

# DRAFT

January 14, 1991



## THE MODERN PARADIGM FOR AGRICULTURAL AND RURAL DEVELOPMENT

An effective program of international assistance and collaboration must be based on sound economic development policies. Over the last two decades an unusual consensus has emerged on how to successfully promote economic development, and especially agricultural development.

This chapter is devoted to a synthesis of that emerging perspective. Topics covered include: (1) the policy setting; (2) the critical role of new production technology; (3) the importance of other forms of human capital; (4) the role of the physical infrastructure; (5) the need for viable institutions; (6) the importance of decentralizing the development process; and (7) realizing the complementarities between development and development at home. Each of these topics is discussed in turn.

### The Policy Setting

Events of recent years have reconfirmed the importance of depending on free markets as the means of organizing economic activities. The poor performance of the centrally planned economies has forcefully demonstrated that central planning and state ownership of resources does not result in sustainable and efficient economic growth. Moreover, economies organized in this way have caused significant damage to the environment and

probably have the poorest chance of experiencing sustainable economic development.

An important implication of this lesson is that nations interested in promoting efficient economic growth must open their economies to economic forces from the international economy. This means that protectionist measures must be reduced to minimal levels and the producer sector of the economy allowed to produce to its comparative advantage. The success of the Newly Industrialized Countries (NICs) of Asia shows how successful such policies can be. The failures in economic performance by countries which have pursued import-substituting industrialization policies behind protectionist barriers carry the same lesson. Infant industry arguments for development behind protectionist barriers carry the same lesson. The problem is that development policies based on such arguments create their own vested interests in the protectionist policies, with the result that the infant is never permitted to grow up.

In addition to allowing the producer sector to play to its respective comparative advantages, a market economy open to the international economy with minimal protectionist measure also allows consumers to exercise their sovereignty in multiple markets, both at home and in the international economy. This exercise of consumer sovereignty puts healthy competitive pressures on domestic industries and induces them to seek and

adopt efficient production practices as a matter of survival.

Another implication of the lesson that a market economy connected to the international economy is best is that balanced growth generally gives the best result. Given that most of the resources in low income countries are in agriculture, this sector should receive important attention in efforts to promote economic development. This is not an argument for an agriculture first development policy, but rather an argument that the urban bias in the past development policies of developing countries, and which now seems to be becoming prominent in bilateral and multilateral development agencies, have been unproductive. The challenge of policy makers is to take those measures that will raise the productivity of resources where they are located, while at the same time encouraging the development of new economic activities that follow from the rise in per capita incomes and that are consistent with the nation's comparative advantage.

This perspective does not imply that comparative advantage is something that comes from heaven and that policy makers can do nothing about. We know that nations can and do alter their comparative advantage, and that they do this to their considerable benefit. However, they do this by investing in those activities that raise their resource productivity, and not by protectionist measures.

Finally, depending on markets to organize the economic activities of a nation does not mean that there is not a role for government or for the public sector. To the contrary, there are very important roles for the public sector, and generally these are critical to the success of the private sector. The point is that there are a number of activities that the private sector will not undertake, or will not undertake at socially optimal levels, largely because they will not be able to capture the full benefits of their investments. Such activities include certain kinds of basic research, certain kinds of applied research, certain kinds of education and training, health care, the collection of data on the performance of the economy, the regulatory framework necessary to make markets work efficiently, and the physical infrastructure for the economy.

It is these public sector activities which will be discussed in the following sections of this chapter.

#### The Critical Role of New Production Technology

Perhaps the most important insight of this past quarter century in terms of knowing how to promote agricultural development has been the realization of the critical role of new production technology. Nobel Laureate Theodore W. Schultz made this the clarion call of his book on Transforming Traditional Agriculture, which was published in 1964 and which was an

important basis of his receiving the Nobel Prize in Economics. Hayami and Ruttan, in their path-breaking study Agricultural Development: An International Perspective, first published in 1970, carried this theme an important step forward.

The importance of new production technology for agriculture was discussed in an earlier chapter. Its importance as a means of producing economic development whose benefits were widely distributed in the economy, and whose benefits tended to be distributed in favor of the poor, were emphasized. Both of these characteristics of new agricultural technology provide the basis for a development process that will be self-sustaining.

Hayami and Ruttan contributed important insights on what was needed in terms of building the capacity to produce this new production technology. In the first place, they differentiated between biological and chemical technologies which enhance the productivity of land, and mechanical technologies which enhance the productivity of labor. Second, by drawing on the agricultural development experience of Japan and the United States, they noted that which of these two kinds of technology a country emphasized depended on the relative resource scarcity the particular economy faced. Land-scarce countries such as Japan had traditionally concentrated on biological and chemical technicals, which raised the productivity of land, while labor-scarce countries such as the United States had traditionally

concentrated on mechanical innovations, which raised the productivity of labor. In both countries the emphasis later shifted as relative resource scarcity changed over time.

Another insight from Hayami and Ruttan was that biological innovations tended to be highly location-specific. Biological innovations (improved varieties) that raised the yields of crops, for example, had to be adapted to local ecological conditions and to local resource scarcity. Thus, to have an adequate agricultural research system, a nation (and the world, by implication) had to have an agricultural research station in each ecological zone. This suggests that such biological innovations are not transferable from one part of the world to another, a mistaken premise that underlaid President Truman's famous Point IV program of an earlier day.

The same does not apply to mechanical innovations, which like much of industrial technology is highly transferable. Except for the need to tailor tractor and equipment size to local farm size and the slopes of hills, most tractors and farm equipment can be transferred from one part of the world to another.

A final insight from Hayami and Ruttan was that much of the capacity for biological research has to be in the public sector. If an improved variety can be reproduced by any farmer and sold

or given to his or her neighbor, private companies will have little incentive to produce such improved varieties. There are important exceptions, of course, such as in the case of hybrid varieties which do not reproduce themselves. In those cases, the private sector can capture the returns from their investments and thus have played an important role in developing such varieties. What in effect happens is that a symbiotic relationship develops in some cases between the private and public sector. In the case of hybrid corn, for example, the public sector produced the inbred lines which are crossed to produce the hybrids, but the private companies crossed the inbreds and sold the resulting hybrids.

Because hybrids are only one source of improved varieties for agriculture, a publicly supported agricultural research system is still needed. In addition to open pollinated lines, many of the innovations agriculture needs involve little more than new ways of doing things. Such knowledge is highly transferable. Similarly, basic research has for the most part to be in the public sector. The new biotechnology based on genetic engineering has the potential to be developed by the private sector, but a more likely evolution of this sector is that it, too, will be shared between the private and public sector.

Social science research is a parallel to biological and physical research. In contrast to the new technology the

biological and physical research produces, social science research produces information for policy makers and private decision makers, with new institutional arrangements being the counterpart to the new production technology of the biological and physical scientists. A major share of social science research needs to be in the public sector since it for the most part does not result in patentable innovations or knowledge that can be sold.

Mechanical innovations can be produced by private sector research since the new knowledge is imbedded in machinery and equipment that can be manufactured and sold. Most such research is done in the private sector, as is the research that leads to improved fertilizers and pesticides.

Finally, patents and other institutional arrangements which protect the intellectual property rights of those creating new innovations and technology for agriculture are essential if the private sector is to be encouraged to invest in research for the modernization of agriculture. This issue will be discussed below.

In conclusion, an essential ingredient for promoting agricultural development is the establishment of a system of agricultural research to produce the biological innovations and the social science research the private sector will not produce.

In addition, institutional arrangements which protect intellectual property rights are also needed.

#### Other Forms of Human Capital

New production technology is not the only form of human capital that is vital to agricultural development. Another form of such capital, and one that is complementary to the new production technology, is education. All levels of education are important, and it has a number of important roles to play in the development process. Graduate training programs which produce the scientists needed to do the biological, physical, and social science research are critical if these scientists are to be educated in ways relevant to the problems of the society and if the research system is to be self-sustaining. A capacity for undergraduate education is needed to train the cadre for a modern agricultural sector. Primary and secondary education is important because it helps raise the productivity of the labor force, and because cognitive skills are needed to decode the technology made available to the agricultural sector.

Education and training play another important role in agricultural development. It is a critical aspect of making the agricultural labor force more mobile and thus facilitates the adjustment of the labor force out of agriculture as economic development proceeds. In this role it helps to raise per capita

incomes in the agricultural sector and thus to reduce the sectoral disparity between the agricultural and nonfarm sector. It thus helps to keep the benefits of economic development widespread in the economy, and to promote a higher rate of expansion of the nonfarm sector.

Still another form of human capital is the health status of the population. Improved health raises the productivity of the labor force in a physical sense. This is important in agriculture where many of the labor activities are physically demanding. Improved health also sharpens the cognitive skills of the individual and thus helps to improve decision making. There are important social dimensions to health care, since poor health is a risk to all citizens and diseases are highly transferable.

Unfortunately, in most countries both the level of educational attainment and the quality and availability of health care are much less in the agricultural and rural sector than they are in urban sector. This contributes to the disparity in incomes between the two sectors, and to disparities in the rates of development.

A final form of human capital is the nutritional status of the society. Inadequate nutrition lowers the productivity of the worker and also dulls his or her cognitive skills. It also contributes to poor health. And in the case of children and

youth, it lowers their ability to learn and to develop their cognitive skills. Investments in adequate nutrition thus can have a high payoff in raising the productivity of the labor force, both in the short and in the long term.

An important issue to note in concluding this section is the high degree of complementarity in investing in the various forms of human capital. Improved nutrition is highly complementary to good health, and both are highly complementary to education. Education, in turn, is highly complementary to new production technology. Thus, if policy makers want to realize the highest returns possible to their investments in any form of human capital, they should invest at socially optimal levels in all forms.

### The Role of Physical Infrastructure

The physical infrastructure is another component of the economy that is essential to a vital economy. This includes such things as highways, transportation control systems, railroads, bridges, and airports. Many components of the physical infrastructure have to be built and managed by the public sector, even though in some cases the installed system can be supported by user fees.

Given the geographic dispersion of agriculture, the physical

infrastructure is especially important to this sector. Commodities have to be transported long distances to consumers, and modern inputs have to be transported similarly long distances from urban-industrial centers to the widely dispersed farms. In addition, farm families have to have access to the goods and services that make up their consumption bundle if they are to have standards of living comparable to their urban counterparts.

Governments in most countries tend to underinvest in the physical infrastructure serving the agricultural and rural sectors. In some parts of the developing world, such as Africa and certain parts of Latin America, the deficiencies of the rural infrastructure are especially great. Development of the agricultural sector simply will not take place without an adequate physical infrastructure.

Much is made in the current rhetoric surrounding foreign economic assistance of the need to provide such assistance to the private sector in the developing countries, and not to the government or public sector. Such rhetoric is somewhat misguided, although the implied point that markets should be given a greater role in such countries is well taken. The point is that public investments are essential ingredients of a market economy, and are important forms of support and subsidy to the private sector. We see that in the case of the capability to produce new production technology for agriculture. We also see

it in the physical infrastructure for agriculture. And later we will see it in the case of the institutional infrastructure for a modern agriculture.

### The Institutional Infrastructure

Institutions and institutional arrangements are also essential ingredients of a modern economy. Institutions are the means by which individuals relate to each other in a society. They refer to the rules and codes by means of which citizens conduct their daily social, economic, and political intercourse. They range all the way from the social institution of marriage, a legal system to protect human rights, police and fire protection systems, rules by which private markets work, private property rights, and Riparian rights which govern the use of surface water.

At a somewhat different level, there are all the institutional arrangements implied by the discussion in earlier sections of this chapter. These include agricultural research systems, educational systems, health care delivery systems, and family planning systems. The development of these systems is an important challenge to development policy makers. They demand a special kind of creativity, especially in the need to adapt the institutional arrangements to local conditions and to change them in response to changing economic conditions as economic

development proceeds. Institutional development has to be an important component of any economic development effort. Clearly, most such institutions need to be in the public sector.

The challenge of viable institutional arrangements has been made clear as one witnesses the attempts of the previously centrally planned countries try to shift to market economies. The difficulties have been great, in part because of the failure to understand what activities need to remain in the public sector and the failure to understand just which institutional arrangements are essential for a private market economy. In efforts to assist the previously centrally planned economies, help in designing and developing the new institutional arrangements may be as important or more important as actual transfers of capital.

#### Decentralizing the Development Process

An important feature of economic development as it has been experienced in most countries is the excessive concentration of economic activities in large urban-industrial centers. Labor is drained out of agriculture and concentrated in urban agglomerations. In many countries, more than 50 percent of the nation's population is concentrated in the capital city.

A certain amount of this concentration is natural.

Industrial and service activities tend to be highly complementary to each other and thus there are economic benefits to a close geographic concentration. But this high level of concentration has important social costs in terms of providing the physical infrastructure for such concentrations, and the negative externalities associated with high levels of pollution and the time lost in moving about in congested streets. These costs make the expansion of economic activities in these centers be extremely costly in terms of the needed investments.

Importantly, these are not the only costs associated with such a development pattern. Similar negative externalities are imposed in rural areas when labor migrates to urban centers. Such migration from agriculture tends to involve geographic migration. What we know about such migration is that it tends to be highly selective. The people who tend to migrate include the young, the more vital and entrepreneurial, and the more well educated. Thus, the migratory process tends to drain the human capital from the rural areas. In addition, when they migrate they tend to take whatever physical capital they have with them.

This exodus of the human capital from the rural areas imposes negative externalities on the supplying regions. This is very similar to the losses recognized in the brain drain literature when the brightest and best migrate to the developed countries after they have received their higher education in

those countries. The exodus leaves a very weak base for developing other economic activities in rural areas, and is another reason why the incomes of rural people tend to lag behind those in urban centers.

Despite the natural complementarities of industrial and service activities, there is no reason why this concentration of economic activities has to be so great. There are sound economic reasons why the development process might be different. And if the negative externalities in both the urban centers and in the rural areas are as large as they appear to be, considerable sums could profitably be spent in reversing or reducing the tendency towards concentration.

Efforts to reverse the trend do not require a heavy hand on the part of government, nor the need to prejudge where particular nonfarm activities need to be geographically located. For one thing, much of the concentration is due to government subsidies, both implicit and explicit, to locate in large urban centers. These subsidies should be drastically reduced or eliminated. In addition, shifting resources from the construction of physical infrastructure in urban centers to improving the physical infrastructure in rural areas will make the rural areas a more attractive place for the industrial firms to locate. Given that agricultural activities are inherently part-time jobs in most countries, the decentralization of the industrialization process

will help make more efficient use of the agricultural labor force.

In most countries which have already experienced economic development the labor force has to bear most of the costs of adjusting to changing economic conditions. They have born these costs by dislocating their families from familiar surrounding and settling in unfamiliar urban surroundings. There is no reason why this is inevitable. Decentralizing the industrialization process will cause the costs of adjustment to be born more equitably, reduce the negative externalities associated with the development process and thus provide a more efficient development process, and make for more efficient labor markets.

### Realizing the Complementarities Between Development

#### Abroad and Development at Home

The United States has long viewed itself as Fortress America. It has long been a large, self-contained economy that was for the most part self-sufficient. Moreover, for most of its history it has been strongly isolationist.

Such a perspective is no longer appropriate. The relative importance of the U.S. economy in the global economy has declined significantly since the end of World War II. It is no longer the scientific and technological leader of the world. It is

increasingly dependent on other countries for raw materials critical to its own economic development. It suffers from environmental damage coming from other places in the world. And increasingly it must live by its wits.

In such a changed situation, the United States has an enormous latent demand for knowledge on the rest of the world. If it is to keep pace with other countries that are experiencing rapid economic development it must increasingly capture the new knowledge that is being produced in other parts of the world. And if it is to establish friendly and constructive relations with other countries in the world, it must forge collaborative arrangements on activities that are mutually important. This nation's foreign assistance programs can be a vital means of establishing such collaborative arrangements.

#### Concluding Comments

The emerging consensus on how to promote agricultural development focuses on the critical role of the capacity to produce new production technology for agriculture on a sustained basis, on the importance of investing in other forms of human capital such as education, good health, and adequate nutrition, on the institutional arrangements needed for a market economy, and on an adequate physical infrastructure. Decentralizing the industrialization process will make for a more equitable and

efficient development process. The challenge to the United States is to protect its position in the world. Its foreign aid program can be an important means of promoting economic development generally for the mutual benefit of the United States and the countries with which it collaborates.