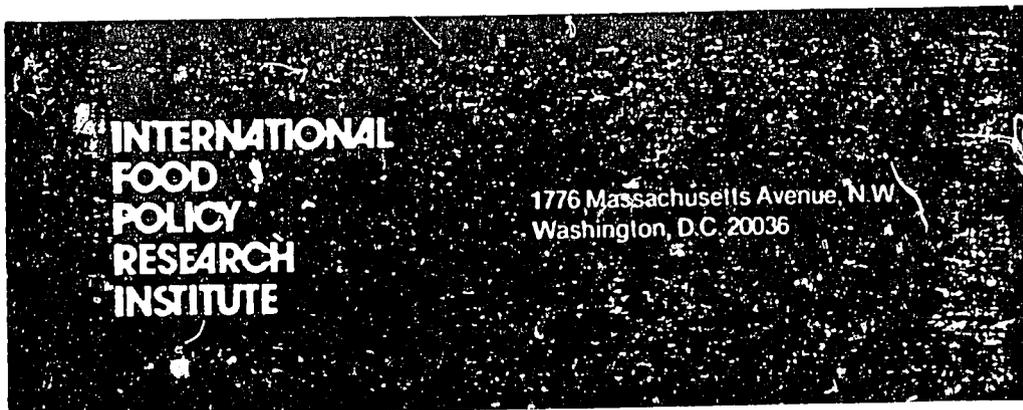


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Agriculture on the Road to Industrialization

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John W. Mellor

Economic development is a process by which an economy is transformed from one that is dominantly rural and agricultural to one that is dominantly urban, industrial, and service in composition. The objectives of the process can be usefully categorized as increased societal wealth, equity, and stability. But because these objectives require a diversification of the economy away from agriculture (no high-income, equitable, stable nations have agriculture as their dominant activity), the process is one of major structural transformation.

If economic development is a process of transforming an economy from producing mainly agricultural to producing mainly industrial and service outputs, what is the nature of a constructive role for the initially dominant agricultural sector? What is the scope for synthesizing an agricultural role into the mainstream of development thought? More specifically, what is the dynamic relation between agriculture and industry in an optimal growth strategy?

Given agriculture's initial importance, it is not surprising that it has received the explicit attention of eminent economists and has been the subject of intensive analysis by generalists and specialists alike. Yet, in view of the contemporary expansion of knowledge about how to develop agriculture, it is surprising that the principal, broad conceptualizations in development economics have not artic-

ulated a central place for agriculture. This has held true through wide-ranging shifts in development-strategy styles—from emphasis on direct allocation of resources to growth in the capital stock, to import displacement, to basic human needs, to export-led growth. In fact, each of these development fashions has had its own strong arguments for not emphasizing agriculture in either capital allocations or public policy. For countries following these mainstream strategies, occasional crises of domestic food supplies, foreign-exchange constraints in association with sudden, large food imports, or threatened cutoffs in large-scale food aid have prompted flurries of attention for agriculture. But such spurts of concern all too often have generated only such short-term palliatives as higher prices for food producers; they have not produced sustained long-run development efforts that build agriculture as part of a larger strategy.

There are, of course, numerous examples of development *practices* that have indeed given agriculture a central place. Notable are the post-Meiji restoration period in Japan as well as the developmental thrusts in Taiwan, Thailand, Ivory Coast, Malaysia, the Punjabs of India and Pakistan, and to some extent other parts of South Asia. It is ironic that, perhaps because of the critical importance of trade expansion in an agriculture-based strategy, several of these successes are perceived as examples of export-led growth rather than as a successful agriculture-based strategy.

The intellectual neglect of agriculture's role in development no doubt is rooted in an underlying view of agriculture as initially backward; development promoters have wanted to move directly to building those sectors that carry the image of modernization. An urban-based intelligentsia (including development economists), a related caste-like separation of largely micro-oriented agricultural economists and largely macro-oriented development economists, and urban-based political systems all combine to provide an intellectual basis and political pressure for directing resources to the urban sector.

In decrying this neglect, however, it is important to recognize that there is an intellectual case for downplaying agriculture in the development process. To make the contrary case, three substantial questions must be answered affirmatively:

- (1) Can agricultural production be increased by means of advances in resource productivity?
- (2) Can effective demand for agricultural commodities expand apace with accelerated agricultural growth?
- (3) Can a dynamic agriculture provide an effective demand "pull" for growth in other sectors?

The following discussion will show why these are the vital questions, why it is not unreasonable to think that the answer to each may be "no," and what the contrary bases are for the affirmative answer that in turn defines a central role for agriculture in a dynamic process of economic transformation and growth. This exploration will make clear the essential connection between agricultural growth and employment growth—and hence the need always to speak of an agriculture- and employment-based strategy, not of one or the other independently.

The strategy described here has two key distinguishing features aside from the emphases on agriculture and employment. First, continuous, institutionalized technological change provides the basic engine of cumulative growth. Second, growth in domestic demand provides the basic markets both for the increasing agricultural output and for the activities that create rapid growth in employment. Trade is important—but mainly to serve the purpose of restraining growth in capital-intensiveness.

Before discussing the main elements of an agriculture- and employment-based strategy, common failings of alternative strategies will be briefly noted, as well as which of those failings an agriculture-based strategy might or might not meet. A sketch of the debate as to the efficacy of agricultural and non-agriculture-based strategies follows.

Development Failings and Agriculture's Potential

Robert McNamara's presidential address to the 1973 World Bank annual meeting epitomized a widespread and growing view that the ascendant development strategies of the 1950s and 1960s had an unacceptably small impact on poverty. That the expression of such concern had subsided so much by the late 1970s owed less to a diminution of the reality of the problem and more to the realization that the various direct attacks on poverty meanwhile ventured were no more successful than earlier efforts in mitigating the problem.

Failure to make a dent in the poverty problem was associated with four related phenomena:

- (1) Food supplies per capita rose little or not at all, and hence the diets, nutritional status, and related well-being of the poor could not be enhanced.
- (2) Employment growth rates seemed to lag even behind population growth rates, so that the poor could not obtain income to command more food or other basic wants.

(3) Growth and basic services were often available only in a small number of immense urban concentrations, with high overhead costs and little impact on the population dispersed over the rest of the country.

(4) Overall growth rates were themselves much slower and less well sustained than expected.

The first three are directly related to the lack of poverty abatement. The last, even if it was not a direct cause, certainly reinforced equity-related failings. Clearly, an agricultural emphasis strikes at one of the root causes of poverty: inadequate food supplies. Accelerated agricultural growth also provides a substantial direct increase in employment because of the large aggregate size of the sector and the nature of its technology. And agriculture, as a broadly diffused activity, spreads economic activity and employment beyond the megalopolis.

One should be clear, however, as to what accelerated agricultural growth cannot do *directly*. First, it cannot provide high overall growth rates in output or employment. For the staple foods sector, growth of 3–4 per cent is considered very rapid, and 4–5 per cent for the agricultural sector as a whole is extraordinarily rapid.¹ The constraint of limited land area, the biological nature of agricultural production, and the dispersed, variable production system explain the common experience of such low ceilings on growth rates. Similarly, it is doing well indeed to experience a 0.6-per cent growth rate in agricultural employment for each percentage point in the output growth rate.² Thus the agricultural sector can at best provide employment for its own population growth, and it is likely to fall far short of that. And agricultural growth alone obviously cannot supply the broadening of consumption patterns beyond food that all people desire.

These limitations explain why an agriculture-based strategy must have major *indirect* effects on growth and employment in other sectors if it is to be seen as central to development strategy. These indirect effects must come from the expenditure of increased agricultural income on non-agricultural goods and services, in turn creating not only additional output in those sectors but also additional employment. To be consistent with an agriculture- and employment-oriented strategy, one must ask of those activities that they be large in aggregate, employment-intensive, and broadly distributed geographically.

From these foundations, we can skip ahead of the story to outline what a development strategy must look like if agriculture

and employment are to play a central role. *First*, the agricultural production growth rate must be accelerated; this must normally derive from technological change. *Second*, the expenditure pattern from the net additions to income arising from the accelerated growth must create demand for a wide range of goods and services with a high employment content, much of the production of which must be broadly diffused in rural areas (e.g., in major market towns). *Third*, increased food marketing will somewhat depress food prices,³ thereby encouraging employment in other sectors by making labor somewhat cheaper relative to the goods and services it produces.

Historical Sketch of the Agriculture versus Industry Debate

Industrial Orientation

With G. S. Fel'dman's writing as the theoretical base, the Soviet Union's practice in the 1920s was to equate industrialization with modernization. The arguments constantly recurred in subsequent development literature. Capital and labor were believed to be more productive in industry. Industry was seen as having major economies of scale and external economies, while agriculture was subject to diminishing returns. Industrial "externalities," including industry's modernizing force, promoting new modes of economic behavior and new forms of social organization, were all seen as supportive of growth. Given the diminishing returns in agriculture, if underemployed labor could be mobilized out of agriculture with no loss of production, the argument for industry was compelling. In this context, it is fitting that Paul Rosenstein-Rodan's piece on economic development, published in 1943, was entitled "Problems of Industrialization of Eastern and South-Eastern Europe."⁴

A major force in the development literature of the 1950s and 1960s and in the practice of both India and China⁵ grew out of the conceptualization by Fel'dman, as further developed by P. C. Mahalanobis, and related to the concepts of Roy Harrod and Evsey Domar.⁶ Increase in the capital stock was the source of growth. It followed in the view of Fel'dman and Mahalanobis that this resource should be directly allocated to capital-goods production, and not to consumer-goods, including agricultural production. In practice, industrialization became highly capital-intensive, with little employment growth and consequently little growth in demand for

food; hence there was little upward pressure on food prices, even though agriculture was doing poorly. The strategy, since it was inward-looking, spawned a whole generation of closed-economy growth models showing how capital should be deployed among sub-sectors. The push was always on industry.

A substantial ancillary literature dealt with the balance of growth and the issue of whether or not capital intensity could be reduced by choice of technology. The answer, in the confines of an inward-looking strategy, was that it could not. A. K. Sen provided the definitive rationalization of that conclusion, basing it on the inevitable need for more food to underpin the increased wages from employment growth and diminishing returns (increasing capital intensity) in agriculture.⁷ The proponents of this capital-intensive strategy realized that equity and poverty abatement would be postponed by the strategy, although they hoped that relatively inexpensive efforts in agriculture and cottage industries (e.g., community development in India) would mitigate the problem.

The import-substitution strategy popularized for Latin America by Raul Prebisch⁸ was driven by the view that primary-commodity prices, particularly including those of agricultural commodities, would inevitably trend downward relative to the prices of manufactured goods. It followed that a developing country should shift out of agriculture and into industry as quickly as possible. The market would come from displacement of previously imported goods. In practice, however, as implementation of the strategy progressed, more and more capital-intensive imports were displaced by domestic production. Thus as expansion proceeded, capital intensity increased, employment growth slowed, income distribution became more skewed, and the growth rate decelerated.

By the mid-1960s, concern was growing that development was moving too slowly, and the poor were not participating significantly in such growth as was occurring. At the same time, agricultural research was demonstrating the capacity to provide major new technology to increase agricultural productivity—the green revolution. Why did the concurrence of these breakthroughs and the concern for poverty reduction of that time not bring a sharp swing in development strategy toward an agriculture- and employment-based strategy of growth?

The green revolution is based on new technology and rapid growth in fertilizer use, increased commercialization of agriculture, and a complex set of national-level institutions run by a large and rapidly growing number of highly trained people. The sharp rise in energy prices led to a wish to de-emphasize the use of fertilizer and

even of irrigation based on energy-using pumps. Western environmental concerns also were on the ascent and did not favor fertilizer. Mounting attention to equity problems strengthened interest in dependency theorists, who in turn also had a negative view of fertilizer as an instrument of Western multinationals. Concurrently, anti-elitism favored primary over higher education, turning foreign aid away from advanced training of the scientists and technicians essential to the success of the green revolution. Concern with poverty reduction, energy depletion, environment, dependency, and elitism all seemed associated with each other. All this was reinforced by a literature decrying the then reputed negative effect of the green revolution in further skewing the rural income distribution; it was said (incorrectly, it is now clear) that only the larger farmers benefited from the new technology⁹ and that they would use their new wealth to buy out small farmers and tenants.

The combined impact of these forces retarded response to the essential requirements of the green revolution and spawned a "basic human needs" approach that emphasized social welfare functions and agricultural production only in highly complex regional projects. The integrated rural development projects that resulted not only were not integrated into national support structures for agricultural growth; they tended to siphon the latter for personnel. Almost universally, the integrated rural development projects failed due to excessive complexity and a lack of central support services.¹⁰ (Local institutions are, of course, central to the green revolution, but they are effective only when serviced by national-level support structures, including research.) The basic-needs approach had a major influence on foreign assistance in the 1970s, particularly in the least developed countries that include the bulk of Africa but also a few other countries, such as Nepal, in Asia.

Asian countries that had benefited from earlier foreign assistance emphasizing large-scale, high-level technical training and well-developed agricultural research systems were able to pursue the green revolution effectively and even to restrain foreign aid from single-minded pursuit of the new directions of the 1970s. In that context, the basic-needs strategy could be used to deal with "second-generation" problems in the context of the other requisites of a successful green revolution. It is notable, however, that where—as in India and the Philippines—the green revolution was not associated with an employment orientation, it served substantially to displace food imports and build food stocks rather than as the base for a new development strategy. The basic-needs strategists, while often vigorously and specifically attacking the green revolu-

tion, were generally silent about strategies giving priority to capital-intensive industry and import-substitution. There was urgent need to change those strategies to provide the essential employment complement to the green revolution.

The failings of the capital-intensive strategies, dependent as they were on market interference, also prompted a trend quite separate from the equity-oriented basic-needs strategy: a renewed interest in a market-oriented strategy commonly emphasizing export promotion. With the gradual demise of the basic-needs orientation in the early 1980s, the strategy of export-led growth or export promotion became the new fashion. Of all the post-World War II strategies, this was the one least deleterious to agriculture. It argued against overvalued currencies, which discriminate so strongly against agriculture. It argued generally for prices favorable to agriculture, supported commercialization of agriculture (including import of key inputs), and fostered better domestic markets for agricultural output by favoring employment-intensive industries—with beneficial effects on employment for the poor and hence greater expenditure on food. In practice, however, the export-promotion strategy looks explicitly to markets abroad—rather than to the broad-based domestic markets that accelerated agricultural growth can provide. This, combined with an anti-governmental bias, works against support for large public investments in the key areas of research, education, rural roads, and rural electrification that are so critical to an agriculture- and employment-based growth strategy. In practice, the export-promotion strategy also emphasizes trade to allow economies of scale, thereby favoring more capital-intensive industries relative to relying more on vigorous domestic markets.¹¹

Agricultural Orientation

Although a clear agriculture- and employment-based strategy has not been ascendant, agriculture has never lacked for a good word from an eminent economist. During the postwar renaissance of concern for the macro-economics of growth, Nicholas Kaldor stated:

Economic development will, of course, invariably involve industrialization . . . this can be expected to follow, almost automatically, upon the growth of the food surpluses of the agricultural sector. . . . Once this is recognized, the efforts of under-developed countries could be concentrated—far more than they are at present—in tackling the problem of how to raise productiv-

It is, however, clear from succeeding lines in Kaldor's piece that he had little grasp of what was involved in the modernization of agriculture and least of all as to what was required to provide a stream of land-augmenting technological changes—although his intuition as to the importance of agriculture and the importance of education to agricultural growth, were both correct. Perhaps Kaldor was also facile in his perception of the near-automaticity of agriculture's growth converting into industrial growth. Our knowledge of these processes has improved immensely since 1954, although its scant diffusion to macro-economists still prejudices thought about development.

Paralleling the broad orientation of development economics away from agriculture was an evolution of knowledge about how to develop agriculture. Farmers were presented as economically rational responders to prices and technology;¹² understanding of the need for radically improved technology was articulated in economic terms,¹⁴ and the nature of a range of complementary agricultural growth requirements was set forth.¹⁵ Myriad empirically based analyses have filled in the picture. More important, the scientific groundwork for the green revolution was laid by the activities of the Rockefeller Foundation in Mexico and India, and by the Ford and Rockefeller Foundations in establishing the International Rice Research Institute, the precursor of and role model for the Consultative Group on International Agricultural Research. The result was the bursting of the green revolution in Asia in the late 1960s and a clear appreciation of the requisites of accelerated agricultural growth.

Compared with the immense gains in our understanding of the agricultural development process *per se*, the relationships between agriculture and the rest of a developing economy remain less fully explored. While there have been many contributions on the subject, the empirical data underlying the relationships asserted are much less complete than is the case with the micro-economics of agriculture—and hence the policies implied remain more speculative.

Nevertheless, four major threads of the analysis can be defined. First, the critical role of food as a wage good (the object of consumption from the increased income of employment) was elegantly defined in W. Arthur Lewis's classic paper.¹⁶ Second, the need for productivity increase in agriculture and the role of technology was laid out by Johnston and Mellor.¹⁷ Third, the resource transfers from agriculture that so facilitate growth of the non-agricultural sector were delineated from the Japanese experience by Kazushi Ohkawa, Bruce Johnston, and I. Ishikawa,¹⁸ and meticulously documented for Taiwan by T. H. Lee.¹⁹ Fourth, the critical role of agri-

culture in stimulating growth in the non-agricultural sector has been explored with respect to both consumption goods²⁰ and producer goods.²¹

An Agriculture- and Employment-Based Strategy of Economic Growth

An agriculture- and employment-based strategy of economic growth has three basic elements. *First*, the pace of agricultural growth must be accelerated despite the limitations of fixed land area. Technological change solves a major, special problem of agricultural growth and allows low-income countries to use the most powerful element of growth. *Second*, domestic demand for agricultural output must grow rapidly despite inelastic demand. This can occur only through accelerated growth in employment (more precisely, increased demand for labor), which is facilitated by the indirect effects of agricultural growth itself. *Third*, the demand for goods and services produced by low capital-intensity processes must increase. This, too, is facilitated by the technology-based increase in agricultural income. As we proceed, we will see that these three elements continually interact in the strategy.

Technological Change in Agriculture

One of the most important theoretical and empirical findings in analysis of Western economic growth is the identification of technological change as a major source of growth. Hence it is initially surprising that in the various ascendant macro-economic theories of economic growth for developing countries, technological change has not been assigned a central role.

On second thought, however, the neglect is understandable: These ascendant theories have been preoccupied with growth in the initially minuscule industrial sector, where the first concern necessarily has been to expand the capital stock as the basis of growth. Only if the dominant agricultural sector is to be central to growth can technological change play an immediate, major role. It happens that, because of Ricardian diminishing returns, technological change is in any case essential to agricultural growth. The land area for agriculture being generally limited, increased output is traditionally obtained via declining increments in output per unit of input as input intensity increases. The result is rising costs, which must be offset by rising prices if incentives are to prevail. It is apparent that cumulatively increasing relative food prices are not socially acceptable. Thus it is essential that the incentive to pro-

duce more in the face of constantly rising costs be met by technological change rather than by price increases. Continuous, cumulative technological change is the proven effect of institutionalized agricultural research systems.

The rudiments of getting agriculture moving through technological change have been fully understood for a long time.²² Development of a technology system (including research) and technically competent extension are primary. The nature of agricultural technology is such that rapid growth of sophisticated input delivery systems is essential. For this latter, and for effective multipliers of other sectors, a highly developed infrastructure of roads is required. Underlying the total process is rapid growth in the number of highly trained people and of the institutional structure within which they can work effectively.

In all of these elements, the public sector must play a key role in physical investment and institution building. The essential financial and organizational requirements of governments are so immense that every effort must be made to maximize activities in the private sector and to concentrate public-sector attention on only those essential agricultural support activities not taken up by the private sector. Agriculture, with its small-scale orientation, is more in need of public-sector support than industry. The sharp turnaround in Asian agriculture—resulting in a 30-per cent increase in growth rates in basic food-staple production from the 1960s to the 1970s—impressively demonstrates the results of turning the public sector's attention to the requisites of technological change in agriculture.

The urgency of moving the agricultural sector is underlined by its role as a supplier of food as essential backing to employment growth. It is generally understood that developing countries have a large pool of extremely low-productivity if not idle labor. In effect, this provides a highly elastic labor supply. If jobs become available, labor is ready to march into them. What has not been fully recognized is that the supply of labor is a function of two independent markets: a labor market and a food market.²³ Increased employment provides the labor class with added income, 60 to 80 per cent of which is spent on food. If the food supply is not expanded, increased employment will cause the price of food to rise, squeezing the real incomes of laborers back nearly to the previous level, reducing the incentive to work, placing upward pressures on wages, and reducing employment. Thus, accelerated growth in employment must be accompanied by accelerated growth in food supplies.²⁴ Three arguments have been used against the need to emphasize domestic food production in this context.

First, the labor-surplus arguments take the position that labor is already maintained and idle in the rural sector; hence, until there is a "turning point" at which labor is fully absorbed, food supply is available for labor transferred to other occupations.²⁵ This argument neglects the theoretically and empirically verifiable fact that increased employment, even in the face of surplus agricultural labor, results in increased wage payments in the hands of people with high marginal propensity to spend on food. A related argument is that employment can only grow very slowly due to the capital constraint. The striking contrary evidence is that developing countries that have done well in agriculture expand employment rapidly enough to have to increase food imports.²⁶ We will, however, return to this argument later.

Second, there is a widespread belief that the aggregate supply of food is elastic with respect to price. If such is the case, higher food prices induced by increased purchasing power in the hands of the poor will readily bring forth the needed increased supply of food. The theoretical and empirical evidence is clear on this point: Under essentially all conditions, the aggregate supply of food is only slightly responsive to price.²⁷ Most simply, this is due to Ricardian diminishing returns. It is possible to accelerate the growth rate of food production sharply, but only through the processes of technological change. With existing technology, the aggregate supply response to higher prices is comparatively limited.

Third, it is believed that the supply of food from imports is highly elastic. Up to a point, this assumption is probably correct. Certainly Singapore and Hong Kong have been able to expand employment rapidly and to meet the consequent increased demand for food with imports. It is less certain that supplies would be adequate if the bulk of the developing countries succeeded in a rapid employment growth strategy without increasing domestic food production. But the possibility of importing food to meet the demands of increased employment strengthens the argument that generating demand and resources for growth of other sectors must be an important part of the argument for an emphasis on agriculture.

Adequate Effective Demand for Food

There is an important theoretical problem in realizing the full potential of accelerated technological change in agriculture. The demand for food tends to be inelastic. If food production increases rapidly without increased employment, prices will tend to fall sharply and eventually cause reduced production. The way to deal

with the problem is through accelerated growth in employment, which under the low-income conditions of developing countries is efficiently translated into increased demand for food. The correct response to increased food production is no more through constantly decreasing prices than the way to meet the need for increased production is through constantly increasing prices. The correct response to the former is employment; to the latter, it is technological change.

Prices, it must be emphasized, are not so much problems as indicators of problems. If food prices are rising, this indicates that the supply is not being increased rapidly enough through technological change. One should in such circumstances redouble efforts in the technological change arena. While waiting for these redoubled efforts to succeed, food would have to be imported, so as to prevent employment being held back by rapidly rising food prices.

Conversely, declining food prices mean that the success in technological change is moving ahead of the employment strategy. Governments may come under substantial pressure from organized farm interests to maintain agricultural prices as technology moves ahead even though demand is not keeping pace. The result will be either subsidized exports or, more likely, rapid growth in domestic stocks. India's record in the early and mid-1980s has been a prime example: Stocks were built up to four times the level that would be justified by optimal stocking policies. This is an example of a country achieving modest success in technological change and doing badly on employment growth. One should in those circumstances examine the allocation of capital and of demand structures to see what can be done on the employment side.

Just as the preceding discussion emphasized the need to meet food requirements by domestic production, so this discussion stresses growth in domestic income, not exports, for generating effective demand for growing supplies of food. If one is exporting staple foods, this means that one has a more-than-adequate supply of food to provide for the growth in demand from the existing rate of growth of employment. In a low-income, low-employment economy, one should obviously be striving for policies that increase domestic employment as a way of fully taking up food supplies.

Demand Stimulus to Non-Agricultural Employment

The role of agriculture in providing effective demand for production from the non-agricultural sector has received little emphasis in the literature and has been poorly understood. In the most extreme

phase of its evolution, this view was: "Agriculture stands convicted on the count of its lack of direct stimulus to the setting up of new activities through linkage effects—the superiority of manufacturing in this respect is crushing."²⁸ This position overlooked that technological change in agriculture can increase net national income and thereby generate added demand for consumer goods. The neglect of this aspect was reinforced by capital-centered growth theory, which tended to view consumption and the production of consumption goods as antithetical to growth. This bias was aggravated by excessive emphasis on "modern" consumer and capital goods to the neglect of services and more traditionally produced consumer goods. A more careful review of early Western development history, despite the weak technological base of its agricultural growth, would have helped avoid this misreading.²⁹

A central problem of contemporary development practice is illuminated by a quote from Sir John Hicks that has roots in a long history of his own work: "That it is possible for a 'developing country,' by choice of techniques that are too capital-intensive, to expand employment in its modern sector less rapidly than it might have done is nowadays familiar."³⁰

The failures in economic development to which Hicks refers have been associated with a poor record in agricultural growth and failure to connect success in agriculture to driving the rest of the economy. These failures have been associated with a marked dualism in capital investment—a small portion of the labor force operating with high capital intensity and a large portion with low capital intensity. The result, as Hicks would lead one to expect, is generally low productivity of both capital and labor. That dualism exhibits itself partly in low allocations of capital to agriculture, occasional instances of investment in state farms and other capital-intensive elements within agriculture, and a widespread tendency to place the bulk of additional capital in large-scale, capital-intensive industries with few additional employees, leaving little capital for the dominant remainder of the labor force.³¹

Agricultural development offers a potential for rapid growth in domestic demand for labor-intensive goods and services. Incremental consumption patterns of peasant farmers have a large rural-services component, and a large share of other goods consumed is also produced relatively labor-intensively.

It is essential to note two needs if the favorable demand effects of agricultural growth are to be achieved. *First*, the increments to demand must come from volume-increasing and unit-cost-decreasing technological change. Raising prices is not likely to

help. Although the income transfer from urban to rural people arising from higher agricultural prices may provide some modest, net restructuring of demand favorable to employment, only a major, continuous increase in net national income from new technology can be expected to provide a continuous aggregate effect. *Second*, the infrastructure of communications essential to growth of rural industry and services must be in place. Highly developed infrastructure is essential to agricultural production growth, favorable consumption incentives, and to the complex, interactive system of region-based urban centers that are so essential to a high-employment content in an agriculture-based growth strategy.

Capital stock must grow rapidly if employment is to do the same. In an agriculture-led strategy, however, market mechanisms should work well to raise the savings rate. Much of the capital needed for agricultural growth can be generated in agriculture itself in response to technology-induced high rates of return. The non-agricultural supply response to increased demand may well be highly elastic. If capital proves to be a constraint, higher prices will result, transferring resources from newly prospering agriculture to those activities. The critical investment bottlenecks are more likely to be in the public sector, with government at the local or national level not gathering or allocating adequate resources for the massive rural infrastructure that is essential to agricultural and employment growth. The 20- to 30-per cent savings rates that characterize so many contemporary developing countries are inadequate to the task only because the capital intensity of many productive processes is excessive and because too small a share of the savings is invested in infrastructure. Agricultural linkages can contribute to reducing that intensity and to spreading capital more thinly.

Policy Issues

Pursuit of an agriculture- and employment-based strategy of growth requires quite different public-sector policies than those comprising alternative strategies. Discussion of key policy requirements serves to bring out distinguishing characteristics of the strategy as well as to indicate what policy shifts are needed if it is to succeed.

Trade

An agriculture- and employment-based development strategy requires an open trading regime. That point must be made explicitly

because of the emphasis on meeting the demand for wage goods arising from employment growth from domestic food production and on providing domestic demand for the increased food production. Those inward-looking emphases are a product of comparative advantage, reinforced by high transfer costs typical of developing countries, and do not require protection. (Thus this strategy is highly complementary to and supportive of the points made elsewhere in this volume by Jagdish Bhagwati.)

The high employment-growth leg of the strategy requires that capital be spread thinly over a rapidly growing labor force. There is little scope to restrain rising capital-labor ratios in a closed economy. Although particular goods and services may have low capital-labor ratios, they always seem to have component parts that have very high capital-labor ratios (e.g., fertilizer for agriculture, and steel, aluminum, and petrochemicals for otherwise labor-intensive manufactured goods). Thus while agricultural growth generates direct demand for a final product that is efficiently produced by labor-intensive processes, there must be rapid growth in imports of capital-intensive intermediate goods and services. Clearly, accelerated growth of such imports must be matched by accelerated growth of exports. The latter should be goods and services with relatively high employment content. This fits obviously with standard trade theory. The need to foster such exports will further restrain increases in aggregate capital-labor ratios. The rapid growth in domestic markets for labor-intensive manufactures would itself be favorable to low-cost production and therefore to their external competitiveness. Taiwan's rapid success in exports in the late 1950s was based on prior development of domestic demand.³² A somewhat undervalued exchange rate facilitates full pricing of agricultural commodities; encourages restraint in using inputs that are capital-intensively produced because they will be imported and thus more highly priced; and provides some additional incentive to export the more labor-intensive commodities, helping to overcome the various institutional hurdles to exports that inevitably exist in developing countries. This is, of course, the opposite of the exchange-rate policy that is consistent with the capital-intensive approaches.

If employment does move ahead of the capacity to produce domestic food staples, one should obviously take advantage of that opportunity and import food to support the more rapid growth rate of employment. If, on the other hand, food is being exported, one should examine carefully whether trade policies are restraining the imports of capital-intensive goods and services and the export of labor-intensive goods and services, or whether infrastructure investment is inadequate for rapid growth in domestic employment.

Poverty Reduction

The agriculture-employment strategy is innately favorable to reducing poverty. Thus it is important to mobilize resources for its vigorous pursuit. The strategy increases the supply of less expensive food and increases the demand for labor. These are the two essentials for removing poverty through growth. Wherever poverty is massive, a shift to such a strategy of growth should be the first priority of poverty alleviation. In the context of such a strategy, special attention is properly given to removing frictions that are especially deleterious to the poor. Thus attention may be needed for infrastructure to bring more remote areas into the process; credit for small, labor-intensive processes; and technical assistance in production and marketing of vegetables and other less capital-intensive, small-scale activities.

In the longer run, the new agriculture- and employment-based strategy does bring a problem of regional disparities. Agriculture will move more rapidly in some regions than others simply because of the accident of technological breakthrough. Even over the long term, there may be some regions with physical resources for which it will be impossible to come up with improved technologies. The first-round effect of widening regional disparities through differential progress in agriculture will be strongly reinforced by the favorable local multiplier effects of accelerated agricultural growth. Historically, migration has proved the most common means of dealing with this problem. With potential for migration, it makes little sense to invest in technology at low rates of return in areas that have very little capacity for its development while at the same time starving areas that could provide faster growth of such an equity-oriented type. On the other hand, the social problems of migration need to be recognized and alternative measures sought.

There is also, of course, a residual problem of equity for persons who are handicapped by their circumstances. Income transfers are necessary for meeting such a problem. Far more pervasive is the problem of poverty during the transition while an agriculture-employment growth strategy is getting under way. Since shifting to such a strategy is so very favorable to poverty reduction, dealing with the interim and transition problems by redistribution of resources is apt to be costly to later reductions in poverty. Large-scale rural public works may be redistributive and assist the growth strategy itself. Urban food subsidies may serve to stabilize the urban labor force. If non-fungible foreign food aid is used to support such efforts, the cost in terms of less growth and reduction of poverty in the future may be close to nil.

The Role of Government

The role of government is critical to an agriculture- and employment-oriented strategy. Because agriculture is a small-scale sector, there has to be substantial public-sector investment in the support for that sector in the form of, for example, transportation, power, communication, research, education, and input supplies systems. Because these burdens are so heavy, government needs constantly to seek ways of transferring these activities to the private sector. Thus activities such as marketing, which the private sector performs fairly well, should remain as much as possible in that sector. Input distribution should be moved into the private sector as quickly as the latter can take it up.

Since agricultural development is diffused over a wide geographic area, the infrastructure requirements are massive. And since the process is one of rural modernization, development of small- and medium-scale industry, and upgrading of consumption patterns, the needs for rural electrification and communications are critical. Thus, while a heavy-industry-oriented strategy requires large-scale, public-sector investment in major urban areas, a more rural-oriented strategy still requires considerable investment of this type to service market towns. This will sorely strain the capacity of government to raise capital resources; there will be a tension between the need for private incentives and the need for public revenues. Governments will need to make tough budgetary choices that allow scope for little beyond the investments in infrastructure, education, and technological change in agriculture that are the centerpieces of the strategy. The agriculture-employment strategy founders because governments do not recognize its large resource requirements and, therefore, the need to drop activities that may be appropriate only for alternative strategies. This explains why, for example, India and the Philippines have combined success in agriculture so inefficiently with employment growth, as compared with, for example, Taiwan or Thailand.

Price Policy and Technological Change

As pointed out earlier, prices are indicators of, not solutions for, the problems of agricultural production and employment. The answer to the problem of agricultural production is technological change. When the latter has been inadequate, rising prices will indicate a problem and, one hopes, induce corrections. However, because the processes of technological change entail substantial lags between

investment and results, prices are an extremely inefficient way to send signals. It is much better to analyze the need, as has been done here, and to act before the price changes indicate a problem. In any case, grossly overvalued exchange rates or other interventions may provide price relations unfavorable even to a technologically dynamic agriculture. However, such policies are probably an essential element of an alternative strategy and will only change a whole strategy, particularly its capital allocations, changes.

A more serious price problem may arise from a highly dynamic agriculture. Technology may increase agricultural production in specific sub-regions much more rapidly than effective demand can be created in those regions, which in turn may be isolated by inadequate infrastructure. In such circumstances, it may be desirable for government to serve as buyer of last resort, build stocks, and transport basic agricultural staples to other regions. Governments must be very careful, however, not to spend massively on building stockpiles of food, as has been happening in India in recent years, instead of spending to accelerate technological change in agriculture and provide the infrastructure that is so essential to increasing output and employment.

The role of agriculture as a stimulator of non-agricultural growth probably means that some of the benefits of lower prices for production in agriculture will be used to stimulate production in other sectors by a swing in the terms of trade in favor of the agricultural sector. Indeed, some market-induced depression of agricultural prices in response to lower costs seems an inevitable part of the process.³³

Foreign Assistance

The critical role of foreign trade in supporting an agriculture- and employment-based strategy of development requires that the industrial countries keep their markets open for relatively labor-intensive goods and services from developing countries—and that those countries will have the foreign exchange for purchasing capital-intensive goods and services they need for a high-employment strategy.

In initiating the strategy, foreign aid has a tremendous important role to play in accelerating the growth of education, particularly higher education, which is so essential to the culture- and employment-based growth strategy. Vast numbers of trained people are critical to developing and running agricultural research systems, extension systems, and input supply systems.

The details of public policy for an agriculture-employment strategy require constant development and analysis of data, and fine adjustments, which in turn require trained people. Decades of effort can be saved by major commitments of developed countries to expand education through foreign training and technical assistance.

It should also be noted that, although Japan and Taiwan moved into technological change in agriculture after they had already built a very substantial infrastructure in irrigation and transport systems, present-day developing countries may have to make these investments concurrently. Foreign assistance can help with these heavy investments.

Foreign assistance also can contribute to financing imports of capital-intensive goods and services during the early stages of the strategy, when exports may still lag; and food aid can help provide infrastructure, facilitating a stable political environment through food for work and food subsidies.

Foreign assistance may have a powerful role to play in aiding the transition from an inappropriate capital-oriented strategy or an import-displacement one into the more appropriate agriculture- and employment-based strategy. There will be substantial equity problems in the transition. Because the alternative strategies are so inequitable in the short run, they are usually accompanied by food subsidies and other elements to redress the inequities. Foreign assistance can help with the sorting out of these matters, but it must take care to do so in a way that facilitates a genuine transition to the new strategy instead of delaying it.

Today, Africa faces special problems substantially because of unusually inappropriate national and foreign assistance strategies applied in the 1970s. African countries are particularly short of the trained personnel for an agriculture- and employment-oriented strategy of development. They have traditionally had some of the worst infrastructure situations of any of the developing countries, and they suffer from a high degree of instability in principal export commodities. Comparatively massive foreign assistance is needed in the realms of training, investment in infrastructure, and stabilization of export earnings.

Looking Ahead

In most Asian countries, the green revolution has demonstrated both the potential and the basic requisites of accelerated growth in agriculture. Unfortunately, the role of investment in rural infrastructure has been inadequately understood, slowing the selec-

tive spread of technology to new areas to maintain high growth rates. Similarly, the dynamics of agricultural growth, calling for gradual diversification beyond initially dominant cereals, has not been sufficiently understood to favor continued expansion of research capacities and the dynamic development of complex marketing systems for perishables. Far more important, however, has been the very laggard response of employment growth in countries such as India and the Philippines compared with that in Taiwan and Thailand. The employment record in India and the Philippines, both of which have done moderately well in agriculture, is puzzling. The answer probably lies with a strong import displacement and a capital-intensive development strategy that has left both economies poorly structured to benefit from accelerated growth in agriculture. That problem requires considerable attention. Major past, inappropriate investments may have to be written off and a new start made.

In Africa, the situation is at once conceptually simpler and in practice more difficult. The basic act of moving the agricultural sector has not yet been put together. Training, national institution-building, and giving development priority to the needs of the most responsive regions and commodities must be pursued vigorously. A complete reorientation of foreign assistance as well as of national policies is needed.³⁴ Given the gross inadequacies of trained personnel, institutions, and rural infrastructure, the task will be difficult and lengthy. Obviously, complex political compromises will be needed, but an urgent effort must be mobilized if measurable progress is to be made.

Once an economy gets moving, the non-agricultural sector will rapidly increase in relative importance and take on a life of their own. Institutions must be developed to foster technological improvement in those activities. As the economy diversifies, it must have the capacity to support and foster that diversification. The demands for trained personnel and institutional capacity will burgeon. But these longer-term needs must not be allowed to diminish the here-and-now priorities for agriculture and employment growth upon which the economy's post-agricultural prospects so largely depend. Africa, in particular, has suffered from such a lack of priority on the part of national policies and donor-country assistance alike.

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