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Staff Paper

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Systems in Fighting Hunger Through Fostering
Sustainable Economic Growth**

by
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**THE STRATEGIC ROLE OF FOOD AND AGRICULTURAL SYSTEMS IN
FIGHTING HUNGER THROUGH FOSTERING SUSTAINABLE
ECONOMIC GROWTH**

by

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INTRODUCTION

One of AID's four major goals is to foster sustainable economic growth. Implicit in all of AID's goals is a humanitarian concern with improving the quality of life of the poor in developing countries. What role does investment in food and agricultural systems play in attaining these explicit and implicit goals? How does hunger alleviation fit into this process? What strategic issues does AID face in developing a strategy to contribute to the Agency's broader goals of sustainable economic growth and reduction of poverty?

Economies in many developing countries are characterized by widespread poverty, hunger, and semi-subsistence-oriented production. The cause of most of the chronic hunger is low income (Sen; World Bank, 1986; Jayne et al.). This paper outlines why investment in agriculture and the other parts of the food system is essential to transforming these economies into more productive systems capable of sustaining much higher levels of material well-being. The term "food system", as used here, refers to the full set of activities involved in the production, processing, and distribution of food ("from seed to table"). It encompasses not only farm-level production, but also input supply and output distribution, as well as the institutions (laws, rules of contract, markets, etc.) that coordinate these activities. Food systems thus encompass what is traditionally referred to as "agribusiness" as well as rural factor markets and farm-level agricultural production.

The challenge of increasing productivity in the food system is immense. The demand for food in developing countries is projected to more than double by the year 2025, driven by both population and income growth (Yudelman, p. 3). For sub-Saharan Africa, the World Bank (1989) estimates that agricultural production must grow at a sustained rate of at least 4%/year to foster broad-based economic growth.

The challenge is not only to increase food production dramatically, but to deliver it to rural and urban consumers at a low real price. The term "real price of food" refers to the price of food relative to the incomes (in terms of money, time, and other resources) of those consuming the food. Thus, for a wage earner, the real price of food can be viewed as the price of food relative to her wages. For a farmer, the real price may be the time and land needed to produce a unit of food relative to that needed to produce a unit of coffee or cotton. If more food is produced, but only at high real prices, then little hunger alleviation results, as the poor can't afford the increased output. Equally important, as explained below, having a supply of low-cost food is essential to expanding employment opportunities for the poor in both farm and non-farm sectors of the economy.

The paper shows that from a strategic planning perspective, the major policy issue is not whether to invest in agriculture or in other sectors of the economy. It is rather how to use investment in agriculture and the rest of food system as a tool for transforming the structure of the economy, thereby increasing overall productivity and broad-based growth. The effect of such broad-based growth is to diminish poverty-induced chronic hunger. There is a strong complementarity between productivity increases in the food system and broad-based growth in the rest of the economy. But given scarce resources, important questions arise as to the types and phasing of investments in the food system and the rest of the economy.

To fuel structural transformation of the economy, an ongoing stream of technical changes *throughout the food system* is required. Furthermore, complementary reforms in markets and other institutions and investments in infrastructure are critical to foster adoption of socially profitable new technologies. Such actions are also necessary to facilitate the exchange and intersectoral resource transfers that are central to transforming the economy. The paper concludes by raising some questions to debate in developing AID's strategy to help foster structural transformation.¹

I. ECONOMIC GROWTH AND STRUCTURAL TRANSFORMATION

The development community has long debated the goals of economic development. While analysts disagree on many details, most include in their conception of development a broad-based increase in the material standard of living of the population, at least to the point where people can pursue healthy, productive lives (World Bank, 1986). W.A. Lewis, the father of modern development economics, also stressed that development involves giving individuals more options about how they spend their lives (Lewis, Annex).

Increasing people's material standard of living and broadening their options requires increasing their access to resources beyond those in their immediate surroundings. In other words, achieving the basic objectives of economic development involves integrating people into the broader resource and knowledge base of the world.

Every major economy that has moved from low-income to high-income has undergone such a process of integration. The integration manifests itself in a change in the structure of the economy. This *structural transformation* of the economy involves:

- a. A process by which increasing proportions of employment and output of the economy are accounted for by sectors other than agriculture. The economy becomes less agriculturally oriented in a relative sense, although agriculture and, more broadly, the food system continue to grow absolutely and generate important growth linkages to the rest of the economy. Structural transformation thus involves *a net resource transfer from agriculture to other sectors of the economy, over the long term*. Both time-series and cross-sectional data show that all major countries that have succeeded in substantially increasing per capita incomes have experienced this shift in the sectoral composition of their economies (table 1). Economists have widely analyzed the forces driving this shift in the sectoral composition of the economy (Engel's law, gains from specialization and exchange, and increases in farm-level productivity) (e.g., Doving; Timmer).

¹It is important to distinguish between *structural transformation* and *structural adjustment*. Structural adjustment refers to a package of short- and medium-run programs aimed at (a) stabilizing an economy whose previous macroeconomic policies have led to serious imbalances in both the government budget and foreign-exchange reserves and (b) changing the incentives in the economy (relative prices, tax regulations, rules governing the private sector, etc.) to create the conditions for sustained long-term growth. If the structural adjustment programs succeed in fostering long-term growth, the economy may begin to undergo the process of structural transformation described below.

SECTORAL COMPOSITION OF DEVELOPING ECONOMIES

Share of Labor Force (%)	Low-Income		Lower-Middle Income		Upper-Middle Income	
	1965	1980	1965	1980	1965	1980
Agriculture	77	72	65	55	45	29
Industry	9	13	12	16	23	31
Services	14	15	23	29	32	40
Share of GDP (%)	1965	1990	1965	1990	1965	1990
Agriculture	41	31	22	17	16	9
Industry	26	36	32	31	36	40
Services	32	35	44	50	47	51

SOURCE: World Bank, *World Development Report*, 1988 and 1992.

- b. Movement of the economy away from subsistence-oriented household-level production towards an integrated economy based on greater specialization, exchange, and the capturing of economies of scale (Reynolds). Many functions formerly conducted on the farm, such as input production and output processing, are shifted to off-farm elements of the economy. For example, farmers rely more on external sources of power (e.g., gasoline-powered pumps) and less on producing that power themselves through human or animal power. Milk is sold to creameries rather than processed into butter on the farm. Thus, resources shift *within* the food system as well as between the food system and the rest of the economy. Consequently, the off-farm elements of the food system (agribusiness and food retailing) grow relative to farm-level production both in terms of value added and employment.

This process of specialization and exchange eventually can progress very far. In the U.S., for example, only about 10% of the value added in food eaten by consumers is created on the farm.² The remaining 90% is created by input producers, trucking firms, food manufacturers, restaurant employees, and others in the off-farm segments of the food system. One implication of this process is that driving down the real cost of food to consumers requires increased attention to fostering technical and institutional changes in the *off-farm* elements of the food system. Increasing productivity at the farm level is absolutely necessary but is alone insufficient to assure decreases in the real price of food to consumers.

Another implication is that for this process of structural transformation to go forward, the economy must develop low-costs means of exchange. High transaction costs in the economy can choke off structural transformation by making it too costly for people to rely on the specialization and exchange necessary to take advantage of the new technologies in the food system (Staatz et al., 1993). Improved mechanisms to help households manage risk are also necessary. Currently, one of their only means of risk management is through income diversification, which may hinder gains from specialization.

- c. Increased access of individuals to knowledge systems of wider world, as embodied in new technologies, management practices, and institutions. In the modern world, the sources of economic growth depend increasingly on these types of embodied knowledge. A critical challenge is to identify the most effective mechanisms to transfer this new knowledge to food-system participants in developing countries while at the same time assuring that those participants share equitably in the benefits that derive from that new knowledge.

As the economy as a whole is transformed, so too is agriculture. *Agricultural transformation* refers to the process by which agriculture shifts from being dominated by highly diversified, subsistence-oriented farms towards more specialized production oriented towards, and dependent on, markets (Seckler).

²Calculated from data in USDA (1992), p. 77 and USDA (1994), p.56.

The process of agricultural transformation involves a greater reliance on input and output markets (the off-farm elements of the food system) and increased integration of agriculture with other sectors of the domestic and international economies. As this process of integration proceeds, the source of output growth shifts from expanded use of land and (especially) labor to increased use of knowledge from outside the farm, as embodied in new technologies, management practices, and institutions (ways of organizing human interaction). For example, between 1960 and 1990, at least 80 percent of the 110 percent increase in cereal production in developing countries came from higher yields, due mainly to expanded use of new technologies and complementary investment in irrigation (Yudelma et al., p. 4).

Agricultural transformation also involves incorporation of indigenous knowledge--e.g., via farming systems research--into the "modern" scientific knowledge base. Achieving this linkage of indigenous and external knowledge systems requires substantial investment in human capital. It also requires mechanisms to mobilize public and private investment in various complementary physical capital needed to exploit the new technologies. For example, to exploit new rice varieties, substantial investment in irrigation infrastructure is often needed.

II. AGRICULTURE'S ROLE IN THE STRUCTURAL TRANSFORMATION

If the major objective of economic development policy is to foster structural transformation, then why invest in agriculture? Wouldn't the most direct way to decrease agriculture's relative role in the economy be to concentrate investments in non-agricultural sectors? These questions were hotly debated by development economists in the 1950s and 1960s. (See Staatz and Eicher for a summary of that debate.)

The debates of the 1950s and 1960s led to two major conclusions. First, given the large number of people in rural areas in most developing countries, it would be impossible to reduce poverty significantly in the short to medium run if agriculture were ignored. Furthermore, because agriculture in most developing countries has lower capital-output ratios and higher labor-output ratios than many other sectors, an agricultural-led strategy would generate more employment in the short-run than would an industry-led approach (Mellor, 1966).

Second, even if one is *only* interested in the long-term structural transformation of the economy, investment in agriculture is warranted. There is a need to distinguish between the long-run objective of decreasing the relative role of agriculture in the economy and the short- and medium-run strategic actions needed to attain that objective (Nicholls). The need for strategic investments in agriculture and the food system to foster long-run structural transformation becomes evident when we examine in more detail the process of structural transformation.

Let's start with some fundamentals. In order for growth to occur, the economy must produce a surplus above current consumption needs. In most low-income countries, most of the initial investible surplus has to be generated out of agriculture and related rural activities because these sectors play such a preponderant role in the economy. In the early stages of economic growth, the non-agricultural sectors are so small that even if they generate high profit rates, the total amount of surplus produced is small relative to the investment needs of the country. The few exceptions are mineral-rich, sparsely populated countries; those that can rely on massive foreign capital inflows (increasingly unlikely in the post Cold-War world); and city-state seaports like Singapore and Hong Kong.

If resources have to be transferred from agriculture to finance growth in other sectors, can those resources be withdrawn without first investing in agriculture to increase its productivity? Or do countries need first to "prime the pump" by investing in agriculture to assure its ability to generate a reliable and sustainable surplus?³

From the 19th Century through the 1950s, many countries in Southeast Asia and West Africa were able to finance economic growth by simply expanding cash-crop cultivation into new areas, using existing technologies. In these countries, both underemployed labor and land were pulled into production to meet expanding overseas demand for their products (Myint). The land frontier has closed in almost all countries over the past 40 years; thus, the scope for this particular model of agriculture-led growth (dubbed the "vent for surplus" model by Myint) has dwindled. In most parts of the world, agricultural growth through continued area expansion cannot take place without serious environmental consequences.

The challenge for most countries, then, is to transfer resources from an agriculture that can only grow through intensifying production, as its scope for area expansion is very limited. If resources are withdrawn from agriculture to finance growth in other sectors without sufficient simultaneous growth in agricultural productivity, demand for domestically produced agricultural products is likely to outstrip supply (Ranis and Fei). Several consequences are possible, none of them supportive of broad-based economic growth:

- a. If the resources are transferred through forced deliveries from farmers, rural consumption levels may fall below levels of subsistence, leading to widespread hunger. This was the approach used by Stalin to finance structural transformation in the USSR.
- b. In large, relatively closed economies, land-locked countries where there is a wide gap between import- and export-parity prices for basic staples, and countries whose ability to import is severely limited due to foreign exchange constraints, the lack of productivity growth will drive up domestic food prices. Higher food prices in turn drive up wage costs and the real exchange rate, making these countries less competitive in international trade and slowing overall economic growth by raising production costs in the non-agricultural sectors. This is the "food bottleneck" first described by Ricardo in the early 19th Century and applied more recently by authors such as Mellor and Delgado to analysis of growth strategies in India and the Sahel.
- c. For more open economies, failure to invest in agriculture may hinder growth by creating foreign exchange constraints through lack of growth in agricultural exports or through burgeoning demand for food imports.
- d. The lack of a dynamic agriculture also limits the domestic demand for products and services produced by the non-agricultural sectors because rural incomes are depressed. Furthermore, a stagnant agriculture constrains industrial growth because much industry in poor countries involves agricultural processing (e.g., textile manufacture). If domestic agriculture can produce the basic inputs to these industries only at high cost, those industries become less profitable and less competitive internationally.

³The following paragraphs draw heavily from Mellor, 1973.

On the other hand, as Johnston and Mellor pointed out over 30 years ago, a dynamic agriculture can make five important contributions to structural transformation:

- a. Labor released by increasing productivity in agriculture is available to work in other sectors.
- b. Capital (both physical and human) generated in agriculture can flow to other sectors.
- c. Increasing agricultural productivity provides the food needed by a growing non-agricultural labor force.
- d. Agriculture can generate foreign exchange by producing both exports and import-substitutes.
- e. A dynamic agriculture provides a market for production from the non-agricultural sectors.

For agriculture and the food system more generally to make these contributions to structural transformation, it is not enough that the sector generate a surplus. Mechanisms must be in place to transmit some of the productivity gains in the food system to other sectors of the economy. These mechanisms facilitate a net transfer of resources across sectors. Historically, the most important transfer mechanisms have included:

- a. *Expropriation of farm products*--for example, forced deliveries by farmers to state marketing agencies at below-market prices.
- b. *Capturing of land rents, either by the state or by private landlords.* The value of the economic surplus gets capitalized into the value of the land. This "economic rent" can then be appropriated directly by landlords for investment in other sectors or be captured by the state through a land tax.³ Both mechanisms were extremely important in transferring resources from agriculture to other sectors during Japan's structural transformation of the late 19th and early 20th Centuries (Okhawa, Johnston, and Kaneda). The attractiveness of taxing economic rents is that in theory such taxes do not decrease production incentives because the rents represent a return to resources above that which they could earn in alternative uses. In practice, imposing land taxes requires good cadastral records, which many poor countries lack.

³The concept of "economic rent", first developed by David Ricardo in the early 19th Century, is related to, but differs from, the every-day use of the word rent. An economic rent represents the earnings that accrue to a resource beyond those paid to the next best substitute for that resource. For example, consider a country in which there are only 2 qualities of land, A and B. For a given amount of inputs, land of quality A yields 60 bushels of corn and B yields 100 bushels. If land of quality A is freely available to everyone, then the "economic rent" on land B would equal 40 bushels. Farmers would be willing to pay up to 40 bushels of corn to get access to land B. This is the rent that the landowner of B can appropriate from those wanting to till the soil.

- c. *Fostering private intersectoral resource transfers.* Historically, a major way in which resources have been transferred across sectors is by farmers and landlords voluntarily investing earnings from agriculture into other sectors. This investment has involved movements of both human and financial capital. For example, a major transfer of resources from agriculture to industry took place during South Korea's structural transformation by rural households' investing in their children's education. Many of these educated rural youth then went to work in industrial and commercial enterprises in urban areas (S.M. Lee). In Mali, earnings from cotton cultivation have served as a major source to allow rural households to invest in other sectors, particularly commerce (Dioné, 1989).

For this type of voluntary intersectoral resource transfer to work successfully, mechanisms must be available to farmers and landlords that allow them to invest easily in other sectors. Well-functioning capital markets and widespread access to educational systems reduce the costs of this type of intersectoral resource transfer and therefore facilitate structural transformation.

- d. *Reducing the price of agricultural products relative to non-agricultural products (turning the terms of trade against agriculture, or "invisible transfers").* Perhaps the most important, yet least obvious, way of transferring resources intersectorally is to lower the price of agricultural products, particularly food, relative to non-agricultural products. This change in relative prices can be achieved through taxation of agricultural outputs and inputs or through simply allowing the price of agricultural products to fall if productivity increases within the agricultural sector allow the growth in supply of agricultural products to exceed the rate of growth of effective demand.

The fall in consumer food prices relative to the price of other goods has the effect of transferring resources from the food system to other parts of the economy, as it now takes fewer resources from the non-food sectors to buy a unit of food. Because such transfers are less immediately apparent than the others discussed above, economists refer to them as "**invisible transfers.**" Invisible transfers have played a crucial role in the structural transformation of many countries, such as Taiwan (T.H. Lee; Mellor, 1973). Lower food prices to consumers allow industrialists to hold down money wages, making their firms more profitable and competitive internationally.⁴

Lower food costs (in terms of resources devoted to food production) can also free farmers' resources for use in other income-earning activities, such as cash-crop production and non-farm enterprises. This impact can be particularly important where food markets function poorly, inducing farmers to give priority to producing a large proportion of their own food before diversifying into other enterprises. In such circumstances, driving down the real cost of food to farmers, either through improvements in farm-level technologies or through improving the functioning of rural food markets, can expand non-food crop production (including non-farm enterprises) and

⁴This impact of lower food prices on economic growth was first described by Ricardo in the early 19th Century.

reduce pressure on fragile agricultural resources to produce staple foods (Jayne; Borlaug; Lele).

All of the options for intersectoral resource transfer outlined above require ongoing productivity growth in the food system in order to be economically and politically sustainable. Over the long run, the invisible transfers, stimulated by productivity gains within the food system, are likely to be the most important mechanism to foster structural transformation (Mellor, 1973).

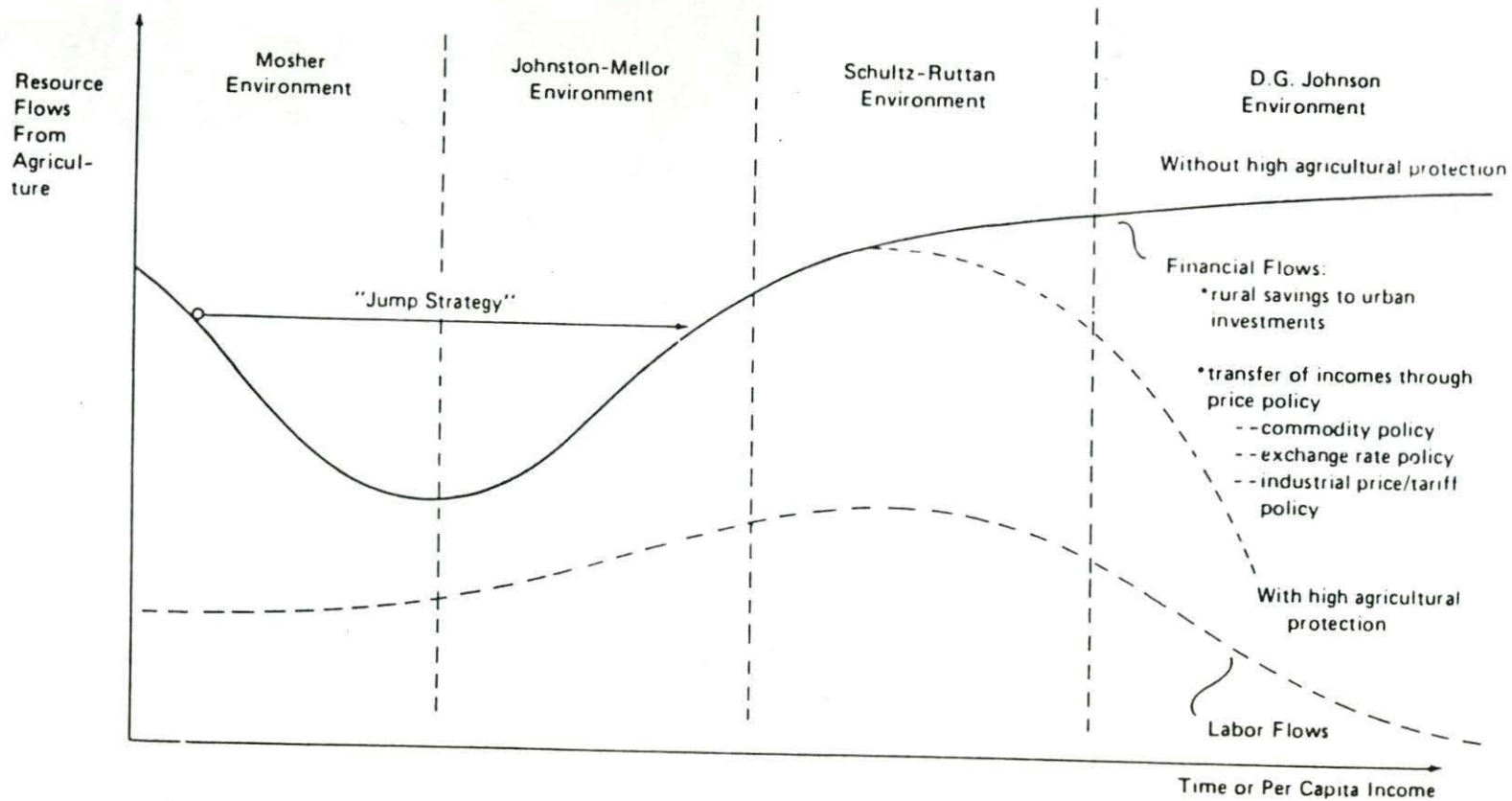
Reductions in the real cost of food to consumers can result from improvements in both the farm-and off-farm components of the food system. As countries urbanize and consumers demand more services be incorporated in the food they buy, it is common for the off-farm elements to account for over half of the final consumer price of food. Therefore technical and institutional improvements in the off-farm elements of the food system, combined with increases in farm-level productivity, are increasingly critical to fostering the resource transfers necessary for structural transformation.

Thus, the broader strategy isn't one of investing in the food system vs. investing in other sectors. Rather, it is how to use agriculture and the broader food system as a tool for structural transformation of the economy. The aim is to allow agriculture to contribute resources to other sectors while still maintaining the profitability of farming. Achieving this goal requires both productivity growth within agriculture and effective mechanisms to facilitate transfer of resources across sectors.

Evidence from throughout the world indicates that, in general, developing countries that have had the highest growth rates of the agricultural sector have also had the fastest growth of the overall economy and of the non-agricultural sectors (e.g., Badiane; World Bank, 1994). This supports the view that productivity growth in agriculture promotes rapid non-agricultural growth, a conclusion that also comes out of research on micro-enterprises (Haggblade, Hazell, and Brown).

Timmer has analyzed the net resource flow between agriculture and other sectors of the economy at different stages of development (figure 1). At very low levels of income (which he dubs the "Mosher environment," after Arthur Mosher's book Getting Agriculture Moving), a net inflow of resources into agriculture is needed to increase productivity growth so that the sector can generate an investible surplus. Many countries in sub-Saharan Africa find themselves in this environment. As agricultural productivity grows, the sector can begin contributing net resource flows to other sectors. (This period he calls the "Johnston-Mellor environment", after those authors' seminal article on the contributions of agriculture to economic growth). In high-income countries, there may be a reversal again, as resources flow back into agriculture through various price and income support programs.

Timmer's diagram focuses on net resource transfers to *farm-level* agriculture. If the food system is viewed more broadly to include input and output provision and processing, the net transfers are not so dramatic. Indeed, a major characteristic of the structural transformation is rapid expansion of the non-farm elements of the food system relative to farm-level production. The implications for policy of this shift are discussed in the next two sections.



Policy Settings:

"Getting Agriculture Moving"—institutional change; new technology; structure of markets and incentives; significant investments in rural infrastructure

"Agriculture as a Contributor to Growth"—establish market links with industry; technology and incentives to create a healthy agricultural sector; improve factor markets to mobilize rural resources

"Integrating Agriculture into the Macro Economy"—declining share of food in urban budgets; push to make agriculture efficient; shift resources out, but substantial income distribution problems from lagging rural labor productivity

"Agriculture in Industrial Economies"—small share of food commodities in consumer budgets; income distribution a political issue; unemployment in industrial sector creates pressures to keep labor in agriculture; environmental concerns and "way of life" issues

Fig.1. Changing Environments for Agriculture's Contribution to Economic Growth

SOURCE: Timmer, 1990.

III. CHALLENGES FOR THE FOOD SYSTEM

For structural transformation to proceed over the long run, countries need to find ways to reduce the real cost of food to consumers while still maintaining the profitability of food production for farmers and others (traders, processors, etc.) in the food system. This is the basic "food price dilemma" outlined by Timmer, Falcon and Pearson. The dilemma arises because the price of food is both an incentive to produce and a major determinant of the real income and hence consumption levels of the poor.

Many previous approaches to the hunger and structural transformation challenges have addressed only one side of the dilemma. Those concerned with reducing urban bias and increasing production incentives have argued for increasing agricultural prices in order to raise rural incomes and boost production incentives. But this approach ignores the impact of the higher prices on poor net buyers of food (many of whom are themselves rural residents), whose chronic food insecurity derives from their low real incomes (Mellor, 1978; Weber et al.). It also ignores the constraints that higher food costs have on wage rates and hence creation of jobs for the poor. Advocates of the "basic needs" approach, as well as those supporting a Stalinist approach to structural transformation, have argued that low food prices are essential. But if low food prices are not accompanied by lower unit costs of production that result from productivity-enhancing improvements in the food system, the result will be stagnant production, shortages, or burgeoning imports.

The long-run solution to the food price dilemma is to foster structural transformation through increased productivity in the food system. This requires technical changes in both the farm and non-farm segments of the food system. In designing such changes, it is important to have a view of the entire food system, as changes in the off-farm elements of the food system often have important implications for farm-level technology (Staatz and Bernstein; Boughton, Staatz, and Shaffer). For example, because of changes in relative prices, incomes, and increased urbanization, consumers in West Africa are increasingly demanding easy-to-prepare processed grain products. Responding to that demand may require simultaneous changes in milling technology and varietal choice by farmers. In addition, a systems view allows researchers to identify where within the food system the greatest potential for major productivity gains lies. At the margin, should resources be shifted from rust resistance to development of off-farm storage technology? A purely farm-level focus does not allow researchers to evaluate such tradeoffs.

Technological change within the food system frequently needs to be accompanied by complementary institutional change. Jayne and Rukuni, for example, outline how movement restrictions on maize in Zimbabwe constrained adoption of small hammer mills. These mills produce whole-grain meal that sells at substantial discount relative to industrially produced maize meal, thus providing an important staple for the poor. They are also much more labor-intensive than industrial mills and hence increase employment. Once movement restrictions began to be relaxed, the use of small mills expanded rapidly, thereby generating employment and improving the access of the poor to low-cost food. More fundamentally, institutions such as well-functioning input and output markets, investment codes, contract enforcement mechanism,

and tax systems are necessary to facilitate the specialization, exchange, and intersectoral resource transfers that are central to structural transformation.⁵

During the process of structural transformation, the food system faces three challenges. The relative importance of these three challenges varies depending on how far a country has progressed into the process of structural transformation. For each country, one of the dilemmas in developing a food strategy is how much it should emphasize each of the following roles for the food system.

1. **The food system needs to help people feed themselves, either directly or through income generation.** For example, increases in farm-level productivity can help poor farmers living in resource-poor zones to feed themselves directly. Increases in cash-crop production can increase the capacity of farmers to buy food through the market and expand employment opportunities for landless laborers. And increases in productivity in off-farm elements of the food system may generate more employment and incomes for workers in that part of the economy.
2. **The food system needs to stimulate broader economic growth,** especially by serving as a source of resources that can be invested directly in other sectors and by producing cheap wage goods so that other sectors can have a low-cost labor supply. In addition, broadening the availability of inexpensive basic staples may stimulate the production of cash-crops within the agricultural sector by making it cheaper and less risky for farmers to specialize in cash-crop production.
3. **The food system needs to keep up with economic growth by developing new products and services in response to urbanization and income growth.** If the food system can only respond to these changing demands at high cost, it may act as a brake on economic growth and employment, especially within the food system itself.

The potential tradeoffs are of the following sort. In the short run, improvements in farm-level technology to boost agricultural production for direct consumption can help alleviate hunger. But if hunger is basically a problem of low incomes, then this is not the only way, and may not be the best way to help the rural poor. A strategy of concentrating solely on increasing staple food production in resource-poor zones, for example, may prove to be a very costly way of reducing poverty. Over the longer run, there is a need to create strong economic growth that pulls poor workers and farmers into more productive opportunities in farming, the rest of the food system, and other sectors of the economy. This may argue for a greater emphasis on concentrating investment in higher-potential agricultural areas, improving markets to assure low-

⁵Regional specialization and trade may also have positive environmental effects, as areas unsuited to staple-crop production can now specialize in more environmentally friendly types of production. Lardy describes how China's policy under Mao Zedong of encouraging grain self-sufficiency in each region of the country led to enormous problems of soil erosion in the hilly areas of north China, where forests were cut down to expand grain cultivation. With the economic reforms in China which have allowed greater regional specialization and trade, many areas of the north have begun to revert to their traditional reliance on forest products, and trade those products for staple foods.

cost transfer of food between surplus and deficit regions, and strengthening rural factor markets (Reardon).

IV. CHALLENGES FOR DEVELOPING A STRATEGY TO FOSTER STRUCTURAL TRANSFORMATION

The argument outlined above can be summarized as follows:

- Chronic hunger is fundamentally a problem of low real incomes, in both rural and urban areas.
- The major way to fight hunger is through increasing real incomes and expanding employment.
- Historically, countries that have achieved large increases in real incomes have done so through structural transformation of the economies. This structural transformation has involved expanded non-farm employment, increased integration of agriculture with the rest of the economy, and expansion of the off-farm elements of the food system.
- Achieving structural transformation requires transformation of the food system, as keeping food prices low (while maintaining profitability of agriculture) is essential to expanding real incomes and employment in other sectors of the economy. That is, achieving growing levels of employment at increasing levels of real income is promoted by low food prices. These low food prices raise real incomes while reducing the real cost of labor, thereby promoting productivity.
- Generating the productivity increases needed to bring about these lower food prices requires an ongoing stream of technological and institutional changes *throughout the food system*. In addition to improved farm-level technology, these include improvements in input and output markets, factor markets, and tax systems, along with market-supporting infrastructure, such as roads, market facilities, information systems, and reliable systems for contract enforcement.
- The transition from farm to non-farm employment is not automatic. Problems often exist with labor markets and new and expanding enterprises. Facilitating the generation of non-farm activities that expand employment and income is an essential complement to improving agricultural production.

A major challenge for AID is to develop a *strategic plan* to foster structural transformation and broad-based income growth in a highly uncertain world. All strategic planning involves developing three elements: a **vision** of where you want to go, a **strategy** for achieving those long-term objectives, and **tactics** to implement the strategy and deal with short-term contingencies. In the context of structural transformation, developing the vision involves strengthening within the Agency the understanding of the long-term transformation process, particularly the key role that improvements in the food system play in that process. Developing a strategy entails evaluating options for the long- and medium-term investments in various programs, including the tradeoffs between investing in one option rather than another. The

tactical questions involve having plans to implement the strategies and deal with unforeseen events.

It is crucial that strategy and tactics are compatible with promoting the objectives of the vision. For example, emergency food aid is often used as a tactic to deal with short-run crises arising from natural or human-created disasters. If that food aid is distributed in a way that disrupts markets and local incentives to farmers, then it may work against both the strategy and vision of structural transformation.

The Vision: Developing a Food Systems Perspective of Structural Transformation

Several elements of the vision of structural transformation emerge from the previous discussion:

- Structural transformation addresses the long-term problem of hunger through creation of jobs, increases in productivity throughout the economy, and the movement of some low-income/low-productivity farmers into other economic activities where opportunities are greater. Yet to create these new opportunities, continued investment in agriculture and the broader food system is crucial.
- A food systems perspective stresses that agriculture is not an isolated sector but part of a broader economy. The process of economic integration inherent in structural transformation results in agriculture becoming even more tightly intertwined with the rest of the economy, particularly the off-farm elements of the food system. An important implication is that technical or institutional changes at one level of the food system (e.g., in grain milling) may have important consequences for other parts of the system (e.g., seed production). Recognition of such system interactions is crucial in improving technical and institutional innovation.
- The food systems approach also stresses that there is a high degree of complementarity among changes in policies, institutions, and technologies in helping foster the transformation. Each is necessary, yet none is sufficient by itself to bring about widespread transformation.
- The source of economic growth in the modern world is increasingly new knowledge, as embodied in improved technologies and institutions (Reich). Overcoming poverty requires developing ways to give the world's poor a claim on these new knowledge-based technologies (e.g., improved seeds) and institutions (e.g., new ways of contracting) rather than simply being bypassed by the technological revolution sweeping the rest of the world.
- Historically, many people have been left out of the development process even in countries that are making considerable progress in structural transformation. Political conflict, bad weather, pests, etc. are also facts of life, and those caught in disasters that eliminate their access to food and other necessities require special assistance. That is, the transformation will not solve problems of war, injustice, and natural disaster. Strategies and tactics are therefore required to address the needs of these people while at the same time not hindering the broader process of transformation.

Strategic and Tactical Issues

Developing a Coordinated Systems Approach to Changes in Policies, Institutions, and Technologies

In developing programs to foster transformation, AID supports both policy reform and technology development and diffusion. There are important synergies between the two types of activities. Without substantial increases in food system productivity coming from improved technologies, the surplus needed to fuel the transformation will be lacking. But without well-functioning markets and other mechanisms to mobilize resources and transfer some of the increased productivity to other sectors, the transformation will be stalled. The need for improved coordination between policy makers and technical scientists flows both ways. Policy makers need better information on technical aspects of production (e.g., the potential response of production to liberalization of fertilizer markets depends in part on how fertilizer-responsive currently used crop varieties are). And the success of technical research in raising national production depends critically on how well-suited the new technology is to the likely economic environment (Staatz; Dioné, 1991; Oehmke and Crawford).

A crucial challenge, then, is to assure that the world agricultural research system (defined here to include those working on improved policies as well as improved technologies) adequately addresses issues at all levels of the food system and the interactions among them. This global system includes the CGIAR, regional centers such as the Institut du Sahel, NARS, universities (including the CRSPs), NGOs, and the private sector, including farmers. AID needs to be concerned about how to strengthen the links among the various components of the world agricultural research system so that work on farm-level technology relates more closely to research on the other elements of the food system and on the changing patterns of demand, as well as to policy reforms that help foster transformation.

The relative emphasis that should be given to farm and off-farm elements of the food system will vary depending on the stage of development of the country involved. Yet even in very low-income countries, such as Mali, there is evidence that taking a more systems perspective can increase the productivity of agricultural research (Boughton, Staatz, and Shaffer).

Currently, one of the weak links in the world agricultural research system is national analytic capacity to address the interaction between technology and policy issues in many countries, particularly in Africa. This suggests that AID may want to continue the priority it has historically given to strengthening developing-country agricultural research agencies, universities, and extension efforts. Developing ways for other elements of the world research system (IARCs, NGOs, universities, private firms) to link more effectively with, and complement the work of, developing-country NARs is one important component of this approach. For example, what role can NGO's play in linking researchers more directly with farmers and other representatives of the private economy? What roles should NARS play in helping set priorities for the CG system?

Making Research Systems More Demand Driven

In recent years, AID has recognized the importance of making the agricultural research system more demand-driven, with more attention paid to off-farm elements of the food system (USAID). But what does "making a research system demand driven" mean in practice? Whose

demand should drive the system? If farmers are poorly informed about the likely evolution of markets, should the research system be entirely driven by their demands? Is there a need for others to develop a strategic vision that helps guide research? If so, where should this strategic reflection take place? Given the site-specific nature of many of the technology and policy issues faced, much of the reflection needs to take place in NARS and regional centers. But clearly there is also a need for reflection at a more global level, implying important roles for CG centers, universities, and research units within organizations like the World Bank.

Public/Private

Another challenge is to decide what mix of public- and private-sector activities to support in the food system, both in research and in other areas, such as input and output marketing. The movement in the 1980s away from heavy public-sector involvement and output marketing in many countries was based on recognition that many state-run organizations had blocked rather than fostered transformation. Yet in some domains, particularly in input distribution, private firms have sometimes been slow to fill the void left by the retreat of parastatals. In some cases, this may simply indicate that distribution of such inputs is not economically viable. But in other conditions, questions of risk and the public-good nature of the goods and services being produced may prevent small private firms from taking up the slack left by the retreat of the state (Statz et al.)

More generally, the debate between "public vs. private" has often been cast too narrowly. A myriad of ways exist to construct "private" markets, each with different sets of rules and each implying a different public role (Schmid). Some of the most successful mechanisms for technology transfer have been public/private partnerships (e.g., the CFDT model for cotton development in francophone Africa; partnerships between national agricultural research systems and private seed companies). A great deal of analysis is needed to identify creative ways of linking public and private sector activities to foster transformation.

Mechanisms for Knowledge Transfer

Related to the above point is the need to examine mechanisms to speed the integration of people in poor countries with the broader knowledge base of the world. One question is what role foreign firms (e.g., U.S. agribusinesses) can play in technology transfer and capital mobilization. An agriculture-led strategy of economic development reduces the demands for capital relative to an industry-led approach because capital-output ratios are typically lower in agriculture than in industry in developing countries (Mellor, 1986). Nonetheless, given the scope of the development challenge, the amount of capital that needs to be mobilized for development is enormous. It is highly unlikely that most of this capital can be met by foreign investment, particularly in the poorest countries, where the investment climate is not attractive. Therefore, there is a need to strengthen mechanisms that allow transfer of new technology combined with mobilization of local capital.

The challenge is further complicated because of the very small size of many developing economies. The small size makes it difficult to achieve economics of scale and specialization, particularly in non-agricultural enterprises, without substantial international trade. It is difficult to develop internationally competitive industries without mobilizing investment and importing technical inputs, including technical and organizational knowledge.

The problem is that achieving economies of scale and competing in international markets requires relatively large organizations. Given the very thin markets in many countries, creating or importing such large organizations often results in monopoly or at best monopolistic competition. For example, what are the potential dangers if a firm like Cargill gains a monopoly over hybrid seed distribution in a small African country? How do these dangers compare with the costs of not allowing such a company, with its improved technology, into the country and relying instead on a local seed company (itself perhaps a monopoly)? Monopoly power creates the potential for both economic exploitation and political influence. Regulation is needed and regulation creates the potential for a market in regulatory decisions. A challenge, then, is to examine alternative governance structures, such as franchising, for carrying out various functions in the economy that allow the transfer of such technology and yet limit the scope of the resulting large organizations involved.

Dealing with Emergencies and Those Left Behind

Inevitably, not everyone will be able to take advantage of the new opportunities opened up through structural transformation. And unforeseen natural disasters and civil strife can put large numbers of people at risk. A challenge is to develop mechanisms to deal with these problems that don't disrupt the broader process of transformation.

One way to avoid disasters is to understand better the factors that make households living at the edge of subsistence vulnerable to food shortages and to develop improved mechanisms that allow those households to cope with disruptions without being "pushed over the edge." AID has supported work on identifying the poor and their sources of vulnerability, and such work deserves continued support. Improved mechanisms for household risk management also need to be developed. These could take various forms, depending on the source of household vulnerability. They could range from developing more pest-resistant crop varieties to strengthening targeted credit programs for the poor (Kangasniemi et al.)

Once disaster strikes, there is a need to deal with it in a way that reinforces the process of structural transformation rather than works against it. Historically, a key element in AID's disaster-response tool-kit has been food aid. Creative options are needed for using emergency food aid in ways that help those at risk while not disrupting the market processes crucial to transformation (Tschirley, Weber, and Jayne). Public works programs are part of the answer (Pinstrup-Andersen; Lundberg and Diskin). But the recent GATT agreement, reorganizations in USDA, and upcoming Farm Bill will likely result in changes in US food-aid availability, rules for its use and the data base available to determine food-aid needs. These changes will require a re-thinking of food aid policy. Developing policies for use of emergency food aid and other disaster relief within the context of a broader vision of structural transformation will be central to assuring that disaster relief also becomes a tool for long-term development.

We have learned from the past 150 years of history that structural transformation is possible. Certainly the challenges of rapid population growth and environmental degradation are more daunting than they were in the past. Yet the world's stock of knowledge is very large in contrast with even 50 years ago. There is an abundance of venture capital in the world and talented people to organize resources. If developing countries are willing to build social contracts that brings those left out in, structural transformation can take place. If AID focuses on supporting

the fundamentals of such a transformation, it can contribute to greatly improving the lives of the poor.

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