

William C. Thiesenhusen, Director
Land Tenure Center
The University of Wisconsin
Madison, Wisconsin

April 20, 1973
DRAFT - Prepared at the
request of the International
Bank for Reconstruction and
Development

WHAT CHANGING TECHNOLOGY IMPLIES FOR AGRARIAN REFORM

Table of Contents

Role of the Agricultural Sector in LDCs, p. 1

Need for Increased Agricultural Output, p. 1

How Can Agriculture Adjust?, p. 2

What Kind of Technology?, p. 6

How the Green Revolution Might Effect Social Problems, p. 11

The Employment Problem, p. 11

Inability to Obtain Inputs, p. 23

Other Distributional Considerations, p. 26

Implications for Policy, p. 27

An Integral Agrarian Reform, p. 27

Other Policy Priorities, p. 35

All former drafts of this manuscript--
ones with white cover pages--should be
discarded.

April 20, 1973
DRAFT - Prepared at the
request of the International
Bank for Reconstruction and
Development

WHAT CHANGING TECHNOLOGY IMPLIES FOR AGRARIAN REFORM

William C. Thiesenhusen*

Agriculture is of central concern for development policy makers because in most less developed countries (LDCs) it tends to be the largest sector of the economy in terms of percent of the work force employed and often even in the share of GNP it generates.¹ One challenge that agricultural sectors in most LDCs face today is that they must produce ever-increasing amounts of food and fibre because population is growing so rapidly.

Role of the Agricultural Sector in LDCs

Need for Increased Agricultural Output

The need to produce more is painfully obvious when one contem-

*Professor of Agricultural Economics and Agricultural Journalism and Director, the Land Tenure Center, University of Wisconsin, Madison.

¹In this paper economic growth is defined as an increase in GNP per capita, while development is considered to be a more inclusive term encompassing economic growth along with "expanded opportunities and the human capacities needed to exploit them, [and] a general reduction of mass poverty, unemployment, and inequality." See Peter Dorner, "Needed Redirections in Economic Analysis for Agricultural Development Policy," American Journal of Agricultural Economics 53, no. 1 (February 1971), pp. 8-16. "Enhanced security" should probably be added to Dorner's definition.

plates recent and widely publicized demographic data. While the population of North America is 228 million and it is rising at a rate of only 1.3 percent a year, Latin America's total population is 283 million and is growing at well over double the U.S. rate, at 2.9 percent per annum. Similarly, Africa has a population of 344 million and is increasing at 2.5 percent per year, while Asia contains 2,056 million and this number is rising by 2.3 percent annually.²

If the population of, say, Latin America continues to grow at its present rate, there will be more than twice as many people in the region by the year 2000. While there are great differences between countries, this means that Latin America's total agricultural production will have to at least double during that time--just to keep everyone where he is today. The U.S. could take more than twice as long to accomplish this awesome task.

How Can Agriculture Adjust?

There are four ways in which agriculture might gear up to meet demands for more food, discounting the alternative of sustained importation of large amounts of farm products for most countries because of its costliness (and perhaps short-term unavailability); in practice, a country uses them in various combinations:

1. An effort may be made to press forested land or natural pasture in already settled areas into cropping.
2. Land that is unused or the plow may be more intensively cultivated using traditional inputs, e.g., more

²United Nations, Statistical Yearbook, 1971, E/F 72.xvii.1 (New York, 1972).

laborers might be put to work on each cultivated acre.

3. An attempt may be made to develop the know how that will make it possible to farm frontier lands.
4. There may be an all-out effort to utilize new technology to produce more from every acre now being worked.

Alternative (1), even if combined in some way with (2) or (4), could have very undesirable consequences. But if the other alternatives are closed, hilly woodlands will be deforested, humid jungles will be denuded, and prairies will be plowed. Hence gullies will be cut, soils will be leached, and dust bowls will be formed. In the longer run, the hydrologic cycle will likely be seriously interrupted and soils now usable for range and forest will be left in ruin.

Since strategy (2) has an obvious upper limit most eloquently spelled out by Schultz³, policy makers are usually left with some combination of (3) and (4). In countries where a frontier remains to be settled it is often looked to as a sort of panacea which is potentially capable of making up the food deficit, accommodating overpopulation, and maybe even earning foreign exchange with its hidden wealth. So Indonesians foster transmigration from Java, Brazilians cut a road through the untracked Amazon, Ecuadorians speak of the El Dorado they hope to find on their Andean slopes, and Nigerians believe in the potential of their "Middle Belt."

³Theodore Schultz, Transforming Traditional Agriculture, (Yale University Press, New Haven, Connecticut, 1964).

However, a frontier strategy, while politically relatively easy, is likely to be very costly for most countries in the foreseeable future because agronomic data is scarce, infrastructure is expensive, and the intensive use of this usually unproven soil may have the same consequences as those outlined for strategy (1). Therefore at the same time that research on how to use land which is too wet, too dry, too steep, too leachable, too disease prone, and/or too remote continues, most countries will have to rely on alternative (4): new technology will have to be applied to a more or less fixed land base to produce more food.⁴

One recent author is especially clear about the formidable effort this implies for LDCs:

Scientific agriculture ... must produce the greatest technical achievements of twentieth century man. The economic and social advances made possible by agricultural technology in the United States, Western Europe, and Japan during the first half of the century must be surpassed in the less developed countries. Their agriculture must outrun unprecedented population growth...⁵

But the very technology that makes it possible to alleviate hunger may have unforeseen and unfortunate secondary effects on society.

⁴Colonization in frontier areas is not always successful. See Peter M. Gladhart, Capital Formation on the Ecuadorian Frontier: A Study of Human Investment and Modernization in the Riobambenos Cooperative, A. E. Res. 72-5, Department of Agricultural Economics, Cornell University (Ithaca, April 1972).

⁵Rutherford M. Poats, Technology for Developing Nations (The Brookings Institution, Washington, D. C., 1972), p. 16.

This paper focuses on the following questions:

1. What are the actual and/or probable impacts on various groups in society that new technology may have upon its introduction into traditional agriculture?
2. How may some of the adverse effects be alleviated?

In this paper, I do not propose to delineate precisely who wins and who loses because of the adoption of technology in agriculture. The more studies are completed the more it becomes clear that there are few generalizations that can yet be drawn to cover every country situation.

But most technological change tends to have deleterious effects on some groups within society. This is not to deny that technological change is the sine qua non of development or that in the interest of some societal goal of egalitarianism its positive benefits should be foregone by everyone. But international lending agencies and national governments must attempt to develop some prescience about both intended and unintended effects before throwing their wholehearted support behind one investment project or another.

Last year, President Robert S. McNamara put the World Bank Group on record when he set forth his suggested goals for the international development community:

The first step should be to establish specific targets, within the development plans of individual countries, for income growth among the poorest 40% of the population. I suggest that our goal should be to increase the income of the poorest sections of society in the short run--in five years--at least as fast as the national average.⁶

⁶Robert S. McNamara, "Address to the Board of Governors," Washington, D. C., September 25, 1972.

If benefitting those who have so long been denied the benefits of economic growth is an explicit goal of, say, a capital loan, either (1) the technology embedded in the capital may need to undergo some modification in order to be optimally useful, or (2) the institutions through which it must filter or be delivered may need to be fundamentally changed.

Conventional economic wisdom tells us in general terms which groups are likely to be beneficiaries of new technology and de Janvry has nicely summed up the case:

Major gains from technological advance in agriculture can accrue to a number of social groups under a variety of forms: to consumers in the form of lower food prices; to early farm innovators in the form of Schumpeterian profits; to agri-business entrepreneurs when monopolistic or monopsonistic structures prevail in their markets; to subsistence farmers in the form of improved consumption levels; and, in a 'classical-Marxian' framework, to employers through lower wage goals and higher surplus values.⁷

What we don't know is who benefits and who loses in specific cases. For this reason I can only make a plea for farsighted analyses and good research on the part of aid donors before a grant or a loan is made.

What Kind of Technology?

This discussion will focus on the technological change in less developed countries that has dominated discussions in the past six or

⁷Alain de Janvry, "Welfare Implications of Alternative Technological Paths in Agriculture," Paper presented at the Ford Foundation OLAC Seminar in Agriculture, Mexico City, November 1972.

seven years: the so-called green revolution technology, the "miracle" seeds which, when used with designated amounts of fertilizer, ample water, and proper husbandry, give sudden and dramatic increases in yield. This seed-fertilizer revolution has occurred most markedly in two subsistence crops, wheat and rice.

The wheats are short-stemmed, relatively day-length insensitive, and highly responsive to inputs. Total semi-dwarf wheat acreage in India, Pakistan, Mexico, Turkey, Afghanistan, Tunisia, Iran, and Morocco expanded rapidly from 0.6 million hectares in 1966 to 10.6 million hectares in 1970. Production from these improved varieties during the same period increased from 1.6 million tons to 22.7 million tons.⁸

Area devoted to high yielding rice in South and East Asia rose from 17,700 acres in 1965/66 to 25,293,500 acres in 1970/71.⁹ Sri Lanka's rice crop increased 34 percent in two years. The Philippines had four consecutive record rice harvest.¹⁰ Table I offers some tentative income figures presented by Lester Brown.

⁸Sheldon K. Tsu, High-Yielding Varieties of Wheat in Developing Countries, ERS-Foreign 322 (USDA, Washington, D. C., September 1971).

⁹AID, "Green Revolution Grows Greener," War On Hunger 6, no. 5 (May 1972), pp. 10-11.

¹⁰Lester R. Brown, World Without Borders (Random House, New York, 1972), p. 21.

Table I

Income from Traditional and High-Yielding Varieties (net income per acre)		
	Traditional Varieties	High-Yielding Varieties
Wheat:		
Turkey	\$32	\$ 80
Pakistan	\$13	\$ 54
India	\$17	\$ 76
Rice:		
West Pakistan	\$25	\$ 45
East Pakistan	\$30	\$119
Philippines	\$81	\$140

Mostly 1968 data. From Lester R. Brown, "The Social Impact of the Green Revolution," International Conciliation, no. 581 (January 1971), p. 15.

Even so, it is not correct to imply that the current green revolution represents the only page in history where a quantum jump has been made by applying technology to agriculture. Hybrid corn produced a similar phenomenon in the U.S. In LDCs, productivity of some export crops has increased markedly over several decades.¹¹ Also, the spread of rice culture from Japan first to Taiwan and later to Korea was a variant on the same theme.¹² Reaching back further in time, a Sung emperor of 11th-century China is said to have introduced a rapid-maturing rice from Indochina which could be harvested 100 rather than 170 days after sowing.¹³ The unique feature of the contemporary green revolution is probably the short time in which it caught hold.

And yet one should not exaggerate the effects the contemporary green revolution has had. Even in the Asian "green revolution countries" the macro-agricultural data changed little in the 1960s because of rapid population growth. In India and the Philippines, agricultural production per head was roughly the same in 1970 as it was in 1960. In Indonesia it was noticeably lower. In Pakistan it was 14 percent higher but at that time figures included Bangladesh, where agricultural output per head did not rise (Table II).¹⁴

¹¹Rodolfo Quiros, "Agricultural Development and Economic Integration in Central America" (Ph.D. Diss., University of Wisconsin, 1971).

¹²Yujiro Hayami, "Elements of Induced Innovation: A Historical Perspective for the Green Revolution," Explorations in Economic History 8, no. 4 (Summer 1971).

¹³Michael Perelman, "Second Thoughts on the Green Revolution," The Nation (July 17, 1971), p. 21.

¹⁴Keith Griffin, The Green Revolution: An Economic Analysis, Report No. 72-6 (United Nations Research Institute for Social Development, 1972). p. 57.

Table II

Per Capita Agricultural Production
in Six Asian Nations: Percentage
change 1960-1970

Sri Lanka	+10
India	0
Indonesia	- 4
Pakistan	+14
Philippines	0
Taiwan	+15

From Griffin, The Green Revolution, p. 57.

It is not without risk that some scientists have projected a fairly steady and smooth upward climb out of the fear of famine for the LDCs. Since water control has been essential to green revolution varieties, only amply rainfed or irrigated lands have been incorporated and these are limited in supply and very expensive to create.¹⁵ Furthermore, many countries in which the green revolution has taken place are subject to natural disasters or exigencies of weather which can play havoc with any advances. In 1972 drought hit from Kabul to Peking; the Philippines had flooding in Luzon, droughts in the south. And, in five crucial Philippine provinces a disease known as Tungro appeared.¹⁶ Parts of India had a good year, but Bengal and Bihar did not. Of Pakistan, a Ford Foundation agricultural officer says, "West Pakistan

¹⁵Scientists are working on high yielding rainfed wheats and barley for low rainfall areas, however.

¹⁶Marcus F. Franda, "Policy Responses to India's Green Revolution," American Universities Field Staff Reports 16, no. 9, (July 1972) and "Asia: Wilted Revolution," Newsweek (December 25, 1972), p. 37.

appears to have reached a production-plateau with wheat production from the four provinces totaling between 6.3 and 6.5 million tons for the last three out of four years."¹⁷

How the Green Revolution Might Effect Social Problems

Even given the best of production success however, the green revolution is likely to exacerbate existing social problems; indeed, the better the production the worse the strain on the social fabric will probably become. There are two major ways in which green revolution technology might strain the rural institutional pattern in LDCs:

1. The green revolution technology might cause some agricultural workers to be unemployed or more underemployed than formerly.
2. Some farmers might completely or partially be denied access to the new technology, thus increasing the income gap between the rich and the poor.

The Employment Problem

One of the most acute social problems in contemporary LDCs is lack of employment opportunities. In India, unemployment is estimated to have increased from 11 percent of the labor force in 1951 to 15 percent in 1961, a level maintained throughout the decade. There are 100,000 who enter the labor force each week in India. Study after study shows us that in country after country real unemployment data

¹⁷Gordon W. Mclean, "Wheat Production in West Pakistan," Mimeo., Islamabad, March 10, 1972. Bernard D. Nossiter, "The Death of Slogans," The Washington Post, April 18, 1973.

indicate a higher percentage of jobless now than in the early 1960s. It has been estimated that 75 million people in LDCs are currently unemployed and in the next decade 225 million additional workers will need work. That is nearly three times the total labor force in the U.S.¹⁸ Slowing the population growth, while essential, won't help this problem in the short term. New entrants to the labor force over the next 15 or 20 years--those who will also bear a new generation of workers--have already been born.

While good data on the extent of the employment problem in rural areas do not exist, one might imagine that it is as serious there--or more so--than in towns. Indeed, a structure of agriculture which doesn't permit enough employment and hastens farm-to-city migration is an important cause of the urban problem.¹⁹ Some feel that the green revolution technology may be exacerbating what is already a bad situation.

The most direct way that income distribution can be affected by the green revolution is if rural workers--who already crowd the low end of the spectrum of income receivers in most LDCs--lose their jobs or become more underemployed than presently because of it.

In summarizing one seminar on the green revolution in New Delhi, Das indicates that determining the income impacts of technology on

¹⁸Robert d'A. Shaw and Paul A. Laudicina, "Jobs: A Growing Global Crisis," Communique No. 7 (Overseas Development Council, Washington, D. C., March 1971).

¹⁹William C. Thiesenhusen, "Latin America's Employment Problem," Science 171 (March 5, 1971): 868-74.

various tenure groups is not an easy task:

While in UP, the neglected group may be the share-croppers on large estates, in Maharashtra it may be the marginal farmers on hill-side slopes. Landless labour might have gained in Punjab, whereas share-cropper dispossession in Tamil Nadu may have worsened the position of agricultural labourers there.²⁰

Whether the green revolution displaces workers seems to depend somewhat on which constellation of the following (non-exhaustive and interrelated) list of factors are found and how they are changing over time: 1) which green revolution crop is grown, 2) diversity of farming program followed, 3) amount of machinery and in which practices it is used or comes to be used, 4) whether or not double cropping is practiced, 5) size of farm, and 6) pattern of land tenure and presence of tenants, occasional labor, resident farm labor, etc.

When the green revolution is accompanied by the importation of labor-saving implements it often means a loss of jobs. But it does not necessarily mean increased joblessness if the speed with which one crop is harvested and another is planted decides whether a farmer is able to double crop or not. Likewise, if heavy equipment is needed to reclaim land before it can support farming, more jobs may result.

Nonetheless when one operation, say seeding, is mechanized for the above reasons and the power source becomes available at the farm in the form of a tractor, it will be easier to mechanize other farm operations. The cost of adding implements is probably marginal when

²⁰Amritananda Das, "Understanding the Green Revolution," Economic and Political Weekl (November 18, 1972), pp. 2266-67.

the investment in a tractor has already been made. Even if the first round produces increased labor use, second-round effects may be adverse.

Again, the fertilizer used with wheat and rice not only stimulates cereal growth, but growth of weeds as well. At weeding time, therefore, either family labor is employed more fully, additional labor is hired for the job, or mechanical and chemical techniques may be adopted replacing the labor completely.

The reason that mechanization seems to accompany the use of green revolution inputs is that government policy or even that of loaning or granting agencies may, for one reason or another, encourage it.²¹ Regardless of the country-wide situation, regional or seasonal labor scarcities are common--or landlords may perceive a scarcity even when one does not prevail.

All signs point to the use of a great deal of caution when the deleterious employment effects of the green revolution are diagnosed. Barker, et al., discovered that in the Philippines the structure of employment in rice farming changed while total demand for labor remained fairly constant with the introduction of the new technology. The reduced labor requirements for mechanized land preparation were more than offset by increased labor requirements for weeding and harvesting (Table III).²² It remains to be seen whether the labor peaks

²¹ See, for example, Carl H. Gotsch, "Tractor Mechanization and Rural Development in Pakistan," International Labour Review 107, no. 2 (February 1973), pp. 133-66.

²² Randolph Barker, William H. Meyers, Cristina M. Crisostomo, and Bart Duff, "Employment and Technological Change in Philippine Agriculture," International Labour Review 106, nos. 2-3 (August-September 1972), pp. 111-39.

Table III

Changes in Total and Hired Labor Use Patterns in the Wet Season and Concurrent Changes in Technology Between 1966 and 1970 In Selected Areas of the Philippines with High Rates of Mechanisation

Survey Area	Labor Use					
	1966			1970		
	Man-days/ha		Per-centage hired	Man-days/ha		Per-centage hired
	Total	Hired		Total	Hired	
Central Luzon-Laguna						
Land preparation	17	3	18	10	2	23
Pulling and transplanting	15	14	96	17	16	99
Weeding	5	2	36	11	3	31
Other pre-harvest	8	2	19	8	1	15
Harvesting and threshing	18	16	86	21	18	85
Total	64	37	58	67	41	62
Laguna						
Land preparation	20	4	18	11	4	37
Pulling and transplanting	10	9	95	10	10	99
Weeding	16	2	16	18	10	56
Other pre-harvest	8	1	10	10	1	14
Harvesting and threshing	32	32	100	31	31	100
Total	86	48	57	80	57	72

From Barker, et. al., "Employment and Technical Change," p. 128.

created for these operations might be so steep that mechanical processes will ultimately be substituted for hand work or many day laborers will be substituted for resident workers.

At any rate, chances are good that as accentuated peaks and valleys appear in the structure of employment, less resident farm labor will be needed. What this means is that where the patron-client relationship exists, it may well break down. This may be applauded as one more necessary step toward development, but in some countries where the system had overtones of landlord benevolence or noblesse oblige, the change is liable to be a wrenching one for many workers. When labor requirements were more or less evenly spread throughout the agricultural year, resident farm labor was called for which related the labor force to the landlord in a traditional patron-client diadic contract. Landlords frequently provided live-in workers with a house, some land and/or other perquisites while the worker provided his labor. When the rhythm of work is changed so that some labor-use peaks get very steep and troughs appear in other seasons, there is no good reason to support workers full time on the farm, so day laborers tend to be substituted for resident laborers. Frankel discusses this point with reference to India:

The rapid progress of agricultural modernization tends to undermine traditional norms of agrarian relationships based on the exchange of mutual, if noncompatible, benefits and services that have historically provided a justification for inequalities between the propertied upper and middle castes, and the landless low castes and Harijans.²³

²³Francine R. Frankel, India's Green Revolution: Economic Gains and Political Costs (Princeton University Press, Princeton, New Jersey, 1971), p. 198.

Yet labor does not always lose. In some areas of the Indus Plain where Mexican wheats have been adopted, cost of labor as a percent of crop value has doubled.²⁴ In the Hazara district in Pakistan, one researcher found that technical change in the form of new high yielding wheat varieties is definitely labor using in Lora and Oghi because mechanized harvesting is impossible on the hilly and terraced farms there. Man hours required per acre rose from 169 for native varieties to 252 for dwarf varieties.²⁵

Tenants face a very special problem as green revolution inputs come to be used and farming becomes more profitable. As land values rise with increased crop values, rents may rise. Certainly landlords will not allow benefits of the green revolution to flow entirely--or maybe even in part--to renters. They will be successful in raising rental payments because of the competition from many potential tenants for rental property. Or sometimes owners have been known to simply reclaim the leased property and work it with hired labor and/or machinery.

Of India, Frankel states rather bluntly:

Certainly, [landlords] do not hesitate to raise rentals in line with appreciating land values and/or to evict even tenants having long-standing cultivating possession of the land. Moreover, the land reform laws in all states, while largely abortive, have caused landlords to view tenants as potential adversaries.²⁶

²⁴Robert d'A. Shaw, "The Employment Implications of the Green Revolution," Mimeo. (Overseas Development Council, Washington, D. C., June 1970).

²⁵Refugio Rochin, "Dwarf Wheat Adoption by Barani Smallholders of Hazara District: Technological Change in Action," Mimeo. (Ford Foundation, Islamabad, May 1971).

²⁶Frankel, India's Green Revolution, p. 197.

There are other ways in which the green revolution may have an effect on labor use:

- 1) The green revolution might shift land away from high labor-use crops to crops that are not so labor intensive. This is not to say that shifts are unwarranted or should be foregone, but that employment consequences need to be known and acted upon by policy makers.
- 2) The technological opportunities presented by the several green revolution crops vary in their potential for creating employment. It may well be the case that rice farmers may adopt the structural labor-using forms of Japan and, because it is more amenable to mechanization, wheat may adopt the capital intensive structural form of the U.S.²⁷
- 3) Even where double cropping is not possible, green revolution varieties may require precision seed-bed preparation that hand labor cannot provide.

It is argued that the green revolution may make new demands on infrastructure that are so pressing that new jobs will be created in such activities as roadbuilding and irrigation works.

That such a potential exists, but may not be exploited is illustrated in a recent paper by John W. Thomas.²⁸ He indicates for

²⁷Kazuo Saito, "On the Green Revolution," The Developing Economies 9, no. 1 (March 1971), pp. 16-30.

²⁸John W. Thomas, "The Choice of Technology in Developing Countries: The Case of Irrigation Tubewells in Bangladesh," Mimeo., Preliminary Draft (Development Advisory Service, Harvard University, Cambridge, Massachusetts, September 1972).

Bangladesh that only with irrigation is a boro (November to May) crop in the six-month dry season possible. Therefore the sinking of 20,000 tubewells was targeted as a goal to be reached by 1975. Three tubewell alternatives existed, designated here for simplicity's sake as low cost, median cost, and high cost.

Analysis showed:

- 1) The internal rates of return--using actual and shadow prices-- were substantially greater for low cost wells.
- 2) Low cost drilling techniques create far more jobs while requiring only a fraction of the capital investment used by median and high cost wells.
- 3) Slower initial capacity to install low cost wells does not offset the cost advantage in a rate of return comparison. Demand seems to lag behind installation until about the fourth year anyhow.
- 4) Farmers themselves would help install the low cost wells, thus learning how they operate; median and high cost wells would be installed by contractors.
- 5) Mobility of heavy, more expensive rigs is limited by the absence of roads and bridges while low cost rigs are light and can be transported by boat, animal cart, or even on men's shoulders. Therefore, if low cost wells are used they can be more broadly distributed throughout the country.
- 6) A higher percentage of the small, cheap rigs can be made in Bangladesh, thus stimulating small-scale industry. Repair and maintenance can also be done locally. Median and high

cost wells do not have these advantages.

Thomas concludes:

On balance the arguments for the low cost wells over median and high cost appear impressive. With low cost wells, economic return is higher, the employment and training effects are greater, the components of the wells hold greater potential for the creation of domestic industry and they will provide a broader distribution of the benefits of well irrigation.

Given the overwhelming evidence, one might imagine that low cost wells would have been used. In fact, the government requested assistance for median and high cost wells. Why this was the case is due to a number of factors:

- 1) Price distortions--inconsistencies in the tax and duty structure--made the market cost of high speed diesels less than that of locally produced engines despite the fact that the latter cost only 75 percent as much to produce. Because the Pakistan rupee was overvalued, imported equipment was obtained for as little as half its true cost to the economy.
 - 2) If wage rates exceed the opportunity cost of labor as they did in East Pakistan in 1970, labor intensive methods become less attractive. When the problems of management of labor crews are added, contractors will generally adopt capital intensive methods despite the fact that this is highly inconsistent with existing factor endowments.
 - 3) The form of aid frequently depends more on the requirements of the donor country than on those of the recipient.
- Policy makers in developing nations may accept a technology they consider second best if foreign financing is available

only for that choice. Bangladesh counted on substantial external help for its irrigation program and, hence, had little bargaining power when a determination of the kind of technology to be used was made.

- 4) Foreign drillers, who could be held contractually responsible for performance, appeared a safer bet than a decentralized operation involving a large number of low cost rigs. Besides a low cost program operating at scattered locations required a decentralized administrative system and resultant loss of control by central authorities.
- 5) For government officials, technology with the appearance of modernity is less prone to criticism than simple technologies.
- 6) The staff, equipment, procedures and mentality of foreign consultants are oriented towards high cost, high quality construction.

The first two are economic factors and project analysis techniques, such as shadow prices, can factor these out. The last four, Thomas concludes, probably figured most importantly in the decision not to use the low cost rigs.

Similarly, Timmer found that the pronounced disinclination of Indonesian officials to seek out viable labor-intensive projects stemmed, in addition to the usually mentioned economic distortions, from at least three "non-economic" sources.

- 1) It is easier from any bureaucrat's point of view to administer a few large capital intensive projects than many small ones.

- 2) Regulatory officials who expect private gain find it easier and more remunerative to "work" with larger capital intensive projects than small ones.
- 3) Donors of foreign aid have a "fixation" on capital intensive projects: they are easier to oversee and they use the available manufacturers and techniques of the respective developed country.²⁹

If the number of landless laborers is small and there is little migration from other areas, it is possible that off-farm worker conditions may improve with the introduction of new technology. Robert d'A. Shaw reports that in Ludhiana District total workers' wages increased with the introduction of new technology because laborers now find off-season employment installing tubewells and leveling land.³⁰

Small-scale farmers who can't make the transition to green revolution technology will find, sooner or later, that their already meager production is selling for less. They will either retreat further into subsistence cultivation or take advantage of high land prices to sell out. After they have left their land they will become rural landless laborers or join the hordes of migrants in town.

While jobs in industry are usually scarce, some may find jobs in artisan shops or labor-intensive factories and be better off than when they were farming. Marcus Franda believes this is currently

²⁹C. Peter Timmer, "Choice of Technique in Indonesia," Mimeo. (Development Advisory Service, Harvard University, Cambridge, Massachusetts, September 1972).

³⁰Robert d'A. Shaw, "The Employment Implications."

the situation workers face who were displaced from agriculture in the Indian Punjab. He doubts that this will continue to be the case if this process continues throughout the 1970s, however.³¹

Inability to Obtain Inputs

There is some thought that green revolution technology may be biased against the peasant. Griffin has suggested that if a single technology is used by all farmers confronting similar climatic and soil conditions, it "meets the test" and has no such bias. His conclusion is that:

At the moment, it appears that new varieties of rice developed in Taiwan are one of the few innovations that can pass this test. Technical change in Taiwanese agriculture is widespread and the reason for this, in our opinion, is that landownership is equally distributed in small parcels and that all peasants have approximately equal access to fertilizer, water, technical knowledge and credit. In these circumstances, a technical change that is profitable for one farmer will be equally profitable for all other farmers and innovation, in consequence, will be rapid and inevitable.³²

But the current situation in many Latin American countries is that rich, irrigated bottom land is owned by the well-to-do while peasants must carve out their plots on mountainsides or other land which presents some formidable natural difficulty and to which their claims are tenuous. Likewise in many Asian countries that do not have an egalitarian system of landownership, it is generally the richer farmers with the most land who can afford a tubewell or other even more complex irrigation

³¹Personal conversation with the author, February 23, 1973

³²Griffin, The Green Revolution, p. 47.

technology.

The seeds and fertilizers themselves are so highly divisible one would imagine that, given the marked increase in production that could be expected, all farm size-groups would tend to adopt them quickly. This is often the case, as research in parts of India and Pakistan seems to show. But, in countries characterized by a relatively few large farms and many small ones, credit institutions are probably effectively controlled by the large farmers. Since optimal fertilizer use is increased three or four times under the green revolution, with higher plant populations correspondingly larger short-term production loans are needed. Farmers with larger acreages will probably be regarded as good credit risks and prime candidates for loans; the cost of servicing a loan to a small farmer may be as great as that to a large one. The red tape and delay may also deter the small farmer from borrowing. Even assuming zero credit availability to everyone, large-scale farmers would be able to finance a certain level of inputs from their own savings while small holders usually find this impossible. And even if small farmers who are prevented from receiving public credit are able to borrow from the private credit market, they will probably have to pay usurious rates which may well cancel out profit. Worse yet, the peasant may be so encumbered with past due accounts that he is not able to avail himself of any credit--private or public. Essentially the same argument can be made for water supply. In areas where irrigation is necessary, water use may be controlled by those who are able to deny an allotment to small-scale farmers.

More generally, the success of the green revolution rests on how

well; the non-farm sector can provide inputs: the seed-fertilizer revolution is distinguished by its increased dependence on purchased inputs. If there are bottlenecks in the distribution of these inputs that affect the quantity of the inputs delivered and the timing of their delivery, income will be affected. The chances for the large-farm sector to obtain seed and fertilizer may be greater than that of the small-farm sector simply because the large-scale farmer has more expertise in dealing with complex bureaucracies. And if there is a problem with an input shortfall, the large-scale farmer can use his personal vehicle to pick up seed, fertilizer, and pesticide at a more distant location, an alternative usually not open to small, under-capitalized farmers. Griffin believes that:

Perhaps the most important reason for the bias of the 'green revolution' is the bias of government policy. For many years research, extension and investment programmes in agriculture have been devoted to raising output (preferably exportable output); their primary concern has not been to increase the welfare of the rural population and improve the distribution of income and wealth.³³

This does not mean that those with small farms are always denied green revolution inputs. Rochin found that Barani (rainfed) smallholders in Pakistan "have adopted dwarf varieties of wheat in a remarkably short time." In Hazara they heard about it on the radio, saw it growing in demonstration plots, and were quick to purchase the inputs when available.³⁴

³³Griffin, The Green Revolution, p. 48.

³⁴Rochin, "Dwarf Wheat Adoption by Barani Smallholders of Hazara District."

Other Distributional Considerations

Several other points dealing with the green revolution have distributional consequences the direction of which is hard to predict:

1. The green revolution may shift the cropping pattern from food legumes which are rich in cheap protein needed for the diets of the rural poor (like beans) to crops that are higher in carbohydrates (like wheat).³⁵
2. If a government is successful in taxing the beneficiaries of the green revolution (a highly dubious matter), who will benefit from the resultant public expenditures?
3. If the resultant food is exported, income effects will depend on who gets the foreign exchange that is generated. Will the government get a share? If so, how will it be used? What will happen to the share retained by individuals? Will it make up an income stream for the already rich with little "trickle down" effects on the poor? Will it be invested in towns or in the countryside? Will it be used for conspicuous consumption? Will it be sent out of the country and hoarded abroad?
4. People in remote areas, regardless of farm size and command over resources, will benefit less than their counterparts nearer towns or those that are connected by good roads to cities (ceterus paribus).

³⁵Uma Lele and John W. Mellor, "Jobs, Poverty and the 'Green Revolution'," International Affairs 48, no. 1 (January 1972), pp. 20-32.

5. If one region within a country profits while another lags behind, the stage is set for internecine conflict.

Implications for Policy

An Integral Agrarian Reform

The type of land tenure system seems a rather crucial variable in determining how technology is shared and, hence, how income streams are directed. Griffin claimed that one reason for the wide spread of high yielding rice in Taiwan was the egalitarian landownership pattern.³⁶ This system seems propitious for a broad sharing of income benefits. If inputs are provided it also fosters substantial growth.

In regions where a few own most of the good land while the vast majority of those who own land have very small plots, technology will probably flow to those who already have most resources and the gap separating the rich and the poor will grow. In this situation countries may show substantial economic growth--but its benefits will probably accrue to a very small group.^{36a}

In situations where ownership of units may be by a small group and tenancies are small and relatively equal but tenants have no control and little power--as in the Philippines--results may be mixed. If new inputs come to be widely used, sharecropping and cash renting tenants may be evicted as their profit grows--or their rental payments may be increased. Another possibility is that tenants may be unwilling to make any kind of long-term investments because they feel themselves

³⁶See the quotation on p. 23.

^{36a}This is the case in much of Latin America. See also Leslie Nulty, The Green Revolution in West Pakistan (Praeger, New York, New York, 1972) and the review by James M. Blume in War on Hunger, Vol. VII, No. 4, April 1973, p. 22.

so insecure.

A land reform designed so that rights to property are widely shared is in order for areas where much of the land area is owned by a few farmers. These governments should follow a vigorous "growth with distribution policy," and it should doubtless begin with a sweeping land reform to re-shape agrarian institutions in a more egalitarian fashion so that they become amenable to the adoption of technology without concentrating income that results therefrom. But care must be taken so that the post-reform tenure system:

1. Will promote enough security so that beneficiaries will be encouraged to invest.
2. Is accompanied by credit, technical assistance, marketing, and extension facilities designed for beneficiaries.
3. Will not encourage beneficiaries to sell their rights to a small and powerful group not affected by reform.

In Bolivia, for example, (1) and (2) were not provided for after reform and while ownership on the altiplano is much more egalitarian than in the pre-reform period, the potential for growth is weak.

Land reform (defined as providing each plot holder with an individual title to his property) is probably not appropriate for communal lands, especially those in much of Africa, for it might destroy the implied social security system in which clan members have a claim to a piece of land as long as they live. It is very possible that many would sell out under an individual plot system before the industrial capacity in town was able to absorb them productively. The existing system in most countries is not entirely rigid: "pledging"

affords some flexibility to expand one's control over land for limited periods.³⁷ If a policy of "individualization" were vigorously pursued in communal Africa, the same situation might develop as in the period of liberal reforms in nineteenth-century Mexico and Central America where much land was taken from indigenous communities. It would seem appropriate for communal Africa to by-pass a Latin American-type land tenure system.

The major problem in communal areas is that while the peasant is secure and ownership of wealth is more or less egalitarian, there is little growth. Growth could be fostered by development of an effective government-subsidized input delivery system and/or the farmers could be provided with credit using the crop and not land as collateral. Changing the ownership structure of agriculture is likewise inappropriate where farms are already fairly uniform in size.

In most countries where reform is called for and where tenants are already cultivating small plots, the post-reform institutional pattern will probably be the family farm. This may well have positive production implications. It has been found in a number of countries that production per acre is inversely related to farm size and the employment potential of the small farm is perhaps greater than any other type of post-reform tenure except, possibly, that prevailing in China about which we have insufficient evidence.

The small farm holds so much employment promise because when employment opportunities are few the small farmer tends to use his

³⁷Richard Barrows, "Land Tenure and African Agricultural Development," Mimeo. Land Tenure Center, April 1973; and Alemsege Tesfai, "Communal Land Ownership in Northern Ethiopia and Its Implications for Government Policies," Ditto. Land Tenure Center, December 1972.

own and family labor up to a point at which additions to output resulting from additional labor use are zero. On the other hand, large farmers would hire additional workers only up to the point that the marginal cost (wages) is matched by marginal return.

When farm sizes are small, farmers can be expected to adopt those technologies of the seed-fertilizer revolution that are neutral to scale, and probably not those, such as large machinery, that have economies of scale. This means that seeds, fertilizers, small-scale machinery will probably be adopted while caterpillars, self-propelled combines, etc., will not unless farmers are organized into groups or, more specifically, into unions or cooperatives.

Because it is so difficult to work with individual peasant cultivators (unless they are organized), and because of the high cost of land division in hacienda agriculture, some countries will favor producer cooperatives for their post-reform settlement pattern.

Where it is called for and where massive land reforms are not politically feasible (or where they have been already carried out), more assistance must be directed to the existing small-farm sector so that new and more secure income earning opportunities are created in rural areas. It should be remembered that this, too, is a delicate political matter: there either must be a resource shift from whatever privileged sub-sector has been the major recipient of public funds heretofore or a net addition to expenditures on agriculture.

Major new research efforts are required to develop the technology required by the existing small-farm producer, and by all agricultural units following basic structural reforms. Up to the present, even

biological research has been highly selective, concentrating on high-yielding varieties of wheat and rice and on export crops. The work of international research centers like the corn and wheat center in Mexico (CIMMYT) and the rice center in the Philippines (IRRI) must be expanded to include additional crops (including those that do not call for such careful water control) and livestock, especially those grown on small farms. Also in-country research capacity for analyzing the problems specific to each must be developed.

All technology--but especially that which is mechanical in nature--must be tailored to fit surplus labor conditions existing in most LDCs. Some would argue the impracticability of developing machine technology for small farms. Yet the record of agricultural performance in countries with small-farm systems, such as Japan and Taiwan supports the opposite argument.

In most countries, the primary emphasis should be placed on land-saving technologies if both increased production and employment objectives are to be met. This does not preclude the introduction of some types of mechanization into the small-farm sub-sector, provided they are specifically designed with small farms in mind. For example, a well-adapted garden-type tractor with complementary implements would be particularly valuable on small farms. A garden tractor may indeed be labor-saving, but it is also land-saving inasmuch as it permits working the land more intensively, often improving yields.³⁸

Research on the technology itself is only one basic requirement.

³⁸See Peter Dorner and Herman Felstehausen, "Agrarian Reform and Employment: The Colombian Case," International Labour Review 102, no. 3 (September 1970).

In addition, it is necessary to provide the institutional framework that will deliver it to small-acreage farm producers and beneficiaries of agrarian reform. These include delivery systems for:

- (1) farm credit
- (2) improved production inputs
- (3) marketing farm produce
- (4) technical assistance
- (5) formal and informal rural education, health, family planning, etc.

Past policies favored designing delivery systems for the large-farm sub-sector; the small-farm sub-sector has been largely neglected. While it is recognized that both sub-sectors require a variety of services, it should also be acknowledged that service needs of the small-farm sub-sector may be completely unavailable in the community because large farmers don't need them. Or they may exist but be weak because they aren't used by large farmers and hence are under-capitalized.

Improved delivery systems for reaching small producers can be approached in various ways. In some cases, it may be best to restructure the public service agencies now operating in this field. In other cases, special agencies may be called for to serve the needs of all producers of a specific crop, (as, for example, is currently the case with coffee in Colombia and sugar beets in Chile). Social science research into the design of delivery systems is probably fully as necessary as research on the technology itself. Put bluntly, there has been little experience on how to effectively design programs to serve millions of small producers scattered over the

countryside.

Sometimes the Puebla Project in Mexico and the Comilla project in Bangladesh are cited as successful input delivery systems. In fact, there are very few examples.

A rather high cost model which could be modified in poorer countries is the CIARA program (Fundación para la Capacitación e Investigación Aplicada a la Reforma Agraria) that operates in Venezuela with funds from the national agricultural bank.³⁹ Basically, it makes loans to asentamientos (agrarian reform settlements in which, unlike the Chilean case, usually consist of individually farmed plots) which, in Venezuela, tend to be meted out only when there are good chances of its economic success--when technology for increasing yields is known.

In general, only asentamientos with a rather strong local organization are chosen for participation. Under this scheme, a "borrowers' union" is founded of all potential borrowers. The union discusses its production and credit problems. Each union is given some technical advice by an agricultural technician (perito agrícola) who services it and several neighboring unions. The banking process is streamlined by having one borrower represent the union. Input orders can be pooled by this selected campesino and handling and delivery costs are thus reduced.

Besides strict supervision and the provision that nearly all who want credit can receive it, there are other differences between CIARA

³⁹This description is taken from William C. Thiesenhusen, "Green Revolution in Latin America: Income Effects Policy Decisions," Monthly Labor Review (March 1972).

and regular agricultural banks' credit programs. The latter issue cash at three times during the growing season. Credit is mostly in kind to help insure that the proper blend of inputs are used. The regular credit program did not fill total normal needs for a crop. CIARA plans its loans so that they completely cover operating costs from soil preparation to harvest. When machine work is needed, the operator is paid directly by the borrowers' union after the work is accomplished. Cash is loaned directly only when campesinos have to pay labor or when funds are specifically approved for consumption purposes.

To decide on the physical inputs required, a detailed asentamiento cropping plan is prepared. Officers of the union (primarily the secretary general who is an elected asentado) and the perito agrícola discuss possible alternative cropping plans for each farm with its owner well in advance of the planting season. In accordance with CIARA's "one step at a time" policy, however, the cropping alternatives open to farmers the first year they participate are quite circumscribed; land parcel holders who want to grow nontraditional crops are invariably turned down. CIARA's first priority is to close the wide gap between current and potential productivity in the traditional crops. At one settlement studied, it was estimated that given proper management and a satisfactory input mix, corn yields could economically be pushed to an average of 2,500 - 3,000 kilograms per hectare, from the 1965 and 1966 levels of 749 and 1,282 kilograms respectively.

After each farm plan is complete, the perito agrícola combines those of all farms on the asentamiento. The master plans go to the

ingeniero agrónomo for the zone who combines all of the plans in the state. Technicians decide what inputs would have to be supplied, how much tractor work would be needed, how much day labor is to be financed, and (allowing for some flexibility) the amount of cash subsistence payment needed. When changes in the farm plans have to be made, they are discussed with the perito who takes up the matter with the farmers. The complete plan is finally approved at a general meeting.

The bank through CIARA issues to the borrowers' union the total amount of credit called for; the ingeniero agrónomo orders all inputs in truck loads. For cash needs, a local bank account in the name of the borrowers' union is opened. The union draws checks on it which must be signed by one of its elected officials.

There are very little data on the success of this program, but recompensation rates substantially increased over pre-CIARA days when agrarian reform beneficiaries came to regard production loans as a subsidy. Repayment rates in themselves are some indication that production is rising.

Other Policy Priorities

Programs that provide advanced education to agricultural technicians should also be re-evaluated. Are enough being produced to meet the country's needs? Is the training being received appropriate to the changing conditions of the countryside? Are they receiving enough training or, conversely, are they receiving so much that they leave agriculture or possibly even the country after their schooling

is complete? Furthermore, special government efforts are required to provide the incentives and conditions necessary for locating more of the existing trained people (agriculturalists, health and social service workers) and the facilities they need in the rural areas rather than encouraging their over-concentration in cities.

In addition to distributive land reforms and programs designed specifically to serve the needs of small-farm producers and a reformed tenure structure in agriculture, there is a need for special programs directed at employment creation in rural areas. This is especially true because there are so many landless peasants in most countries who will not be able to receive land without excessive fragmentation resulting. Some possibilities for employing this group are:⁴⁰

- (1) If land is redistributed and special efforts are made to reach small farmers with services to increase their incomes as outlined above, there will be an expanded market for many new inputs among this large segment of the farm population. This will open up many opportunities in rural areas for the establishment of local industries to produce such inputs as hand seeders, hand pumps, animal-drawn implements, construction materials, new seeds, containers such as bags, boxes, baskets and cartons, etc.
- (2) Likewise, with a production structure geared to a wider market demand, farm output processing industries in many

⁴⁰See Monroe Rosner, "The Problem of Employment Creation and the Role of the Agricultural Sector in Latin America" (Ph.D. diss., University of Wisconsin, 1972).

rural areas should become profitable--such as canning, freezing, drying, curing, packaging, etc. It is of critical importance for the integration of rural people into society that an increasing number of these rather labor-intensive industries be located in rural areas and small towns rather than concentrated in central cities.

- (3) Public rural employment programs can be started to provide jobs in the construction of infrastructure such as irrigation works, drainage systems, schools, roads, community centers, and communication facilities. If people construct these works in areas in which they live, such that benefits accrue to them there incentive to produce will be enhanced.
- (4) In those countries where new land areas or a frontier is available, colonization and resettlement projects can be designed, provided they are not too expensive per beneficiary.⁴¹
- (5) A minimum wage policy for rural wage workers should be enacted and enforced.⁴²

Without strong rural organizations pressuring for change, there may be little incentive for redistribution and a widening of opportunities. While authoritarian measures can carry development to a

⁴¹Costly colonization projects with small numbers of beneficiaries cannot be considered as a serious and defensible rural development program. Since countries have extremely limited resources, rural development programs must be designed to have an impact on large masses of people.

⁴²While minimum wages have in the past often led to a reduction of jobs, this would not be so likely after a restructuring of the land tenure system and policies that priced capital at its true scarcity value.

certain stage, it is the mass of common people who must provide the markets to keep the process going. This requires widely shared economic and political citizenship which can be realized only through the reallocation of power.

In its final report, the Special Committee on Agrarian Reform of the Food and Agricultural Organization of the United Nations,⁴³ noted several conditions leading to some of the basic agrarian reforms of the past several decades. Peasant organization and involvement in pressing for the political decision to reform characterized many cases.⁴⁴ Peasant organizations also frequently played a major role in the reform implementation. On occasion peasants took over the land even before the Government took formal action. Such organizations are also essential for achieving "freedom of status," which no longer means simply breaking feudal patterns of land tenure but also acquiring the ability to help with the creation of a new structure, with the management of rural services, and with the whole range of national policy measures directed at rural development.

By way of contrast, the Committee noted that in those countries where only modest reforms were achieved, peasant organizations were often circumscribed in a particular way, restricted to certain functions, or even prohibited by law.

⁴³United Nations Food and Agricultural Organization, Report of the Special Committee on Agrarian Reform, Rome, 1972.

⁴⁴See Rodolfo Stavenhagen, ed., Agrarian Problems and Peasant Movements in Latin America (Anchor Books, Garden City, N.J., 1970), especially the articles by Huizer and Landsberger and Hewitt. Also see Marion R. Brown, "Peasant Organizations as Vehicles of Reform," in Land Reform in Latin America: Issues and Cases, Peter Dorner, ed. (Madison, Wisconsin, Land Economics Monograph No. 3, 1972), pp. 189-206.

International conventions recognizing the right of workers to organize and engage in collective activities must be honored. Such organizations must not be dominated by employers or controlled or dissolved by governmental authorities. They should be encouraged in their rural community development efforts. The integration of local associations into regional and national organizations is the means by which peasant participation can become effective at various levels of rural service administration and development planning.⁴⁵

International assistance agencies clearly cannot and should not make decisions for national governments. Yet neither are they completely passive or neutral participants in this process. Governments are made up of individuals who represent a wide variety of interests and ideological commitments. There is no homogeneous, monolithic view on such fundamental issues as those represented by development policies and strategies. Minority positions may well evolve into those of the majority--sometimes over a short period of time. Diversity and conflict inevitably exist, political situations in many countries are relatively fluid, and new alignments of power sometimes emerge very rapidly. International assistance agencies can certainly help to support and strengthen such minority positions operating within governments if such positions are, as defined above,

⁴⁵The following points are adopted from Peter Dorner, "Problems and Prospects of Multi- and Bilateral Assistance for Agricultural Development," statement prepared at the request of United States Senate Appropriations Subcommittee on Foreign Operations, June 2, 1972; and William C. Thiesenhusen, "Rich Lands, Poor Lands--A Perilous Gap Between," The Milwaukee Journal, March 5, 1972.

socially desirable.

At the very least, such agency heads of their representatives must speak out vigorously on vital issues irrespective of what individual governments may say or do. This is entirely appropriate; the United Nations has on numerous occasions enunciated the principles proclaiming full "participation of all members of society" and the establishment of "forms of ownership of land and of the means of production which preclude any kind of exploitation of man, ensure equal rights to property for all, and create conditions leading to genuine equality among people."

Still, international assistance agencies are limited in the action they can take. Such agencies cannot by-pass national governments to reach and influence directly the people in the receiving country. Thus, when channeled through the existing governmental bureaucracy, assistance directed at helping the underprivileged may often fail to achieve its intended objectives.

Nevertheless, some possibilities do exist.⁴⁶ First, if a national government is able to muster the political will and overcome the forces of presently entrenched interests, international assistance agencies should make every effort to help such a government restructure its economic system if this will lead to wider participation.

Second, international assistance agencies should take every precaution to ensure that their efforts--advertently or inadvertently--

⁴⁶These points are from Peter Dorner and William C. Thiesenhusen, "Latin American Rural Development Strategies for the 1970s," prepared at the request of the Organization of American States, August 1972.

do not work counter to the urgent requirements to create more jobs, improve income distribution, and elevate the conditions of life of the mass of people at the bottom of present income distribution pyramids. In selecting and evaluating projects, these agencies should give preference to those which hold most promise for benefitting the large mass of rural people rather than the privileged few. The social, employment, and income distribution effects of development projects should be accorded weight in benefit-cost calculations. Assistance should be withheld from projects likely to lead to increased concentration of wealth and income and to greater social inequities. To see what social effects various types of loans have, lending agencies should attach a research component to some of them with the explicit purpose of finding out whether the lower-strata of society is in fact benefitting.

Third, there should be better communication and coordination among the various multi- and bilateral assistance agencies and with national agencies in any given country. Ideally, such coordinative efforts should be made within the country's own planning process. There should be sufficient similarity of purpose and criteria so that the international assistance agencies are not operating at cross purposes. A major effort needs to be made to strengthen the in-country capacity for independent research, analysis, and evaluation which should precede and accompany all major development programs to make certain that benefits reach the poor.

Obstacles to development are not only or all political. The

analytical framework within which development is conceived also bears on these issues. Because development is too often equated with growth in average per capita output in the economy as a whole, investments are channeled to those projects which promise the highest short-run rate of return within the present structure of resource ownership. And cost-benefit ratios are computed on the basis of the prevailing patterns of resource ownership and income distribution. Such calculations ignore the needs and the demand-potentials of the peasant sector, whose present low incomes and expenditures carry little weight in such calculations. Consequently, rural investments from both domestic and foreign sources have favored projects promising the highest rate of return within the present structure of demand, often emphasizing capital intensive rather than labor intensive techniques. This has often been the pattern followed for investments in the industrial sector as well as in the commercial agricultural sector.

That this conceptualization and analysis is based on false premises has already been explained. The direct relationship between investment and productivity (irrespective of the resource ownership structure) and the creation of new job opportunities and improved income distribution does not exist. In the agricultural sector, agrarian reform along with other measures in the suggested new strategy for rural development can be key issues in linking investment, productivity, employment, and a more egalitarian income distribution. Past strategies often ensured that most of the benefits of development efforts accrued to those who opposed institutional re-structuring.