

AGRICULTURE IN GROWTH: CHANGING RESEARCH AND DATA NEEDS FOR EFFECTIVE POLICY*

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1. INTRODUCTION

If high rates of agricultural production growth are to be attained and maintained, policy must evolve as objectives and priorities change. Policies must be chosen consonant with new market and technological conditions, with the dynamic interactions of institutional and physical infrastructure, and with the iterative effects of past policy itself. Effective policy cannot develop unless appropriate data are collected and analysed to clarify evolving policy needs. To the inexperienced eye, the processes and the institutions that address these needs must often seem inefficient and ponderous, poorly oriented towards the objective, and of questionable priority for use of large quantities of human and financial resources. That view is reinforced if the policy making and implementation process results in indecision, conflicting policies, or failure to note data and analyses. Perhaps this explains why so few Third World countries have built the requisite data collection and analysis base for sound food and agriculture policy development.

India stands at the forefront of Third World nations in possessing the institutional capacity to diagnose agricultural policy needs and to monitor their effects. That capacity derives generally from long educational and cultural traditions. Specifically it owes much to the intelligence, the technical knowledge, and the intuitive insights of Dr. V.G. Panse in defining the data needs. His discernment and persistence were instrumental in the development and effective operation of the major elements required to meet those needs. The Indian Agricultural Statistics Research Institute and the Indian Society of Agricultural Statistics both bear his imprint—the one as a government agency serving specific purposes and the other as a

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society fostering the interchange of ideas among a large and growing body of professionals. I had some appreciation of the value of his contributions when I first lived in India over 20 years ago. Subsequent years devoted to comparative analyses of Agricultural progress have strengthened my sense of the importance of adequate institutions for data collection and analyses headed by people of sound intuition and intellectual integrity.

Obviously I am flattered and delighted to be asked to deliver the Panse Memorial lecture. My theme is the changing data needs for planning and implementing a strategy for agriculture in growth. There are three essential aspects of such a strategy: the processes of agricultural growth; the interactions of income distribution with agricultural growth; and the linkages that bind agricultural growth to that of other sectors. To begin I will trace briefly the evolution of Indian policy and its underlying strategy. I choose India as an example, not only because it is the place of this lecture, but because of the length and richness of the Indian experience. The elements and even the sequence of policy evolution are likely to be repeated elsewhere. The presentation is devoted more to defining policy and strategy than to data needs per se, because the latter flow so readily if the former are understood. A long-range view provides a larger opportunity to observe how data collection responds to perceived policy needs and to see why it is so often untuned to the needs of its time.

2. AGRICULTURAL PRODUCTION GROWTH

India's post-Independence agricultural production strategy and policy may be divided into three periods.¹ In the first, growth was expected to flow directly from socially oriented measures designed to increase equity. In the second, emphasis was placed on assuring supply of purchased inputs. In the third, new agricultural production technology was central to the strategy. Each of these quite different emphases may be better seen as a correct perception of a necessary condition for growth than as either incorrect or alternative means of achieving growth. From this perspective the policies and their fruits evolve slowly to a productive system, and the data base and analytic capacities developed for each episode cumulate to the total required for effective policy support.

1. I develop these views in much greater detail, although for a different purpose, in John W. Mellor, Thomas F. Weaver, Uma J. Lele and Sheldon R. Simon, *Developing Rural India: Plan and Practice* (Ithaca, N.Y.: Cornell University Press, 1968); the views are further refined in John W. Mellor, *The New Economics of Growth: A Strategy for India and the Developing World* (Ithaca, N.Y.: Cornell University Press, 1976).

Growth from Equity

Development concepts now dominating transnational literature and international meetings are strangely reminiscent of those at the earlier Indian stage, comprising the First and Second Five-Year Plans (1951-56 and 1956-61). These views emphasize reform of land tenure and village power structures; organization of rural people, particularly the poor; and socially oriented education. Many of the inherent problems and disappointments could be avoided by studying the Indian experience of the 1950s and early 1960s and the reasons for subsequent policy changes.

In India's First Five-Year Plan, agriculture was perceived as constrained by three related forces: exploitation (by the landowner, the moneylender, and the trader); ignorance (of the illiterate, backward peasant who was therefore expected to use resources inefficiently); and lack of water (seen primarily as susceptibility to the vagaries of weather rather than as a requirement of high-intensity farming). It was presumed that if agriculture were to become an equitable sector, needed production increases would follow. The inputs of capital, foreign exchange, and other scarce resources would be small in this approach. This position was consonant with the push toward large-scale industry that was emerging in the First Plan and elaborately set forth in the Second Plan. In brief, exploitation was to be tackled through land reform, cooperative credit and marketing, and market regulation. Ignorance was to be tackled through community development, particularly through social education and community organization but including a technically weak extension service as well. And lack of water was to be tackled through extensive, labor-intensive irrigation projects.

There was a certain innocence to these ideas arising from an undifferentiated perception of the farmer and leading to expectation of a unity of production and equity concerns. In contrast, in today's debates about equity, a prosperous peasant (Kulak) is distinguished from the smaller farmer and the landless, and devolution of authority in rural government to the kulak class is disputed. Irrigation schemes, infrastructure development, and even traditional education are seen by some as likely to worsen existing inequalities in favour of the kulak class. I will return to this problem of divergence between equity and production concerns later.

Effective evolution of the First and Second Plan agricultural policies required a firm foundation of continuous, accurate reporting of agricultural production. Large production increases were seen as essential to meeting equity objectives. Independent India inherited a

comprehensive production reporting system based on detailed land records and aggregated judgments about change in crop size. A statistically sound sampling and crop cutting system was grafted to this.

Large weather-induced fluctuations often make it difficult to judge agricultural production trends. Indian planners were undoubtedly misled initially by the favourable weather patterns of the First Plan period, thereby attributing more success than was justified to the policy measures of that plan. This invited the continuation of those policies in the Second Plan. However, the accumulated data soon brought into question the supposed improvement in production. Moreover the data pinpointed successes and failures by region and by crop and differentiated the separate effects of area expansion and yield. This made it more difficult to rationalize support for policies that could not alone meet important objectives. These statistical capabilities, which are so much taken for granted in India, are still absent in much of the Third World, leaving as matters of debate what should be matters of fact, and impeding orderly policy modification.

Equally necessary to sound policy evolution were large-scale, comprehensive analyses of specific issues such as the All-India Rural Credit Survey, the Agricultural Labor Enquiries, and the Farm Management Surveys.

Given that ready access to credit was essential to ending exploitation, and that public institutions were to be the means to that end, it was essential to know (on a national basis with appropriate regional differentiation) who got how much credit from what sources and under what conditions. When the Credit Survey was published in 1957 that information was available as a basis for redefining credit objectives and the means of reaching them. These could in turn be monitored by subsequent surveys and more specialized enquiries such as the 1978 Report on Agricultural Credit Schemes of Commercial Banks.

The massive, countrywide Agricultural Labour Enquiries eventually provided the base of knowledge for a sophisticated description of the nature of poverty, for dealing with specific aspects of that problem, and for comprehending the limits of short-term measures for amelioration of poverty.

The Farm Management Surveys, repeated over several years and agroclimatic regions, provided a wealth of information, fully accessible to all analysts, on the conditions of agricultural production, including relations to scale of farming and sources of inefficiency. These data played an important role in pointing up the basic rationality of small

farmers and turning attention to the various means of increasing economic incentives. It is a pity that analogous, successor bodies of data are not as readily available to the full community of scholars and analysts.

Improved Access to Inputs

The agricultural production data and the various studies challenged major assumptions behind the First and Second Plan strategies for agriculture. The exploitation problem proved to be more complex than initially envisaged. More importantly, the farmer now was recognized as an astute decisionmaker, motivated to increase his income, but impeded by the failure of others to supply him with critical inputs. The potential to increase production was seen to be much greater in some environments, and hence regions, than in others.

The intensive Agricultural District Program, instituted at the beginning of the Third Five-Year Plan (1961), reflected these lessons. It concentrated on certain districts judged to have particularly high potentials for production growth, and emphasized, among other elements, accelerating growth in fertilizer use. The assumption that more equitable access to land, credit, markets, and knowledge would bring growth, was replaced by a new attitude focused almost single-mindedly on growth. The previous efforts were judged not so much incorrect as inadequate. The new priorities arose because earlier efforts failed to provide enough food to meet the needs of the poor and of politically important interests. In practice, the introduction of community organization (albeit largely benefiting the more prosperous peasantry) and the expansion of public credit and marketing institutions provided an improved situation that gave the new measures a much greater chance of succeeding.

This second stage in the evolution of a production policy brought new elements to the data and analytical base. The new strategy was so grounded growth in fertilizer use that it became essential to know the extent of use by region and crop and the amount of variation in response to fertilizer. Because output growth was seen as so closely related to input, yardsticks were needed to judge farm response to facilitate planning for adequate quantities of inputs and to estimate output. A widespread system of fertilizer trials, developed on an increasingly sophisticated statistical base, also provided a broad look at a wide range of technology-related questions. The new production orientation, the increasing complexity of programs, and the recognition of regional variation in potentials called for data on input levels and production response amenable to comparative analysis by regions. The system of fertilizer trials helped meet this need.

The large data collection undertakings of the Intensive Agricultural District Programme offered further scope for such analyses, and provided a wealth of information that greatly improved the basis for sound policy evolution. Collectively these studies drove home the significance of new technology and revealed the weak technological base of much of Indian agriculture.

New Technology

The essential role of land in agricultural production and its finite limits make agriculture the classic example of diminishing returns and increasing costs. Consequently technological change is paramount for accelerated growth in agricultural production. When studies documented that the growth rate during the second Plan period was actually lower than that of the earlier decade, emphasis switched to the generation and application of new technology. The advent of the Third Plan coincided with the development of dwarf wheat varieties. A central role for new technology only underlined the continuing need for incentives, reduced exploitation, and input delivery systems. But more and somewhat different data bases were also needed. These are the data-oriented challenges of the moment.

Clearly the potentials and problems of new high-yield agricultural technologies are highly area specific. We must know where they are succeeding and where not, and what are the dimensions and causes of failure. This information serves several purposes. It corroborates the need for expansion and improvement of the agricultural research system to cover regions and disciplines still inadequately served. It indicates those problems that can better be solved by means other than research, and it delineates situations for which there is no currently defined solution. If we accept that farmers will indeed choose what is in their own interest, we must diagnose the environmental changes needed to elicit decisions that meet societal objectives. We must have considerable replication of research on the effects of various technologies. What combinations of inputs, crop varieties, and production practices are appropriate and under what circumstances? Expansion and elaboration of the fertilizer trials would be helpful. The size of the production increases needed to support a rural-based growth strategy calls for full participation in new technology. Hence we must ask what regions, what groups of farmers, are left out of the process, and why. We need to refine the tools of diagnosis well beyond simple description. Effective research tells us something not only of how to spread known technology further but what technology is still needed. A good example is the International Rice Research Institute's

systematic cataloguing of possible constraints to full application of new technology and measurement of their relative value under varying circumstances¹. Duplication of that approach could prove very useful.

Today's emphasis on high-yield technology has greatly increased the need for controlled water supplies. Under poor water control conditions, yields are lower and less consistent. Throughout the Third World over half the production increase of the next decade will depend upon expanded irrigation². And much of the stagnation in food production will be in areas of little expansion of irrigation. Current research at IFPRI suggests a striking primacy of ground water, compared with other sources of water, as an instigator of multiple cropping, greater intensity per crop, and increased stability. If that finding is substantiated, it could have profound implications for water investment in the next decade. It merits much additional research. Hypothetically an effective agricultural policy would assess the total potential for irrigation, estimate investment requirements, array projects over time, and delineate means to implement rapid development. Data are needed to drive home to policy-makers in an unequivocal fashion the importance of irrigation. Large-scale analyses focusing on the interaction of investment in water with technology may be called for.

High-intensity agriculture greatly increases the need for adequate infrastructure, particularly roads and electrification. Their importance to production objectives is augmented by their role in reducing poverty through employment growth and other means. A long-term plan is needed to provide this infrastructure in a timely and orderly manner. Common sense tells us, to say nothing of the farmer (!), that we have not paid enough attention to infrastructure investment. The intensity of farming declines rapidly as one moves away from roads and electric lines, resulting in large areas that are not reaching their production potential. Because infrastructure often takes a long time to develop, calculation of discounted present values frequently contradicts the findings of simple tabular and regression analysis on the relationship between infrastructure and growth. That reinforces the need for descriptive data on infrastructure.

1. International Rice Research Institute, *Farm-Level Constraints to High Rice Yields in Asia: 1974-77* (Los Banos, Philippines: International Rice Research Institute, 1979).

2. Peter Oram, Juan Zapata, George Alibaruho, and Shyamal Roy, *Investment and Input Requirements for Accelerating Food Production in Low-Income Countries by 1990*, Research Report No. 10 (Washington, D. C.: International Food Policy Research Institute, 1980).

The infrastructure question relates to the water control question because ground water, normally the best controlled water source, tends to be developed most fully in association with highly developed road and electricity infrastructure¹. Such relationships need to be carefully described and monitored. We must document more fully the nature of the relationship between growth and infrastructure. In fact current data collection systems could be modified to correlate many societally important variables with roads and electrification.

Finally, we need to reorient much existing data collection and analysis toward implementation—a swing of emphasis from what to do to how to do it. Why is it that we know for years that certain things should be done, and yet they do not get done? At one end of the spectrum this calls for more detail on what to do. It is not enough to point out the need for controlled water. Timing, quantities, and the kind of system required must be specified precisely.

But there is a need also for something quite different, namely a concern for institutions, and the numbers and characteristics of personnel to staff them. Although the answers may lie outside the narrowly defined field of economics, we must determine what environment is needed to obtain various classes of production results. What details of institutional structure lead to success? Beyond that we need comparative analysis of institutional structures for achieving particular purposes. This work should focus on the quantity and quality of personnel needs for effective institutional development. And we need to monitor the institutions to decide which policies and practices enable them to meet their objectives most efficiently.

This large agenda of data and analytic needs may seem unrealistic in light of the trained personnel and financial resources available. Nevertheless, just as agriculture is a highly variable system requiring decentralization of its servicing institutions, so data collection and analysis can be and must be decentralized. Certain functions, including key economic relationships, may be centrally studied. But much data and analysis must be replicated in many locations. State, district, and institution-specific facilities for such work need to be built. The cost of such analytic facilities is small compared to total development expenditures and expected output. Lack of trained personnel is, of course, a major bottleneck. But until that bottleneck is broken, resources will continue to be inefficiently utilized.

1. See for example B.D. Dhawan, "Groundwater Irrigation in East Uttar Pradesh", (Delhi, India: Institute of Economic Growth, July, 1978).

3. INCOME DISTRIBUTION

Increasing equality lessening income disparities, and abolishing poverty have been central goals of Indian planning from pre-Independence days. The early Five-Year Plans explicitly opted for less employment and less consumption in the short run, but only to provide greater investment for growth and hence more employment and reduction of poverty in the long run. In the early plans, agriculture was seen as a consumer goods industry of particular relevance to the well-being of the poor, but not as a component of the investment thrust that comprised the long-term answer to poverty. It was assumed, however, that agricultural production could be greatly increased without substantial drain on the scarce resources required for industrial development. The miscalculations were two: an under-rating of the resource costs for getting agriculture moving and of the restraint on mobilization of labor and other resources that would arise from a retarded agricultural sector. In addition, the limited successes in agriculture proved a major factor in preventing equity improvement. All that was done on other fronts was nullified by the rise in food prices growing out of the very success in raising the purchasing power of the poor through those other measures. Thus came a more diligent search for direct means of reducing poverty and improving income distribution.

To accomplish this, data describing the conditions of poverty are necessary. Unfortunately, although the data base for employment, size and tenancy structure of farms, and access to institutions is substantial, it generally tells a depressing story for further improvement by political means.

The concern swings to analysis of consumption patterns of the poor as a base for subsidies. The National Sample Survey has been of immense help in monitoring the consumption of the poor. But the story that emerges is again depressing in that it dramatizes the immense numbers of the poor and how deprived they are of even the most basic goods. This returns us to the First Plan solution of solving poverty problems in the agricultural sector itself.

The connection between agricultural growth and poverty abatement is, of course, direct. Lack of food is the starkest element of deprivation of the poor. And a larger proportion of the income of the poor is spent on food. In the face of large production increases, the poor will benefit from declining prices even if incomes of the poor are not raised by expanded employment. However, even in this Panglossian world there remain problems.

Two problems arise within agriculture itself that require data and data analysis. First, as I will clarify in discussing development strategy,

an agriculture-based growth strategy greatly adds to regional income disparities.¹ This is because new technologies tend to give a better response in areas already favored with well-controlled water, good roads, and efficient institutions. In addition, initial disparities are multiplied by the stimulus of agricultural growth to others sector.

Some sources of increasing disparity flow from innate characteristics of a region. Others are amenable to change. Important data is needed to determine what regions are lagging in technology application and income growth. To what extent are difference in investment, institutions, or physical environment responsible, and what can be done about it? Although posed as distribution questions these are production questions as well. Which regional problems can be dealt with by breaking production bottlenecks and which cannot? Although a sophisticated data base exists in India for tackling these questions, they have not received adequate attention.

Second, interpersonal income distribution is profoundly affected by accelerated growth. Unlike capital-oriented growth strategies, agriculture-based strategies have underlying forces favorable to improvement for low-income people. But linkages are complex and therefore may fall short. More emphasis is needed on two tracks. We need to connect the distribution of income by factor shares to the interpersonal distribution of income.² The connection is at best tenuous. However, if production affects income distribution, we need to know by how much so that we can determine what proportion of the problem remains to be solved through other approaches. And the only way we have of tying production processes to distribution is via factor shares. This should be done for new technology,³ but similar analysis for irrigation investment would also be useful. With knowledge of the direct effects of growth on incomes of the poor in hand, we then can concern ourselves with measures to transfer income to the poor.

Analysis of factor shares and the resultant effects on income and expenditure patterns also have production implications, especially for agriculture. Growth of production in agriculture through yield-increasing technology does not directly cause expansion in effective

1. For an early prediction of this problem see John W. Mellor, *The Economics of Agricultural Development* (Ithaca, N.Y.: Cornell University Press 1966), p. 298-300.

2. For a quite different conclusion and statement of the problems, see K.R. Ranade, *Income Distribution: The Unsolved Puzzle* (Oxford University Press, 1978).

3. See for example Chandrashekhar Ranade, "Distribution of Benefits from New Agricultural Technologies—A Study at Farm Level" (Ph.D. thesis Cornell University, 1977).

demand commensurate with the supply accrual. Thus, if incentive prices are to be maintained, ancillary measures to raise employment, income, and expenditure for food may be necessary. These may take the course of direct subsidies on food, thereby sustaining farm producer prices and encouraging input use and risk taking. The efficacy of alternative approaches, not only on production but on incomes, consumption, nutrition, and health of the poor, deserves fuller examination. The direct final impact on the nutritional status of the poor is what counts.

I wish to touch briefly on an issue that weighs heavily on both distribution and growth questions. Weather-induced fluctuations in production are an exceedingly important issue in an agriculture-based strategy. Because it is the poor who do the bulk of the adjusting to fluctuations in food availability, it is an important income distribution question. And because an agriculture-based strategy is rooted in larger fluctuations than alternative strategies, with larger attendant costs, it is a vital growth question. We need more knowledge of the sources of production fluctuations and how they may best be dealt with. Any storage approach leads to international schemes because of the workings of insurance principles. Thus, analysis of international insurance, loan, aid, and buffer stock programs enters in. However, all such analysis must rest on a firm data base describing the variance in agricultural production, how that variance changes with development processes, and the income distribution effects.

4. GROWTH LINKAGES

In a sense a review of agricultural development policy in India brings us full circle. Initially it was believed that efforts toward an equitable society and poverty alleviation would themselves bring about the production growth that was part of the answer to equity problems. In practice those measures were not enough to solve the production problem. Indeed food production began to be seen as central to eradication of poverty. The next step, a single focus on production, sharpened some aspects of unequal income distribution, particularly regional differences, and tended to widen interpersonal disparities within regions as well. At this point a dilemma became apparent. Production measures themselves did not solve poverty problems even though they were a necessary condition to that solution. Direct measures to reduce poverty and income inequalities proved to be either politically inapplicable without major changes in political systems or so expensive that they compromised growth efforts. Then we returned to an attempt to deal with agricultural production and rural poverty simultaneously. But now that joint view must develop

from a more sophisticated base than before in recognition of the importance of indirect linkages between agricultural production and broader processes of economic growth.

Relating agricultural production to income distribution and to overall growth raises three policy issues. First, if agricultural growth requires a much greater resource input than originally expected, on what basis does one justify such reallocation of resources? The answer must lie, at least in part, in the effect on overall growth. Second, how do agricultural growth processes bring about growth in other sectors, and how do they influence employment? And third, what policies facilitate those connections between agriculture and other sectors.

Traditional theories of economic growth explicitly exclude agriculture from growth processes. Professor Mahalanobis saw agriculture as essential to welfare but as a consumer goods industry the expansion of which was detrimental to the growth rate, at least in so far as scarce resources were used.¹ A.K. Sen, in contrast, recognized agriculture's role as a wage-good sector, and that employment growth and agricultural growth went hand-in-hand. He concluded, however, that because of the problem of diminishing returns such growth in early stages of development, when capital was scarce, would be detrimental to long-term growth and would only serve to postpone full amelioration of the plight of the poor.²

We do not have a well-articulated theory of growth with a place for agriculture. Such a theory must have two central elements that separate it from the Harrod-Domar and Fel'dman-Mahalanobis models. These elements call for quite different data and analytic approaches for planning and monitoring. First, technological change must be central to such a growth process. Second, the dynamics of consumption must be incorporated as a means of linking growth among sectors.

Technological change is central to any strategy based on agricultural growth. This is clear from Sen's analysis, which shows the effect of the diminishing returns and increasing costs that afflict a technologically stagnant agriculture. It is net-product-increasing technological change that brings the dynamics of consumption to the fore in growth. In the static technology model, growth can only come from increase in the capital stock and is therefore the antithesis

1. See the review of various theories from this point of view in John W. Mellor, 'Models of Economic Growth and Land-Augmenting Technological Change in Foodgrain Production,' in *Agricultural Policy in Developing Countries*, ed. Nurul Islam (London: The Macmillan Press, Ltd., 1974), p. 3-30.

2. A.K. Sen, *Choice of Techniques* (New York Augustus Kelley, 1968).

of consumption. With technological change there is an addition to net product. In the case of agriculture, the pervasiveness of the sector offers opportunity for that addition to be large and broadly distributed. Consumption patterns determine how that initial addition to income is distributed and the strength of the links to other sectors.

An agriculture-based strategy of growth has three major needs for data as a basis for sound policy analysis. These are the distribution of income by factor shares and from that to the interpersonal distribution of income; the expenditure patterns of various income groups; and the production characteristics of the sectors on which additional income is expended.¹

The initial distribution of the benefits of technological change is itself a complex question, which varies according to the technology and the conditions under which it is applied. Thus data are needed on a broad sampling basis. In addition, difficult methodological questions need to be addressed.

Once the initial distribution of benefits is understood, analysis is needed of how that income is expended. The emphasis is on stratification according to relevant income classes and incremental expenditure patterns. Expenditure data tend to be deficient for this purpose. Not enough detail is available on items with a small base but large marginal propensities to consume them. Too much of future importance, to use terminology of an old Indian expenditure survey, is listed under sundries which are in turn under miscellaneous! Not enough attention is given to services generally and local services in particular. What is the composition and the impact on resource requirements of spending a large proportion of increments to income on education? Housing seems to get lost in expenditure surveys despite the known importance to expenditure in villages. I suppose this latter occurs either because it is classified as investment or because its lumpiness creates sampling problems. But if we are concerned about how agricultural growth stimulates growth in other sectors, housing and its component parts are a major element. In order to develop policies to shift consumption in desired directions, we need careful data analysis.

1. For an early statement of these needs see John W. Mellor and Uma Lele, 'Growth Linkages of the new Foodgrain Technologies,' *Indian Journal of Agricultural Economics*, Vol. XXVIII, No. 1, Jan.-Mar. 1973. For a model of these relationships emphasizing the foodgrain sector, see Uma Lele and John W. Mellor, 'Distributive Bias and Labour Transfer in a Two Sector Economy,' (forthcoming). For a fuller presentation of the conceptualization see John W. Mellor, *The New Economics of Growth: A Strategy for India and the Developing World* (Ithaca, N.Y.: Cornell University Press, 1976).

Finally, we must learn much more about production activities in provincial regions and how they may be stimulated by consumption arising from technology-based, efficiency-increasing production processes in agriculture. We know income elastic agricultural commodities bulk large in consumption patterns. What other activities have aggregate impact? We know very little of these processes, and yet rural-based employment depends on it. We need to expand work, such as that done by IASRI, beyond agriculture to general rural activities.

5. CONCLUSION

The cynic may have two responses to the foregoing. On the one hand, there is no sense of priority, and yet the agenda is so large that it cannot be covered. On the other hand, it may all be irrelevant because policy is not made through such rational data-based processes.

Let me respond to the former point. Yes, there is much to do before an agriculture-based strategy directed toward food production growth, increased equity, and accelerated overall growth can succeed. That is why it takes so long. Let us face up to that. We must be patient for results and impatient about pursuing the component parts. But much has already been done. For India, I can suggest only a few new thrusts, such as placing priority on a fuller understanding of the dynamics of consumption and on the nonfoodgrain rural activities in agriculture, manufacturing, and the services. If priorities can be set, and with a little luck, meeting only a few high-priority needs may speed up the process substantially. That is one reason why development takes off sooner in some places than others.

As to the latter concern, I respond that policymaking is a complex process. Many policymakers cannot or choose not to understand research and research results. Research most relevant to policy may still be very tangential in the policymaker's view. In any case, researchers often define the problem no sooner and often later than the policymaker, though policy decisions will not wait for the results. Research normally must be repeated over and over before its message is clear. And by the time its importance is recognized, the impacts studied probably have long since been evident through informal processes. Dr. Panse undoubtedly had to wait patiently to see the widespread fertilizer trials on farmer's fields evolve into recommendations to the fertilizer industry, but his drive and persistence enabled him to pursue his goals to valuable conclusions.