGIAR, NGOs, and US and European universities have neither the mandate or the resources to make an effective and sustainable contribution to resolving Africa's human capital degradation. This problem needs to be addressed first and foremost by Africans during the next 25 to 50 years. The degradation of human capital in agriculture has important implications for Africa's future development prospects, as well as for donors, international organizations, and universities in industrial countries.

Yet increased donor aid is not the answer to Africa's empty harvest or to its human capital degradation. Over the past decade, Africa has received US\$ 64 billion of donor assistance to carry out policy reforms, but the results have been disappointing (Collier 1997). A World Bank study, *Assessing Aid: What Works, What Doesn't, and Why* (1998), recently concluded that the success of policy reforms is crucially dependent upon "a good institutional environment." Before proceeding, it is important to define institutions and organizations. Economic historian Douglass North, who has long argued that a distinction must be made between institutions and organizations (North 1990), defines institutions as the rules (the legal system, financial regulations, and property rights) that nurture, protect, and govern the operation of a market economy. By contrast, organizations refer to universities, extension services, and cooperatives that carry out specific missions in society.

In his 1993 Nobel lecture in Stockholm, North argued that the field of development economics was stalled because neoclassical economists assumed away the importance of institutions and time (North 1998). He contends that the major challenge facing poor nations in Africa, Asia, and Eastern Europe is to develop the consistent and transparent institutions that are essential for the effective performance of organizations. The practical implication of North's argument is that organizations such as universities and extension systems can expand and flourish with the inflow of donor support, but they are likely to be unsustainable in countries that do not have political leaders and farm organizations working together to create and sustain "a good institutional environment."

The nagging problem, however, is that the present knowledge base on how to create a "good institutional environment" in African nations is woefully inadequate. Likewise, the knowledge base on how to craft effective demand-driven organizations to help poor African farmers, traders, and the owners of micro-enterprises is seriously lacking. In the balance of this paper, I shall focus on how to strengthen the core organizations for a modern agriculture: national agricultural research systems, national extension services, and universities.

Since two-thirds of the people in Africa derive their livelihood from agriculture, it follows that effective agricultural institutions are a *sine qua non* for getting agriculture moving in Africa. But it is difficult to secure financial support for designing and testing new institutional models because of the "naive institutional optimism" that pervades many donor agencies. This false optimism assumes that African nations can import institutional models from other continents (e.g., Grameen Bank, Green Revolution package programs, the T&V extension model, and agricultural university models from India and the USA), thereby short-circuiting the time-consuming process of building indigenous institutions through a trial and error and learning-by-doing process.

Without question, the magnitude of the institution-building task in Africa is more daunting than it was in India in the 1960s, when three major international organizations helped that country build a system of agricultural institutions.³ By contrast, in Zambia in 1996, there were 180 different agricultural projects being financed by a dozen major donors. The challenge now is to merge, reshape, and craft a coherent system of public and private agricultural support institutions in Zambia and other African nations. Building effective institutions is an onerous task because of the plethora of donors and the thousands of NGOs that are awkwardly trying to make the transition from their proven role in food relief to becoming effective agents of agricultural development (White and Eicher 1999).

This lecture covers four topics: Afro-pessimism and what can be learned from a similar wave of pessimism that blanketed Asia in the 1960s; what has been learned about the causes of Africa's empty harvest; capacity building in agriculture with an emphasis on the *agricultural knowledge triangle* that comprises three interlinked institutions (teaching, research, and extension); and, in closing, institutional challenges for debate and further study. Special attention will be devoted to the sharp decline in the quality of African university education, human capital degradation, and the "meltdown" in the capacity of African universities to offer high-quality graduate education. Unfortunately, this meltdown is occurring at the same time that donors have "pulled the plug" on scholarships that enable African agriculturalists to study overseas.

Afro-Pessimism: Lessons from Asia and Latin America

Afro-pessimism is flourishing in Africa today. It reflects the sense of hopelessness that Africans feel about on-going civil wars, corruption, urban violence, AIDS, and the limited success of foreign

³ *The Ford Foundation helped India strengthen its national extension service; the Rockefeller Foundation assisted with building research capacity and a graduate school for agriculture; and USAID helped finance a network of state agricultural universities (Mellor 1976; Busch 1988).*

aid in improving the welfare of the average person. Today's Afro-pessimism stands in sharp contrast to the optimism of the 1960s when Africa was a modest net exporter of food. At independence in 1960, the absence of a food crisis and the fervent belief in industrialization help explain why many of Africa's new leaders shunned agriculture and announced bold plans to catch up with industrial nations by the year 2000. This optimism was shared by many economists. In 1967, the World Bank's chief economist identified seven African countries with "the potential to reach or surpass" a 7% annual economic growth rate (Kamarck 1967). But reality intervened and every one of the seven countries registered *negative* per capita growth rates over the 1970–1988 period.

Yet Asia's development experience reveals that a bleak economic future for Africa in the twenty-first century is not foreordained. There are scores of cracked crystal balls in economic forecasting. Even Nobel Laureates such as Gunnar Myrdal can widely miss the mark. Myrdal was pessimistic about Asia's development prospects in the late 1960s because of corruption, "soft states," rapid population growth, and the gloomy prospects for agriculture. But Myrdal failed to anticipate Asia's Green Revolution, which was taking root at the same time that his book, *Asian Drama*, was rolling off the press in 1968. The rapid spread of Green Revolution wheat and rice varieties in Asia in the late 1960s and early 1970s and China achieving the fastest rate of agricultural growth in the world from 1980 to 1995 highlight the perils of economic forecasting.

Myrdal was not the only economist who was pessimistic about Asia's development prospects in the 1950s and 1960s. In World Bank reports in the 1950s, both the Republic of Korea and Taiwan were considered to have poor development prospects. At Ghana's independence in 1957, Korea, Malaysia, and Ghana had the same annual per capita income of around US\$ 350. But Malaysia quickly

displaced Nigeria as the world's largest palm oil exporter and, today, Malaysia's R&D-driven oil palm industry is a strong competitor with the USA and Brazil in the world edible oil markets (Jenkins and Lai 1992). In addition, Asian farmers today are routinely producing rice for African palates. Senegal, for example, is importing around 1,000 t of rice every day of the year, mainly from Vietnam, Thailand, and Pakistan. China's agricultural sector grew at an annual rate of 5.9% during 1980–1990 (World Bank 1999), more than triple the 1.6% average agricultural growth rate in the USA and Japan over the past hundred years (Hayami and Ruttan 1985). Although China is still a poor country, with an average per capita income of around US\$ 2.50 a day, it has increased family food security and banished famine. The average male life expectancy in China is now 71 years, just six years short of that in the USA (World Bank 1999). Finally, Bangladesh, long considered a "basket case," has recently emerged as an agricultural success story (Ahmed, Haggblade, and Elahi, forthcoming). The collective lesson Africa can draw from Asia's agricultural development experience is straightforward: The past is not a blueprint for the future!

Latin America's development experience also illustrates the role time plays and the importance of viewing development as a process of learning-by-doing. Most countries in Latin America have been independent for more than 150 years. Brazil, for example, became independent in 1822, some 138 years before Nigeria regained its freedom in 1960. During its first hundred years of independence, Brazil's agricultural economy was typified by numerous coffee booms and busts, but today it is bubbling with agricultural innovations. Brazil has recently emerged as an agricultural powerhouse and its farmers are formidable competitors with American farmers in the global markets for soybean, frozen orange juice, and chicken. Soil scientists have solved the aluminum toxicity problem posed by the Cerrados soils in central Brazil, and local farmers are producing an average of 7.8 t/ha of grain compared with

7.5 t/ha of maize in the US corn belt.⁴ Other Latin American countries have also emerged as aggressive competitors in global food markets. Chile's booming exports of grapes, citrus, kiwi fruit, and wine lend additional optimism to Latin America's agricultural development story. Who would have imagined back in the 1960s that Brazil and Chile would have acquired the technical and managerial capacity to go head to head with US agribusinesses in global food markets? To summarize, the agricultural development experience of Asia and Latin America counters the Afro-pessimism that contaminates Africa.

Nevertheless, despite the poor track record of economic forecasters, doomsday scenarios for Africa continue to be cranked out by Western journalists. The celebrity peddler of Afro-pessimism is Robert Kaplan, an American geopolitical travel specialist who recently incorporated the findings of a two-month tour of West Africa into a globally-based book, *The Ends of the Earth* (1996). A reviewer concluded that "global books such as Kaplan's are exercises in selling fear more than understanding" (Gourevitch 1996).

To summarize, political and economic forecasts for developing countries have proven to be far off the mark. Unfortunately, many instant experts on Africa, such as Kaplan, are reinforcing Africa's sense of failure rather than shedding light on what Africans can do to take charge of the development agenda and begin the ascent to a better tomorrow.

Africa's Empty Harvest in Historical Perspective

The vast, complex, and diverse continent of Africa defies easy generalizations. But after 40 years of independence, five basic facts emerge from Africa's development experience:

⁴ Soil scientists discovered that the soils in central Brazil become depleted after 2–3 years of continuous cultivation. But with the application of lime, phosphate fertilizer, and erosion controls, the soils are highly productive (Sanchez et al. 1982).

- ◆ Africa has an average annual per capita GNP of US\$ 500 (World Bank 1999).
- ◆ Africa's life expectancy is low, and it is falling in some countries because of AIDS. Life expectancy is one decade less than that of South Asia and almost two decades less than that of China.
- ◆ Africa's empty harvest has been dominated by two interrelated food policy problems: short-term food emergencies and a long-term food production gap.
- ◆ The volume of many of Africa's traditional export crops has fallen since the early 1970s, resulting in a decline in export earnings, income, and employment for rural people.⁵
- ◆ Africa's development crisis is far more than economic in nature. The lack of political leadership, the dearth of farm organizations, and the general absence of a "good institutional environment" explain why the crisis will not yield readily to economic prescriptions.

Africa's empty harvest in both food and traditional export crops should be examined together and in historical perspective. Agricultural exports in the continent were buoyant in the 1950s and 1960s, but the volume of traditional agricultural exports declined sharply in the 1970s. Beginning in 1973, Africa became a net food importer. As we dig deeper, we find that virtually every African and Western agricultural economist was slow to recognize that Africa's growing food imports in the 1970s represented the beginning of a chronic food gap. This oversight was clouded by Africa's land abundance and a conviction that the 1968–1974 drought in the Sahelian region of West Africa was a transitory event, rather than the beginning of a decline in Africa's long-term capacity to feed itself.

⁵ By 1988, Africa's total export earnings were less than those of Singapore, a country of 2.5 million people (Summers 1988). If Africa had maintained its global share of nonpetroleum exports, it would have generated an additional US\$ 10 billion in revenue each year during the 1970s, an amount approaching its total annual foreign aid receipts during that period.

Africa's empty harvest was unambiguously identified as a chronic problem in seminal reports by the FAO (1978) and the USDA (1981). Both reports urged African governments to pursue a disciplined strategy to increase food production over the long run. Nevertheless, most African leaders failed to act on those two reports.⁶

The Honorable Tom Mboya, Kenya's charismatic Minister of Economic Planning, was a lonesome advocate for boosting food production in the 1960s. In 1967, Mboya addressed the opening meeting of the Economic Commission for Africa and argued:

A food programme for Africa must be intimately related to the needs of the rest of the world. Our aim is not self-sufficiency; it is to become a major net supplier to the rest of the world. No matter how successful our efforts are to industrialize, it remains a fact that Africa will be for many generations, primarily a producer of agricultural and other primary products. We must learn to do it well and on a rapidly growing scale. This will require a massive frontal attack, not only on the research needs to which I have already referred, but also on the practical problems of production, storage, and marketing" (Mboya 1967).

Africa's food crises should be viewed in historical perspective. The 1918 rice riots in Tokyo were caused by the same basic food production shortfalls that India experienced in the mid-1960s, China in the late 1960s and early 1970s, and Africa in the 1970s and 1980s. The interesting question is: Why didn't African leaders take steps to meet the crisis? There are several explanations that taken together may help us understand this conundrum. First, there was the fervent belief among African political leaders that industrialization was the expressway to prosperity and that food aid could help feed the cities and address food emergencies. Second, the Cold War induced dependency and rewarded predatory regimes, regardless of their

⁶ See the Report on India's Food Crisis and Steps to Meet It that was prepared by a team of American and Indian agricultural scientists under the sponsorship of the Ford Foundation (Government of India 1959).

development priorities.⁷ Third, except in a few countries, there was an absence of political power of farmers, which could present a countervailing force to the prescribed development plans. In countries such as South Africa, Zimbabwe, and Kenya, however, large-scale commercial farmers were politically powerful and effective in making the case for agriculture. Fourth, the delay in facing up to Africa's long-term food production crisis was linked to the ready availability of food aid, a by-product of the subsidized agricultural policies of the North in the 1970s and 1980s. Although food aid can be praised for its role in addressing short-term food emergencies, the ready availability of "food aid subscriptions" delayed the day of reckoning.⁸

The fifth reason for the delay in implementing a long-run food production strategy was the shift in donor assistance strategies in Africa from economic growth and institution building in the 1960s to the premature broadening of the development agenda in the 1970s. World Bank President Robert McNamara led the charge to shift from an economic growth paradigm to a broader development paradigm in Africa. In his speech before the 1973 annual meeting of the World Bank in Nairobi, McNamara (1973) committed the institution to integrated rural development (IRD) to directly attack Africa's rural poverty and underdevelopment. Because of the World Bank's influence, most bilateral donors jumped on the bandwagon and marshaled technical and financial resources to help Africans prepare and implement IRD and area development projects. But in retrospect, Africa's adoption of the second generation agenda was premature

⁷ W. Arthur Lewis described the African leaders on the Cold War dole as the rogues of Africa: Mobutu of Zaire, Banda of Malawi, and Kaunda of Zambia.

⁸ I recall a senior foreign aid official in Nairobi in the 1970s commenting that food aid (for development) was a "plague across the continent" because it took the pressure off African governments to reorder development priorities in favor of agriculture. Later at a SADC meeting in Zambia in 1985, I recall a permanent secretary in a SADC Ministry of Agriculture commenting that food aid had taken the pressure off the Ministry of Finance to increase the budget of the Ministry of Agriculture.

and the results fell as short as the “war” on rural poverty in the United States in the 1960s.⁹

To summarize, the African response to its empty harvest in food and export crops has been sporadic. But development is a cumulative process that is built on a foundation of learning from false starts, poisoned gifts, pilot projects, and occasional successes (Hirschman 1967). Viewing development as a cumulative learning experience entails sifting through the evidence in the hope that a new generation of survivors has learned something from Africa’s experience. Indeed, valuable insights have been gained about the command system versus the market, agrarian capitalism and socialism, the false dichotomy between food crops and cash crops, the folly of developing industry in isolation from agriculture, and the power of special interest groups in pressuring politicians in industrial nations to broaden the development agenda (Stiglitz 1998). By looking back 40 years, we have gleaned some insights that may be helpful in understanding the causes of Africa’s empty harvest and how to get African agriculture moving again. Essential to understanding the situation are the intertwined phenomena of time optimism¹⁰ and catching-up.

Time Optimism and Catching-Up

Africa’s 40 years of independence have been overlaid with an understandable time optimism and a penchant to catching-up with industrial nations in a few decades. The distinguished political scientist Crawford Young recalls:

⁹ *The IRD direct attack on rural poverty failed in the Appalachian region of the USA (during Lyndon Johnson’s presidency), just as a similar program (community development) failed in some 60 countries in Latin America and Asia in the 1950s and 1960s. See Holdcroft (1984) for a discussion of the rise and fall of the community development thrust in the 1950s and Binswanger (1998) for a discussion of the “painful lessons” derived from the IRD experience.*

¹⁰ *The term “time optimism” conveys the practice of understating the time that it will take to achieve a given task such as building sustainable institutions in Africa.*

It's difficult to recapture the sense of exhilaration that attended African liberation at its high water mark in 1960, when no fewer than sixteen states achieved independence. The crumbling of colonialism seemed but prologue to other triumphs (Young 1982).

I recall the spirit of optimism in the early 1960s about Nigeria's prospects for becoming an industrial powerhouse by the year 2000. This was a tall order, but it permeated planning circles and foreign aid thinking and it helps explain why many of Africa's new leaders bet on industry as the vehicle to leapfrog over the agrarian stage of development.

The time dimension has been a major issue in Africa's development debates, especially over the issue of the short- and the long-run priorities for agriculture. Time was also a major issue in Asian policy debates in the early 1960s when influential Asian economists, Benjamin Higgins, and others argued that because agriculture was a declining industry in the long run (in terms of the percentage of the labor force employed and GDP), it was prudent to give short-run priority to industrialization. But William H. Nicholls (1964) argued that short-run policy attention should be given to agriculture to avert a subsequent food bottleneck and a chain reaction of higher food prices, higher wages, and reduced industrial profits.

One of the most important tasks for agricultural economists is to convince ministries of finance to invest some of the taxes collected from farmers back into rural infrastructure and basic agricultural institutions in the short run in order to enhance the productivity of agriculture in the medium to long term. Few agricultural economists in Africa have won this argument, partially because of the ready availability of food aid subscriptions. Also, in dual agrarian societies such as South Africa, large-scale farms have helped ensure a reliable food surplus, thus taking the pressure off

the ruling party and the Ministry of Finance to address the needs of the country's 10 million communal farms and the rural poor (Eicher and Rukuni 1996).¹¹

The belief that a poor nation can catch up through an "industrial spurt" has undermined the case for a disciplined, long-term approach to building rural infrastructure and the scientific capacity for a modern agriculture. Five examples illustrate the time optimism and penchant for instant development:

- ◆ The distinguished Ghanaian economist Robert Gardiner (who later became the head of the UN Economic Commission for Africa) captured the catch-up mood of many African intellectuals and politicians during the 1960s when he noted that: "Given the variety of raw materials and their quality and the potential resources of energy and power with which the continent is endowed, there is no reason why the present level of development in Western Europe should not be attained by Africa by the beginning of the next century" (Gardiner 1968).
- ◆ At a political rally in Senegal in 1969, President Senghor launched what he called the "Mystique of the Year 2000" and articulated a "vision of a modern and prosperous Senegal in the year 2000, a Senegal that by then would have tripled its per capita income and entered the ranks of the world's industrialized nations" (Gellar 1982).
- ◆ Philip Ndegwa, the late governor of the Central Bank of Kenya, summed up the urgency of getting on with development by noting that Africa is "desperately short of time" (Ndegwa 1987).
- ◆ The influential 1981 World Bank report *Accelerated Development in Sub-Saharan Africa* (the Berg report), which made the intellectual case for structural adjustment and policy reforms,

¹¹ See Carter and May (1999) for an analysis of rural poverty in South Africa and the policies that are needed to lift the constraints that limit the effective use of the assets (land and labor) of the poor.

concluded with this note of optimism: “policy action and foreign assistance that are mutually reinforcing will surely work together to build a continent that shows real gains in both development and income in the near future” (World Bank 1981).

- ◆ Former World Bank Vice President for Africa Edward V. K. Jaycox reported that if we “focus on capacity building *per se*, not take it for granted that the capacity is there, we can make a tremendous difference in a very short time in Africa” (Jaycox 1993).

These examples of time optimism illustrate why it is important to inject the time dimension into the analysis of capacity building. Because of time optimism it is easy to downplay the time and resources that will be required for building scientific and managerial capacity and moving low-income nations in Africa into the ranks of middle-income countries. Surely it is a challenge for the coming 25 to 50 years. After all, it took Michigan State University 70 years (1855–1925) to develop the capacity to produce its first PhD!

Industrial Fundamentalism and State-Led Agriculture

Peter Timmer (1998) and Yujiro Hayami (1998) have reminded us that three of the most strategic development questions for new nations to resolve are as follows:

- ◆ Should industrialization be promoted in isolation from village agriculture and rural industries or as a complementary activity that promotes agriculture-industry and rural-urban growth linkages?
- ◆ Should priority be given to investing public revenues from taxes on farmers back into agriculture (e.g., roads, schools, research) or into the industrial sector?
- ◆ Should agricultural production be carried out by small-scale private farms or by state-led production schemes such as government plantations, farm settlements, state farms, and ujamaa (communal) farming schemes?

Most new nations answered these questions by pursuing industrialization and state-led agricultural production schemes. A large share of the public revenue from marketing board taxes on farmers was invested in industrial projects (e.g., cement and textile plants) and large-scale agricultural schemes, many of which were inherited from the colonial powers. The Cameroon Development Corporation (CDC) is a good example and it illustrates the concept of path-dependence in action.¹² The CDC was created in 1946 as a statutory corporation to take over and administer the plantations confiscated from the Germans in 1939. At independence in 1960, the new Cameroonian government nationalized the CDC and operated its plantations as a parastatal (government corporation). But the CDC has been a money-losing white elephant. Today it has a labor force of 13,000 and 100,000 ha of land; which includes 11 rubber plantations, seven oil palm plantations, three tea plantations, and two banana plantations. Because the CDC complex has been a drain on the treasury, the government put the entire complex on the international auction block in early 1999.

Path-dependence also comes into play in devising schemes to tax farmers. At independence, many of Africa's new governments continued using the colonial-style marketing boards to tax export crops produced by smallholders. Much of the public revenue from the government marketing boards was invested in state-led agricultural schemes that politicians sprinkled across the landscape. For example, soon after independence in 1961, the government of Sierra Leone established one state farm for each of the country's 13 regions as a means to what one politician described to me as "bringing development to the people." Also, at independence many new governments maintained colonial agricultural policies that

¹² *Path-dependence is a concept used by economic historians to illustrate how development options are influenced by past events. Examples of path-dependence include the continuation of colonial marketing boards, liberal arts style universities, and the dual agrarian structure (large-scale and small-scale farms) in southern Africa.*

conferred tax benefits to large-scale commercial farmers in countries such as Zimbabwe, Côte d'Ivoire, Kenya, and Malawi.¹³

Africa's empty harvest is partially attributed to the gamble at independence to give priority to building modern industrial plants in isolation from the concurrent modernization of village agriculture and village industries (Hayami 1998). Basically, the decision of Africa's new nations to invest public revenues from agricultural taxes into state-run steel mills and plantations (instead of public goods such as rural roads and agricultural colleges to help small-scale farms) represented a pursuit of Karl Marx's belief in mechanized farming and the replication of Stalin's priority for industry.¹⁴ But the decision of Africa's new leaders to invest in industry in isolation from village agriculture and rural industries was also consonant with the views of many Western development economists in the 1950s, who assumed that agriculture was a passive sector, a black box that could be squeezed to finance industry. The author of a leading development economics textbook of the 1950s, for example, asserted that "agriculture stands convicted" for its inability to stimulate economic growth in other sectors of a nation's economy (Hirschman 1958). Today, development textbooks emphasize the importance of promoting agricultural and industrial linkages, increasing rural non-farm incomes, and building rural and urban linkages in an era of globalization.¹⁵

¹³ See Deininger and Binswanger (1995) for a detailed examination of rent-seeking and the tax benefits given to large-scale farms in Kenya, Zimbabwe, and South Africa.

¹⁴ The industrial fundamentalism that blanketed Asia in the 1950s and Africa in the 1960s was partially based on the hope of replicating Stalin's heavy industry model, which converted the Soviet Union into the world's second industrial power in two decades (1930–1950). India borrowed the concept of central planning and industrialization from the Soviets in the 1950s. India, however, abandoned the Soviet heavy industry model in the mid-1960s and gave priority to addressing its food crisis. Likewise, after a decade of experimentation, China discarded the Soviet heavy industry model in 1970 and shifted to a balanced industry/agricultural development strategy followed by the abandonment of communal farming in 1978 and the introduction of the household responsibility system (Lin 1998).

¹⁵ See Reardon et al. (1998) and Hayami (1998).

Regrettably, the decision of many new nations to give priority to industry over agriculture during the past 40 years of independence has yielded a number of false starts in an agrarian-dominated continent. The experiences of Ghana, Tanzania, Nigeria, and Senegal illustrate the folly of giving priority to industry and state-led agricultural production and processing projects. Let us start with Ghana, the most economically advanced country in Africa (excluding South Africa) at independence in 1957.

Ghana

Kwame Nkrumah, the leader of the interim government during Ghana's drive for independence in the early 1950s, invited W. Arthur Lewis to develop a strategy to guide the government in its drive to become a modern industrial nation by the year 2000. Lewis, who later went on to win the Nobel prize in economics, surprised Nkrumah by stressing in his *Report on Industrialization in the Gold Coast*¹⁶ that Ghana should give priority to increasing food production, not industrialization (Lewis 1953). Lewis argued that an industry-first strategy would be undermined by food shortages and rising food prices, which would raise wage rates and eventually slow the rate of growth of industrial production.

Nkrumah ignored Lewis' recommendation and Ghana gave priority to industrialization and harnessing the hydropower of the Volta River to provide cheap electric power for an aluminum bauxite industry. Turning to farming, Nkrumah abolished the national agricultural extension service that served small-scale farms because of his conviction that private small-scale farms were "an obstacle to the spread of socialist ideas" (Killick 1978). Nkrumah promoted state farms because of his belief in the Marxist view of the presumed economies of scale of large-scale plantations and mechanized farming (Nweke 1978).

¹⁶ *The Gold Coast was renamed Ghana at independence.*

But Nkrumah's industry and state farm model of development failed to generate a reliable food surplus and transform Ghana into a modern industrial nation.¹⁷ After 10 years in office, Nkrumah was overthrown while on a visit to China. After Nkrumah was toppled, Ghana experienced a wave of coups d'état in the 1970s and is now on the road to economic recovery.

Tanzania

Tanzania's love affair with industrialization is equally instructive because after the nation gained independence in 1961, President Julius Nyerere made impassioned speeches about reducing urban-rural income disparities by giving priority to farmers and rural communities. Under Nyerere's leadership, however, the government abolished the Ministry of Local Government and the Ministry of Cooperatives and forced farmers to give up their private farms and move into ujamaa villages that were modeled after Chinese communal farms. The government used cotton and coffee tax revenues to help finance the establishment of some 400 state-owned companies, including textile and bicycle factories¹⁸ and an ill-fated pulp and paper factory that was built with technical expertise from Finland (Lipumba 1984). When the government paid small-scale coffee farmers 23% of the world price of coffee (Tweeten 1989), farmers responded to this economic extortion by smuggling coffee and other crops across Tanzania's porous national borders. Although Nyerere is praised for his honesty, his leadership in fostering ethnic harmony, and his voluntary decision to step down from the

¹⁷ *I escorted a group of Nigerian graduate students to Ghana a few weeks after Nkrumah was overthrown in 1967. The students were eager to inspect the achievements of the fiery Pan African leader. But when we arrived in the capital city of Accra, the students were stunned to see Ghanaians lined up at shops for food aid handouts. The Nigerian students had a hard time reconciling their distant admiration for Nkrumah with the reality that Ghana's economy, as Arthur Lewis predicted back in 1953, was undermined by food shortages.*

¹⁸ *In the mid-1980s, I recall the funeral-like atmosphere hanging over the idle, Indian-built bicycle factory on the outskirts of Dar es Salaam and the state-owned shoe factory in Morogoro that was running at only 4% of capacity.*

presidency, one cannot overlook the grim reality that after receiving billions of dollars of foreign aid, Tanzania is the sixth poorest country in the world (World Bank 1999). Tanzania's economic stagnation is a textbook case of the failure of state-led industrialization and communal farming, and it illustrates how draconian rates of taxation on farmers can spawn a massive smuggling operation across national borders.

Nigeria

Nigeria's experience with industrialization represents another painful false start. At independence in 1960, Nigeria inherited an economy that was a net exporter of both food and export crops. Thanks to international investments in petroleum exploration that started in the 1930s, petroleum exports took off in the 1970s and soon dwarfed agricultural exports as the major source of foreign exchange earnings.¹⁹ Awash with foreign exchange earnings from petroleum, Nigeria maintained an overvalued exchange rate that encouraged food imports and undermined incentives for farmers producing agricultural exports such as cocoa, oil palm, and groundnuts. From 1970 to 1995, Nigeria squandered an estimated US\$ 110 billion of petroleum revenues on a plethora of large-scale projects, including a US\$ 3.5 billion state-owned iron and steel complex and numerous ill-fated irrigation schemes in the northern part of the country. Undermined by political instability, corruption, and mismanagement, the Nigerian economy imploded in the 1980s. Today, Nigeria has neither modern industry or productive agriculture.

¹⁹ *At the beginning of the oil boom in the early 1970s, I recall hearing Nigerian intellectuals argue that Nigeria was poised to become an industrial giant, i.e., the Brazil of Africa, and that Nigeria would be exporting VW automobiles and armaments to other African countries in the 1980s.*

Senegal

When Senegal won its independence from France in 1960, President Leopold Senghor announced grandiose plans for Senegal to become an industrial society through “state initiative and planning, economic specialization, and industrialization” (Vaillant 1990). In the 1960s, the government followed the advice of French advisors and developed infrastructure to support new industries, continued the production of its main export crop (peanuts), and maintained close trade ties with France (Gellar 1995). In the 1970s, the government tried to diversify its agricultural sector away from peanuts and develop three engines of growth: tourism, ocean fishing, and phosphate exports. Abdou Diouf assumed the presidency in 1981 and pursued Senghor’s dream of achieving an industrial take-off. In a radio interview in 1990, Diouf looked ahead to the year 2000 and commented:

I want Senegal to have finally taken off economically once and for all; I want us to have jump-started the economy in a healthy, energetic, and vigorous way. Once this economic take-off has occurred, I want the country to reach its cruising altitude and cruising speed quickly, taking giant strides toward the status of a semi-industrial, and then industrial, society (Diouf 1990).

But the pro-industry policies of Senghor and Diouf failed to jump-start the economy and the dreams of transforming Senegal into an industrial nation remain unfulfilled.

Africans’ dreams of becoming instant industrial nations have been overtaken by reality. Nevertheless, despite repeated failures, the dreams of industrialization have great staying power. Even though Africa’s population was growing at double the rate of food production throughout the 1970s, the political arm of African governments, the Organization of African Unity (OAU), lobbied the United Nations to declare the 1980s as the Industrial Development Decade for Africa (Hawkins 1986). It seems fair to ask why African

leaders pressed on with industrialization in the 1980s at a time when a million people died in the Great Ethiopian Famine of 1985.²⁰

These four case studies illustrate the unrealized dream of leapfrogging over the agrarian stage of development to become modern industrial powers in a single generation. To be sure, industrial output in Africa grew at an annual rate of 10% from 1955 to 1965 (Rweyemamu 1980). However, the rate of growth slowed considerably in the 1970s and by 1980, because of high investment costs, mismanagement, and a lack of basic infrastructure, industrial production costs were 30–300% higher in Africa than in Asia (Rweyemamu 1980).

The central insight that flows from these case studies is that after 40 years of independence, most African leaders are not assigning high priority to the first generation problem of getting agriculture moving (Mellor 1998a). Moreover, most policy reform packages are ineffective in addressing the critical issue of “political and institutional failure.” Although many African governments accepted aid-for-policy-reform packages from donors during the past 10 to 15 years, it has been relatively easy to renege on the agreed-upon reforms. For example, “during a fifteen-year period, Kenya sold the same agricultural reform to the World Bank four times, each time reversing it after receipt of the aid” (Collier 1997). The political and geopolitical strategic location of Kenya helps explain why many donors tolerate this type of duplicity.

²⁰ *The starry-eyed belief in industrialization and mechanized state farms as the motor of development was reinforced by a widespread view among politicians and development economists that small-scale family farms could neither be made profitable on a recurring basis or be counted on to generate a reliable food surplus to provision the cities. In short, the industrial fundamentalism that permeated Western, Soviet, and African thinking in the 1950s and 1960s was based on a false dichotomy: industry versus agriculture. Both industry and agriculture need each other for raw materials, inputs, and markets. Industry must serve agriculture because farmers are a major market for industrial products and consumer goods in countries where 60–90% of the population are involved with agriculture. The crucial balance between industry and agriculture in any one country in Africa will depend on the nation's stage of economic history, population-land ratios, and other related factors.*

But there are hopeful signs on the horizon. Mali may be considered a case study of a country where agriculture is moving. The military regime was overthrown in 1991 and President Konare took over and promoted democratization, a free press, and the growth of farmer organizations.²¹ A recent paper, "Cotton, Democracy, and Development," traces the emergence of the now-powerful cotton growers association back to 1974, when an extension agent helped local farmers organize a protest against dishonest cotton grading and weighing practices (Bingen 1998). Responding to farmers' demands, the cotton authority "gradually transferred responsibility for cotton grading and weighing, equipment and supply orders and credit management to village groups." Mali's case study reveals how a poor nation can develop grassroots farmer organizations over a period of decades, provided there is enlightened and supportive leadership in the statehouse. Today, cotton and rice production and horticultural exports are flourishing (Tefft, Staatz, and Dione 1997). Mali's economic success and Kenya's decline in the 1990s can fundamentally be traced to who has been in the statehouse: Konare or Moi?²²

There are also seeds of hope in the Sahelian region of West Africa. One observer reports that 25 years after the devastating drought, "most of the countries in the region can claim to have decisively put the threat of famine behind them, making great strides in food production, transport, and marketing" (van de Walle 1998). But the Sahelian region remains extremely dependent on foreign aid. Additional seeds of hope include the introduction of improved cassava varieties in West Africa (Nweke, forthcoming) and the widespread diffusion of hybrid maize in eastern and southern Africa (Byerlee and Eicher 1997) and more recently in Ethiopia. There are also seeds of hope on the agricultural export front. After the 1994

²¹ *President Konare has a PhD in archeology.*

²² *It is still too early to determine whether Mali will join Botswana as an African success story. Much depends on whether the opposition party will emerge as a stronger force and whether President Konare honors the constitution and steps down after two terms in office.*

CFA franc devaluation, cotton production expanded in every Francophone country in West Africa except Senegal. Cotton production has also increased in Mozambique. Success stories in non-traditional export commodities include paprika from Zimbabwe, an array of spices from Madagascar, and cut flowers from Kenya.

But success stories are not the product of a mere decade of toil. Effort must be sustained over a period of decades and this requires extraordinary political leadership. For example, in some countries the seeds of hope of one decade have quickly been squandered in the next decade. Zimbabwe is a classic case of success followed by failure. After independence in 1980, President Mugabe helped level the playing field for smallholder farmers and they responded by doubling maize production between 1980 and 1986 (Eicher and Kupfuma 1998). But Mugabe lost interest in agriculture in the 1990s as he toyed with the land distribution question, pursued erratic macroeconomic policies, and most recently sent his soldiers and gem hunters into the Democratic Republic of Congo (the former Zaire).

Despite Mali's promise and the maize, cassava, and cotton success stories that I have cited, I am still of the conviction that most governments in Africa are treating long-term agricultural development as a secondary activity. There are only a few countries in Africa today where there is political commitment to mount and sustain a disciplined long-term effort to increase broad-based agricultural growth.

Getting Agriculture Moving Again

Turning to the future, it is important that agriculture is called upon to do more than feed Africa's growing population. For if we call on agriculture solely for increased food production, we would be selling agriculture short. Long-term investments must be made in the agricultural sector to feed a growing population, generate jobs for a growing rural labor force, generate foreign exchange through the sale

of traditional and non-traditional exports, serve as a market for industrial products, and contribute to rural and urban poverty alleviation by driving down the real (inflation-adjusted) cost of food over time (Johnston and Mellor 1961). These multiple challenges for the agricultural sector explain why agriculture is entitled to a large claim on public resources in order to build roads, research stations, colleges of agriculture, and other essential components of a modern, science-based agriculture. This is precisely what happened in the United States from 1860 to the 1920s, a 60-year span during which the government built roads, schools, and a free rural mail-delivery system, as well as colleges of agriculture and a national network of more than 400 agricultural research stations and sub-stations (Galbraith 1985). But this six-decade time frame is at sharp variance with the time horizons of most African leaders and foreign aid officials. The desire for quick fixes is epitomized by the case of an American ambassador in an African country who directed his foreign aid chief in the early 1980s to design projects that would generate "high visibility and quick returns." This predilection for the quick fix is simply a manifestation of the current political mandate in industrial countries to achieve people-level impacts in Africa as soon as possible.

Many African leaders are still postponing the day of reckoning, when it will be necessary to face up to the long-term food gap and the loss of export markets, and to make the hard political choices and investments required to develop a modern agriculture. India faced a similar crisis in the early 1960s and after several years of intense debates, the government made a fundamental political decision to launch an all-out campaign to become self-sufficient in food, a goal that it reached 16 years later in 1981.

Much has been learned in Asia during the past 40 years about the catalytic roles that agriculture can play in the development process. A large global knowledge base is now available on what is

required to mobilize agriculture as a major contributor to breaking the cycle of poverty, hunger, and famine.²³ This information can be used, in turn, to mobilize the hidden creativity and unexploited potential of Africa's 50 million farm families as an engine of agricultural growth. We now turn to the difficult task of figuring out how to develop effective and sustainable agricultural institutions.

Institutional Expansion, Downsizing, and Restructuring

Africa's post-independence agrarian history has been dominated by two distinct phases of institutional expansion and reform. The first, from 1960 to 1985, can be described as a public sector expansion phase *par excellence*—it was consonant with the state-led development paradigm of the day. The second, from 1985 to 1999, can be described as a period of downsizing public universities and research and extension services, privatizing parastatals, and encouraging foreign private investments and new forms of public/private partnerships.

The Expansion Phase: 1960 to 1985

At independence, virtually every new government launched massive public sector initiatives to mobilize, educate, and nurture the potential human capital that had been buried under seven colonial regimes. The scope of this human capital renaissance was daunting. At independence, Botswana had only 40 university graduates. In 1960, 90% of the agricultural researchers in Africa were expatriates.²⁴ To Africanize the civil service, new governments dramatically increased primary and secondary school enrollment, constructed new universities, and sent thousands of students abroad for BSc and graduate level training. Donors responded admirably to the human capital challenge by helping to finance the construction of new universities, upgrading diploma level schools of agriculture into

²³ See Johnston and Mellor (1961); Schultz (1964); Eicher and Baker (1982); Lele (1991); Martin (1992); Idachaba (1995); Eicher and Staatz (1998); Rukuni (1994); Mrema (1997); Hayami (1997); Delgado (1998); Rusike (1998); and Reardon et al. (1998).

²⁴ By contrast, at India's independence in 1947, almost all research scientists were Indian.

faculties of agriculture, and converting faculties of agriculture into agricultural universities.

The achievements of the first generation of human capital development are impressive:

- ◆ The number of extension workers in sub-Saharan Africa increased from 21,000 in 1959 to 57,000 in 1980 (Judd, Boyce, and Evenson 1986).
- ◆ The number of universities increased from around 20 in 1960 to 160 in 1996 (Beintema, Pardey, and Roseboom 1998).
- ◆ The number of full-time equivalent agricultural scientists increased from around 2,000 in 1960 to 9,000 in 1991 (Pardey, Roseboom, and Beintema 1997). In many countries, the number of scientists increased five- to tenfold. In Nigeria, the number of agricultural scientists increased from 100 in 1960 to 1,000 in 1985.²⁵

The Downsizing and Restructuring Phase

The overexpansion of many public organizations serving agriculture from 1960 to 1985 was followed by a period of retrenchment and restructuring from 1985 to the present. Structural adjustment loans typically included agreed-upon conditions (conditionality) to reduce the size of the civil service and research and extension services, privatize parastatals, and promote private enterprise.²⁶ The three core institutions in the agricultural knowledge triangle—research, extension, and higher education—have been downsized and restructured, and new private institutions (seed and

²⁵ To be sure, there is substantial variation among the 48 countries in terms of the timing, speed, and scope of the increase in the size of public agricultural services such as research and extension. Anglophone countries made the most rapid progress in replacing colonial scientists and civil servants. The Francophone countries lagged because many new governments invited the French to continue to manage their national research institutes for 10–15 years after independence. Lusophone countries were latecomers because Mozambique and Angola did not win their independence until 1975.

²⁶ In the early 1990s, many donors pressed African governments to go beyond these reforms and tackle corruption and promote decentralization, participation, and democratization.

fertilizer companies, universities, etc.) are now in stiff competition with their public counterparts. Following are highlights for the key players in this downsizing phase.

Agricultural Extension

Most public agricultural extension services in Africa are now in crisis because of their ineffective performance and their inability to underwrite the quantum growth of most national extension services. The T&V extension model has also come under attack because it has been found to be fiscally unsustainable. The crisis in extension has helped fuel the search for a diversity of approaches, including increased participation of the private sector and NGOs.²⁷ Unfortunately, there is little rigorous research on the cost-effectiveness of alternative extension models.

Agricultural Research

The rapid expansion in the number of agricultural researchers in the 1960s and 1970s was challenged in the 1980s because many public research systems were found to be unproductive and heavily dependent on foreign aid (Pardey, Roseboom, and Beintema 1997). Because of these problems, many national agricultural research systems (NARS) are now being downsized. The Kenya Agricultural Research Institute (KARI) is overstaffed and is now being downsized (staff rationalization) with the assistance of a US\$ 10 million grant from the European Union. Agricultural research is now moving in the same direction as extension, and a search is underway for a wide range of public and private models that are demand-driven and fiscally sustainable (Rukuni, Blackie, and Eicher 1998).

Agricultural Higher Education

Since the mid-1980s, universities have suffered a sharp cut in real budgets, a decline in the quality of the educational experience,

²⁷ For a discussion of alternative extension models for the twenty-first century, see Antholt (1998). For a discussion of the evolution of the T&V system see Venkatesan and Kampen (1998). See Bauer, Hoffinan, and Keller (1998) for a stinging critique of the T&V model.

and a brain drain.²⁸ Many faculties of agriculture that were launched in the 1960s and 1970s have carried out ambitious academic staff development programs. As a result, in many countries there are more Africans with PhDs in faculties of agriculture than in the public agricultural research institutes. This explains why several observers have recommended ways to increase the contribution of universities to the research program of NARS (Byerlee and Alex 1998).

Four insights can be derived from this review of agricultural institutions that will be of help in the third phase of institutional change—crafting demand-driven and fiscally sustainable public and private institutions and NGOs. First, because of the immensity, diversity, and complexity of Africa, and the path-dependence that is embodied in its seven colonial heritages,²⁹ it is foolhardy to assume that a single university or research or extension model will be effective throughout Africa. Peter Timmer illustrates the complexity of African agriculture by recalling his first visit to Kenya.

Rice is a whole lot easier technologically. I can drive from Jakarta to Krawang, the rice bowl of West Java. It's 60 miles, 70 miles, out and back, and it's rice fields. And it's one variety or another, but it's rice all the way out. Come back a different road and it's rice all the way back. I haven't been in Africa much, but the one time I was in Kenya, I remember driving up one hill and down the next and seeing 12 different agroclimatic zones and 12 different cropping patterns, and 50 different crops. I couldn't believe the complexity of the farming systems as they varied up and down the hills (Timmer 1991).

Timmer's observation reinforces the point that the complexity of African diets demands more location-specific research on cropping systems than is required in the rice bowl of Asia.

²⁸ For a discussion of the decline in the quality of the university experience, see Coleman and Court (1993); Ajayi et al. (1996); and Willett (1998). For a discussion of building scientific capacity in agriculture, see McKelvey (1965); Odhiambo (1989); Beintema, Pardey, and Roseboom (1998); Eicher (1990); Jones and Blackie (1991); Lele (1991); Lynam and Blackie (1994); and World Bank (1992).

²⁹ French, English, Spanish, German, Belgian, Portugese, and Italian.

The second insight is that most African nations are at an earlier stage of scientific and institutional development than India was on the eve of the Green Revolution in the mid-1960s. This proposition challenges the prevailing time optimism and reinforces the need to pay careful attention to the time and resources required to accomplish the task of strengthening the human capital base and the institutional foundation.³⁰

Third, imported institutions from other cultures and other continents will undoubtedly have a high failure rate in Africa if they are replicated before the satisfactory completion of a pilot phase. The T&V extension model is an example of replicating an imported model in several dozen African countries before it was thoroughly tested. But testing and modifying imported models requires public and foundation resources to finance pilot projects and independent evaluation teams that have the freedom to collect benchmark data and evaluate the performance of alternative organizational models.³¹ The slow and patient development of the Grameen model of micro-credit is a good example of how action research and pilot projects were used to develop a new type of credit organization (the Grameen Bank) before it was replicated on a national scale. After Professor Mohamed Yunus completed his graduate study in economics in the United States, he joined a university in northern Bangladesh and set up an action research project to find out if the poor were bankable, i.e., would they repay small loans. He secured financial support from the Ford Foundation and later from IFAD to implement action research from 1976 to 1979 in villages surrounding

³⁰ See Lele and Goldsmith (1989) for an insightful analysis of India's strategy of building scientific capacity in agriculture.

³¹ If we turn back the clock to the colonial period, we note that before the large Gezira irrigation scheme was launched in the Sudan, researchers carried out pilot agronomic projects for 13 years before the water was turned on (Milligan and Hapgood 1967). Likewise, before a cotton research station was established in Uganda, British colonial officers spent five years studying local farm practices for use in designing on-station trials (Arnold 1976). By contrast, in Senegal, two large dams were built in the 1970s, far ahead of local agronomic research on crop rotation and anthropological research on how to organize farmers, i.e., individually, collectively, etc.

his university, followed by a pilot phase from 1979 to 1982. In 1982, he decided that he had enough information to replicate his Grameen (village) micro-credit model throughout Bangladesh (Robinson 1998).

Much energy has also been wasted in trying to replicate Asia's Green Revolution model in Africa before the completion of pilot studies. Over the past decade, many instant experts on Africa have talked glibly about the ease of replicating Asia's Green Revolution model in Africa. Many of these experts have overlooked Africa's early stage of scientific development, falsely assuming that Africa had the requisite infrastructure,³² irrigated land, trained scientists, technology, and national and local institutions to replicate the Asian model.³³

Fourth, there are numerous design flaws in donor-financed, supply-driven models of institution building (Ruttan 1982; Eicher 1982; and Tendler 1997). Notable among these flaws is the priority given to front-loading research, extension, and education projects with new buildings, vehicles, and overseas training in order to achieve visible progress in four to five years, the time frame that most donors need to justify the preparation of a second five-year phase. The repetition of this cycle often leads to a large staff, a magnificent set of buildings, limited scientific capacity, and a bloated and fiscally unsustainable institution. Also, the supply side approach that is supported by foreign aid allows local administrators (deans of agriculture and directors of NARSs and extension services) to postpone the day of reckoning, i.e., the need to focus on the demand side and generate political and financial support from farm organizations, commodity groups, and agribusiness firms. Finally, the supply-driven model often ignores the research needs of local and national groups of farmers, traders, and agribusiness and

³² See Spencer and Badiane (1995) for a comparative assessment of rural road density in Africa and Asia.

³³ See my early reservations about the Sasakawa-Global 2000 initiative to increase food production in Africa (Eicher 1988).

underinvests in the marketing and trade research required to ferret out global trade opportunities. Because of these design flaws, attention has now shifted to crafting demand-driven models.

To be sure, much has been accomplished during the downsizing and restructuring of extension, research, and higher education over the past 15 years, but there is a paucity of research on the performance of these restructured institutions. For example, there are numerous studies showing that NGOs can increase grassroots participation in extension programs, but there is no study in Africa to date on the cost and benefits of achieving these higher rates of participation (White and Eicher 1999).

Crafting Demand-Driven Agricultural Knowledge Triangles: Bread-and-Butter Issues

We now turn to some bread-and-butter issues³⁴ in reforming and strengthening the three core institutions that make up the

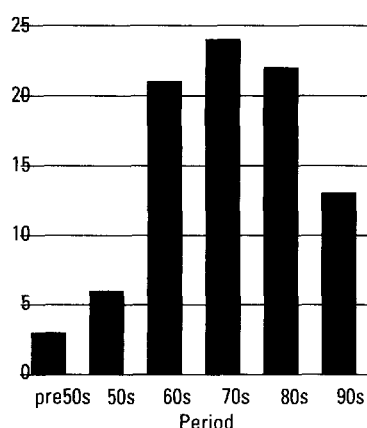


Figure 1. Establishment dates of universities with a faculty of agriculture or veterinary sciences in sub-Saharan Africa.

Source: Beintema, Pardey, and Roseboom (1998).

agricultural knowledge triangle: research, extension, and agricultural higher education. In most countries, universities are the weak link in the triangle, partially because they are in their infancy. Figure 1 shows that most faculties of agriculture in Africa were established during the past 20 to 30 years. Crafting agricultural knowledge triangles is complicated by the fact that Africa is littered with donor-financed development projects, including 2,740 in

³⁴ I am borrowing this phrase from Derek Byerlee's influential article "Bread and Butter Issues in Ecuadorean Food Policy" (1989).

Tanzania alone (Jaycox 1997).³⁵ Because of the well-known flaws in the project approach to institution building, let us turn to the agricultural knowledge triangle as a way of integrating research, extension, and education activities and ensuring the sequential continuity of investments in these core institutions.

The Agricultural Knowledge Triangle

Over the past 10 to 15 years, there has been an on-going debate about the need to move beyond the project-by-project approach to a systems approach to coordinate and sequence interlinked investments in agricultural research, extension, and education.³⁶ Various scholars have articulated this approach under the following rubrics: agricultural knowledge system, agricultural knowledge information system (AKIS), and what I call the agricultural knowledge triangle.³⁷ Basically, these approaches argue that public and private managers of separately governed institutions should come together and “coordinate” decisions on the size and sequencing of complementary investments, because the payoff has been found to be higher if they are planned and executed as a joint activity rather than pursued as freestanding extension, research, or education projects (Evenson, Waggoner, and Ruttan 1979; Bonnen 1998; Boughton et al. 1995).

Despite the high returns to projects that integrate research, extension, and education, African governments and donors, for many reasons, have usually prepared separate projects for each of

³⁵ See Morss (1984) for an early statement on the negative impact of the proliferation of donors and projects on the major institutions in Africa.

³⁶ See Roling (1988) for a discussion of this evolution. For an update on Wageningen University's adoption of a knowledge system approach see Roseboom and Rutten (1998).

³⁷ Examples include a USAID plan to strengthen agricultural research and faculties of agriculture (USAID 1985); ISNAR's report on strengthening linkages between research and farmers' organizations (Eponou 1996); ISNAR's recent study of linkages between universities and NARSs in Africa (Michelsen and Shapiro 1998); and the World Bank's Agricultural Research and Training Project in Uganda. For a synthesis of the evolution of the World Bank's support for agricultural services (mainly extension and research) in Africa see Venkatesan and Kampen (1998).

these activities. First, colonial export crop research stations were established in many countries between 1900 and 1920, followed by a time lag of 50 to 70 years before faculties of agriculture and veterinary science were established. This historical head start and studies showing high rates of return to research help explain why agricultural research institutes have often received generous donor support. Second, research and extension activities are often included in the same project because both organizations are often administratively housed in the ministry of agriculture. Third, joint research, extension, and higher education projects are difficult to coordinate and implement because the administrators of universities, extension, and research services typically report to different ministries. Fourth, it is well-known that projects that integrate research, extension, and higher education, as typified by the US land grant model and the state (Indian) agricultural university model, have not performed well in Africa.³⁸ Lastly, the bureaucracies of donor and international organizations present their own constraints. An extension specialist describes the bureaucratic difficulties in preparing and implementing joint research, extension, and agricultural higher education projects in the World Bank:

The Bank's involvement with the development of higher agricultural education at the university level in Africa has been minimal. . . . Within the Bank, the Agriculture Divisions have no responsibility for universities, which are the responsibility of the Education Divisions. . . . It is not therefore surprising that the Bank projects in extension and research do not provide support to higher agricultural education (Venkatesan 1991).

What has been the result of sprinkling separate extension, research, and higher education projects across the African landscape? Has this approach resulted in an underinvestment in one of the three

³⁸ See Johnson and Okigbo (1989) for a critique of the introduction of the land grant model in Nigeria and Idachaba (1998) for a discussion of the problems in implementing the state agricultural university model in Nigeria.

components of the triangle? A recent World Bank review of its expenditures on research, extension, and education sheds light on this question. The review found that agricultural higher education received about 2% and agricultural research and extension received roughly 98% of the World Bank's US\$ 4.8 billion of global

Table 1. World Bank global support for agricultural research, extension, and agricultural higher education, 1987–1997

	Mil. US\$	Percent
Agricultural research	\$2,482	51.50
Agricultural extension	2,229	46.25
Agricultural higher education	108	2.25
Total	\$4,819	100.00

Source: Willett (1998).

investments in agriculture education, research, and training during 1987–1997 (Table 1). How did Africa fare under this US\$ 4.8 billion package? During 1987–1997, the World Bank made six loans to agricultural higher education totaling US\$ 108 million. Three of those loans were for Africa.

East and Central Africa

The bread-and-butter issues in strengthening agricultural knowledge triangles in East and Central Africa are extremely complex because of the colonial legacy, the large number of agricultural institutions in the region, the institutional preferences of a multiplicity of donors, and the fragmentation of agriculture and natural resources within universities into separate faculties of agriculture, forestry, and environmental sciences (Mrema 1997; Norman 1998). Table 2 shows that there are currently 35 faculties of agriculture, forestry, and veterinary medicine in the ten countries in East and Central Africa. With 35 faculties, there is an obvious duplication of effort in the region, which leads us to ask, “Why can’t the faculties of agriculture and forestry be merged in some of these universities?” Because of the large number of faculties of agriculture and forestry in the region, most donors do not have an adequate information base for deciding which faculty or faculties to support in the region.

Table 2. Universities in the ten East and Central African countries with faculties of agricultural science

Country	University	Faculties		
		Agriculture	Forestry	Vet. Med.
Burundi	Université du Burundi	√	-	-
Eritrea	University of Asmara	√	-	-
Ethiopia	Alemaya University of Agriculture	√	√	-
	Addis Ababa University	-	-	√
Kenya	University of Nairobi	√	-	√
	Egerton University	√	-	-
	Moi University	√	√	-
	Jomo Kenyatta University of S & T	√	-	-
	University of Eastern Africa, Baraton	√	-	-
	Université d'Atananarivo	√	-	-
Madagascar	Université Nationale du Rwanda	√	-	-
Rwanda	Université Nationale du Rwanda	√	-	-
Sudan	University of Khartoum	√	√	√
	University of Juba	-	√	-
	University of Gezira	√	-	-
	Red Sea University	-	(Fisheries)	-
	Bahr El Ghazal University	√	√	-
	Dongola University	√	-	-
	El-Gadarif University	√	√	-
	Upper Nile University	-	√	-
Tanzania	Sokoine University of Agriculture	√	√	√
Uganda	Makerere University	√	√	√
Congo (formerly Zaire)	Université de Kinshasa	√	√	-
	Université de Lubumbashi	-	-	√
	Total	18	11	6

Source: ASARECA Strategic Plan Report (information supplied by Directors of NARIs); Mrema (1997).
Note: Total: 35 faculties of agricultural sciences.

Virtually all the faculties of agriculture and forestry in East and Central Africa are under financial stress, poorly organized, and losing senior staff to NGOs and the private sector. Two examples illustrate the problems in building high-quality graduate programs in agriculture in East and Central Africa. The first example demonstrates the problem of staffing and sustaining regional MSc programs; the second example pertains to offering PhD degrees in the region.

Regionalization of training is frequently mentioned as a way to drive down the unit cost of graduate programs. However, there is a large gap between the theory and practice of offering a MSc degree

for students from a region such as East and Central Africa. The experience of the University of Nairobi illustrates this point. With financial assistance from the government of Germany, the University of Nairobi launched a MSc program in agricultural economics in 1974 for students from East Africa (Amann and Kriesel 1976; Thimm 1992). The two-year program consisted of coursework during the first year and thesis research in the student's home country during the second year. Although it was exciting to teach courses to students from East Africa, academic staff members found it difficult to find the time and resources to travel to Uganda and Tanzania to supervise the research of the MSc students from these countries. Also, because of low salaries, funding constraints, and frequent university closures, the University of Nairobi's Department of Agricultural Economics lost eight staff members with PhDs between 1985 and 1995 (Ackello-Ogutu and Mwangi 1995). Finally, because of the lack of scholarships, the intake of students from East Africa dried up in the early 1990s. The total intake of students fell to three (all Kenyan) in 1997.³⁹ This sobering case study of a 25-year effort to build and sustain a MSc degree program (1974–1999) reveals that it is easy to garner foreign aid to *launch* a regional MSc program but difficult to gain local financial support to *sustain* a regional MSc degree program, decade after decade.

The second example of the inherent complexity of building high-quality graduate programs focuses on PhD level training. The recent experience of Makerere University in Uganda illustrates how difficult it is to secure funding and experienced scholars to teach up-to-date courses, mentor students, and supervise PhD theses. Instead of sending Ugandans to the United States for PhD training, Makerere University launched an "alternative PhD program in agricultural economics" in 1996. Eight American professors were recruited to volunteer their time and teach a one-month PhD course at Makerere on an accelerated basis (Wessell 1998). To date, eight PhD courses

³⁹ The total intake of MSc students was as follows: 1989, 20; 1991, 12; 1993, 5; and 1997, 3.

have been taught to nine Ugandan doctoral students. But World Bank and USAID projects offer no funds to recruit visiting professors to oversee the nine students during their research, analysis, and writing of PhD dissertations in Uganda. Again the easy task in PhD training programs is to teach courses. The challenge is to mobilize local financial support to recruit, reward, and retain a cadre of dedicated indigenous academic staff members who enjoy the challenge of recruiting, teaching, mentoring, and supervising the research of students.

The Particular Case of Kenya

After 36 years of independence, Kenya's public agricultural institutions are in serious disarray. There is an on-going debate over the mandate, relevance, cost-effectiveness, and sustainability of the five university faculties of agriculture, the T&V extension model, and the sustainability of KARI. Presently, the linkages between the three supply-driven components—research, extension, and universities—are weak. Agricultural research is the strongest component in the triangle, but KARI is currently dependent on donor assistance for around 60% of its budget. KARI has just completed a major research priority-setting exercise and a major human capital building program, and it is an innovator in biotechnology. KARI's Agricultural Research Fund has been effective in encouraging researchers from the universities and the private sector to conduct research consistent with KARI's research priorities. In addition, KARI's managers are aggressively trying to develop a leaner and more demand-driven organization. Meanwhile, Kenya's T&V extension model is now being reconsidered. Major problems facing extension include the shortage of operating budgets and a lack of solid field evidence that the T&V model is effective, efficient, and fiscally sustainable.⁴⁰

⁴⁰ For an exchange of views on T&V extension in Kenya, see Bindlish and Evenson (1997); Picciotto and Anderson (1997); Anderson (1998); and Murethi and Anderson (1998).

Agricultural higher education is the weakest component in the triangle; furthermore, the quality of agricultural training has deteriorated over the past decade. From 1970 to 1985, the University of Nairobi was known for its high-quality undergraduate training and research programs and its emerging graduate programs in many disciplines, including agriculture. But four new public universities were added from 1984 to 1994, with each new university adding a faculty of agriculture. During this period, politics was injected into the academy, and in the mid-1980s, the ruling party forced all public universities to double their intake of students. The decision to double intake resulted in a sharp drop in staff morale and the quality of the academic experience, as well as an exodus of senior academics to more attractive opportunities in southern Africa, overseas universities, and the private sector (Oniang'o and Eicher 1998).

Kenya's experience in trying to develop a national university of agriculture is sobering. Egerton College was launched in 1941 by Lord and Lady Egerton "to train sons and daughters of farmers the science and practices of agriculture."⁴¹ In 1988, Egerton College was upgraded to Egerton University and given a mandate to become a national university of agriculture. But politics intervened and Egerton was encouraged to admit a large number of students to its Faculty of Education.⁴² Gradually, Egerton was transformed into a general purpose university; today, it is experiencing great difficulty in retaining its senior academic staff. Table 3 shows that Egerton's Faculty of Agriculture is made up largely of junior academic staff (50 assistant lecturers and 51 lecturers). The table also shows that out of 135 faculty members, only six are senior academic staff; four of those are associate professors and two are professors for the six departments in the Faculty of Agriculture. The Department of Agricultural Economics has only one PhD in residence out of a total

⁴¹ Geoffrey Mrema, *personal communication*, November 21, 1998.

⁴² *Many secondary school graduates did not have the necessary grades in science to be admitted to the faculties of science, agriculture, etc.*

Table 3. Kenya: Academic staff in the Faculty of Agriculture, Egerton University, 1998

Department	Assistant Lecturer	Lecturer	Senior Lecturer	Professor	Associate Professor	Total
Ag Econ/Business Management	9	13	3			25
Agronomy	5	11	11	1		28
Animal Science	11	6	9	1		27
Dairy Food Science/Technology	2	8				10
Horticulture	17	6	1		2	26
Natural Resources	6	8	3	2		19
Total	50	52	27	4	2	135

Source: Ekwamu et al. (1998).

of 25 academic staff members. The capacity of Egerton's Faculty of Agriculture to offer high-quality graduate degrees in agriculture is problematic because of the exodus of senior academic staff, political meddling, and financial stress.

Without question, the quality of graduate education in faculties of agriculture and forestry is crucially dependent on the presence of senior academic staff at the rank of associate professor and professor, because they must take the initiative in mentoring junior faculty members and setting the research direction and tone of graduate education. Senior academics also play a crucial role in mobilizing funds for graduate student research and monitoring the completion of degrees.

Another sensitive question concerns the issue of size and critical mass. During the 1980s, Kenya increased the number of faculties of agriculture from one to five, but the quality of the educational experience suffered as budgets were stretched. For example, in 1993/94, the University of Nairobi's Department of Agricultural Economics had a budget of US\$ 532 for supplies. With five university faculties of agriculture, one may legitimately ask: Has Kenya made the same historical (and probably irreversible) mistake as Belgium? Because of language differences, Belgium, a nation of 10

million people, has four universities with a faculty of agriculture. By contrast, the Netherlands, a nation of 35 million people, has one world-class agricultural university—Wageningen.

These bread-and-butter examples of restructuring agricultural institutions in East Africa, and particularly Kenya, help explain why social scientists need to conduct research on the process of crafting demand-driven agricultural knowledge triangles (Eyzaguirre 1996). The task before us is to figure out how to build country-level agricultural knowledge triangles that are operationally linked to farmer organizations, the private sector, and the regional and global scientific communities. But in East Africa, and especially Kenya, this task is fraught with political obstacles because politicians are giving priority to the expansion of undergraduate education. Also, many donors have pulled back from universities and are now giving priority to agricultural research, extension, and NGOs. Likewise, with the cutback in donor funding for overseas training, donors have hastily and prematurely dropped the responsibility for graduate training into the lap of local universities. The deans of agriculture, forestry, and veterinary science in East and Central Africa are trying to develop strong linkages with ASARECA.⁴³

The privatization of public agricultural services accompanying structural adjustment programs is attracting senior academics and undermining the capacity of universities in East Africa to offer high quality local MSc and PhD degree training. Currently, there is a tug-of-war between private consulting firms, policy institutes, and the public universities for experienced agricultural scientists and managers. The latest attempts to strengthen one discipline at a time (e.g., AERC's program to strengthen economics) in East and Central Africa are unlikely to be fiscally sustainable. The bottom line is that public universities, the rapidly expanding private consulting firms,

⁴³ ASARECA (*Association for Strengthening Agricultural Research in Eastern and Central Africa*).

and policy research institutes all need each other. This need reinforces the necessity to get on with crafting country agricultural research triangles that nurture these symbiotic public and private partnerships.

Challenges

The overarching development challenge facing African agricultural scientists and policymakers today is how to help Africa's 48 independent nations rediscover their agrarian heritage, bury Afro-Pessimism, take charge of the foreign aid agenda, and mount a disciplined, long-term effort to develop a modern agriculture. But African leaders are feeling frustrated by the reluctance of donors to take a long-term approach to capacity and institution building. For example, in 1995, the World Bank appointed a group of eminent Africans to form a working party and report to the World Bank on the progress being made by the multi-donor African Capacity Building Initiative (ACBI). The working party, chaired by the distinguished Kenyan economist Harris Mule, presented its report to the World Bank in October 1996. The following passage was among the report's highlights:

The World Bank is a major player in Africa's development and its interventions have major impacts on the pace and pattern of Africa's development in general, and capacity building in particular. It is not easy for outsiders to gauge how far the Bank has been successful in promoting capacity building in Africa. Many of the recent Bank statements on capacity building are, however, impeccable, and have played an important role in placing capacity building issues on the African policy agenda....

Yet these initiatives, important though they are, are mere additions to the Bank's main mission, which is lending. There is no evidence that they are pursued with the same enthusiasm and vigor as, for example, policy-based lending. This is in spite of the fact that without capacity, the impact of the

Bank's operations, whether on project or policy-based lending, will have below optimal results (Mule 1996).

Despite these frustrations, it seems fair to pose the question: Why should donors invest in long-term capacity building in Africa when African political leaders engage in cross border wars, purchase fancy jets, build unneeded international airports, and readily tolerate corruption? Even if donors agree to help support capacity-building programs, there is an absence of intellectual agreement on how to build agricultural knowledge triangles for 48 countries with seven colonial histories.

In light of these frustrations and powerful crosscurrents, what can African agriculturalists do to mobilize African and donor support to plan and implement a disciplined, *balanced, accretionary* long-term program to build a system of institutional pillars for a modern agriculture? I emphasize *balanced* and *accretionary* because many donors have offered generous short-term support for one or two of the pillars (e.g., extension or research). The World Bank, for example, has been generous in supporting research and extension projects, but it allocated only 2% of its global US\$ 4.8 billion research, education, and extension expenditures to agricultural higher education over the 1987–1997 period. I have already underscored the futility of seeking a recipe for building institutions in the large, complex, and diverse continent of Africa. Rather, attention should be directed to eight challenges that require further study and debate. The first two challenges call for Africans to step forward and provide some long overdue political and scientific leadership.

Challenges Ahead

1. Creating a "good institutional environment"

In this lecture, I focused attention on building the three cost-effective public organizations—research, extension, and training—that form the agricultural knowledge triangle, because these

organizations are essential for a modern agriculture. Although public organizations are necessary, they are not, in and of themselves, a sufficient condition for agricultural development. To be effective, public organizations must be nurtured, protected, financed, and rewarded by a “good institutional environment.” Such an environment includes a transparent legal system, protection of property rights, stable macroeconomic conditions, and political participation of farmers and commodity groups. In addition, once a good institutional environment is established, it requires unusual political skill to maintain it over time.⁴⁴

African leaders must take responsibility for building a good institutional (political) environment for development. After a good institutional environment is in place, the next step is for the agricultural leadership—both public and private—to encourage political leaders to concentrate on the first generation problem of accelerating the rate of agricultural growth. The next step is to craft demand-driven agricultural knowledge triangles that are operationally linked to and supported by farm organizations, the private sector, and the global scientific community.

2. Crafting agricultural knowledge triangles

I have stressed the basic point that research, extension, and agricultural higher education are complementary activities and that the collective return on investments in these activities will be higher if they are interlinked rather than pursued separately. But designing a triangle that achieves *sequential continuity* in these three investments requires a rare skill that is not covered in the basic textbooks on project appraisal. Crafting is a process—an intensely political process. The University of Nairobi’s 25-year attempt to develop a sustainable, regional master’s degree program in agricultural economics is a classic example of an organizational

⁴⁴ *The current difficulties that universities, extension, and research organizations face in Kenya, Zimbabwe, and Nigeria illustrate what happens when political leaders allow a good institutional environment to deteriorate.*

experiment that was financed by the North but never supported by the national or regional governments, in this instance, Kenya's political leadership and its Ministry of Finance.

Unfortunately, there is a dearth of vision in Africa, in donor communities, and in academia on how to craft demand-driven agricultural knowledge triangles and how to achieve sequential continuity of the core investments. In light of this vacuum, I recommend that a one-year moratorium be imposed on all proposed donor-financed research, extension, and higher education projects in Africa. Those 12 months should be used to buy time to allow African agriculturalists and donor representatives to come together and figure out (1) how to develop demand-driven agricultural research triangles; (2) how the leaders of separately governed organizations (research, extension, and faculties of agriculture) can communicate and cooperate; (3) how the triangles can be linked to and supported by the local and national political processes; and (4) what donors can do to assist in the crafting process.

3. The case for long-term scientific assistance

Starting in the mid-1980s, many development specialists pointed out the shortcomings of long-term technical assistance and recommended its rapid phase out together with a build-up of African consulting firms and the transfer of training from overseas to African universities.⁴⁵ But this blanket approach to the localization of human capital improvement has some flaws. There is growing evidence that overseas training in agriculture is being prematurely phased down, before African universities have had the time to mobilize resources and a national political commitment to build and sustain high-quality local MSc degree programs. I recommend a gradual phase down of overseas training at the MSc level over the coming decade, coupled with an intense dialogue with ministries of finance on financing local MSc training programs.

⁴⁵ Also see Berg (1993) and Jaycox (1993, 1997).

Turning to technical assistance, a new type of long-term technical assistance—scientific technical assistance—should be introduced to help shore up graduate training programs and develop African research capacity in such areas as intellectual property rights, biodiversity, agribusiness, and information systems. Surely a cadre of 500 scientists from industrial nations, spread over 48 countries during the coming 25 to 50 years, would have a high payoff. The scientists should be posted in universities, national agricultural research institutes (NARIs), and ministries of science and technology.

The issue of long-term scientific technical assistance in agriculture is closely related to the new initiative to build advanced scientific institutes in Latin America, which has been under discussion for more than a year, thanks to the leadership of President Eduardo Frei of Chile. Several Latin American governments, private foundations, and the World Bank are preparing a plan to develop a global chain of so-called Millennium Institutes that will serve as scientific centers in developing countries (Macilwain 1998). Initial plans call for the establishment of centers in middle-income countries such as Chile, Argentina, Brazil, and Colombia. If the concept proves successful, it will be promoted in Asia and Africa. Hopefully, the architects of the Millennium Institutes for Africa will study the history of similar projects in Africa over the past 40 years (Eicher 1989; Court 1991; Coleman and Court 1993; and Ajayi et al. 1996).

4. Expanded aid agenda

In the early 1960s, three major donor organizations, USAID, the Ford Foundation, and the Rockefeller Foundation, worked together closely to help India build an effective system of institutional pillars (research, extension, and education) for a modern agriculture (Lele and Goldsmith 1989). The government of India proved to be a superb innovator as it set up a number of new

institutions such as the state agricultural university system (Busch 1988), the Agricultural Prices Commission, and Fair Price Shops. But donor coordination has proven to be much more difficult in Africa than it was in India because of the large number of donors in Africa, changing donor fashions, and the broadening of the development agenda to the point where agriculture has been marginalized in many donor agencies. USAID's experience dramatically illustrates how agriculture has been marginalized over the past decade. In 1985, USAID allocated the largest share of its Africa budget to agriculture (47%) and it provided scholarships to 250 Africans for overseas training in agriculture (USAID 1985). In 1998, USAID allocated only 10% of its Africa budget to agriculture (USAID 1998) and provided scholarships to around 20 African students for overseas long-term training in agriculture (Atwood 1998).

What is driving this shift in donor priorities away from human capital improvement and old-fashioned agricultural development and economic growth? Two icons in development economics, John Mellor and Anne Krueger, have addressed this question. Mellor recently commented on why it is so difficult to get donors to focus on agricultural growth in Africa:

Foreign aid is now captive to a myriad of special groups. Today they include child survival, vitamin A, microcredit, poverty, microenterprise (excluding agriculture), empowerment of women, environment, wildlife preservation, and on and on. Extrapolation of the history of special interests in foreign aid suggests that tomorrow the list will be different and longer. Priorities and strategy cannot coexist with such a panoply of special interests, each with its own objectives (Mellor 1998b).

Stanford economist and former World Bank Vice President Anne Krueger argues that the World Bank has made a mistake in taking on "soft issues" such as environmental matters, cooperation with NGOs, and combating corruption. She contends that "a strong

case can be made that the Bank has moved far beyond its essential competence in addressing these issues, and in so doing, has overstretched the capacity of its staff" (Krueger 1998). But in light of recent events in Indonesia and Zimbabwe, one can challenge Krueger on her description of corruption as a "soft issue." Without question, corruption is a core issue in Africa and one must applaud the World Bank for *trying* to address it. Nevertheless, one can agree with Krueger's general concern over the World Bank's broadened agenda. World Bank Vice President Joseph Stiglitz recently laid out a "new paradigm for development" that includes participation, decentralization, and community development (Stiglitz 1998). Hopefully, World Bank staff will study the failure of the community development movement of the 1950s and Robert McNamara's ill-timed and poorly executed IRD thrust of the 1970s.

To summarize, the broadened development agenda of donors makes it difficult for African governments to garner donor support for a long-term attack on Africa's human capital degradation and its ineffective agricultural institutions.

5. *Changing roles of public and private institutions and NGOs*

What are the most productive roles for public, private, and NGO institutions in supporting African farmers, traders, and agribusiness firms? There are many ideological positions on this issue, but there is little hard evidence on the performance of various types of public, private, and NGO organizations over time. However, we can glean some insights from Zimbabwe's experience in laying the foundation for increasing maize production:

- ◆ The government—not Oxfam—developed Zimbabwe's impressive all-weather road network.
- ◆ The government—not private seed companies—conducted research for 28 years (1932–1960) that led to the development of the SR-52 hybrid that increased maize yields by 40%.

- ◆ Commercial farmers—not external pressure—developed a politically powerful farm organization that made the case in the Parliament for public investments in research and farmer support organizations (Eicher 1995).

Zimbabwe's experience highlights the strategic importance of an active government role in the early stage of development, because private traders are unlikely to deliver research, extension, and credit services to smallholders, especially those in remote areas (Blackie 1990). The state was the organizer and risk-taker in developing Zimbabwe's all-weather road network, agricultural research system, and its extension service. Zimbabwe's private sector has slowly taken on a greater role in maize breeding, seed distribution, and the marketing of new high-value export crops. Avoiding dogmatism is critical when considering what should be done by the state or the private sector and when examining the sequencing and changing roles of the public and private sectors and NGOs over time (Bonnen 1998; Echeverria 1998).

6. Institution building vs. marginalist approaches

Over the past 40 years, the pendulum for building Africa's human capital and scientific capacity has shifted from building new institutions (i.e., the supply side approach) to a more delimited or marginalist approach. Most of the current capacity-building programs can be classified as marginalist. Donors have made this shift because of on-going civil wars, the failure of large-scale institution-building projects, and a growing awareness of the length of time involved in institution building. Currently, short-term capacity-building initiatives are in vogue in donor circles. These include support for commodity research networks (Robinson 1998) and strengthening a single discipline, such as economics under the African Economic Research Consortium (AERC) (Fine 1997).

On the issue of time, two scholars studying the experience of the Rockefeller Foundation's University Development Program (UDP), which assisted 15 universities in 12 countries for 20 years (1963 to 1983), concluded that "a high concentration of resources over a short period of time can result in a 'too much, too soon' syndrome" (Coleman and Court 1993). If the Rockefeller Foundation discovered that 20 years was too short of a time to build strong and effective universities, what does one infer from this experience for the architects of the marginalist approaches that are now in vogue? The lesson that I draw is that time and sustainability should be kept in mind as donors finance an increasing number of commodity networks and draw up 10-year plans to develop "sustainable" PhD programs in Africa.

African and Western scholars should challenge the misleading time optimism that is now conventional wisdom in development circles. Without question there is a need to mount a major effort to strengthen the agriculture knowledge triangle over the next 25 to 50 years.

7. Graduate education: strategic issues

Undergraduate education is the bread-and-butter of African university education, and the political pressure to increase undergraduate enrollment is relentless. Nevertheless, the urgency to set up African-based graduate programs is dramatized by two sobering facts. First, as few as 20 Africans a year currently receive doctorates in economics from *all* sources, both within the continent (including South Africa) and outside of it (Fine 1997). Second, Ghana has been independent for 42 years and "no Ghanaian university has ever produced a PhD in Economics" (Jebuni 1998). When the AERC was launched in 1988, it carried out a study of graduate education in economics in Africa and found that "graduate training in any meaningful sense appeared to have collapsed in most universities." The study attributed this to the following systemic causes: "lack of

funds, civil disorder, loss of good staff, deteriorating faculties and equipment, and a massive expansion of undergraduate enrollment” (Fine 1997). Many donors and foundations have responded to these issues by “pulling the plug” on overseas training (prematurely in my judgement), thus accelerating the devolution of graduate training in Africa. However, the Africanization of graduate education is occurring precisely when the quality of undergraduate education in Africa is declining because of the rapid proliferation of faculties of agriculture, forestry, and MSc programs, and a “meltdown” in the capacity in some fields (especially agricultural economics and economics) to offer high-quality MSc degree programs. A number of sub-regional (e.g., southern Africa) MSc degree programs are now being introduced throughout Africa, but the experience of the University of Nairobi’s MSc program in agricultural economics for East Africa illustrates the difficulty of securing local financial support to sustain these programs over the long term.

In summary, African universities are being summoned to take on the second generation challenge—expanding graduate education—at a time when politicians are promoting a relentless expansion of undergraduate enrollment. Foreign aid-financed overseas training is being prematurely phased out. Without question, overseas PhD training in many fields of agriculture will be needed for many decades. The complex issues involved in building graduate education capacity in Africa require further study and debate.

8. Whither the CGIAR?

What is the role of the CGIAR in capacity building in Africa? What has transpired since my critique of the CGIAR in the early 1990s (Eicher 1992, 1994)? In 1992, I argued that the CGIAR management had taken a wrong turn in the road when they increased the number of CGIAR centers from 13 to 18⁴⁶ and that the CGIAR was overburdened with secondary tasks at the expense of

⁴⁶ Today, the CGIAR comprises 16 centers.

that which was essential. Looking back, it is clear that the addition of five new centers was driven by valid substantive concerns to expand research on natural resources and the environment, and the desire of some bilateral donors to find a permanent home (in the CGIAR) for some of the non-affiliated centers that they had been supporting. The financial stress following the expansion is partially a result of the failure of donors to provide a commensurate increase in the budget to support the expanded mandate and the addition of five new centers. To address the noticeable loss of momentum of the CGIAR system in the 1980s, I declared that there was

an urgent need for the Chairman of the CGIAR system to appoint a high-level Commission of four eminent scientists and four CGIAR members to study alternative management structures for the 21st Century. The Commission should be financed by a foundation(s) and given 24 months to prepare a White Paper with a recommended management structure. A new management model should be in place by Centers Week of 1994 (Eicher 1992).

Six years later, the Strong Report was presented at the 1998 Annual Meeting of the Centers. The Strong Report falls far short of resolving the tough problems facing the CGIAR and posed by the Africa question, which is the Achilles' heel of the system. It remains to be seen whether follow-up studies will satisfactorily resolve the unfinished work of the expert panel.

Since the CGIAR centers are spending 40–44% of their collective budget on Africa, it is important to examine the CGIAR's record of capacity-building there. One can applaud WARDA's initiative in setting up the rice research network and IFPRI's decision in 1992 to help strengthen the Bunda Faculty of Agriculture in Malawi, as well as IFPRI's recent move to establish similar programs in Ghana and Mozambique. But one wonders whether IFPRI can mobilize the required funds and stay the course for the 10–20 years

that are required for building MSc capability in faculties of agriculture that are in their infancy. Indeed, after seven years of assistance to the MSc program in agricultural economics in Malawi, IFPRI has withdrawn its support (except for short-term consultants) and shifted its attention to strengthening the Faculty of Agronomy in Mozambique. In retrospect, it may have been prudent for IFPRI to have helped the University of Zimbabwe strengthen its regional MSc program in agricultural economics and urged Malawians to pursue their MSc degrees in Zimbabwe.

The WARDA and IFPRI examples illustrate how difficult it is for CGIAR centers to mobilize adequate resources for long-term capacity-building programs in Africa. The budgets available to CGIAR centers are extremely modest relative to those of agricultural experiment stations in the United States. For example, in 1997, the budget of the Michigan State University Agricultural Experiment Station (AES) was US\$ 65.6 million. The AES has 141 tenure-stream (permanent) faculty members serving a clientele of 51,000 Michigan farms, comprising 8,000 full-time commercial farms, 16,000 part-time farms, and 27,000 "hobby farms."⁴⁷ When I juxtapose CIMMYT's 1997 budget of US\$ 30.6 million, alongside its global mandate for maize and wheat, and its economics, natural resources, and biotechnology programs, I am forced to conclude that CIMMYT should move cautiously before embarking on new programs to combat human capital degradation in Africa. Instead of each CGIAR center trying to resolve this dilemma, the entire CGIAR system should address the following question: What can the CGIAR collectively do to help accelerate the development of Africa's scientific capacity in food, agriculture, and natural resources?

⁴⁷ Commercial farms have annual sales of over US\$ 100,000 per year; part-time farms have sales of US\$ 10,000-99,000 per year, and hobby farms have sales of less than US\$ 10,000 per year.

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Eicher's article, "Facing Up to Africa's Food Crisis," in *Foreign Affairs* (1981) called attention to Africa's chronic food problem and the need to move beyond short term integrated rural development projects and structural adjustment program. For the past two decades, Eicher has urged African policymakers and donors to focus on the fundamentals of agricultural development: strengthening institutions and macroeconomic capacity; improving human capital; and developing an indigenous capacity to develop, borrow, and diffuse new technology appropriate to the circumstances of small-scale family farms.

Two of Eicher's books have served as standard development textbooks: *Agriculture in Economic Development* (with L. Witt) 1964; and *International Agricultural Development*, Third Edition (with J. Staatz) 1998. His other books include *Research on Agricultural Development in Sub-Saharan Africa: A Critical Survey* (with Doyle Baker) 1982; *Zimbabwe's Agricultural Revolution* (with Mandivamba Rukuni) 1994; and *Africa's Emerging Maize Revolution* (with Derek Byerlee) 1997.



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