

# **BUILDING AGRICULTURAL INSTITUTIONS**

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**Transferring the Land-Grant  
Model to India and Nigeria**

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**Arthur A. Goldsmith**

**Westview Press**

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Shortly after World War II the United States began to export to developing countries the "land-grant model"—its system of applied agricultural science. This system is made up of subnational agricultural universities, extension services, and experiment stations, and also of national-level organizations to support and coordinate agricultural development. Though it worked well in the United States, results have been mixed in the third world.

This book compares and contrasts two attempts—one Asian, one African—to replicate the American system. The first country (India) is a relative success, the second (Nigeria) is a relative failure. Tracking institutional development in this pair of nations over the past several decades is instructive, for they represent opposite poles on the range of policy outcomes. Similar impulse and design did not yield similar results. India ended up assimilating much, though not all, of the land-grant model and benefiting from it; Nigeria assimilated less and benefited less.

These two cases are more than historical curiosities. They provide important lessons for policy makers today, especially those working in the sub-Saharan region. Tropical Africa has a desperate institutional deficit. This shortage of institutional capacity has many manifesta-

tions, but surely the most serious is that region's chronic inability to feed itself. The green revolution, which swept through Asia starting in the 1960s, has barely touched Africa. A major drag on sub-Saharan agriculture, while certainly not the only one, is the weak base of institutions there compared to Asia. Development of better technological organizations is necessary, although not sufficient, to modernize African farming. The problem of Africa's institutions was well-known thirty years ago, in the dying days of colonialism. Vast amounts of money, equipment, and manpower have been invested since then to overcome it. Yet that region's ability to find, adapt, and distribute farm technology now lags even further behind Asia's.

The underlying aim of this book is to understand the basis of Africa's dismal institutional showing, and suggest what socioeconomic conditions and management interventions might be required to improve the infrastructure of knowledge-generating institutions. Given the United States' long and continuous history of technical assistance to agriculture, it is enlightening to compare its institution building programs in a representative African and Asian country. Why did the land-grant system transplant poorly to Nigeria, but take root reasonably well in India?

My interest in this topic started several years ago with the India case. I was engaged in a research project at the World Bank being directed by Uma Lele.\* She wanted to explain India's favorable use of foreign assistance. Explanations of institutional change are questionable if not developed within a systematic, comparative framework. To draw lessons with any confidence, at least two points of reference are needed. More than anyone else, Lele made me aware of the rich insights to be gained by exploring the similarities and differences between India and Africa.

The evidence from the cases shows that technical institutions are "supply-driven." They are planned and implemented by technical experts, not "demand-driven" by pressure from society. But the

\*See our article, "Development of National Agricultural Research Capacity: India's Experience with the Rockefeller Foundation and its Significance for Africa," *Economic Development and Cultural Change* 37 (January 1989): 305-43. Parts of that article are reprinted here with permission of the University of Chicago Press. Another outgrowth of that project is my piece, "The Management of Institutional Innovation: Lessons from Transferring the Land Grant Model to India," *Public Administration and Development* 8 (July-September 1988): 317-31, where I initially worked out some of the ideas developed more fully in this book.

process is not narrowly technocratic. There are also political dimensions. Internal, organizational politics and external, national and international politics all affect whether institutions accept or reject innovations. I give special attention to the role of public sector entrepreneurs in institutional development, and to how factional pushing and pulling help to shape the look and behavior of technological institutions. The stance of outside political elites strongly affects the pace and direction of change in the short-run; over the long-run the attitude of farmer groups can be even more important.

The pages that follow could not have been written without access to unpublished sources. I am grateful to the staffs of the Ford Foundation Archives, the Rockefeller Archive Center, and the U.S. Agency for International Development Library for lending me a hand in obtaining and reviewing a mass of original materials. I would like to thank Sharon B. Laist, Ford Foundation Archivist, for granting permission to quote from that organization's records. Secondary literature, always difficult to locate on third world topics, was also essential to this research project. Stephen Haas of the Healey Library at the University of Massachusetts, Boston helped me track down some of these writings. I relied heavily on the interlibrary loan system, but also was privileged to be able to work extensively at the Mugar Library (especially the Africana collection) at Boston University, the Mann Library at Cornell University, and the Library of Congress. I was also able to visit India and Nigeria to look at documents there.

Several institutions helped to defray the expenses of visiting some of these sites. After the initial World Bank and Rockefeller Foundation support, arranged by Uma Lele, I had backing from the American Institute of Indian Studies, the Indo-American Fellowship Program, and the Educational Needs Fund at the University of Massachusetts at Boston. A grant from the Joseph P. Healey Foundation was also useful in enabling me to buy release time from teaching. I would like to thank Milton Esman, Alan Hoben, David Knapp, Susanne Rudolph, and Norman Uphoff for their assistance in obtaining these resources.

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chronicle, they were enormously helpful in providing background and correcting some misinterpretations on my part. Norman Uphoff, Deborah Bräutigam, and Ian Mayo-Smith were unsparing and meticulous in their insights. I deeply appreciate all their observations. Elizabeth Goldsmith provided the essential, but often elusive, intelligent layman's perspective, and helped me reorganize and clarify the argument that follows. She also backed me up in other ways, large and small. I shall always be grateful. The interpretation of events offered here, however, remains mine and I will have to take both credit and blame.

Finally, I would like dedicate this book to Emily Goldsmith, who was born just as I was beginning to compose it. She provided a needed diversion from writing, and got me to use the remaining time more efficiently than I knew how. May all fathers be so fortunate.

*Arthur A. Goldsmith  
Brookline, Massachusetts*

## ABBREVIATIONS AND ACRONYMS

ADPs	Agricultural Development Projects (Nigeria)
AID	Agency for International Development (United States)
AIDL	Agency for International Development Library
CGIAR	Consultative Group on International Agricultural Research
CIMMYT	International Maize and Wheat Improvement Center
CSNRD	Consortium for the Study of Nigerian Rural Development
FAO	Food and Agriculture Organization of the United Nations
FFA	Ford Foundation Archives
FSR	Farming systems research
GDP	Gross domestic product
HYV	High-yielding variety
IADP	Intensive Agricultural Districts Program (India)
IAR	Institute of Agricultural Research (Nigeria)
IARI	Indian Agricultural Research Institute
IAS	Indian Agriculture Service
IBRD	International Bank for Reconstruction and Development
ICAE	Indian Council on Agricultural Education
ICAR	Indian Council of Agricultural Research

ICRISAT	International Crops Research Institute for the Semiarid Tropics
IITA	International Institute of Tropical Agriculture
IFPRI	International Food Policy Research Institute
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
NAFPP	National Accelerated Food Production Project (Nigeria)
NCST	National Council for Science and Technology (Nigeria)
NUC	National Universities Commission (Nigeria)
OPEC	Organization of Petroleum Exporting Countries
PIRRCOM	Project for Intensification of Regional Research on Cotton, Oilseeds and Millet (India)
RAC	Rockefeller Archive Center
R&D	Research and Development
T&V	Training and Visit (system of agricultural extension)
TCM	Technical Cooperation Mission (of U.S. to India)
UNDP	United Nations Development Program
UNESCO	United Nations Educational, Social and Cultural Organization
USDA	United States Department of Agriculture
UGC	University Grants Commission (India)
VLW	Village level worker

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## INTRODUCTION: INSTITUTIONS, TECHNOLOGY, AND AGRICULTURAL DEVELOPMENT

India seemed trapped in an ever-tightening vise in the mid-1960s, caught between an enormous, fast growing population on one side and stagnant foodgrain production on the other. One alarmingly titled book from the period, *Famine 1975!*, after noting the country's heavy dependence on American-grown food, concluded that "no matter how one may adjust present statistics . . . it will be beyond the resources of the United States to keep famine out of India during the 1970s."<sup>1</sup> Even the mainstream Science Advisory Committee to the President thought catastrophe to be inevitable. Current trends were leading to a 15 million ton gap between domestic supply and demand for foodgrains by 1971, a deficit whose elimination the committee believed "cannot be regarded as realistic."<sup>2</sup>

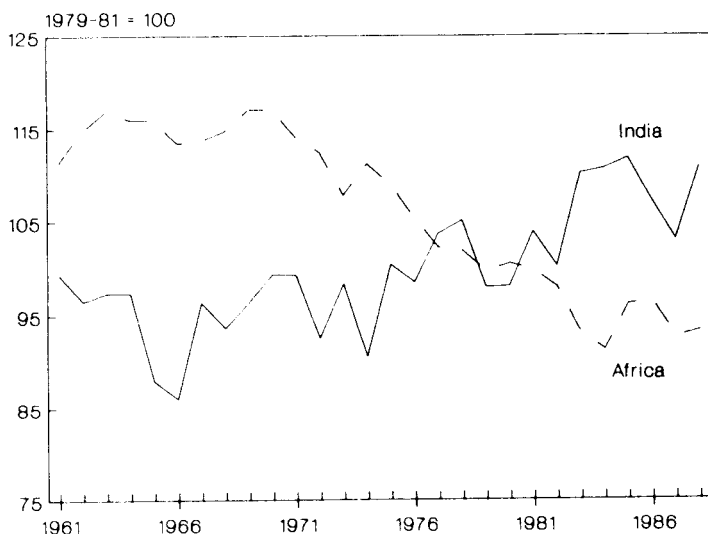
The soothsayers were wrong; the disaster did not take place. Instead, India's 1970-71 foodgrain harvest broke all records, exceeding 100 million tons for the first time. To most of the world's surprise, the simultaneous development of new varieties of food plants and improved agricultural techniques enabled India to become a net exporter of grain that year. Not all seasons were so bountiful, yet total foodgrain production was able to reach 150 million tons only fifteen years later. Hunger still exists despite this so-called green revolution—the per capita supply of calories per day in 1970 was virtually unchanged compared to a decade before, and it has increased little subsequently. Nonetheless, the turnabout in India's agricultural fortunes was remarkable.

While India outpaced Malthus, at least temporarily, sub-Saharan Africa has not been so successful. The continent was likewise struggling to catch up with diverging farm production and demographic trends during the 1960s, when most of its forty-odd

countries became independent. Even in 1960 the Food and Agriculture Organization (FAO) of the United Nations was worried because food supplies were barely keeping pace with or were falling behind population growth, and because demand was flat for almost all Africa's farm exports.<sup>3</sup> These same statements hold true in general today, thirty years later.

Between 1961 and 1985 production of crops and livestock on the continent (including North Africa) rose by little more than half, while population about doubled. Much of the modest increase in production came about from bringing new land under cultivation (the amount of which rose 11 percent between 1961-65 and 1985), rather than from farming more efficiently and intensively. Yields of many important crops remain far lower in Africa than in India; the FAO estimates, in fact, that African farmers in 1985 grew two-thirds as much cereal per hectare as their Indian counterparts. The effect on food supplies has been devastating. Per capita production of food in 1985 was 10 percent below the level only a decade earlier. In India it was about 10 percent higher. (See figure 1 for a graphic comparison of Africa's feeble per capita agricultural production trends with India's better performance.)

Figure 1 Per capita agricultural production index, India and Africa, 1961-88



SOURCE: Constructed from three indexes as reported in *FAO Production Yearbook* (Rome: various years).

The continent has made up its food deficit by imports—about 37 kilograms of wheat and flour, 9 kilograms of maize, and 7 kilograms of other cereal products for every resident in 1985. Few countries in the region can sustain such a level of overseas purchases given their anemic export sectors—between 1974 and 1985 the volume of agricultural exports from Africa declined by about 15 percent. Modest improvements in domestic food production do appear to have taken place since the mid-1980s.<sup>4</sup> Yet, as the recurrent outbreaks of famine south of the Sahara show, economic recovery and food security are far from assured.

Why has Africa not undergone a green revolution while India has? The reasons are manifold.<sup>5</sup> Africa has less irrigated land, worse infrastructure of roads and railways, more hostile growing conditions, more diverse cropping patterns. Africa is made up of many national governments, versus India's single one, and they have been less stable, more preoccupied with internal strife, less influenced by rural political interests, and thus not as able to pursue public policies favorable to agricultural development. The continent's national economies are internally less diversified than India's and are more open to world economic forces. Africa also has a much flimsier base of technological institutions and of human capital, which in turn has restricted the supply of improved farm technology.<sup>6</sup>

### **Agricultural Technology Complex**

It is this last set of factors—what I call the agricultural technology complex—that are the focus of this book. By agricultural technology complex I mean all institutions (and the requisite trained manpower) in a country that carry out any of the following three functions: extension of farm advisory services, education of university students in agricultural subjects, and conduct of research in agricultural science. Each of these functions is essential to propagate farm technology, broadly understood to mean practical knowledge about agriculture. The sum of them is more important than any of them singly—ideally extension, education, and research come together as an interdependent system for applying science to farm problems and for dispersing the findings to users. (Some might want to add the mobilization of groups of farmers as a fourth dimension of the technology complex, though I subsume this as one of the subsidiary tasks of agricultural extension.<sup>7</sup>)

There is synergy among these functions. Extension (and local

organization), education, and research enrich each other. Farm outreach services and agricultural experiment stations, for example, are enhanced when they can draw on a solid educational system for their scientists and technicians, just as an educational system benefits from having good research and administrative positions in which to place its graduates. The United States, which underwent its own agricultural revolution earlier in the twentieth century, has gone further than other countries in forging horizontal links among the three functions. It has also erected strong vertical links between the national and subnational level, to form a dense grid of institutions devoted to the creation and modification of agricultural technology. The resulting institutional framework—known as the land-grant model because grants of real property were its original source of finance—was essential to the modernization of rural America. The land-grant model is not a panacea. But its basic principles make sense anywhere. Many developing countries have tried to adopt these principles. Two such countries—India and (representing Africa) Nigeria—are contrasted against each other, as well as against the original American example, in this book.

The reason for comparing these cases is to find out how new ideas about management and organization get transferred from one country to another, and how these new ideas do or do not get implemented as new practices and procedures. Agricultural institutions, and technological institutions in general, are frequently called upon to make organizational innovations. They need to put their own houses in order before they can generate technical innovations for use in the outside economy. What processes are involved in institutional development? What factors lead instead to institutional stagnation or regression? How can the odds for success be improved? Comparative analysis can shed light on these questions. The answers are potentially significant, both from a theoretical and a policy standpoint, for technological institutions in Africa usually resist attempts to reform them. National governments and international agencies have invested heavily in extension, education, and research organizations throughout the region. Yet, in many countries these assets are wasting. Reinvigorating the base of agricultural institutions is crucial to any effort to step-up the pace of overall development in Africa. The means of doing so needs to be better understood.

What are institutions? They are stable, valued, recurring patterns of behavior. Institutions thus include both rules or procedures that