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I am submitting herewith a dissertation written by Mohammad O. Farooq entitled "Basic Needs, Rural Financial Markets, and Appropriate Technology: Toward a Solution of Analytical and Policy Issues." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Economics.

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BASIC NEEDS, RURAL FINANCIAL MARKETS, AND APPROPRIATE TECHNOLOGY:

TOWARD A SOLUTION OF ANALYTICAL AND POLICY ISSUES

A Dissertation

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Doctor of Philosophy

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To
Those
Billions of Human Beings
Whose Basic Needs
Remain
An Unfulfilled Dream

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ABSTRACT

The failure of the standard Growth Approach to economic development to solve the problems of underdevelopment in LDCs has caused an alternative approach, Basic Needs Approach (BNA), to attain prominence in development thought. BNA emphasizes poverty-minimizing growth. Its strategy of direct attack on poverty has better potential for LDCs' development and fulfillment of their populations' basic needs than the trickle down mechanism of the Growth Approach.

BNA requires, among other things, (a) suitable rural financial markets (RFMs) as parts of the overall financial system, and (b) indigenous technological capabilities. The financial system, if it functions as a central element in an institutionalized technology policy, can link technology-related institutions that generate, evaluate, and promote appropriate technologies (ATs) with RFMs that can support adoption and diffusion of ATs in the agro-rural sector.

The above argument uses Bangladesh as a case for illustration. In the light of an institutional framework presented, examined, and extended in this dissertation, it is found that Bangladesh currently does not have an institutionalized technology policy. The current organizational framework and policies related to technological development are not conducive to BNA.

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Chapter I

THE ARGUMENT IN BRIEF

The failure of the standard Growth Approach to economic development to solve the problems of underdevelopment in LDCs has caused an alternative approach, Basic Needs Approach (BNA), to attain prominence in development thought. BNA "shifts attention from the goal of output maximization to poverty minimization" [N. Hicks, p. 985]. Advocates of BNA call for the elimination of urban bias in both product and technology and for the reorientation of development efforts in at least two ways: (a) more emphasis on producing those goods and services consumed by the poor, and (b) creation of employment for the target groups by using appropriate technology and providing public services, especially in the areas of education, health, and housing, until the poor can themselves pay for these basic needs [P. Streeten, 1979]. LDCs today recognizes meeting the basic needs of the poor as one primary objective of development.

BNA requires, among other things, (a) suitable rural financial markets (RFMs) as parts of the overall financial system, and (b) indigenous technological capabilities for evaluating, generating, and promoting appropriate technologies (ATs). RFMs and ATs are interrelated because, on the one hand, producers in the agro-rural sector need financial resources for adoption of ATs; and, on the other hand, even an abundant supply of credit cannot of itself ensure adoption of appropriate technologies. The financial system,

if it functions as a central element in an institutionalized technology policy, can link technology-related institutions that generate ATs and RFMs that can encourage adoption and diffusion of ATs in the agro-rural sector.

A successful BNA thus requires indigenous technological capabilities for assessing existing or potentially new technologies and for generating and promoting ATs that RFMs should be organized to support.

Chapter II

APPROACHES TO DEVELOPMENT: FROM "GROWTH" TO "BASIC NEEDS"

Until the late 1960s, "linear stage growth" theories [M. Todaro, p. 57], popularly generalized as the "Growth Approach" (GA), dominated the mainstream of development thinking. A new approach called the "Basic Needs Approach" (BNA) has been gaining popularity over the old mode of thinking and replacing the earlier approach.¹ The new approach calls for a total reorientation of economic development effort in terms of thoughts and theories, goals and institutions, and policies and tools. Many LDCs are showing interest in adopting and implementing BNA; one of them is Bangladesh. In analyzing the issues related to BNA, Bangladesh, with which I am familiar, will be used for the purpose of illustration. This chapter surveys the literature on BNA and related issues pertinent to this dissertation. The last section of this chapter deals briefly with general socio-economic conditions in Bangladesh and the relevance of BNA to Bangladesh's problems of underdevelopment.

¹There is another paradigm in development thinking called the "International-Structuralist" paradigm [Todaro, p. 62]. Two major streams of thought under this paradigm are (a) the Neoclassical Dependency School and (b) the False Paradigm School. Both of these schools have some similarity with the BNA. However, BNA is not based on any explicit ideological leaning, while the Dependency School and the False Paradigm School are.

The Growth Approach

GA (Growth Approach) is the paradigm of economic development embodied in models like W. W. Rostow's "stages of economic growth", the Harrod-Domar Growth Model, or Galenson-Leibenstein's "big push theory," where the productive capacity of an economy is increased through a steady process of capital investment over time to bring about a rising level of national income.² Rostow's model views development as a series of successive stages through which all countries must pass in order to achieve economic progress. According to these theories,

. . . the right quantity and mixture of saving, investment and foreign aid were all that was necessary to enable the Third World nations to proceed along an economic growth path that has historically been followed by the more developed countries. Development thus became synonymous with rapid, aggregate economic growth [Todaro, p. 57].

Applying these theories to LDCs, the basic strategy for economic development became fast economic growth through rapid industrialization. The productive potential of the industrial sector was considered to be far greater than that of the agricultural sector. The industrial sector was also considered to be at full employment, always able to absorb additional labor. To feed such industrial growth two elements were essential: (1) higher investment realized through higher saving, and (2) additional manpower that was deemed easily extractable from the pool of surplus labor in the

²Todaro categorizes all the variant theories related to the Growth Approach as "Linear Stage" models.

agricultural sector. The basic features of this approach are the "prominent role of saving and investment," "capital-bias," and a "perceived" conflict between economic growth and economic welfare.

As Joseph P. Stepanek summed it up,

Deferred consumption, said to be crucial to the supply of funds for capital-intensive investments, has been pursued by theoreticians and planners with single-minded attention. . . . Western economics . . . is a product of labor-poor, resource-rich countries. . . . As a result, western growth models are largely ex-post facto explanations of a relative endowment and resource price structure that encourages heavy capitalization. Inherent in the commitment to imported models and aspirations is a faith in technological choices drawn from the western shelf. . . . A third fundamental consequence of western growth theory is the perceived conflict between increased production and improved welfare [pp. 23-24].

Whatever way the western theories adjudicate the equity-efficiency problem, such theories have proven inadequate for solving that problem in LDCs. They emanated directly from traditional neoclassical economic analysis, embodying many highly idealized but fundamental assumptions such as consumer sovereignty, perfect competition, profit-maximization, and ever-present full employment. The conceptual and institutional foundation of these theories are derived from and related to the special economic, political, social, and institutional context that characterize the advanced industrial nations, and therefore are neither unconditionally relevant nor unquestionably appropriate to the understanding or solution of problems of the LDCs. Growth theories did not adequately and effectively address the problems of distribution either [T. N. Srinivasan, p. 11]. Some LDCs did achieve remarkable growth

following this approach,³ but most of them did not. The problems of poverty, inequality, and mass deprivation in many of these countries continued unabated.

It was assumed that benefits of growth would "trickle down," but there were no appreciable results [K. Griffin and A. K. Ghose, 1979, p. 367; B. Johnston and W. Clark, p. 9; Eddy Lee, 1980, pp. 99-100; G. Ranis, 1981, p. 1]. Why the assumed "trickle-down" effect did not take place can be easily explained by the urban-bias that was built into the decision making tools such as "project evaluation" or "benefit-cost analysis." Traditional benefit-cost analysis seeks to apply the principles of public investment decision-making to the selection of particular projects or programs for implementation. By applying either the maximum present value criteria or the benefit-cost ratio criteria, benefit-cost analysis seeks to determine whether the benefits of an investment, to whomsoever they accrue, exceed the costs. Benefit-Cost Analysis, strictly applied, is an attempt to implement the potential Pareto-improvement criteria, which is synonymous with the criterion of maximum value of social product. An important aspect of traditional benefit-cost analyses, in the context

³"Over the period 1950-75 most developing countries performed reasonably well in terms of growth in total GNP and GNP per capita. Indeed, the average growth in GNP per capita for developing countries as a whole was 3.4 per cent per annum" [Lee, pp. 99-100]. Also see D. Morawetz, 1977].

of the developing countries, is their total indifference to distributional concerns.⁴

Such indifference to distributional issues can be directly attributed to the neoclassical approach to economic development. As was mentioned earlier, GA is essentially based on a "perceived" conflict between economic growth and economic welfare.⁵

Part of the economist's conventional wisdom, which carries some of the blame for the neglect of welfare issues, including income distribution, is that equity and economic growth cannot be achieved together. Redistribution in favor of the poor, it is argued, tends to reduce the rate of savings, weakens incentives for investment by the rich people, and hence impairs the rate of growth. If this is correct, to worry about equity or distributional objectives would simply be a sign either of shortsightedness or of impatience, since to allow greater employment and consumption

⁴Only since the mid-1970s has the issue of incorporating distributional objectives in benefit-cost analysis been receiving particular attention. See, for example, G. Amin, 1978; J. A. Mirrlees, 1978.

⁵H. W. Arndt, in his article "The Myth of Trickle Down," explains that the thesis that economic development is necessarily an inequalitarian process had been argued by leading development economists such as Arthur Lewis in his famous 1954 article, "Economic Development with Unlimited Supplies of Labour." Lewis remarked, "the central fact of economic development is that the distribution is altered in favour of the saving class" -- that is, the industrialists -- for "it is the inequality that goes with profits that favours capital formation." Kuznet's U-curve hypothesis maintained that "in the early phases of industrialization in the underdeveloped countries, income inequalities will tend to widen before the levelling forces became strong enough first to stabilize and then reduce income inequalities." The contemporary generation of development economists, except a few such as Gunnar Myrdal, accepted the implication of Kuznets' hypothesis that income inequality is an integral part of the process of economic development. They hoped, that ultimately and somehow, some kind of mysterious "levelling forces" will address the problem of distribution [Arndt, p. 7; also see Streeten 1979b, p. 29 and G. Quibria, pp. 285-286].

for the poor "now" can be achieved only at the expense of more consumption and employment later [Amin, p. 142].

This conventional wisdom rests on some such popular arguments as the following:

The rich are likely to save a higher proportion of their income than the poor, and . . . a greater part of profits than of wages are made available for investment. Had the government's ability to tax been high, greater equality may not have reduced the rate of savings, but given the weakness of the fiscal system, higher savings require that income should flow into the pockets of those most able and willing to save. This may demand not only a sacrifice of equity in favor of higher current output, but also a sacrifice of higher current output if with a lower output goes a greater rate of savings. It has, therefore, been argued that investment criteria should favor projects with a higher capital/output ratio even if more labor-intensive projects bring greater output so long as the former allow a higher saving rate through higher share of profits relatively to wages [Amin, p. 142].⁶

Thus an approach to development which assumes that distributional objectives are best taken care of miraculously encourages the Benefit-Cost Analysis to be inherently biased against those projects that may be capital-saving, employment-generating, and meet the needs of the many. The inherent attitude that economic inequality is vital to generate savings from a rich segment of the society that fuels the growth process allowed a prolonged tolerance of the maladies of poverty and inequality.

Sectoral Priority under the Growth Approach

Industrialization is a new phenomenon of modern history. The European industrial revolution was much fed by the agricultural

⁶Also see Mirrlees, 1978, p. 131.

sector. Since then, modern development thinking has paid tribute to agriculture, but only as a contributing sector, secondary to the industrial sector. Growth of these industrialized nations came from maximizing the role of industry, while minimizing and "squeezing" the role of agriculture. Linear Stage growth theories viewed the role of agriculture largely as "passive" and "supportive." As Todaro explained,

Based on the historical experience of western countries, economic development was seen to require a rapid structural transformation of the economy from one predominantly agricultural activities to a more complex, modern industrial and service society. As a result, agriculture's primary role was to provide sufficient low-priced food and manpower to the expanding industrial economy, which was thought to be the dynamic, leading sector in any overall strategy of economic development [p. 252].

As industrialization became synonymous with mechanization, capital-bias became an unavoidable consequence; thus higher investment was an absolute necessity and would come from increased saving. This saving was also considered to be best generated from the capitalists of the industrial sector, who have low marginal propensities to consume and high marginal propensities to save. Industrialization also demanded additional manpower. Traditional growth theories such as the "Two Sector Surplus Labor Model" of W. Arthur Lewis considered the agricultural sector to be overburdened with surplus labor whose marginal productivity was zero. Therefore, according to these theories, the industrial sector not only needed and could absorb such surplus labor, but the shifting of labor from the rural sector was of paramount importance for the very redemption

of the agricultural sector.⁷ Consequently, this kind of disaggregation of sectoral priorities, strategies, and allocations caused the agricultural sector to stagnate, with resulting domestic food deficits, wide urban-rural imbalances, mass exodus from the rural sector to the urban sector, soaring rates of unemployment in agro-rural as well as urban informal sector, and heavily encumbered urban facilities.

There were at least two consequences of neglecting agriculture: ". . . industrial growth would either be stultified or, if it succeeded, would create such severe internal imbalances in the economy that the problems of widespread poverty, inequality and unemployment would become even more pronounced" [Todaro, p. 252]. Furthermore, "whether the emphasis was on industrial growth, import substitution, export diversification, or some other leading edge of urban growth, agriculture and rural population played a secondary role during these two decades (i.e. the 1950s and 1960s). Whatever theories of agricultural development enjoyed prominence during this era, they were defined in terms of their contribution to the prevailing urban-industrial strategy rather than to the well-being of

⁷In recent conventional economic thought, an LDC economy is divided structurally into two major sectors -- modern (urban, industrial) and traditional (rural, agricultural). Each of these two sectors are further divided into two subsectors -- formal and informal [Todaro]. For the purpose of this dissertation, two broad categories of modern and traditional will be used. The subdivision of these sectors does not alter this study in any significant manner. However, to be more precise about the scope of the sectors with which I deal, I use the term "agro-rural" sector, which includes both agriculture and all other small-scale rural industries.

the rural population. Agriculture has remained too far long the supplier of food, labor and capital which fuel the urban growth" [Stepanek, p. 25].

Rural development in general also suffered from misplaced sectoral priority. Again it is the neoclassical view that shaped the vision and policies for rural development. In this view, the factors responsible for the poverty of peasant farmers, small and large, are (1) primitive technology, (2) inadequate irrigation and other rural infrastructure, (3) a lack of complementary inputs such as fertilizer, pesticides, and credit, and (4) an inappropriate price and incentive structure [Lee, 1980, p. 101]. Making these inputs and incentives available to the farmers was considered to be the simple solution of these problems. This supply-oriented process of modernizing traditional agriculture was expected (1) to improve agricultural productivity and raise rural incomes, and (2) to set off self-sustaining growth in the agricultural sector which in turn would be able to generate resources for the industrial development. Rural development policies focused, therefore, on designing packages of inputs and ensuring that those packages reached farming households. The stagnation of the rural sector was blamed on inefficient implementation of sound programs, limited administrative capacity in relation to the vast number of production units involved, and the frequently alleged apathy of the tradition-bound peasantry to change.

In most developing countries the diffusion of new technologies was invariably slow and patchy, being concentrated on 'progressive' farmers and regions. The reaction of the development 'establishment' was to look for design faults in the packages and shortcomings in the

implementation mechanisms. The history of package innovations includes concentration on infrastructure (irrigation, feeder roads), the promotion of key inputs (fertilizer, credit), a comprehensive package of many inputs and most recently, 'integrated rural development' [Lee, 1980, p. 101].⁸

Yet the problem of rural poverty seemed to remain "intractable," which forced an admission of the inadequacy of the existing view, and so perceptions about rural development started changing. Two important aspects of this change in perceptions about rural development are that: (1) rapid growth in GNP (or GNP per capita) has by-passed the poor, especially the rural poor, and there is, in the foreseeable future, no prospect of a changed pattern of distribution of benefit under the current approach to development; and (2) an understanding of rural institutions in particular, and institutional structure of LDCs in general, is crucial to any effective prescription for underdevelopment and poverty. A major shift in perceptions has been "the realization that the economic and political structure in rural areas is a powerful and pervasive impediment to rural development" [Lee, 1980, p. 102].

The overall performance of GA is not encouraging. The policies under this approach undermine the agro-rural sector, which is the largest employer and the largest contributor to the national

⁸These packages are vital for economic development, but given the existing structure of most of the LDCs under GA, they leave income inequality unchanged or even worsen it, where the benefits accrue to the those who are already relatively better-off.

income, and sustains the overwhelming majority of the people living in the rural areas in most of the LDCs.⁹

The Basic Needs Approach

Rise of the Basic Needs Approach

Serious concern for an alternative approach to development did not come into focus until experience accumulated during the last two decades. This experience showed that capital-bias was contributing to chronic and widening unemployment and that the problems of distribution were not automatically being taken care of, as prophesied by the traditional economic theories. Evaluation of performance of growth in many LDCs further revealed indications that the rural poor have sometimes even suffered from the development effort. Johnston and Clark [p. 9] mentions several studies that show that the same kinds of failures recur in country after country, year after year.¹⁰ The facts are not really surprising if the

⁹World Bank, World Development Report, 1981; see various tables, pp. 138, 170, 172]

¹⁰H. Chenery et al., Redistribution with Growth (London: Oxford University Press, 1974); I. Adelman, "Development Economics -- A Reassessment of Goals," American Economic Review, Vol. 65, No. 2 (1975), pp. 302-309; S. P. Huntington and J. M. Nelson, No Easy Choice: Political Participation in Developing Countries (Cambridge, MA: Harvard University Press, 1976); O. Eckstein et al., "Land Reform in Latin America: Bolivia, Chile, Mexico, Peru, and Venezuela," World Bank Staff Working Paper no. 275 (Washington, DC: World Bank, 1978); J. Heyer, "Rural Development Programmes and Impoverishment: Some Experiences in Tropical Africa," Paper presented at the International Conference of Agricultural Economists, Banff, Canada, September 1979. Also see Ghai, 1977, p. 2.

unwarranted preoccupation with industrialization and urban-oriented development is taken into account.

In many LDCs impressive economic growth was achieved in the last decade, but was also often accompanied by all the soaring maladies mentioned earlier. Until the late 1960s there was no alternative in development thinking to the Growth Approach (GA). Since then an alternative approach to development, based on costly and painful lessons of the past decades, has emerged and is now coming to dominate the mainstream of development thinking. The International Labor Organization (ILO) played a pioneering role in popularizing this Basic Needs Approach (BNA). During the early 1970s, ILO undertook the World Employment Programme to study employment problems in the Third World, which led to the focus on the "failure of past development strategies." The World Employment Conference in 1976, under the auspices of ILO, searched for new development ideas. BNA has, since then, been embraced by the governments of the LDCs, at least in their public documents.

Although ILO played a vital role in the formal acceptance of BNA, the approach was by no means new. Many other distinguished institutions and personalities contributed significantly to the process. Tracing the advent of BNA, L. Emmerij [1977, p. 26] comments, "The concept of basic needs is in a sense a natural development of a whole process of thinking that has been going on for quite some years. . . . Between 1974 and 1976 a whole spate of reports saw the light of day . . . the Cocoyoc Declaration . . . the Dag Hammarskjold Report (What Now -- Another Development?) . . . the

Bariloche Group (Catastrophe or New Society?) . . . the Rio Report (Reshaping the International Order), with Jan Tinbergen as coordinator."¹¹

Expressing its concern for a redefinition of development, the Cocoyoc Declaration (1974) attempted to articulate the theme of "basic human needs": "Our first concern is to redefine the whole purpose of development. This should not be to develop things but to develop man. Human beings have 'basic needs': food, shelter, clothing, health, education. Any process of growth that does not lead to their fulfillment -- or even worse, disrupts them -- is a travesty of the idea of development."¹²

Thus BNA has drawn attention because its prime concern is removing mass deprivation within a coherent and comprehensive framework for development. Although elimination of poverty was an

¹¹"The Declaration of Cocoyoc (1974) was a statement issued by a group of social scientists, natural scientists, and economists at the end of a seminar organized under the joint auspices of UNCTAD and UNEP on Patterns of Resource Use, Environment and Development Strategies. What Now -- Another Development? (1975) was prepared by a group of individuals on the initiative of the Dag Hammarskjold Foundation on the occasion of the Seventh Special Session of the United Nations General Assembly. The ILO report (1976) was prepared as the main document for the World Employment Conference of June, 1976. Catastrophe or New Society? A Latin American World Model (1976) was prepared by a group of scholars under the auspices of the Bariloche Foundation, Buenos Aires, Argentina, and represents the main results of their ongoing work on the project. Reshaping the International Order (1976) is the work of an international group of experts working under the leadership of [nobel laureate] Jan Tinbergen. It was commissioned by the Club of Rome" [Ghai, 1977, p. 6].

¹²For a detailed historical perspective behind the BNA, see F. Stewart and P. Streeten, 1976; Emmerij, 1977; Ghai, 1977; ILO, 1979a; Leipziger, 1981; Streeten et al., 1981; P. Ghosh, 1984; Huq, 1984.

important goal of economic development under GA too, that goal was never recognized as central to the process of development. The assumed relationship between GNP and broad based improvement of living standards was not borne out by facts either. A number of studies challenge the supposedly strong or obvious relationship between the rate of economic growth and improvements in the living standard of the poor, whether measured in terms of their share of total income, their absolute level of income, or a defined set of basic needs. I. Adelman and C. T. Morris [1973], in their study of 43 developing countries, and ILO's study of rural poverty in seven Asian countries [S. J. Burki and M. Haq, 1981] found a worsened relative-income position of the poor. In some cases, deterioration in the absolute-income position of the poor was observed. According to these studies, a trickle-up in favor of the small middle class and the very rich rather than a trickle-down to the poor was the reality for many of those LDCs.

Paul P. Streeten, a leading exponent of BNA, has defined the approach in terms of (1) income earning opportunities for the poor, (2) public services that reach the poor, (3) a flow of goods and services to meet the basic needs of all the members of the household, and (4) participation of the poor in the ways in which their needs are met [Streeten, 1979b, p. 29]. The resolution adopted by the World Employment Conference [1976] identified basic needs with two elements. The first element included the minimum, private requirements of a family for adequate food, shelter, and clothing as well as certain household equipment and furniture. The second one

included essential services provided by and for the community at large, such as safe drinking water, sanitation, public transport and health, and educational and cultural facilities [A. Singh, p. 585; also E. Huq, pp. 32-33].

Basic Needs

There is, however, no consensus on the definition of basic needs. Some advocates feel that basic needs should be defined in as much detail as is possible. Such an extensive list which would include non-material needs such as participation in the decision-making process and freedoms associated with internationally recognized "human rights." Others prefer to concentrate on a core of material basic needs, on which core there is general agreement. D. Ghai and T. Alfthan [p. 28] argue that "the alternative approach of a specification of a core list of basic goods and services has the merit of highlighting deprivation in most critical areas and hence of the need to concentrate efforts on attaining targets in those fields. It has also the advantage of simplicity, is likely to command wider agreement than a more extensive list and . . . may have some methodological advantage in setting targets and deriving basic needs income." They, however, concede that "any specification of a bundle of core basic needs must necessarily be arbitrary, in the sense that it cannot be derived from any ultimate, irrefutable principles or

systems of logic." In addition, there is no consensus on who should define and set targets for basic needs.¹³

BNA now occupies a prominent if not dominating position in development thinking and also, to some extent, the development efforts of most of the LDCs who participated in the 1976 World Employment Conference. Those countries agreed upon the resolution adopted by the conference to reorient their development objectives and strategies toward meeting basic needs. Agreement on the resolutions, however, has not necessarily meant genuine commitment to, or significant success in, implementation of basic needs policies in many LDCs. For many LDCs dependent on foreign aid, agreement to resolutions of the international donor organizations, such as the ILO and the World Bank, is unavoidable. In addition, in some LDCs where genuine efforts to promote and implement BNA have been undertaken, success has been impeded by various institutional bottlenecks and other socio-economic conditions such as political instability.

"Although the basic needs approach addresses the deprived population, it is not a welfare concept, because the approach is a mechanism of economic development. The target population's economic productivity is expected to rise as basic needs are met, accelerating the process of development. However, the basic needs approach is not an independent development strategy but it is an important complement to the others already in existence" [Huq, p. 44]. Although governments will provide the essential public services that cannot be

¹³For a brief survey on the issue of who should determine the basic needs, see R. Carr-Hill, pp. 43-44.

expected to be met by the poor themselves or through private investments, BNA does not mean a fat welfare program under which provision of lots of transfer payments will be made and people's life will be improved thereby.

One highly regarded aspect of BNA is its value orientation. It views development not only as improving the material standard of living of the poor, but also puts strong emphasis on the value and the fulfillment of human life as a whole. An emphasis on the philosophical aspects of BNA by some of its advocates has drawn much criticism from the critics of BNA. The concept of "quality of life," especially in its non-material dimension, is, indeed, too elusive and, therefore, difficult to bring under any planning process. However, every approach to development has, and should have, some value orientation. Such orientation is important, but should not be confused with objectives attainable through institutional planning process.

BNA not only aims at creating income earning opportunities for the poor through expansion of employment, but also emphasizes cultural identity, and a sense of purpose in life and work, which interact with the material needs. It should be recognized that cultural identity can have both positive and negative effects. Since development is a process of change, those elements of institutions that work as bottlenecks have to be changed or adapted. However, there can be positive elements of a cultural identity that may be used to mobilize efforts.

There are two basic variants of BNA implicit in the literature. The first one advocates comprehensive micro-level planning to set proper targets, even for each small component of the basic needs package, and not only at the national level, but also at the regional and local level. G. Standing [p. 213] identified this variant as a "technocratic" approach i.e., "count, cost, and deliver." Lee [1980, p. 101] called it a "new orthodoxy" within BNA. A more romantic version of the "technocratic" approach goes even further and insists on mass participation so that each local community can define and decide what should be included in the package, and then sets targets and comes up with a plan to meet the targets. But from the institutional viewpoint, and for most LDCs, this variant is unrealistic and impracticable.

The other variant of BNA agrees that there are certain universally recognized components of a basic needs package, but a thoroughly disaggregated planning may not be crucial for the fulfillment of these basic needs. According to this version, it would be better to adopt technologies that produce products that fulfill a nationally defined package of basic needs and the package should guide the process of planning and implementation. Targets should be set only at the national level or, at most, at the regional level. Emphasis should be on (a) removing various urban-biases in the process of planning and implementation as well as in the production and the consumption pattern, and (b) facilitating necessary changes in policies and institutions, wherever appropriate. Participation, where it exists, will facilitate the process, but if

it does not exist, basic needs still need to be satisfied. Institutionally appropriate technologies to produce appropriate products under BNA may enhance the emergence of institutions that would permit individuals to pursue a fuller package of basic needs, including non-material needs through participation in decentralized decision-making processes.

The difference between these two variants becomes significant when some of the advocates of the first variant stretch their idea to argue that radical revolution (in most cases, a socialist one) is indispensable because, they argue, the socialist institutional framework is more conducive to fulfilling basic needs [J. Mandle, pp. 185-186; Standing, p. 217].

Merits of the Basic Needs Approach

Many scholars, including Franklin Lisk [1977], Sydney Dell [1979], Ajit Singh [1979], and Danny Leipziger [1981] strongly argue for significant advantages of BNA over GA. First, they argue that BNA requires fewer resources and a shorter time to meet basic needs and reduce poverty than a GA because a direct attack on deprivation economizes on the resources on which income would otherwise be spent without contributing toward alleviation of mass deprivation. The economized resources include (1) non-basic-needs items in the consumption expenditure of the poor as well as the rich, and (2) investment expenditure to the extent that its reduction does not detract from constructing the sustainable base for meeting basic needs. Secondly, a direct attack on infant mortality, women's

education, and the provision for old age, illness, and disability is expected to reduce desired family size and fertility rates more rapidly and at lower costs than raising household incomes. M. Hopkins and R. Van Der Hoeven's work on a global forecast of economic development under alternative scenarios of growth and basic needs has shed significant light on the potential of the first advantage. The second advantage, relating to the pressing problem of population, has gained considerable empirical justification from experiments such as the BACCHUE project in Philippines [Hopkins *et al.*, 1976].¹⁴

Streeten illustrated the time framework of four paths to development [see Figure 2.1] by tracing

the log of consumption per head of the poor on the vertical axis and time on the horizontal axis. Path 1 shows at first lower level of consumption but, as a result of better incentives and productive investment, overtakes path 2 at some point (T_1) and, for ever after, the consumption of poor is higher. Path 2 starts with higher consumption by the poor but, by neglecting incentives, private and public savings, and productive investment, falls behind path 1 after a certain date, T_1 . This is how the option is often presented. It should be clear that sound policies should rule out path 3, which is an inefficient way of meeting the needs of the poor.¹⁵

. . . The rationale behind basic needs, however, is path 4. High priority is given to some components of current consumption by the poor which may then, for a while, fall below the consumption levels that could have been attained by the two other paths. When the present generation of children entering the labor force begins to yield returns, (T_2), the

¹⁴It is a dynamic model that simulates the behavior in the long run of both economic and demographic aspects of development. It was undertaken by the ILO to assess in a more quantitative way the level of satisfaction of some core basic needs. It considers the relationship between the economy and the population from both directions.

¹⁵Path 3 is undesirable because resources spent in this path do not bring continuous improvement in the conditions of the poor.

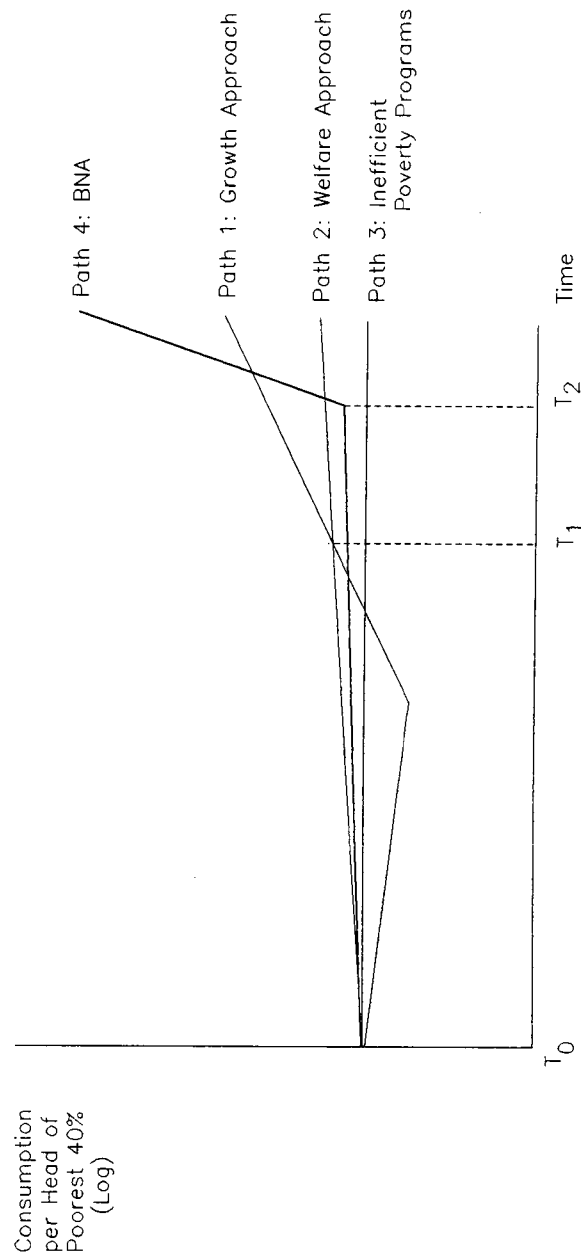


Figure 2.1 Comparison of the Effects over Time of Four Approaches to Consumption by Poor

Source: P. Streeten, "Basic Needs: Premises and Promises," Journal of Policy Modelling, Vol. 1, No. 1 (January 1979), pp. 136-148.

growth path is steeper than it would have been under [path] 1, and overtakes first the welfare path 2 and later the growth path 1 [Streeten, 1979a, pp. 140-141].

Although it is an oversimplified comparison based on hypothetical scenarios, it does make the point that in the long run, BNA offers better promise for growth, and in the short run, it is even preferable to paths 1 & 3 because, at the possible expense of some growth, it permits the present generation to have its basic needs significantly fulfilled. Empirical support for Streeten's comparison is discussed later in this chapter.

Another advantage mentioned by Streeten and Haq is that meeting basic needs not only requires fewer resources, but these fewer resources show higher productivity in meeting basic needs. It is argued that a combined operation for meeting an appropriately selected package of basic needs (e.g. water, sewage, nutrition, and health) economizes on the resources and improves the impact because of linkages, complementarities, and interdependence among different sectors. The ILO [1977], N. Hicks and P. Streeten [1979], D. Wheeler [1980], and Leipziger [1981] have dealt with these issues in great detail in their works.¹⁶ Furthermore, it has been argued that BNA

¹⁶"Strong linkages and complementarities among the outputs of various sectors . . . mean that the effectiveness of intervention in one sector often depends on interventions in other sectors. This point is supported by the findings in the individual sector studies of the World Bank. It was shown, for example, that the effectiveness of investment in sanitation facilities in improving health depends on education in personal hygiene. Similarly, curative medical services are likely to be ineffective if people are chronically malnourished, use germ-infested water, have no sanitation facilities and follow poor health practice in their personal lives" [Burki and Haq, p. 171]. Or, for example, "providing more employment may not materially help the poor if ill-health prevents them from taking full advantage

tends to make more resources available domestically, and possibly internationally, for development. As a serendipitous by-product, a well-developed and well-implemented basic needs policy may earn greater credibility and admiration from foreign donors. The moral appeal of meeting basic needs is obviously strong.

There are four good reasons for believing in these advantages of BNA: (1) the composition of output and mode of production needed to satisfy basic needs in countries with high unemployment is expected to be produced using, wherever appropriate, labor-intensive techniques, which will raise both employment and production; (2) a straightforward attack on malnutrition, disease, and illiteracy lengthens life, improves its quality, and thus also the quality of the labor force [Streeten, 1979a; Burki and Haq; Wheeler]; (3) the removal of motives for large families can be alternatively regarded as a factor reducing the resources required or as increasing the available resources for other uses [Hopkins *et al.*, 1976];¹⁷ and (4)

of it; providing educational facilities in rural areas may not be sufficient if child labour is an indispensable source of family income" [Lee, p. 103]. "Recognition of linkages and complementarities does not necessarily mean that progress has to be made simultaneously in all sectors that meet basic needs. In many situations, improvement in one sector may obviate the need for investment in some other sector. Education, for example, can substitute for improvements in the quality of water -- as it appears to have done in Sri Lanka -- if people are taught to treat or boil water in order to eliminate contamination" [Burki and Haq, p. 171; also P. Richards, p. 649].

¹⁷Also Streeten refers to Cassen's [1976] work, where Cassen emphasized "the complex processes connecting the 'correlates of fertility decline' with other aspects of development, including income and fertility. Morawetz [1978] statistically confirms the link between basic needs and fertility decline" [Streeten, 1979, p. 138].

a participation-based BNA is likely to mobilize more local resources and increase incentives for higher production [R. J. Szal, pp. 27-28]. Many of these arguments still lack strong, extensive empirical support, but their intuitive and theoretical appeal is obvious.

Ghai [1977, pp. 14-15] summarized some broadly agreed upon premises about BNA: (1) The meeting of basic needs of the poor should become the core of development planning and policy. (2) Basic needs are not restricted only to material needs but embrace other dimensions such as fundamental human rights and freedoms, participation, self-reliance, and so on. (3) Basic needs should not be treated in a static manner, frozen once and for all at fixed levels, but rather as evolving over time in line with the growth of the economy and the aspirations of the people. (4) The core material needs should consist of food, education, health, housing, and sanitation. (5) There is no single royal road to achieving basic needs objectives. The emphasis is on diversity and forging of new processes and institutions to accord with differing cultural traditions and other circumstances of individual countries and regions within respective countries. (6) There is need for a "structural transformation" emphasizing redistribution of assets and incomes. (7) Distribution of political power is the central factor in determining the prospects for the initiation and implementation of basic needs strategies.

Whether a trade-off between growth and basic needs exists, and whether the benefits of whatever growth is achieved "trickles down" in the unknown, indefinite and remote future, many development

economists (if not the majority) now agree on the premises and promises of BNA. One leading traditional development economist, nobel laureate Jan Tinbergen, along with a team of twenty international experts, embraced the basic needs concept in their report to the Club of Rome. The team, known as the Tinbergen Group, called for a "global compact on poverty" between rich and poor nations, and for the attainment of national objectives -- such as life expectancy of 65 years or more, literacy rates of 75 percent or more, infant mortality of 50 or less per thousand live births, and birth rates of 25 or less per thousand -- for all developing countries by the end of this century [ILO, 1977, p. viii]¹⁸.

Besides these analytical arguments, there are the painful and expensive experiences of the past decades. Most of the LDCs undertook development efforts to ameliorate the conditions of their people, at least the material standard of living. However, policies, sometimes created and sustained and sometimes worsened the existing conditions [Ghai, 1977, p. 2], and many lives have been lost to starvation, malnutrition, and destitution in many LDCs. The traditional approach to development has not only failed to meet the widely recognized objectives of economic development, but also has caused most of the indicators of better living standards and mechanisms used to attain them to stagnate. As education, health, food, and shelter remain only unfulfilled dreams, the pool of those deprived populations continues to expand, and the maladies of

¹⁸Quoting Jan Tinbergen, Reshaping the International Order: A Report to the Club of Rome (New York: E. P. Dutton, 1976), p. 130.

malnutrition, infant mortality, low life expectancy, and starvation persist. The global level of absolute poverty is a good indicator of the magnitude and urgency of the problem. In Table 2.1, Hopkins compared his global forecast of absolute poverty and employment with three other scenarios.

None of these forecasts predicts declines in the numbers in absolute poverty by the end of the century. Although the forecasts vary from 400 to 1,083 million, depending on the measure of poverty used, Hopkins considers the estimates of the World Bank, the OECD, and the Club of Rome too low. Those estimates, according to Hopkins, are based on optimistic rates of growth. Furthermore, such growth has to occur in a pattern that does not sacrifice distributional concern in the short run. Such gloomy but sensible forecasts have made BNA more appealing.

The Basic Needs Approach Versus The Growth Approach

Is There a Trade-Off?

BNA has been severely criticized by its opponents. Their criticism has three main themes: (a) a trade-off between basic needs and growth, (b) the political implications of BNA, and (c) BNA's lack of a rigorous theoretical foundation. Critics of BNA have argued that, by emphasizing activities which are essentially consumption-oriented, BNA portends a reduction in the rate of growth. They offer some LDCs, such as Sri Lanka, as evidence of a trade-off between basic needs and growth [D. R. Vining, p. 49].

Table 2.1 Global Scenarios of Absolute Poverty* in the Year 2000
(millions of people)

Survey	Estimate
WORLD BANK	410 - 710
OECD	400 - 700
CLUB OF ROME	670 - 780
HOPKINS	754 - 1,083

*Absolute Poverty is defined by Hopkins at \$250 per capita GNP in 1970 dollars. Using the World Bank's methodology of computation, this amount corresponds to the income needed by an individual to obtain 2,150 calorie per day and to buy essential non-food items.

Source: M. J. D. Hopkins, "A Global Forecast of Absolute Poverty and Employment," International Labour Organization, Vol. 119, No. 5 (September-October 1980), pp. 565-577, at p. 576.

Advocates of BNA offer the following counter-arguments. First, even substantial economic growth in the developing countries in the past two decades has failed to reduce poverty and mass deprivation. Thus attacking poverty through "growth-only" is no longer an acceptable alternative. Secondly, the critics of BNA often fail to consider the productivity-augmenting human capital aspects of basic needs. As illustrated by Streeten (Figure 2.1, p. 23), BNA path may be slower in the early stage of development, but in the later stage will be much higher. Thirdly, while BNA does shift the focus from "output maximization" to "poverty minimization," it does not undermine growth. Indeed, growth is a condition for the alleviation of poverty, as Burki and Haq make clear: "The term 'basic needs' has fast become an endangered code word. It is important, therefore, to keep focusing on the ultimate objective of elimination of absolute poverty which requires both 'acceleration in economic growth' and redesign of public services so that the basic needs of the entire population can be met at an earlier date."¹⁹

The basic needs approach is best characterized by the ILO's caption, "Employment, Growth and Basic Needs: A One-World Problem." BNA addresses the growth issue from the viewpoint that two important elements are intertwined in the relationships between growth, employment, and basic needs: the product mix and the factor mix. Any planned choice of appropriate products and appropriate technologies can generate growth, but in different patterns [A. Bequele and D.

¹⁹p. 170. See also R. Ram, pp. 589-590].

Freedman, p. 319]. Hicks [1979, p. 985], in his study of possible trade-off between growth and basic needs, observes:

. . . a basic needs approach will raise productivity, and may not reduce output, particularly in the long-run. Resources for basic needs can be found by redirecting consumption expenditures of both the poor and the rich away from non-basic-needs expenditures, and from unnecessary or even wasteful public sector expenditures. To the degree that basic needs improve the health and education level of the labour force, one can visualize an improvement in basic productivity. Better health is likely to lower infant mortality rates, and ultimately affect fertility and the net reproduction rate [in the desired direction].

The Hicks study addressed two questions: (1) Does the level of basic needs development at the beginning of a period increase the realized growth of output during the period? (2) Do countries that make substantial progress in basic needs during a period experience significantly lower rates of output growth or a lower rate of domestic investment? Their findings suggested that (1) countries making substantial progress in meeting basic needs do not have substantially lower GNP growth rates, and (2) the attainment of a higher level of basic needs satisfaction appears to lead to higher growth rates thereafter. Their study supports Streeten's simplified illustration of alternative paths shown earlier in Figure 2.1, p. 23.

According to a study by Stewart [1979b, p. 24], "between 1960 and 1977, all developing countries improved their provision of basic goods and services, although the improvement was by no means uniform over all the countries." There are not many countries that have achieved progress in basic needs across the board. Some countries have made better progress in one or more basic-needs indicators than the others. Countries with fairly equitable income distribution have

generally performed better than those with relatively unequal income distribution. In the first category, the countries often mentioned in the basic needs literature are China, Cuba, North Korea, South Korea, Sri Lanka, Tanzania, and Taiwan. The oil-producing countries and most other LDCs fall in the second category.

Hicks and Streeten presented their study as "preliminary" and "in need of further testing." Later on, the World Bank's and other studies of Sri Lanka and six other countries during the same period strengthened an important premise of BNA: to wit, that the capacity to meet basic needs can be attained without crippling other programs aimed at growth-enhancing investments.²⁰ The strength of BNA is that it concentrates on achieving a pattern of growth that generates employment and income among the poor, combined with an emphasis on human capital investment and effective access to public services, that produce employable individuals as well as employment opportunities. Empirical evidence on various aspects of basic needs is accumulating. With the resolution of the World Employment Conference [1976], LDCs are paying increasing attention on their progress in meeting basic needs. The results, along with the problems encountered in the implementation of basic needs policies, are coming more and more into focus.²¹

²⁰Although this premise has been questioned by some critics of BNA, the evidence in support of the premise seems overwhelming.

²¹For empirical evidence of accomplishments, see, for example, "Basic Needs: the Case of Sri Lanka" [P. Isenman, 1970], "Evaluating a Basic Needs Strategy and Population Policy: the Bacchue Approach (Philippines)" [Hopkins *et al.*, 1976], and "Income Distribution, Growth and Basic Needs in India" [R. Sinha *et al.*, 1979].

Other Criticisms of the Basic Needs Approach

Some critics have argued that BNA requires so much centralized and disaggregated planning that it may well play into the hands of authoritarian political structures. Authoritarian political systems may use BNA as a means to maintain the *status quo*. However, it has already been argued that BNA is a flexible approach, able to operate under varying circumstances. The critics' fear may prove true, but BNA should not be blamed. There is no evidence that, if BNA had not been adopted, the *status quo* would have changed, and no argument that it should be expected to change. Furthermore, BNA has the potential to induce institutional change in the long run, as an increasing portion of population has access to employment and income and, consequently, starts taking a greater interest in their own futures through participation in the political process.

To the critics, another weakness of BNA is its lack of a rigorous theoretical basis. "If by theory is meant a body of coherent ideas which explains the process, pattern and rate of economic development" [Ghai, 1977, p. 15], then theories of BNA are only at an early stage of development. However, that may not be a serious shortcoming. Traditional economic theories are mostly rigorous and sophisticated exercises in abstraction from reality. In fact, a major source of weakness of traditional economic theories is their inability to capture diverse and unique institutional behaviors in their analyses. That is why institutions are so often treated as exogenous in the neoclassical tradition.

In this respect, BNA may significantly benefit from the institutionalist tradition [Farooq, 1988]. BNA does recognize that understanding of the institutions in LDCs, and proper adaptation or change of those institutions wherever appropriate, are vital for economic development. It is not surprising, therefore, that a fundamental premise shared by the institutionalists and the advocates of BNA is their dissatisfaction with neoclassical economics. If "by strategies is . . . meant the specification of objectives and goals, the formulation of a set of coherent policy measures, and elaboration of institutions, processes and instruments for implementation of policy measures to achieve specified objectives" [Ghai, 1977, p. 15], then BNA does present concrete strategies for development.

Almost a decade ago Ghai remarked that, "although certain kinds of strategic policy changes are suggested by a BNA, there is yet no comprehensive, systematic statement of a basic needs strategy, articulating the main contours and details of the range of policy change required under such an approach. It is necessary now to move from generalities to the specifics of a BNA. This may perhaps be done best by applying such an approach in the concrete context of a national setting" [Ghai, 1977, p. 18]. Ghai made this statement in a book entitled The Basic Needs Approach to Development: Some Issues Regarding Concepts and Methodology, which was intended to do just that. That book included a case study of Bangladesh. Now, almost a

decade later, there exists a vast literature, including empirical works on almost all LDCs.²²

Sectoral Priorities under BNA

As the necessity of reorienting development priorities away from exclusive preoccupation with economic growth and toward broader social objectives is being widely recognized, a primary development objective -- to generate the desired pattern of overall and broad-based income growth for targeted poverty groups -- is coming to be the center of concentrated attention. This objective obviously requires a different set of priorities and strategies from the ones which are oriented toward growth irrespective of distributional consequences. Such a reorientation gives a new perspective to the role of agro-rural sector.

BNA does not necessarily imply priority to any specific sector. The priority assigned to different sectors would be determined by the ability of a sector to contribute toward the attainment of the development objectives under the existing conditions. There are, however, three universally recognized components of a basic needs package: food, nutrition, and health. (Shelter and education may be secondary to these three, except as they are necessary to achieve health.) Nutrition is a direct forward linkage of food, and health is also significantly related to the

²²For a detailed bibliography on varieties of basic-needs-related case studies of 23 countries conducted by the ILO, see Bibliography of Published Research of the World Employment Program (Geneva: ILO, Fifth edition, 1984; the chapter on Basic Needs).

quantity and quality of food consumption. Therefore, food has to be viewed as essential in assigning sectoral priority. Any country's domestic food sufficiency depends upon the level of agricultural productivity. If a country has a food deficiency that has to be met through imports and foreign aid, but has the potential for boosting agricultural production to fill the gap, then agriculture should enjoy a high priority.

Priorities will vary from country to country, depending on many factors, among them: (1) The pattern of domestic production that underlies the securing of adequate supplies of core private commodities. Expansion of domestic food production or of a general agricultural production for export to finance imports of food points toward emphasis on agriculture. On the other hand, increased industrial exports to finance imports of food, expansion of construction of low-cost housing, and increased production of manufactured intermediate inputs indicate an important role for industry. (2) The larger the portion and absolute numbers of poor in urban areas that employment policies aim to affect, the greater will be the emphasis on industry as opposed to agriculture. (3) Within the rural sector, the emphasis on agriculture relative to industry will reflect the particular policies implemented to achieve employment objectives; for example, agrarian reform points to an emphasis on policies that encourage and promote agricultural productivity because of increased efficiency of small farms.

Priority assigned to the agricultural sector can be meaningful only in the context of an overall priority for broad-based

rural development. Agricultural development must be supported by adaptation or generation of technologies suitable for particular countries, by a well-developed delivery system for credit, by effective extension services, and by measures to counter rural-urban migration through creation of income earning opportunities in the agro-rural sector, and fulfillment of other basic needs. BNA, however, should not be equated with the development of only the rural sector. Targeted poverty groups may well include people in the urban sector. Giving primary priority to some sectors does not necessarily mean that strategies cannot be formulated that provide secondary priorities to targeted poverty groups in other sectors. The priority of the agro-rural sector is usually justified on the ground of the size of the targeted groups it covers and its potential to contribute to a broad based, more balanced, and more equitable growth.²³

Development economists are drastically adjusting their views about the agricultural sector.²⁴ Very few economists now consider agriculture as passive or merely supportive sector in the development process, a "handmaiden of industry." Almost two decades ago Gunnar

²³As "the core of world poverty problem lies in the rural areas of the Third World, broad-based ('mass') rural development must play a key role in its alleviation" [Lee, p. 99]. Also Francis Blanchard, the Director General of the ILO, aptly made a similar remark, "The main burden of development and employment creation will have to be borne by the part of the economy in which agriculture is the predominant activity: that is, the rural sector" [quoted by Todaro, p. 251].

²⁴For such a review of new development ideas, see Irma Adelman and J. Edward Taylor (eds.), The Design of Alternative Development Strategies (Rohtak, India: Jan Tinbergen Institute of Development Planning, 1986).

Myrdal said, "It is in the agricultural sector that the battle for long term development will be won or lost."²⁵ Today the agricultural sector in particular and the rural sector in general are often considered the "dynamic and leading elements" in any overall strategy for economic development of the LDCs [Todaro, p. 252]. The focus on basic needs of the population drastically shifts attention toward the agro-rural sector where the disproportionately large segment of the targeted poverty group lives in most of the LDCs.

Advocates of BNA argue that proper management and nourishment of agriculture will contribute to (1) higher production and productivity in agriculture; (2) higher foodgrain production, which will help feed the population domestically, reduce food imports, and improve the balance of payments; (3) greater employment in the agro-rural sector; (4) higher income for rural people, lower income inequality, and improved standards of living for the majority of the deprived population; (5) reducing the rate of migration and thus lessening the burden on the urban sector [Leipziger, 1981]. With adequate, appropriate, and effective public support to meet the basic needs of the poverty groups -- especially in health, nutrition, education, shelter, water and energy -- agriculture can be a dynamic and leading sector that contributes to the necessary industrial base. With the added impetus of rural education under BNA, one may expect a desirable decline in population growth too [Hopkins *et al.*, 1976].

²⁵Quoted by Todaro, p. 251.

What, then, is the role of urban-industrial sector? Industrialization will remain an integral part of the development process, but in a different pattern. "The basic needs approach cannot be interpreted as an exclusive concern with the production of basic goods and the shift towards more labor-intensive methods. On the contrary, as well as expanding the production of basic goods using different technology, it is necessary to make proper provision (either by developing the country's own economy or through regional and international cooperation) for adequate supplies of intermediate and capital goods, which will be produced in modern plants" [S. A. Kuzmin, p. 338]. Thus BNA calls for a reorientation of the entire development process and all the sectors, agro-rural and industrial, in favor of "appropriate products": i.e., basic-needs related products -- primary, intermediate and final -- using "appropriate technology" where appropriateness is defined by the specific socio-economic conditions of a particular LDC.

An idea of "stages" is implicit in BNA. Any country that succeeds in fulfilling the basic needs of its population then can, and should move to the next stage of producing more and more "non-basic-needs." As long as the institutional structure continues to permit the general population to share equitably the fruits of growth and development, the non-basic needs items would no longer be "inappropriate." Technological change can and must take place for

further growth. Therefore, appropriateness is defined not only by the institutional structure but also by the stage of development.²⁶

Synopsis of the Issues to Come

The central theme of BNA is "equitable growth." It considers growth to be an integral part of the development process, but the pattern of growth should be such that the deprived do not continue to be deprived any more. Given the current conditions of almost all the developing countries, a growth path and development process that are oriented toward fulfillment of basic needs are most desirable. Experiences of the LDCs during the last three decades do not show any wisdom in leaving aside the distributional issues to an indefinite future date. Fulfillment of basic needs requires generation of productive employment as a means of earning income. Given the existing rural-urban imbalance, the limited labor-absorptive capacity of the industrial sector, and widespread rural poverty, the agro-rural sector deserves more balanced treatment than it has been accorded so far. Appropriate product-mix, appropriate factor-mix, and appropriate technology are essential determinants of the success of BNA. Inducing change in many existing institutions, and developing suitable new institutions are equally important.

Decision-making tools of development such as Social Benefit-Cost Analysis may require modification to include explicit distributional objectives. Success of BNA is more likely if the

²⁶The concept of "appropriateness" will be discussed in Chapter IV.

society as a whole understands and embraces the approach. Unambiguously stated basic needs objectives in economic planning and a supportive policy framework and institutional structure would be essential. At the next level, project ideas, consistent with the development objectives, changing institutional structure, and natural resources, need to be identified. Application of social benefit-cost analysis to these identified project ideas or proposals should take into account appropriateness of the products or services, the appropriateness of technology involved, the highest possible employment of the available and growing labor force, and the natural resource endowment of a particular country.

The sweeping implications of such a shift of approach to economic development are too broad for this research project. The aim of this research is more limited. The role of technology and rural financial markets has always been considered vital to the economic development of the LDCs. Unfortunately, in the past policies formulated and institutions created for development, have paid little attention to the relationship between rural financial markets and appropriate technology, or to how these two relate to each other under BNA. Is the policy framework for these two and their related institutions harmonious in meeting the goals of social development under BNA? How ought they be linked? Before discussing these central analytical issues directly, the next two chapters discuss rural financial markets and appropriate technology, using the experience of Bangladesh to illustrate the points.

Basic Needs and Agro-Rural Development: The Case of Bangladesh

This section briefly describes Bangladesh, its people, the size and structure of its economy, and the dimension of its problems and poverty. Bangladesh became an independent nation with its present name in 1971. (It was a part of Pakistan during 1947-71, a part of the division into India and Pakistan.)

Economic development of Bangladesh independently of British colonial rule began in post-1947 era. Its development effort became completely independent only after its separation from former West Pakistan in 1971. Since 1947 three five year plans (FYPs) during the Pakistani period and another two FYPs during the Bangladeshi period reflect the development effort of this nation.

Being the eighth most populous nation of the world, with a disproportionately small area (approximately 56,000 sq. miles), Bangladesh ranks almost at the bottom of the list in per capita incomes, the second poorest nation in the world [World Bank, World Development Report, 1980]. High population growth (2.8 percent per annum), a backward agro-rural sector, a poor natural and energy resource base, the constraints of the colonial heritage, and a disturbingly prolonged political instability are some of the prominent features that moved two economists to declare Bangladesh "The Test Case of Development":

If the problems of Bangladesh can be solved, there can be reasonable confidence that less difficult problems of development can also be solved. It is in this sense that Bangladesh is to be regarded as the test case [Faaland and Parkinson, p. 5].

Total arable area in Bangladesh is barely 22.5 million acres, which leaves a per capita arable area of less than half an acre, and this ratio is rapidly shrinking as the population explosion continues. It is overwhelmingly an agricultural economy; amongst countries with such extreme density of population, Bangladesh is unique in being so overwhelmingly rural. In absolute size it has the fourth largest agricultural population in the world, surpassed only by China, India, and the Soviet Union [N. Islam, 1978, p. 2]. About 80 percent of its labor force is engaged in and about 50 percent of its GDP is derived from agriculture [see Table 2.2]. About 90 percent of its labor force lives in rural areas and approximately 30 percent of the labor force suffers from underemployment and unemployment. Actually, "in a predominantly agrarian economy like Bangladesh where large numbers of people are self-employed and unpaid family workers, who do not consider themselves unemployed but may be working only a few hours a week, it is difficult to estimate the magnitude of underemployment" [Huq, p. 5]. The extent of pressure of population on limited resources is evidenced by the fact that the rate of growth of population is about 3 percent -- one of the highest rates in the developing world for a country of comparable size and poverty. Infant mortality rates are as high as 140 per 1000 live births, and death rates are 17 per 1000 [World Bank, 1979, p. 1]. But with a birth rate of 47 per 1000, the high rate of growth of population continues unabated.

Bangladesh suffers from substantial inequality in income distribution. In 1974, the highest quintile of population received

Table 2.2 Structure of the Bangladesh Economy
(Constant Prices of 1972-73)

Year	1972-73	1973-74	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
GDP (Million Taka)	45,300	50,569	52,282	58,686	59,469	63,982	66,766	69,981
Population (million)	74.0	76.4	78.0	79.9	81.8	83.7	85.6	87.7
GDP Per Capita (Taka)	612	662	670	734	727	764	779	798
Sectoral Shares (percentages)								
Agriculture	60.0	57.0	54.6	54.3	52.0	53.2	50.7	49.2
Industry	7.2	6.7	10.5	10.0	10.3	10.3	10.4	10.4
Constr./Trans./Housing/Power	14.0	14.0	14.9	15.7	16.3	14.7	15.4	16.2
Trade and Services	18.8	22.3	20.0	20.0	21.4	21.8	23.5	24.2
GDP growth rate (percent)	-12.6*	11.6	3.3	12.2	1.3	7.6	4.4	4.4
Growth of Per Capita GDP (percent)	-20.5*	8.1	1.2	9.5	-0.7	1.9	2.0	2.4

*In consequence of war damage and dislocation during 1971.

Source: Bangladesh Bureau of Statistics, 1980 Statistical Yearbook of Bangladesh (Dhaka, Bangladesh), pp. 392-394; Bangladesh Economic Survey, 1979-80 quoted by Ejazul Huq, Planning for Core Needs in Bangladesh: The Basic Needs Approach (Dhaka: University Press 1984), p. 7.

38 percent of national income, whereas the lowest quintile had only 8 percent [World Bank, 1979, p. 1]. An already severe rural poverty has been getting worse over the years. The rural population in poverty, as a percentage of total population in 1963/64, was 88 percent and, in 1973/74, 94 percent [ADB, 1978, p. 62]. The inequality of income is mainly caused by the highly skewed distribution of land holdings. In 1977, the top 10 percent of population owned 47 percent of the arable land, and the 10 percent of owners with the smallest holdings only 1 percent [World Bank, 1979, p. 1].

Over 90 percent of the population of Bangladesh lives in rural areas. Hence the profile of rural poverty truly portrays the dimension of deprivation and inequality in Bangladesh. According to an ILO study, 85 percent of the rural households and 86 percent of the rural population in 1963/64 had per capita family incomes below the level required to provide an adequate intake of calories. Defining "absolute poverty" as availability of calorie intake at 90 percent and "extreme poverty" at 80 percent of the recommended intake, 52 percent of the total households and 40 percent of the rural population were estimated to suffer from absolute poverty in 1963/64; about 10 percent of the rural households and 5 percent of the rural population were estimated to suffer from extreme poverty.²⁷

²⁷For 1963-64, Khan (1977a) defined the poverty line at Taka 23.61 per month for the absolutely poor and Taka 17.02 for the extremely poor. According to this definition, about 75 per cent of population is below the poverty line. For a detailed discussion of the poverty line and other related concepts and their estimates in Bangladesh, see Griffin and Khan, 1978; Griffin and Ghose, 1979; and

The situation has only worsened with time. According to A. R. Khan's [1977a, p. 147] estimate, the incidence of poverty in Bangladesh in 1975 showed that 61.8 percent of the population were in absolute poverty and 41 percent in extreme poverty. The Gini coefficient for the rural sector in Bangladesh was .35 in 1963/64 and worsened to .44 in 1973/74 [ADB, 1978, p. 64].

Landlessness adds another significant dimension to the problems of Bangladesh. Even with high population densities and generally small holdings, the ownership of land has become increasingly concentrated. Evidence for 1977 indicates that 3 percent of the households own more than 25 percent and 11 percent own more than 52 percent of all land. In contrast, one third of the rural households own no agricultural land at all. Together with those owning less than half an acre, the effectively landless constitute 48 percent of the rural population. They are mostly sharecroppers or daily lump-sum wage earners. The agricultural wage in 1975 was Taka 9.43 (about 62 cents) per day [Huq, p. 11]. The real wage was, in fact, only Taka 1.28 after the cost of living index rose to 735.6 (1963-64 = 100). In the absence of any minimum wage law, public welfare system, or other effective protection, the effectively landless are at the mercy of the landowners. This is one of the significant factors behind rural poverty. The term "test case" applied by Faaland and Parkinson is justified on the ground

that all the possible aspects of problems usually encountered in the LDCs are present in Bangladesh.

The poverty and underemployment with which Bangladesh was confronted at the time of independence was partly the result of slow growth over the 25 years during which Bangladesh was a part of Pakistan. The continuously increasing food deficit, which reached more than 2.5 million tons in the 1970s, up from 0.5 million tons in mid-1950s, was the combined result of slowly growing food production and rapidly increasing population. The Green Revolution helped reduce the gap, but could not keep up with the population explosion. Investment in physical infrastructure, transport, and communication remained inadequate and unbalanced. "It was on such an underdeveloped economy . . . that the disruptive and destructive effects of the war of liberation of 1971 was superimposed. . . . There was considerable damage to the physical infrastructure as well as a dislocation of the institutional and organizational framework for development administration. There was an absolute reduction in gross domestic production in the post-liberation period [N. Islam, 1978, pp. 3-4].

Due to demonstration effects, the colonial heritage, and the dominance of GA, the path chosen to overcome the vicious circle of underdevelopment for Bangladesh was the path followed by the developed world. The development effort and experience of Bangladesh is a typical case of GA, which, according to Stepanek, represents an "economic model that is entirely inappropriate for the development of an agrarian economy" [p. 22]. If this statement is too general for

the problems of all LDCs, it is not difficult to validate its inappropriateness for Bangladesh.

The dominance of GA is easily traceable throughout the development efforts both before and after 1971. The objectives of Pakistan's First Five Year Plan (FYP) were: (1) to raise the national income and standard of living of the people; (2) to improve the balance of payments of the country by increasing exports and by production of substitutes for imports; (3) to increase the opportunity for useful employment in the country; (4) to make steady progress in providing social services, housing, education, health, and social welfare; and (5) to increase rapidly the rate of development, especially in East Pakistan (now Bangladesh) and other less developed areas of the country [Bhatia, p. 53].

The subsequent plans during the Pakistan and Bangladesh eras gave more quantitative concreteness to the main objectives and emphasized another major problem -- the population explosion. These plans also reveal some remarkable embellishments of rhetoric, but essentially the whole core remained faithful to GA. Table 2.3, on the sectoral allocation of public development expenditure, substantiates the fact that, even during the Bangladesh period, thoughts of rapid industrialization and urban-centered development continue to dominate.

Resource allocation for public development has grown with a tremendous bias toward the industrial sector. Allocation to agriculture and to industry as percentages of public development expenditure in fiscal year 1978/79 was 12 percent and 17.4 percent as

Table 2.3 Public Development Expenditure by Sector
(Millions of Current Taka)

	1973/74		1978/79	
	Revised Budget	Per- cent	Revised Budget	Per- cent
Agriculture, Rural Development and Water	1,579	34.0	3,820	27.5
Agriculture	(576)	(12.4)	(1,810)	(13.0)
Rural Development	(306)	(6.6)	(630)	(4.5)
Water and Flood Control	(697)	(15.0)	(1,380)	(10.0)
Industry	525	11.3	2,420	17.4
Power, Scientific Research and Natural Resources	537	11.6	2,010	14.5
Transport	131	2.8	500	3.6
Physical Planning and Housing	233	5.0	1,060	7.6
Education and Training	307	5.6	720	5.2
Health	207	4.5	500	3.6
Population Planning	50	1.1	430	3.1
Social Welfare	21	0.2	70	0.5
Manpower and Employment	3	-	70	0.5
Cyclone Reconstruction	80	1.7	30	0.2
Other	-	-	300	2.1
Total Development Expenditure	4,638	100.0	13,900	100.0

Source: Bangladesh Bureau of Statistics, 1980 Statistical Yearbook of Bangladesh (Dhaka, Bangladesh), p. 587.

compared to 13 percent and 11 percent in fiscal year 1973/74 respectively. Exclusive allocation to rural development was 6.6 percent in fiscal year 1973/74 as compared to 4.5 percent in fiscal year 1978/79, a clear decline in rural development's share over six years. As physical planning and housing, education and training, manpower and employment have a high urban bias, their combined share can be contrasted to the rural sector. These sectors received 8.4 percent of development expenditure in fiscal year 1973/74 and 13.3 percent in fiscal year 1978/79. These sectoral allocations showed a similar trend during the earlier decade too:

In contrast to the great urgency of agricultural development and the priority accorded to it in government statements, the share of development resources directly allocated to agriculture has been on the decline. In the two year plan, 25 percent of development expenditure is allocated to agriculture compared to 30 percent in the Hard Core program of the FYPl [World Bank, 1979, p. 88].

All this happened despite the fact that GNP grew at 6.7 percent during 1974-79, which is above average in comparison to many other LDCs [see Table 2.4]. In 1979, agriculture employed 74 percent of the labor force and contributed 56 percent of GDP, as compared to 11 and 13 percent respectively by industry. Despite this sectoral size ratio, allocation from public development expenditure was made disproportionately to the industrial sector. With such continuous neglect of the agro-rural sector, there is little possibility that the increase foreseen in agricultural production can provide significantly higher employment [M. Hardiman and J. Midgely, 1982].

With a 3.3 percent average annual growth rate of the labor force, a 6.6 percent rate of urbanization, the burden of unemployment

Table 2.4 Average Annual Growth Rate at Constant Prices
(Percent)

	1960-65	1965-70	1974-78
GNP at Market Prices	4.6	3.6	6.7
Gross Domestic Investment	15.5	6.3	15.8
Gross National Savings	3.3	5.4	2.2
Export of Goods/Services	2.0	3.9	1.3
Import of Goods/Services	12.2	6.8	6.1

Source: World Bank, Bangladesh: Current Trends and Development Issues (Washington, DC: World Bank, March 1979; World Bank, World Development Report 1987, various tables.

has been shifting enormously toward the urban sector [Faaland and Parkinson, 1976]. Thus the whole development scenario indicates a reinforcement of the vicious circle through a growth bias, a squeezed and neglected agriculture, and the other undesirable consequences mentioned earlier.

Inappropriateness of GA for Bangladesh can be explained in terms of the problems associated with the economic factors emphasized by it. Savings play a crucial role in GA. Prescribing and applying GA was based on the hope that a surplus in the form of savings would be accumulated. But that did not happen as expected. Table 2.4 shows that the rate of gross national saving actually declined over the years. The current surplus mobilized internally has been able to finance only 20-25 percent of the development budget. The level of public sector savings has been minimal and sometimes negative, especially if proper allowance is made for a number of expenditures now included in the development budget [World Bank, 1979, p. ix]. The lack of progress in generating savings is a serious weakness of the Rural Financial Markets (RFMs) in Bangladesh, and has made the country's development effort critically dependent on the ability of the country to attract increasing amounts of foreign aid. GA considered the agro-rural sector to be the primary source of surplus mobilization in countries such as Bangladesh, but little effort, or the wrong kind of effort, was made to make this sector economically and institutionally viable. As neither savings nor foreign aid has been sufficient to finance all the development activities, the implementation of many projects, especially both aided or non-aided

rural projects, has been retarded by insufficient funds or by the inefficient allocation of funds. In fact, since the inception of Bangladesh, little has been achieved in removing the institutional bottlenecks to agro-rural development.

Furthermore, increasing food deficits resulting from neglect of the agricultural sector put soaring claims on the mobilized surplus of the country. The capital-bias of GA had been enlarging the pool of unemployed labor, lowering their income and thus their purchasing power, and consequently reducing the effective demand for commodities from the industrial sector. Therefore, without ensuring the satisfaction of the demand for food, the country neither achieved a sustained growth nor could it affect the problems that were expected to be alleviated by economic growth.

Echoing the general concern about the failure of GA in countries like Bangladesh, Huq remarks,

It is evident that a pursuit of conventional growth strategy is not likely to assuage the economic maladies of the nation nor mitigate the poverty that has engulfed the multitude of the people. At any rate, Bangladesh has not been enjoying the growth that is deemed necessary for the alleviation of absolute poverty within a generation, through redistribution process, nor is it likely to in the near future, especially with its narrow resource base and numerous other constraints. It appears, therefore, that an inordinate delay in providing the mass of the people with the basic minimum goods and services (that make living conditions socially acceptable) is to be avoided [p. 1].

To the frustration of the development economists and planners, the food deficit has not declined in recent years. Disregarding the external political impacts of being food deficient, the import of food grain takes a significantly large share of the

country's foreign exchange earnings and reserves that could be spent on something else. Although the arable land in Bangladesh is limited and agricultural productivity is one of the lowest in the world, the land itself is very fertile. The history of the country indicates that land reforms, HYV (High Yielding Variety) seeds and fertilizers, extension services, and promotion of cooperative effort (e.g., the famous Comilla case) have yet to exploit the full potential of the agro-rural sector.

Although increase in crop yield is not a sufficient condition for meeting basic needs, it is a necessary condition for a country with a rapidly growing population. Studies done by M. Alamgir [1975], N. Islam [1978], and A. R. Khan [1979] offer many important possibilities. New varieties of seeds, coupled with adequate, controlled, and regular supply of water and fertilizer can increase the yield by 2.5 to 3 times. An increased use of pesticides and a reduction or elimination of post-harvest losses hold out further prospects for an expanded food supply. Other recent studies done by the World Bank and quoted by N. Islam indicate that with a maximum use of improved inputs alone, rice output in Bangladesh could be doubled by the end of this century; by a combination of improved inputs and maximum use of irrigation facilities, it could be trebled; and if drainage and flood control measures can be secured, it could be quadrupled [N. Islam, 1978, pp. 16-17].

These studies have not even taken into consideration the existing institutional bottlenecks and inappropriate or inconsistent policy measures. However, the studies indicate that a great

potential for agricultural development exists in Bangladesh, a potential that might make the country self-sufficient in foodgrains, and thus save valuable foreign exchange earnings and reserves. The effects of an increase in food production on nutrition and health can also be very significant, provided that the poor people can share the benefit of such development. N. Islam believes that significant employment potential exists in the agro-rural sector. With added labor-absorptive capacity, the labor-intensive agro-rural industries can increase employment potential even more. Increased employment will inevitably raise the levels of income of the targeted groups. Thus the agro-rural sector could contribute importantly meeting the objectives of BNA in Bangladesh. Therefore, on the basis of the criteria of sectoral priority mentioned earlier, primary priority should go to the agro-rural sector which, of course, does not mean abandoning industrial development. Under the conditions specified above, the industrial development should be agro-rural oriented and labor-intensive wherever appropriate, and industries should be selected that meet the objectives of BNA.

Despite the urban-industrial bias in the allocation of development resources, as shown above, there is growing recognition of the problems of deprivation in Bangladesh. The first on the list of the objectives of the Second Five Year Plan (2nd FYP), 1980-85, reads: "To bring about a noticeable improvement in the standard of living by ensuring adequate supplies of the basic needs" [GOB, 1980, p. II-1]. Table 2.5 shows the current status of some of the

Table 2.5 Comparison of Some Indicators of Basic Needs in Bangladesh
(Parentheses for All Developing Countries)
[Brackets for the Low Income Countries]

Indicator	Year	1960	1970	1980	1985
Life Expectancy (Years)		37.3 (44.2) [41.4]	41.6 (53.1) [52.1]	47.4 (58.9) [58.4]	51.0 - [60.0]
Infant Mortality (per 1,000 live birth)		159.0 (153.0) [164.8]	150.3 (112.2) [116.7]	136.1 (93.6) [99.2]	123.0 - [72.0]
Adult Literacy Rate		21.6 (38.8) [25.2]	23.0 (44.6) [29.8]	26.0 [#] (55.5) [51.0]	- - -
Population per Physician		- (13,773) [12,129]	8,430 (8,160) [7,773]	10,940* (5,706) [5,827]	9,700 - [5,770]
Population per Nursing Person		- (6,346) [7,229]	76,810 (4,698) [5,342]	24,450* (2,992) [3,628]	19,400** - [3,880]
Calorie Supply per Capita (percent of requirement)		87.3 (91.2) [86.9]	84.7 (93.8) [90.2]	84.2 (101.5) [97.4]	81.6** - -
Protein Supply per Capita (grams per day)		43.9 (54.5) [51.8]	42.7 (54.9) [52.3]	42.3 (59.3) [56.5]	- - -

#1977 figure; *1979 figure; **1981 figure.

Source: World Bank, World Development Report 1986 (Washington, DC: World Bank), various tables; World Bank, World Tables, 3rd edition, Volume II, Social Data, 1984, p. 6.

indicators of basic needs.²⁸ Bangladesh lags significantly behind others for most of the indicators. Some are even deteriorating -- calorie supply per capita, for example.

Table 2.5 does not include data on housing. Khan's study indicates that the poor condition of rural housing hardly provides any protection to the majority of people from the elements of nature.²⁹ The picture of the urban poor is no better. In the urban areas, an average family of 6.5 members shares on average a 1.5 roomed house, and more than 70 percent of the housing is temporary, constructed without any sanitary facilities, 80 percent is without water connection, and 97 percent without electricity [Huq, p. 10]. Lack of public sanitary facilities combined with the horrible household sanitation conditions poses serious health hazards. This picture, of course, does not include the homeless people, a group that is growing rapidly because of migration to the urban areas and the high rate of natural increase among the homeless group.

The brief sketch drawn above does indicate the potential for development in Bangladesh despite its enormous and multidimensional problems. "The promises that BNA theoretically holds make Bangladesh eminently qualified for adopting it" [Huq, p. 2]. Indeed, the 2nd Bangladeshi FYP (1981-1985) has accepted economic growth, employment creation, and meeting the basic needs of the people as three primary,

²⁸For more detailed information see K. Ahmed (ed.), Nutrition Survey of Rural Bangladesh, 1975-76, Institute of Nutrition and Food Science, University of Dhaka, Dhaka, Bangladesh; and Huq, 1984.

²⁹For a discussion on rural housing in Bangladesh, see A. R. Khan, 1977, p. 75.

interdependent objectives of development [A. Samad, p. 4]. The 2nd FYP explicitly stipulated these objectives: (a) "To bring about a noticeable improvement in the standard of living by ensuring adequate supplies of the basic needs; (b) To expand opportunities for gainful employment, beyond the growth of labour force so that people have access to resources for their basic needs; and (c) To move toward a more equitable distribution of income, resources, and opportunities for better social justice" [GOB, 2nd FYP, p. 4].

Chapter III

RURAL FINANCIAL MARKETS

Finance is an essential ingredient of economic development. Appropriate development of the institutions and instruments of the financial system plays a crucial role in facilitating and quickening the pace of economic development. In any strategy of development, whether from the point of view of resource mobilization or of efficient allocation, a sound and well-integrated financial system is essential [Bhatt, 1980a, p. 127]. However, due to many built-in biases, financial systems under GA (Growth Approach) may fail to meet the ultimate social goals of development. A classic case is the rural financial markets (RFMs). This chapter examines (a) the question of whether the LDCs' efforts to organize rural finance may be counter-productive under GA, and (b) the implications of RFMs for BNA (Basic Needs Approach) in the light of current thought about rural finance.

The role of finance is of great significance to BNA because "finance may substantially affect the amount of resources available to various sectors in an economy as well as income distribution. The effects of finance are usually not readily apparent due to its diffused nature. In some cases the operations of financial markets yield results that are diametrically opposed to publicly stated goals" [D. Adams, 1984a, p. 18].

Because BNA advocates a path of development through generating employment, providing incomes, meeting basic needs, and reducing poverty and deprivation, the role of finance needs to be carefully developed into a financial system conducive to BNA. As argued in the preceding chapter, the agro-rural sector must play a major role in the development of surplus-labor LDCs such as Bangladesh. The entire financial system needs to develop its institutions and policies to achieve the goals of meeting basic needs. In view of the major role of the agro-rural sector, the focus of this chapter will be on the rural financial markets that directly serve the agro-rural sector. However, RFMs must also be properly linked to the urban financial market because the latter has to provide leadership both in the flow of financial resources to the rural sector and in technological development (as it will be argued below in chapter V).

Traditional Views of Agricultural Credits

Cheap and abundant supply of credit has often been considered indispensable for rural development, and especially for agricultural development [C. Bourne and D. Graham, p. 37]. This assumption has induced many donor agencies and many governments in the LDCs to promote a supply-led strategy. Supply-leading finance is "the creation of financial institutions and the supply of their financial assets, liabilities, and related financial services in advance of demand for them, especially the demand of entrepreneurs in the

modern, growth-inducing sectors."¹ This has meant sharp increases in the volume of credits offered and the proliferation of new agricultural credit agencies and rural credit projects. Underlying this strategy was the belief that a supply-led strategy of finance stimulates production, causes more new technology to be adopted, and helps the poor [Adams *et al.*, 1984a, p. 1; Adams, 1984b, p. 69; N. Khan, p. 173]. Also underlying this strategy are other assumptions that have been challenged during the last decade by many. According to Bourne and Graham, these assumptions which have now come under scrutiny are: (a) "Improvements in farming technology are constrained by lack of farm capital, and agricultural credits would facilitate expenditures on new and better production activities." (b) Many farmers need long-term finance. (c) An unsatisfied demand for credit exists "that can and should be met" [1984, pp. 37-38].

The primary goals of the supply of credit from the traditional viewpoint has been to help the poor who have been neglected in the development process [Adams *et al.*, 1984a, p. 1]. This primary goal was expected to be met by (1) modernization of agricultural techniques and practices through adoption of new technologies such as HYVs; (2) rapidly increasing agricultural production; (3) compensating farmers for government price and investment policies; (4) expansion in rural employment and income; (5) a favorable agricultural balance of trade; and (6) equity within

¹Bourne and Graham, pp. 36-37, citing H. T. Patrick, "Financial Development and Economic Growth in the Underdeveloped Countries," Economic Development and Cultural Change, Vol. 14 (1966), pp. 174-189.

the rural sector, and between the rural and urban sectors [Adams et al., 1984a, p. 1; Adams, 1984a, p. 12; Bourne and Graham, p. 36; E. Kane, p. 166].

There has been a common pattern in the traditional agricultural credit projects (TACPs) carried out during the past twenty years in the LDCs. According to Adams and Graham [1981], such a pattern can be partly explained by the effort of the LDCs to replicate the financial institutions -- such as credit unions, credit cooperatives, private banks, and supervised credit agencies -- that were successful in several developed countries. To explain additional similarities, Adams and Graham identified a set of common assumptions underlying those premises: (1) those relating to saver-borrower behavior, (2) those associated with lender behavior, and (3) those about the performance of RFMs [Adams and Graham, p. 348].

TACPs (traditional agricultural credit projects) commonly assumed "that the rural poor cannot save and therefore will not respond to incentives or opportunities to save, that most farmers need cheap loans and supervision before they will adopt new technologies and make major farm investments, and that loans in kind are used in the form granted." About lenders' behavior, common assumptions were "that most informal lenders are exploitative and charge borrowers rates of interests that result in large monopoly profits, that the rural poor do not receive formal loans because formal lenders are overly risk-averse, that the nationalized lenders can be forced to ignore their own profits and losses to service risky customers and the rural poor, and that all formal lenders can be

induced to follow governmental regulations in allocating financial services." At the national level it was commonly assumed "that cheap credit is an efficient way of off-setting production disincentives caused by low product prices or high input prices, that loan quotas established in the capital cities are efficient ways of allocating loans to the countrysides, that loans should be a part of a package of inputs, that only production loans should be made, and that RFM vitality is not related to projects and policies" [Adams and Graham, pp. 348-349].

Similarity of assumptions also produces similarity of RFM policies and techniques. Among these policies and techniques are (1) heavy emphasis "on creating new financial institutions to service particular rural needs or target groups such as the rural poor;" (2) creation of "specialized agricultural banks or development banks that lend primarily to agriculture;" (3) lack of emphasis on financial savings facilities; (4) heavy dependence on central banks, government budgets, and foreign aid for funds; and (6) low, subsidized interest rates "almost always assigned to formal loans and saving deposits alike, thereby penalizing the savers" [Adams and Graham, p. 349].

Performance of the TACPs

If the performance of the TACPs is judged by achievement of their stated goals, then the following conclusions stand clear. The rural poor have not become better off because of these projects and policies. Income distribution and rural-urban imbalance have worsened, sometimes directly as a result of the TACPs [D. Adams and

R. Vogel, p. 480; A. Braverman and J. Guasch, p. 1253]. Indeed, as indicated in Chapter II, even absolute poverty has become more widespread in many LDCs. Except for a few success stories, agricultural production in a number of LDCs has not kept up with the rapidly rising population despite the introduction of HYVs and other new technologies. Adoption of new technologies by typical small farmers has not occurred as expected. In many cases, rural employment and income have deteriorated. Government interference in the forms of price-supports and subsidies have, furthermore, distorted incentives for small farmers [Adams, 1984b, pp. 73-75].

While some TACPs work better than others, all encounter common problems. In addition to serious loan repayment problems in most LDCs and a lack of medium and long-term formal credit available to the rural poor, high transaction costs of many financial innovations (loan portfolio quotas, interest rate ceilings) increase the total cost of financial intermediation. The high transaction costs discourage many from seeking formal loans, and also discourage lenders from serving the groups for whom, in most cases, these credit projects are intended. Lenders' costs of making agricultural loans to medium and small sized farmers can be as high as 20 percent or more of the value of the loans extended, even in moderately well run programs. In an economy experiencing substantial inflation, the nominal rates of interest on loans needed to cover the lenders' costs and also maintain the purchasing power of the loan portfolio can be well in excess of 30 percent of the value of the agricultural loans made. On the borrower's side, costs of acquiring formal loans can be

substantially larger than nominal interest payments. Including the waiting in line, transportation costs, bribes, legal and title fees, paperwork expenses, and time lost from work to deal with the entire process, total borrowing costs, especially for borrowers of small amounts, may be two or three times as much as the nominal interest payments [D. Adams and G. Nehman, 1979; Adams and Vogel, 1986].

There is also "inefficient allocation of resources, causing income and asset ownership concentration, allowing financial resources to flow out of low income areas and, in some cases, diverting resources out of agriculture." In addition, efforts to allocate a larger share of formal loans to agriculture in general and to the rural poor in particular have been ineffective because of unattractiveness of the risks, returns and costs of doing so to formal lenders [Adams and Graham, p. 349; Adams and Nehman, p. 165; Adams, 1984b, p. 71].

In addition to the supply problems, there is also a continued lack of formal credit use among the most of the rural poor. At least three explanations are usually offered for such lack of use or demand. M. Lipton [1976] believes that the problems result from urban bias and the influence of the urban interest groups in denying the rural poor access to significant amount of formal loans. C. Gonzalez-Vega [1984a] blames the supply allocation problems in the financial institutions. He argues that widely used concessional interest policies, coupled with relatively large lender loan transaction costs for servicing small or new borrowers, discourages financial institutions from lending more to the rural poor. A third

explanation argues that most poor do not seek formal credit because they lack profitable investment opportunities, are not aware of the availability of formal credit, do not know how to use formal credit, or are too timid to request formal credit. A variation of the third explanation includes the differences in borrowing costs among various types of formal borrowers as the primary factor for low demand for credit among the rural poor [Adams and Nehman, p. 165-166].

Recent, Market-Oriented Views of RFMs

The failure of the TACPs to meet their stated goals caused the focus on rural credit to shift from supply-led finance to processes of financial intermediation in which the demand-side is as important as the supply-side. Existence of demand for credit should not be taken for granted, and the supply should be organized as a viable part of the process of financial intermediation: that is, profitability should be considered from the point of both lenders and borrowers [R. Tinnermeier, p. 54]. A market-oriented approach to rural finance has emerged over the last two decades in response to the traditional views of agricultural credit and finance.

A rural financial market (RFM) consists of relationships between buyers and sellers of financial assets who are active in rural economies. These relationships are based on transactions that include borrowing, lending, and transfers of ownership of financial assets. . . . RFMs include informal-sector intermediaries, formal institutions, and private borrowing and lending not involving intermediaries. . . . A well-functioning RFM should mobilize rural savings as well as disburse credit; it should grow to meet expanding opportunities without continually requiring subsidized inflows of outside funds; it should have an expanding array of vehicles for attracting savings and offer varied and flexible lending terms and conditions. . . . The great

majority of the economically active rural population should have expanding access to at least some culturally appropriate portion of the market [J. D. Von Pischke *et al.*, pp. 4-12].

Adams and Graham enumerated nine key elements in the new views on RFMs: (1) the expected real rate of interest is a major determinant of borrowers', savers', and lenders' behavior; (2) "negative real rates of interest . . . distort loan demand;" (3) a "more positive attitude about informal financial markets" is needed; (4) the "rural poor may have much larger savings capacities than heretofore recognized, when they are given adequate opportunities and incentives to save;" (5) "borrowers' loan transaction costs are more important in determining loan demand among small and new borrowers than are interest rates;" (6) "overall savings behavior in rural areas is quite sensitive to changes in real rates of interest paid on deposits;" (7) "interest rates and loan supervision have a weak effect on decisions to adopt new technology or make on-farm investments;" (8) inclusion of "loans as part of a package of inputs . . . and use of other similar non-market rationing devices diminishes the most attractive and useful property of finance, fungibility;"² and (9) evaluation of a credit project should rather

²Fungibility here means transferability of funds among different uses. A loan's "fungibility gives the borrower command over any good or service that can be purchased. A loan provides additional liquidity or purchasing power for use in any of the borrower's production, investment, or consumption activities" [Adams *et al.*, 1984a, p. 3]. For example, a cash credit for farming or farming equipment may be used for ceremonial consumption purposes such as the wedding of an unemployed member of a poor household. In-kind credit is not immune from fungibility either, especially where compliance with the credit contract cannot be effectively monitored and enforced and in-kind items can be sold for cash. Fungibility is one of the major cause of high delinquency rate among the borrowers.

focus attention on the performance and vitality of the lender than on measuring the impacts of loans at the farm level [pp. 351-355].

The current literature on RFMs identifies the following key elements in a new strategy: (1) "More flexible interest rates could be a key factor in improving the results from most RFM projects." (2) "With more attractive incentives for savers, RFMs could mount major saving mobilization schemes in rural areas." (3) "Building of new specialized credit institutions to service fragmented financial needs in rural areas should receive less attention . . . [R]ather, policy changes should be aimed at providing more incentives to existing lenders to expand their services in the desired directions." (4) Governments' and aid agencies' introduction of funds into RFMs through special rediscount facilities at Central Banks should be discouraged. (5) Instead of viewing loans as inputs similar to fertilizer, labor, or seeds, "stress should be placed on improving the process of financial intermediation and reducing the costs of this process for society by giving the RFMs strong inducements to adopt cost-reducing innovations" [Adams and Graham, pp. 356-357].

Rural Financial Markets and BNA

An evaluation of the traditional view of agricultural credit and finance indicates that, although TACPs were aimed at uplifting the conditions of the rural poor, the mechanism of such uplift was never properly specified [Braverman and Guasch, p. 1262]. The lack of clarity can, to some extent, be explained by the common faith in "trickle down" under GA. BNA's importance may also lie in its

attempt to explain the processes of development in which both the growth of the pie and people's access to it, especially access by the poor, are given balanced attention. A distinguishing feature of BNA is its emphasis upon the access of the poor to factor markets from the production side, and to product markets from the income and consumption side. Unlike other approaches, "BNA concentrates more on the nature of what is provided than on income per se, focusing on the channelling of particular resources to groups identified as deficient in them" [I. Ahmed and D. Freedman, pp. 433-34; emphasis added].

Improving income distribution by improving access to both factor and product markets requires that the financial system must not yield results inconsistent with these goals. Successful implementation of BNA would also involve significant reallocation of resources from one sector to another. As allocators and mobilizers of claims on resources, financial markets play a major role in such movement of resources. A financial system may negatively affect income distribution by mobilizing more deposits in an area than it extends in loans, thereby transferring resources out of those areas. In some cases the volume of savings transferred out of rural areas and poor urban areas may exceed the amount of government assistance directed toward easing problems in these areas [Adams, 1984a, p. 18]. Also, "where negative real rates of interest are in force, where widespread defaults on loans are tolerated, and where large agricultural credit portfolios are involved, the operation of financial markets can also transfer large amounts of income to borrowers. This may cause a further skewing of the income

distribution, because the subsidy is always proportional to the size of the loans. Large borrowers get large subsidies, small borrowers get small subsidies, and non-borrowers get no subsidy. In addition, negative real rates of interest on deposits transfer purchasing power from savers to borrowers. If borrowers are generally richer than savers, this will further skew income distribution" [Adams, 1984a, p. 19]. Therefore appropriate changes in the financial system are essential for BNA to work properly.

The Rural Financial System in Bangladesh

Objectives of Financial Policy

The government of Bangladesh identifies agriculture, small industry, and exports as three priority sectors among which "emphasis on agriculture as the priority/essential sector has remained throughout," and "to channel more flow of funds into the priority sectors and away from speculative activities and hoarding" has been an important, explicit, operational objective of the financial policy [A. Virmani, p. 1]. "The agricultural credit policy of the Government aims at increasing the flow of funds to the agricultural sector for production purposes, particularly to small and marginal farmers through credit institutions" [APO, 1978, p. 17]. Among the implicit objectives underlying the explicit ones are: (1) "To correct imperfections in the credit market which lead to economically or socially inefficient use of credit. This objective influences the choice of sectors or borrower categories for both positive and negative allocation measures. . . . (2) To provide welfare subsidies

to target groups, to transfer income between groups of borrowers, and to alter the division of gains in transactions between informal lenders and borrowers. . . . [A]nd (3) To correct imperfections or impediments in other markets, or to mitigate their effects, by providing subsidies through the credit system" [Virmani, pp. 1-2].

To achieve these goals, the government of Bangladesh has formulated an agricultural credit policy promoting the growth of agricultural output to the level of self-sufficiency in food, the welfare of farmers, and the expansion of rural employment [Virmani, p. 81; APO, p. 16]. It is not clear whether the promotion of farmer welfare relates to the entire agricultural sector, or to target groups of poor and landless. The Government documents on credit policies and on overall financial policies do not make reference to BNA or to any mechanism by which the objectives of policies are going to be met. The Government's policy is formulated in terms of the credit delivery system of the formal institutions because, again, it is generally held that non-institutional credit is exploitative and therefore allocation of funds through formal institutions would, at least to some extent, alleviate the problems of the small and marginal farmers. "Ironically enough, the small/marginal producers, who account for about 70 percent of rural cultivating households and the bulk of the nation's agricultural production, were effectively bypassed by the rural credit programme; in their lack of adequate land or other resources, they were not found creditworthy" [M. Muqtada, 1984, p. 65; also see M. Molla, 1976, p. 51]. The government has adopted the usual supply-led policies:

"nationalization of banks, loan quotas, loan size limits, special rediscounting facilities in [the] central bank, loan guarantee programs, administrative commands, large agricultural credit supply increases, and arm twisting by political leaders of the financial community."³

Current Structure of RFMs in Bangladesh

Like most other LDCs, Bangladesh has a major problem of fragmented financial markets: between rural and urban markets, within the agro-rural sector, and between formal or institutional and informal or non-institutional markets. Such fragmentation is the result not only of the institutional framework, but also, even mainly, of the financial policies of the government under GA. Although the RFMs serve the majority of the population in Bangladesh, they did not receive adequate attention until the early 1970s [Z. Ahmed, 1982].⁴

Institutional agricultural credit in Bangladesh involves a multi-agency system consisting of: (a) the six nationalized commercial banks (NCBs); (b) the Bangladesh Jatiyo Samabay [National

³Bangladesh Bank, "Preface" to Problems and Issues of Agricultural Credit and Rural Finance, Proceedings of the International Workshop on Providing Financial Services to the Rural Poor, Dhaka, October 23-25, 1978.

⁴See also Z. Ahmed, citing G. Donald, Credit For Small Farmers in Developing Countries (Boulder, CO: Westview Press, 1976); R. McKinnon, Money and Capital in Economic Development (Washington, DC: The Brookings Institution, 1973); USAID, Spring Review of Small Farmer Credit, Volume 20, (Washington, DC: The Department of State, 1973).

Cooperative] Bank (BJSB) and its affiliates; (c) the Integrated Rural Development Program (IRDP) and its affiliates; (d) the Bangladesh Krishi [Agricultural] Bank (BKB), a government-sponsored specialized agricultural bank and its principal agency for supplying agricultural credit; (e) banks in the private sector; and (6) the Grameen Bank, a newly created bank for the poorest section of the rural community [APO, p. 18]. Formal institutions carry out their agricultural credit operations under either the Normal or the Special Program. "Under the Normal Program all the lender institutions provide credit to the rural sector, with each institution following its own procedures and formalities. Such program provides financing for rural capital investments, like the purchase of pumps, tube-wells, etc., and for the processing, storing, and marketing of agricultural produce" [Z. Ahmed, pp. 53-54]. With the exception of the cooperatives, all the NCBs (nationalized commercial banks), along with the BKB (Bangladesh Krishi Bank), are required to participate in the Special Program for lending to small farmers whom the Normal Program fails to cover. The Special Program primarily extends short-term loans for agricultural production, under a simplified and, in contrast to the Normal Program, uniform lending procedure. The government provides the funds for the Special Program, and the amount is allocated by area and crop targets fixed by the Ministry of Agriculture. The Central Bank establishes the rate of interest for lending by all the institutions, and requires the banks to use their allocated funds only for rural lending [Z. Ahmed, pp. 53-54; APO, p. 18].

Similar to the problems encountered by the credit programs in many other LDCs, RFMs in Bangladesh have many serious shortcomings, including failure to repay loans, small supply of formal agricultural credit, few medium and long-term loans for the agricultural sector, lack of facilities to mobilize savings in rural areas, and high transaction costs. High operating costs in the rural sector and strict interest rate ceilings have been a barrier to expansion of NCBs' operation in the agro-rural sector. Failing to induce the NCBs to expand their operations in the agro-rural sector, "the government established specialized financial institutions such as BKB and BJSB [Bangladesh Jatiyo Samabay Bank] to provide credit to the rural market. However, the specific requirements for lending, institutional arrangements and financial policies that accompanied these institutions inhibited rather than fostered growth and development of the agro-rural sector" [Z. Ahmed, pp. 17-18].

Given the financial policies and structure, the specialized institutions in Bangladesh "have limited their roles mainly to the supply of credit. . . . In addition, dependence on external funds has resulted in financial policies which suit the needs of the funding source. Typically this includes interest rate policies and/or loan portfolio restrictions and guidelines" [Z. Ahmed, p. 18]. The implications of low interest rate ceilings are manifold. (1) Low interest rates, especially under the conditions of high inflation rates and low repayment rates, have inhibited private savings and often have eroded the capital position of the financial institutions. (2) Low interest rates may inhibit growth if they make projects with

low or negative rates of return appear viable. (3) Income inequality may be worsened and markets further fragmented by the non-interest rationing effect of low interest rates in favor of the upper rural strata. (4) Low interest rates on deposits have hindered accumulation of deposits causing greater dependence of the financial institutions on external funding. (5) "Guidelines such as loan quotas and other restrictions on portfolios limit the scope of portfolio diversification, hindering risk-minimization, revenue maximization, and more balanced repayment inflows" [Z. Ahmed, p. 19 citing Adams and Graham, 1981]⁵

Financing crop and other agricultural activities claims the major share of institutional credit. Non-agricultural institutional loans are still a meager proportion of the total rural loan portfolio. "For instance, within the public sector alone, funds for special rural projects to help marginal farmers, and landless poor constitute less than 5 percent of the total agricultural credit" [Muqtada, p. 66].

Other Relevant Features of RFMs in Bangladesh

Over the period from June 1975 to June 1980 the proportion of total advances to the agricultural sector rose significantly as compared to manufacturing and other sectors. The doubling of the index for loans to agriculture over this period indicates a major

⁵See also C. Gonzalez-Vega, "Interest Rate Policies, Agricultural Credit and Income Distribution in Latin America," EDI Discussion Paper no. 3 (Washington, DC: EDI, World Bank, 1981); Vogel, 1981.

shift of institutional credit towards the agricultural sector [Table 3.1]. The government of Bangladesh has adopted many measures to increase the flow of funds to the agricultural sector, but for production purposes only [APO, pp. 17-18]. However, even with the large expansion of the operations of the financial institutions over the years, both in total amount of credit disbursed and in number of borrowers served, the growth has not kept up with the growth in credit demand in the agro-rural sector.

The informal rural credit market accounts for more than three-fourths of total credit in the sector [Muqtada, p. 66; APO, p. 17]. According to one estimate, the 1979-80 disbursement of institutional credit of Taka 2,684 million was only 16 percent of the estimated total amount of rural credit demand.⁶ This pattern is consistent with other LDCs where it has been found that a large number of small borrowers do not use the financial institutions. These borrowers prefer to obtain credit from informal sources where the costs are competitive with bank loans when total transactions costs are added to the interest costs.⁷ Although institutional interest rates are low, one survey of small farmer credit in Bangladesh found that the transaction costs of borrowing from formal lenders make the effective costs of bank loans as high as those of

⁶Z. Ahmed, p. 68, citing Muhammad Yunus, "Rural/Agricultural Credit Operations in Bangladesh," Paper presented at the Annual Conference of the Bangladesh Economic Association, April 30-May 3, 1981 (Dhaka, Bangladesh).

⁷Z. Ahmed, p. 19, citing G. Nehman, "Small Farmer Credit Use in a Depressed Community of Sao Paulo, Brazil," Unpublished Ph.D. Dissertation (Columbus: Ohio State University, 1973).

Table 3.1 Credit Allocation Index by Sector*

Sector	Year	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80
Agriculture		.172	.201	.222	.255	.306	.344
Manufacturing		7.865	6.403	5.330	5.992	5.635	5.520
Construction		.168	.135	.207	.290	.628	.265
Transportation		.793	.793	.565	.570	.549	.475
Trade		2.702	2.750	2.803	2.329	2.424	2.337

*Ratio of (a) advances by Scheduled Banks to different sectors as a percentage of total advances to (b) the percentage share of the respective sector in GDP.

Source: A. Virmani, "Evaluation of Financial Policy: Credit Allocation in Bangladesh," World Bank Staff Working Paper No. 672 (Washington, DC: World Bank, 1984).

informal loans.⁸ The transaction costs for new borrowers who do not have previous experience is even higher. High transaction costs of borrowing in the formal market reduce the demand for formal credit and thus work as a rationing mechanism for the available credit.

Studies of many other LDCs have shown that "financial controls such as low interest rates ceilings can lead to increased credit rationing of low-income borrowers and thus reduce their access to formal markets, and on the other hand, increase the concentration of credit to the few rich borrowers."⁹ Gonzalez-Vega has further showed that in the case of interest rate ceilings, "the lenders shift some of their transaction costs of lending over to the borrowers, further increasing the costs of borrowing."¹⁰ As in many other LDCs, high transaction costs are now central feature of the rural credit delivery system in Bangladesh. According to J. Ladman [1981], in most cases existing complex delivery systems entailing considerable transaction costs for both lenders and borrowers are a result of the restrictions and policies instituted by the government.

Informal creditors play a vital role in the RFMs in Bangladesh. Although no definitive data on informal sources is available, there have been many surveys to estimate the share of the

⁸Z. Ahmed, pp. 19-20, citing M. Shahjahan, Agricultural Finance in East Pakistan (Dhaka, Bangladesh: The Asiatic Press, 1968).

⁹Adams and Nehman, 1979; Gonzalez-Vega's [1976] study corroborates Adams and Nehman's position.

¹⁰Z. Ahmed, p. 20 citing Gonzalez-Vega, "Interest Rate Policies, Agricultural Credit, and Income distribution in Latin America," Discussion Paper no. 3, Colloquium on Rural Finance, September 1-3, 1981 (Washington, DC: EDI, The World Bank).

informal creditors in total agricultural credit. According to a recent, nationwide survey of 3,129 farmers who did not borrow from institutional sources, about 62 percent obtained credit from informal lenders [Z. Ahmed, p. 68]. Therefore, greater focus needs to be given to the informal sources so that resources can be mobilized, directed, and allocated in a consistent framework of development.

The unorganized, informal markets consist of relatives, friends, and neighbors as the most important sources of credit, followed by large farmers, landlords, merchants, and professional moneylenders. In the survey mentioned above, "it was found that 51 percent of the respondents would get credit from friends and relatives and 27 percent from moneylenders, merchants, and traders" [Z. Ahmed, p. 69].

In the multi-agency structure of lending institutions, the BKB [Bangladesh Krishi Bank] has become the leading institution in the total disbursement of credit [Table 3.2]. The BKB offers credit for a broad range of agricultural activities -- (a) production, transportation and marketing of agricultural produce, (b) farm-machinery and equipment, (c) irrigation and flood control, (d) cold storage, (e) animal husbandry, (f) poultry farming, (g) horticultural orchards, and (h) small scale cottage industries. However, the BKB primarily offers medium and long-term loans, and only against collateral. The other specialized lending institutions, such as BJSB [Bangladesh Jatiyo Samabay Bank], play a minor role compared to the BKB. Only the BKB has improved its ability to achieve its targets during 1976-1981. The rate of growth of disbursement by the BKB was

Table 3.2 Distribution of Agricultural Credit by Institutions
(in million Takas)

	1974-75	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81
<u>Target</u>							
BKB*	167.2	220.0	363.5	432.3	658.8	1030.0	1798.6
BJBS/BSBL**	130.0	155.0	200.0	220.0	247.5	290.0	380.0
NCBs#	160.0	120.6	283.5	471.4	665.4	753.0	1304.5
Total	457.2	495.6	847.0	1123.7	1571.7	2073.0	3483.1
<u>Disbursement</u>							
BKB	N.A.	N.A.	316.8	372.9	586.7	1189.6	1853.2
BJBS/BSBL	N.A.	N.A.	113.3	170.5	201.0	1460.0	257.0
NCBs	88.1	206.1	219.4	365.4	506.9	553.6	685.8
Total	348.6	482.9	649.5	908.8	1294.6	2013.6	2796.0
<u>Achievement: Distribution/Target (percent)</u>							
BKB	N.A.	N.A.	87.1	86.2	89.0	115.4	103.0
BJBS	N.A.	N.A.	56.6	77.5	81.2	93.2	67.6
NCBs	55.0	170.8	77.3	77.5	76.7	73.5	52.5
<u>Rate of Growth of Disbursement (percent)</u>							
BKB	N.A.	N.A.	N.A.	17.7	57.3	102.7	55.7
BJBS/BSBL	N.A.	N.A.	N.A.	50.4	17.8	34.5	-4.9
NCB's	N.A.	133.9	6.4	66.5	38.7	9.2	23.2

*Bangladesh Krishi Bank; **Bangladesh Jatiyo Samabaya Bank/Bangladesh Samabaya Bank Limited; #Nationalized Commercial Banks.

Source: A. Virmani, "Evaluation of Financial Policy: Credit Allocation in Bangladesh," Working Paper No. 672 (Washington, DC: World Bank, 1984), p. 86.

greater than that of other agencies during the same period. Yet the BKB's share in the total of RFMs is small and its ability to make a significant difference in rural development is limited.

Average interest-rates for informal loans are significantly higher than for institutional loans. Average nominal interest rate for formal and informal loans are 12.0 percent and 42.1 percent respectively [Table 3.3]. Real interest rates on formal loans are negative when the low nominal rate is adjusted for inflation. Real interest rates on informal loans are quite high, and the interest rates on small sized, informal loans are even higher, and therefore biased against the poor.

Transaction costs for informal loans are significantly lower than for institutional loans [Table 3.4 and 3.5]. The process of borrowing from institutions is complex and time consuming. Low transaction costs and simple and less-time-consuming processes are two factors that explain the predominance of informal transactions in the rural financial market.

Distribution of informal loans is biased against poorer borrowers. Borrowers with larger land holdings and requesting larger loans dominate the total loan portfolio [Table 3.6].

The distribution of loans and institutional banking activities are heavily biased toward the urban sector. Although the percentage of bank branches is greater in the rural areas, deposits and advances are approximately ten times larger in the urban areas. Also advances by rural branches are one-half or less than deposits [Table 3.7]. Thus there seems to be a reverse flow of financial

Table 3.3 Average Interest Rates by Loan Size
(percent)

Loan Size (Takas)	Nominal		Real	
	Formal	Informal	Formal	Informal
1- 500	12.0	43.3	-3.0	24.0
501-1000	12.0	70.0	-3.0	47.1
1001-3000	12.0	46.6	-3.0	26.9
3000-above	13.2	22.0	-2.0	5.7
Sample Average	12.0	42.1	-3.0	23.0

Source: Adapted from Z. Ahmed, "Transaction Costs in Rural Financial Markets in Bangladesh," Dissertation (Charlottesville, VA: University of Virginia, 1982), p. 128.

Table 3.4 Average Transactions Costs of Borrowing from
Formal Institutions
(in Takas)

Size of Loans	Average Travel & Misc. Costs	Average Cost of Workdays Lost	Average Trans- action Costs (TC)	Ratio of TC to Loan (%)
1- 500	52.0	58.0	110.0	29.4
501-1000	94.0	126.0	220.0	27.9
1001-3000	147.0	129.0	276.0	17.5
3000-above	370.0	161.0	531.0	6.9
Sample Average	140.5	131.5	272.0	21.7

Source: Z. Ahmed, "Transactions Costs in Rural Financial Markets in Bangladesh: A Study of Rural Credit Market," Dissertation (Charlottesville, VA: University of Virginia, 1982), p. 133.

Table 3.5 Average Transactions Costs of Borrowing from
Informal Institutions
(in Takas)

Size of Loans	Average Travel & Misc. Costs	Average Cost of Workdays Lost	Average Trans- action Costs (TC)	Ratio of TC to Loan (%)
1- 500	1.5	5.6	7.2	2.5
501-1000	3.3	20.0	23.3	2.5
1001-3000	1.7	56.6	58.3	3.6
3000-above	18.6	16.4	35.0	0.9
Sample Average	4.6	15.9	20.5	2.4

Source: Z. Ahmed, "Transactions Costs in Rural Financial Markets in Bangladesh: A Study of Rural Credit Market," Dissertation (Charlottesville, VA: University of Virginia, 1982), p. 133.

Table 3.6 Loans by Size and Sources of Credit
(percent)

Loan Size (in Takas)	Informal Sources	BKB
1- 500	54.0	8.2
501-1000	12.5	41.0
1001-3000	12.5	42.6
3000-above	21.0	8.2
	<u>100.0</u>	<u>100.0</u>
Average Loan Size (Takas)	1,516.0	1,875.0

Source: Adapted from Z. Ahmed, "Transaction Costs in Rural Financial Markets: A Study of a Rural Credit Market," Dissertation (Charlottesville, VA: University of Virginia, 1982), p. 103.

Table 3.7 Distribution of Banking Activities: Urban vs. Rural
(percent)

Year	1975-76		1976-77		1977-78		1978-79	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Deposits	90.5	9.5	90.3	9.7	89.6	10.4	86.2	13.8
Advances	96.6	3.3	96.5	3.5	95.5	4.5	93.5	6.5
Net Difference	+6.1	-6.1	+6.3	-6.3	+5.8	-5.8	+7.2	-7.2
Branches	N.A.	N.A.	49.3	50.7	41.9	58.1	41.8	58.2

Source: Adapted from A.S.M.F. Ahsan, "Performance of Rural Financial Markets in Bangladesh," in Bangladesh Bank, Problems and Issues of Agricultural Credit and Rural Finance, Proceedings of the International Workshop on Providing Financial Services to the Rural Poor, October 23-25, 1978 (Dhaka: Bangladesh Bank), p. 21.

resources from the rural to the urban sector. Furthermore, the government's policy of forcing NCBs to open a minimum number of rural branches before they are allowed to open additional, more profitable urban branches may result into establishment of token branches in the rural areas without affecting rural development [Adams and Vogel, p. 481]. The number of rural branches thus means much less than it might appear to mean.

The ratio of recovery/disbursement of the BKB has significantly improved during 1972-77 [Table 3.8]. However, this improvement may be the result of a more rigorous screening process eliminating the more risky borrowers. The BKB prefers borrowers with sizable land holdings. According to Molla, the BKB has lent increasingly to small farmers during 1972-76. His statement would be true if "small farmers" are, as he defined them, those holding up to 3 acres of land. But these borrowers may not be the actual cultivators. According to F. Januzzi and J. Peach, "small farmers" should be defined not only by size of land holdings but also by whether they are the actual cultivators. If the borrowers are "nontilling, noninvesting landlords" engaged in sharecropping, then the BKB may be serving the wrong group. Without taking a closer look at the borrowers' profiles, it is difficult to say whether the BKB's improvement in loan recovery is significant for rural development.

Another important aspect of the recovery rate for formal credit is that, in most cases of delay or delinquency, the defaulters are not the poor but the well-to-do, influential farmers [Braverman and Guasch, p. 1257].

Table 3.8 Recovery of Loans by Bangladesh Krishi Bank
(in million Takas)

	1972-73	1973-74	1974-75	1975-76	1976-77
Disbursements	179.0	135.7	176.3	185.1	388.5
Recovery	67.2	119.0	200.0	274.8	294.9
Outstanding	612.3	671.3	717.5	742.1	903.3
Overdue	256.4	300.6	328.9	326.1	339.8
Overdue/ Outstanding	42.2	44.7	45.8	43.9	37.61

Source: Adapted from M. Molla, "Institutional Delivery System of Agricultural Credit in Bangladesh," in Bangladesh Bank, Problems and Issues of Agricultural Credit and Rural Finance, Proceedings of the International Workshop on Providing Financial Services to the Rural Poor, October 23-25, 1978 (Dhaka: Bangladesh Bank), p. 10.

Misutilization of loans is widespread in Bangladesh. The problem has been attributed primarily to the fungibility of the loans, competing needs for both subsistence and ceremonial purposes, and inability of the credit institutions to prevent fungibility [N. Khan, p. 175]. Misutilization of funds frequently causes the borrowers to default when immediate needs override their other concerns, including their future credit-worthiness. Another possible reason for misutilization of funds is that, in many cases, when the borrowers do receive loans, half the season is over and borrowers cannot make use of that loan for the current season. Such out-of-season loans provide both motive and opportunities for diverting the funds to alternative uses [N. Khan, p. 176].

There are still other important features of informal credit. Credit from friends and relatives is very frequently in kind, and interest free. In Bangladesh, a Muslim country, people, in accordance with Islam, tend to shun professional moneylending that involves interest. Transactions in the informal credit market are primarily personal, involving people who know each other; and, in consequence, collateral and security requirements and payment schedules are flexible. With such flexibility, the default rate in the informal credit market is high. Even professional moneylenders and landlords take considerable risk because such defaults usually cannot be usually pursued in the courts [Z. Ahmed, pp. 69-70]. In most cases, lending operations are very simple. Security could be a simple personal pledge. Most loans are short-term in maturity, small in size, and mostly used for working capital and consumption

expenditures. Loans made for long-term investments or in large amounts are rare [Z. Ahmed, p. 71].

Evaluation of Market-Oriented Analyses of RFMs

The recent focus on rural financial structures has significantly helped to identify some basic problems of the financial aspects of agro-rural development and describe the existing processes of financial intermediation. Although most recent analyses of RFMs are embedded in an essentially neoclassical paradigm, they have made valuable contributions in the following areas: (1) emphasis on the role of both lender and borrower from the behavioral point of view; (2) exposing the weaknesses of supply-led strategies that ignore the demand side; (3) the importance of mobilizing savings in the rural areas for a self-sustaining rural credit mechanism [Molla, p. 52]; and (4) the negative effects, through TACPs, of cheap credit on income distribution. However, there are shortcomings in the recent discussions and related studies of RFMs.

First, by emphasizing the processes of financial intermediation, recent analyses of RFMs look at the financial aspects from the viewpoint of an organized, monetized market. But such market often does not exist in LDCs (including Bangladesh) -- or, at least, they are less widespread than assumed. It is not clear whether monetization precedes development, or development precedes monetization, or whether they move in parallel. Discussions about RFMs do not propose effective ways to monetize rural finance. While monetization should be studied in the macro context, most theoretical

and empirical works do not deal with RFMs as a part of the larger economy or as related to other institutions.

Secondly, as in the case of the TACPs, market-oriented analyses of RFMs do not specify how the current problems of rural finance are related to specific approaches to development. While advocates of the recent view of RFMs do not explicitly state their position about GA and how it has shaped the TACPs, their views are rooted in neoclassical growth theories. The role of money and financial structures in the development processes of the LDCs was brought in focus by Edward Shaw¹¹ and Ronald McKinnon¹² in the early 70s. Although they explicitly admitted that markets in the LDCs are fragmented, prices not uniform, information expensive, mobility imperfect, and monetization minimal -- and therefore that conventional views about money and finance are not well-suited for LDCs -- nevertheless they still develop their model within the framework of neoclassical economics.

The main argument of Shaw and McKinnon is that policies such as interest rate ceilings and rationing of loans by quota restrict the scope of the intermediating role of financial institutions, inhibit capital formation, and are responsible for the problems of the financial sector in LDCs. "Following the Shaw-McKinnon model of financial liberalization and economic development, Louis Spellman

¹¹Edward Shaw, Financial Deepening in Economic Development (London: Oxford University Press, 1973).

¹²R. McKinnon, Money and Capital in Economic Development (Washington, DC: The Brookings Institute, 1973).

[1976] and C. Gonzalez-Vega [1976] developed a neoclassical growth model with financial intermediation to show that a liberalized financial system . . . will raise capital-output ratios and capital intensity in the economy" [Z. Ahmed, p. 13]. A surge of interest in a liberalized rural finance followed, but ignored the question of how a different result could be achieved.¹³

Thirdly, similar to the studies of TACPs, the RFM studies have focused primarily on agricultural credit because agriculture occupies an overwhelming position in the rural sector. But agriculture alone cannot be the source of development and, in the long run, fewer and fewer people can be absorbed in agriculture as technological development takes place. Therefore, in addition to agriculture, the focus should be on the agro-rural sector in general. Furthermore, RFMs cannot grow and evolve properly if not linked with the urban financial markets. To focus only on RFMs without any link to the larger economy narrows the scope too much.

Fourthly, the advocates of the market-oriented views of rural finance emphasize changing policies and eliminating inefficiencies so that RFMs can evolve as a market-oriented process of financial intermediation [Lipton, p. 543; Adams *et al.*, p. 6]. According to these advocates, the needs of the target groups should be met outside the process of financial intermediation. Yet, at the same time, they criticize supervised, specialized credit institutions that attempt to

¹³There are those who seem to have taken an institutionalist approach to rural credit, such as A. Braverman and J. Guasch [1986], but they appear to be exceptions.

meet the credit needs of target groups, and they have no alternative prescription for meeting the needs of these groups. They do not address the issues raised in Chapter II -- how the problems of deprivation of basic needs and poverty can be addressed in the development process, or how the problems of unemployment and an ever-growing pool of landless people can be resolved. The question of the landless is of special importance because farmers without land or agricultural wage earners face a life of abject poverty. Issues of finance in general and rural finance in particular should spell out the role of finance in a development process that accepts fulfillment of basic needs and minimization of poverty as primary goals of development.

Fifthly, both the traditional views and the recent views of RFMs deal with issues of finance without any reference to technological development. It has already been mentioned that one of the major objectives of TACPs was to help the poor farmers adopt new technologies. Studies of RFMs indicate that cheap, subsidized credit offered by specialized, supervised agencies have not been successful in meeting that objective. These studies have established a new consensus on the point that farm activities or adoption of new technologies are seldom constrained by lack of credit [Lipton, p. 543]. However, it is not clear whether the new view can produce better results in inducing farmers to adopt new technologies, or how the view might help to do so.

These studies do not deal with "appropriateness" of the technological choices faced by the poor, uneducated farmers. They

fail to establish the link between financial and technological development. There is no indication in the RFM literature about a possible leadership role for the financial institutions in inducing appropriate technological development.

To this last aspect I shall return in Chapters V and VI. But before analyzing the nature of existing links between finance and technology, and the nature of a desirable link, it is necessary to review the current trends in thinking about technological development, and especially about "appropriate technology."

Chapter IV

PLANNING FOR TECHNOLOGICAL DEVELOPMENT UNDER BNA

Although there is controversy over precisely how technology affects development, there is no disagreement that technological development is a crucial driving force behind economic development. "[I]t is a resource and the creator of new resources" and "a powerful instrument of social control and affects decision-making to achieve social change" [UNIDO, p. 97]. Technology in use is determined by the technologies available to the country from the set of world technologies and by the choices made from that set [Stewart, 1977, p. 1]. Technology is used in this dissertation broadly, extending to all the skills, knowledge, experiences, organizations, and procedures used to solve the problems of producing and using goods and services [UNIDO, p. 97].

The unemployment problem is not attributable to technological bias alone, but the "problem can be traced to the introduction of new technologies which soak up limited capital but create few employment opportunities in the process, and the related failure to disperse new capital widely throughout a nation so as to use existing labor and land more effectively," as well as to the "rapid rates of population growth" [E. Edwards, p. 4].

How a particular approach treats the role of technology in development has significant implications. The followers of the Growth Approach (GA) usually assume technology to be neutral and thus

directly transplantable [Koloko, p. 589]. But there are others, especially, but not limited to the institutional economists, who recognize technology as non-neutral. On the one hand, technology "incorporates, reflects, and perpetuates value systems and its transfer thus implies the transfer of structure." On the other hand, it is "an agent of change and a destroyer of values" [UNIDO, p. 97]. Proper choices of technology can enhance more equitable distribution of income and opportunities. Improper choices can build-in a mechanism that systematically denies such enhancement.

Choosing Technologies for Development

The problems of development discussed in Chapter II are closely related to patterns of technological development in the LDCs. As growth and industrialization became synonymous in most of the LDCs, the rapid growth that occurred was concentrated in the small, modern, urban sector of the economy that used modern technologies imported from the Western shelves. In the attempt to replicate the western patterns of development, it was overlooked that modern western technologies were appropriate for rich societies with high labor-cost, high cost per job created, low rates of population growth, and high saving-income ratios, but might not be equally applicable to the LDCs [A. Robinson, p. xi]. Inevitably, there were no spill-over effects of the achieved growth on the rural-traditional and urban-informal sector. Nor did such technological progress in the urban sector facilitate technological progress in either of the other sectors [H. Singer, 1977a, p. 3].

Effects of Past Patterns of Technological Development

The technologies chosen for the urban manufacturing sector generally have been capital-intensive for the following reasons: (1) the technologies were originally designed for labor-scarce societies, (2) modern technologies were considered more efficient, productive, and output-augmenting, (3) capital-intensive technologies were assumed to reduce supervision cost, (4) there was a lack of R & D efforts and expenditure to adapt the imported technologies, (5) preferential treatment was given to imported technologies through different types of fiscal incentives, (6) many LDCs actively pursued, and still pursue, industrialization policies to attract foreign investors who are primarily parts of multinational enterprises and are, almost without exception, bent upon choosing capital-intensive technologies [ILO, 1978b].

In agriculture, the emphasis, from the technology side, has been on modernization through farm-level mechanization and improved inputs including high-yielding varieties (HYVs) and fertilizer. If mechanization other than in irrigation has raised productivity in any surplus-labor LDC -- and it is doubtful that it has done so -- it has been at the expense of agricultural employment,¹ a sad result when

¹There seems to be an agreement on this point on the basis of studies in Africa, Asia, and Latin America. See E. S. Clayton (1974) citing ILO, Mechanization and Employment in Agriculture (Geneva: ILO, 1973); Carl H. Gotsch, "Tractor Mechanization and Rural Development in Pakistan," International Labour Review, Vol. 110, No. 2 (February 1973), pp. 133-166; E. S. Clayton, "Mechanization and Employment in East African Agriculture," International Labour Review, Vol. 109, No. 4 (April 1972), pp. 309-334.

evaluated against the sheer size and rates of growth of the rural civilian labor force (for example, for Bangladesh see Table 4.1).

In many LDCs, including Bangladesh, fragmentation of land holdings has prevented large scale mechanization [M. B. Hossain, p. 46]. However, due to the existing highly-skewed distribution of land ownership, the power of the rural elite landlords, and widespread poverty, such mechanization as there has been has further skewed inequality by creating greater landlessness and providing a motive for rural-to-urban influx [E. Clayton, p. 59]. Lack of urban and rural non-agricultural employment opportunities has exacerbated the economic conditions of the rural poor, especially the landless. In the last two decades the landless and virtually landless population has grown at an increasing rate [see Table 4.2]. The landless and the small land-owning groups are mostly concentrated in cultivation, agricultural wage earning, cottage industry, and petty trade and business [see Table 4.3] -- in all of which wages, incomes, or profits are very low.

Mechanization, however, should not be abandoned altogether. "Although situations where mechanization can increase both incomes and employment in the short or medium term are becoming less common, it is nevertheless important to identify such opportunities as do exist" [Clayton, p. 61]. According to Clayton, "selective mechanization" that is "income-increasing and either employment-neutral or, preferably, employment-generating and which does not increase rural income disparity," especially when there are

Table 4.1 Civilian Labor Force of Bangladesh by Sex and Urban/Rural Residence
(Million Persons)

Year	Total			Urban			Rural		
	Male	Female	Both Sexes	Male	Female	Both Sexes	Male	Female	Both Sexes
1961 Census	16.1	0.8	16.9	1.0	0.1	1.0	15.1	0.8	15.9
1974 Census	21.0	0.9	21.9	2.0	0.1	2.1	19.0	0.8	19.8
1981 Census	24.4	1.5	25.9	3.1	0.2	3.3	21.3	1.3	22.6
1983/84 Labor Force Survey*	26.7	2.4	28.7	3.6	0.4	4.0	22.7	2.0	24.7

*1983/84 as percent of 1961.

Source: Bangladesh Bureau of Statistics, 1983/84 Statistical Yearbook of Bangladesh, Dhaka, December 1984, p. 145, and computations based thereon.

Table 4.2 Landlessness in Rural Bangladesh

Year	Number of Landless Laborers (in millions)	Landless Labor as a percentage of total cultivators
1951	1.51	14.3
1961	2.47	17.5
1963-64	2.71	17.8
1964-65	2.75	17.5
1967-68	3.40	19.8
1977	6.06	---

Source: A. R. Khan, "Poverty and Inequality in Rural Bangladesh," p. 155, in ILO (ed.), Poverty and Landlessness in Rural Asia (Geneva: ILO, 1977); Bangladesh Bureau of Statistics, Statistical Yearbook of Bangladesh 1980 (Dhaka, Bangladesh), p. 189.

Table 4.3 Occupational Structure of the Landless and Small Land Owning Groups

Occupation	Percentage of Total Workers Engaged in the Occupation							
	1980 Survey				1982 Survey			
	0.0-0.5 Acres	0.51-2.0 Acres	2.1 & Over Acres		0.0-0.4 Acres	0.41-2.0 Acres	2.1 & Over Acres	
No. of Workers in the Sample (000's)	1,165	595	295		2,663	1,507	821	
Cultivation	22.8	76.5	88.8		22.9	68.8	75.7	
Agricultural Labor	39.4	11.6	1.0		35.6	11.1	-	
Cottage Industry	24.5	16.2	10.2		23.3	9.5	2.4	
Trade & Business	19.2	18.2	21.3		20.9	15.3	9.3	
Transport Services	2.6	1.9	0.7		4.5	2.8	nil	
Other Services	8.3	6.0	7.8		8.8	12.9	20.1	
Miscellaneous Occupations	10.9	11.6	3.2		13.7	7.6	1.9	
All Occupations*	127.7	142.0	133.0		129.7	128.0	109.1	

*The column totals exceed 100 because some workers are engaged in more than one occupation.

Source: M. Hossain, "Employment Generation through Cottage Industries: Potentials and Constraints, in International Labor Organization, Bangladesh: Selected Issues in Employment and Development (Geneva: ILO, 1986), pp. 119-150, at p. 126.

opportunities for creating non-agricultural rural employment, can be useful.

The Green Revolution has brought enormous changes to the agricultural sector of the LDCs. The productivity-augmenting effect of the Green Revolution is well-known. Evidence from Bangladesh, India, Pakistan, and the Philippines shows that, with unaided or animal-assisted labor with traditional tools and equipment, employment increases by almost 50 percent or even more, with a doubling of yields, when an acre of some traditional variety of crop is replaced by an HYV type. The primary causes of greater labor demand are (a) weeding, (b) application of fertilizer and pesticide, (c) harvesting and threshing, and (d) multiple cropping [I. Ahmed, 1976, p. 84; Alamgir, 1975, p. 275; Muqtada, 1975, p. 404]. However, the HYVs are not bias-free. "They were developed without any consideration of questions of scale or of the receiving economic/social structures. . . . [W]hen introduced into the real economic and social conditions of most developing countries the high-yielding varieties are clearly 'landlord-biased'."² Furthermore, introduction of HYVs in many LDCs has not made any significant impact on the real wages of agricultural labors [Alamgir, 1975, p. 275]. Some of these studies also indicate that the employment-generating effects of HYVs are reversed when even partially mechanized power techniques are used. Studies in India, the Philippines, and Sri

²Koloko, p. 592 citing K. Griffin, The Green Revolution: An Economic Analysis, UN Research Institute for Social Development Report no. 72.6 (Geneva, 1972).

Lanka have "clearly shown a decline . . . in the labour requirement per acre on partly mechanized wheat fields" [I. Ahmed, 1976, p. 84].

What Has Been Wrong, & What Might Be Right

Orthodox approaches viewed development as a process in which the breakdown of the traditional sectors paves way for industrialization of the economy through investment in production that involves labor-saving, capital-intensive, productivity-raising, and output-augmenting technologies. Such approaches failed (1) to address the issue of how, in labor-surplus economies, expansion of capital-intensive enterprises would bring employment -- especially when, under existing conditions, employment could be generated in the traditional agro-rural sector; (2) to describe a path of structural transformation of the economy in which the traditional agro-rural sector would be able to derive and absorb benefits from the urban-biased growth, and then be a viable part of the overall economy; and (3) to specify how the inevitable negative income distribution effect of such an urban-biased growth would be mitigated. Furthermore, they viewed technology in a narrow, static sense: technology meant a set of tools and equipment ready to be used by the LDCs.

✓ That choice of technology is an important part of the development process did not receive much attention until the failure of the conventional approaches became apparent and the "past patterns of development" were blamed [Singer, 1977, p. 3]. Recent thinking about ways to develop, such as BNA, calls for new patterns in which the focus of development should be on the interrelations among three

problems -- the elimination of poverty, the elimination of unemployment, and the fulfillment of the basic needs of those bypassed by past growth. Maldistribution of income in the LDCs is a result of these three interrelated problems.

Technology, Employment, and Basic Needs ✓

The crucial problem among the three interrelated ones mentioned above is unemployment. (Unemployment should here be understood as underutilization of human resources, including both regular unemployment and underemployment in whatever form, open or disguised.) BNA's focus on employment-generating aspects of technology is meaningful because employment is a direct means of generating income and opportunities for the poor to have access to basic needs and it is a more efficient and effective and less corruptible means of both redistributing income and improving income equality. (The implications of product-biases in existing patterns of development were discussed in Chapter II.)

It is also important to examine the biases in processes of production. The overwhelming proportion of technologies employed in today's LDCs originated in the industrialized economies of the West where labor is relative scarce and capital relatively abundant [M. Betz, p. 4]. In any economy with scarce labor and abundant capital, the production process would be bent upon economizing the scarce resource for a given level of output. Gradually, sophisticated equipment become more and more expensive and labor-saving. "This characteristic of applied technology is one of the major ingredients

of the unemployment problem in virtually every low-wage economy" [A. Bhalla, 1976, p. 189].

Factor-price distortion has been argued as one of the primary reasons for capital-bias in technology choice in LDCs [Bhalla, 1976, p. 191]. There are other biases in the technologies in use in many LDCs: (1) pervasive influence of the local bureaucracy in selection of projects,³ (2) built-in bias in the tariff and tax structure toward capital-intensive technologies, (3) the shortage of entrepreneurial capability influencing the decision makers to select highly capital-intensive projects [Betz, p. 6].

For a long time the only concerns about technological development were efficiency and productivity. There was no concern about "appropriateness" in choice of technology. In most cases there was no articulated technology policy that attempted to plan or to manage technological development in the LDCs, to encourage development of indigenous capability to innovate, or to adapt available technologies.

Appropriate Technology: Semantics and Criteria

The concern to address the problem of unemployment and deprivation of basic needs in the LDCs led to a debate over a set of technologies that is different from the existing "technology shelf" of the West [Bhalla, 1976]. To describe these kinds of technologies -- adapted or indigenously generated -- that can meet the needs of

³Local influence could play positive role under BNA, but only if the target groups are strongly represented in the local power structure.

the LDCs, new terminologies have come into vogue, such as "alternative," "intermediate," "soft," or "appropriate" technology. The difference between these expressions are more a matter of style than substance.

Historically, the philosophy behind such ideas about technology is rooted in the vision of Schumacher -- "Small is Beautiful." However, Schumacher opted for "alternative" instead of "appropriate" technology. Different people prefer different expressions based on their perceptions about the limitations or incongruities of these expressions. If "alternative," alternative to what? Would there always be alternatives to a given set of existing technologies? If "intermediate," intermediate between what? How small is too small and how big is too big? Are smaller- or larger-scale technologies always bad? Would the LDCs always end up with intermediate technologies? Are intermediate technologies always applicable, regardless of sector, region, or country? If "appropriate," appropriate for what? What is an inappropriate technology? These are some of the questions raised by opponents of such concepts [DeGregori, p. 189].

However, even such a hardline opponent of these technologies such as DeGregori agrees that "what is needed is a conceptualization of a theory of technology as a problem-solving process that thereby embodies the concept of appropriateness within it" [DeGregori, p. 189]. He further agrees that, before assimilation into specific socio-cultural or institutional settings in the LDCs, modification and adaptation of new technologies are important. Both of his

arguments indicate the importance of making proper choices about which existing technologies are to be modified or adapted, and about what sorts of technologies are to be indigenously generated for solving specific problems.

That the existing technologies from the Western shelf, unmodified and unadapted, in many cases, are not useful for the LDCs is now an established fact. Development of LDCs, both specific goals and the paths to attaining those goals, require a different set of technologies -- modified, adapted, or indigenously generated. The expressions mentioned above are only an imperfect way of describing such varieties of technologies. I prefer to call such technology "appropriate" because it seems broader in applicability. Given the institutional settings of some sectors or regions within a country, small-scale, labor-intensive technologies may be appropriate; for other sectors or regions, large-scale, capital-intensive technologies may be appropriate. In some cases, neither so-small nor so-large -- i.e. intermediate technology -- may be appropriate. In some cases, direct transfer of an existing technology may be unavoidable; in other cases, modifications and adaptations would be indispensable. Again, in some cases, generation of new indigenous technology would be appropriate. In a labor-surplus country, labor-intensive technologies, whenever available and applicable, would be appropriate; different factor endowments would dictate different technologies. Furthermore, for the poorer LDCs, technologies for producing basic-needs goods would be appropriate now. As the country moves from the stage of satisfying basic-needs to satisfying non-

basic needs, changes of factor proportions may call for different sorts of technology [Stewart, 1977, p. 108-109].

Appropriate Technology (AT) is a dynamic, flexible concept that implies "a suitable policy framework and a broad-based pattern of development" for LDCs. "It is not a tool-kit of a selected number of [existing or potential] technologies with technical and engineering specifications which could fit in with the requirements of all the LDCs" [Bhalla, 1979b, p. 46]. AT (Appropriate Technology) should not be viewed as second-rate technology. Adaptation of an existing technology to make its application more appropriate for an LDC or to generate a new AT, "be it an inexpensive water pump, a long-lasting roof for slum dwellings or a truly efficient oxcart, is in many ways as complex and challenging from the conceptual point of view as any modern industrial innovation" [Jequier, 1979b, p. 3]. Furthermore, AT should not be viewed as a universal substitute for conventional modern technology. Their roles can be complementary. Emphasis on AT does not and should not rule out the use of modern technologies "in those cases where they are particularly well adapted to local situations" [Jequier, 1979b, p. 3]. Indeed, the characteristics and aims of AT for different sectors should be different [see Figure 4.1].

Some Criteria

Much of the literature on AT has focused on the issue of "appropriateness." A lot of confusion about AT could be avoided if, from the beginning, it was made clear that no technology is

MODERN SECTOR		NON-MODERN SECTOR	
Characteristic	Aim	Characteristic	Aim
Reduced K/L _____ (K/O not increased)	increase employment opportunities	Raise K/L _____	increase productivity and employment opportunities
Simplicity of operation _____	reduce skill requirements	Reduce K/O _____	minimize skill and entrepreneurship requirements
Appropriate Products _____	eliminate 'excess' standards and help achieve appropriate technology	Small scale and therefore low cost of each machine _____	increase access to local entrepreneurs
Large or small scale _____		Local inputs _____	stimulate other activities
Urban and rural, mainly urban _____		Appropriate products _____	extend production activities of traditional sector and hence labor utilization
		Urban and rural, mainly rural _____	

Figure 4.1 Requirements of an Appropriate Technology for Modern and Non-modern Sectors

Source: F. Stewart, "Technology and Unemployment in LDCs," in E. Edwards (ed.), Employment in Developing Nations (New York: Columbia University Press, 1974), pp. 83-132, at p. 109.

technologically inappropriate [A. Mayhew and W. Neale, p. 13; DeGregori, p. 189]. Hence, the discussion about AT should be, as in this dissertation, derived not from a narrowly technological argument but from economic, institutional, and other viewpoints. "Philosophically, appropriate technology implies that the decision makers should have the wisdom to devise, plan, evaluate, and select from a wide range of technical solutions to a given problem . . . based on a broader range of criteria than has been true in the past. AT emphasizes the need to include social as well as economic criteria in these decisions. It advocates a greater number of economic indicators than are addressed in the normal economic feasibility study" [Betz, p. 3]. ATs can be generally described as technologies that are adapted to the social and cultural environment as well as economically and technically viable [Koloko, p. 587]. According to Betz, AT can be defined as "providing technical solutions that are appropriate to the economic structure of those influenced: to their ability to finance the activity, to their ability to operate and maintain the facility, to the environmental conditions involved, and to the management capabilities of the population" [Betz, p. 3].

Since the concept of "appropriateness" is specific to particular contexts, it is useful to state clearly that in this dissertation, "appropriate" is to be understood as appropriate for poor, labor-surplus, BNA-pursuing LDCs such as Bangladesh. Broadly, the criteria for AT can be categorized as economic and institutional. Some useful economic criteria are (1) low investment cost per workplace, (2) low investment cost per unit of output, (3) low cost

of final product, (4) high potential for employment, (5) use of local resources, and (6) efficient use of natural resources. Among the institutional criteria are (1) consistency with the fulfillment of basic needs, (2) organizational simplicity, (3) high adaptability to a particular socio-cultural environment, and (4) potential for easy diffusion in rural areas.⁴ According to Mayhew and Neale, another important institutional criterion for AT is the ability of a technology to cause suitable social disruption that does not lead to violent conflicts or socially destructive alienations. Successful ATs should increase labor productivity, reduce the cost of output, generate a necessary surplus for further development [M. Greeley, 1980, p. 154] and, wherever appropriate, induce institutional change.

Some trade-offs among these diverse criteria, and the resulting vagueness as to when a criterion is satisfied, are inevitable. More studies over a longer period are needed to gain better understanding of the quantitative dimensions of such trade-offs. Meanwhile, policy makers have to use their best judgments, changing with accumulating experience about AT in different LDCs, in weighting these criteria.

Appropriate Technology: Some Examples

A possible appropriate technology warrants attention if it (a) provides potential for more employment, (b) is profitable to the

⁴M. Betz, p. 3 citing R. Eckaus, Appropriate Technologies for Developing Countries (Washington, DC: National Academy of Science. 1977).

users and reasonably efficient, and (c) furthers the national goals of development. The standard approach to development has, in practice, held a deterministic view: that, due to fixed factor-proportions, choice of techniques, especially in manufacturing, does not exist. But there is growing awareness and accumulating evidence that "possibilities of substitution exist between labour and material inputs, between labour and working capital, between skilled and unskilled labour" [Bhalla, 1975, p. 311]. A series of case studies conducted by ILO on can making, jute processing, textiles, sugar processing, cement blocks, metalworking, and extractive industries, has established that (a) varying level of substitutability among factors is possible, and (b) capital-intensive solutions are not always efficient compared to alternative, less capital-intensive or more labor-intensive solutions.

The potential for such substitutability provides a broader range of choice of technique, especially when production is viewed as a series of processes, each consisting of a different activity or task requiring different inputs of unskilled labor, skills, and equipment. When any production process is disaggregated into a large number of tasks, factor proportions in each task or activity warrant separate examination [Bhalla, 1975, p. 315]. Such disaggregation implies that "a very labor-intensive method in one process (e.g., mixing cement on the ground) could be combined with a more mechanized one in another (e.g. the use of a block-maker)" [Bhalla, 1975, p. 316].

In Agriculture

That a potential for employment generation exists with more appropriate technologies has been demonstrated in a study of two villages in Bangladesh [see Tables 4.4 through 4.7]. The study concludes that "agriculture in each of two villages can productively absorb substantially more labour through increased cropping intensity, a shift towards more labour-using and productive cropping pattern and more intensive weeding, fertilization and interculture" [A. R. Khan *et al.*, p. 108].

In Rural Industries

In another study, the ILO [1978b] evaluated choice of technology in eight basic needs related food processing industries. The study included rice milling (Indonesia, India), maize milling (Kenya), storage of food grains (Zambia, Indonesia), coconut-oil processing (tropical regions), fish processing (tropical regions), cane sugar production (India), and bread baking (Kenya, Nigeria). The study evaluated the technologies in use, which ranged from primitive to modern in nature, and from very small to very large in scale.

The summary of the conclusions from the seven case studies are: (1) in a majority of these cases neither primitive, labor-intensive technologies such as hand-pounding of rice in family-level units nor capital-intensive, large scale units are as profitable and efficient as intermediate scale, partially mechanized units; (2) in some cases, for example rice milling, the coarse product of small

Table 4.4 Effects of an Alternative Intensity and Pattern of Cropping
in Two Villages in Bangladesh

	Bhatpara	Bhabanipur
Current Net Cultivated Acres	423	192
Current Gross Cropped Acres	678	308
"Target" Net Cultivates Acres	426	199
"Target" Gross Cropped Acres	852	398
Additional Gross Cropped Acres	174	90
Additional Acres under HYV Rice	140	75
Additional Acres under Miscellaneous Crops	34	15
Additional Cropped Acres to be Brought under Irrigation	140-174	75-90
Additional Cropped Acres as Percentage of Current Gross Cropped Acres	20-25	24-29

Source: A. R. Khan et al., Employment, Income and the Mobilization of Local Resources: A Study of Two Villages (Bangkok: ARTEP, ILO, 1981), p. 109.

Table 4.5 The Gap Between Actual and Potential Labor Use
in Two Villages in Bangladesh

	Bhatpara	Bhabanipur
Population	2,363	2,426
Number of Employed Persons	668	679
Average Number of 8-hour Days Worked per Worker per Year	275	261
Total Number of Mandays of Work	183,700	177,219
Additional Persons Who Could be Included in Employed Labor Force of Which Currently:	299	287
Unemployed	27	24
Inactive Male	89	65
Inactive Female	183	198
Target Number of 8-hour Days to be Worked per Worker per Year	283	283
Additional Workdays that can be Mobilized	89,961	96,159
Actual Workdays as Percent of Potential Workdays	67	65

Source: Adapted from A. R. Khan et al., Employment, Income and the Mobilization of Local Resources: A Study of Two Villages (Bangkok: ARTEP, ILO, 1981), p. 105.

Table 4.6 Employment and Income Effects of Increased Intensity and Changed Pattern of Cropping in Two Villages in Bangladesh

Source	Increased Employment (Man-Days)	Increased Income (Maunds* of Paddy)
I. Bhatpara		
Additional HYV Rice	13,496	5,740
Additional Miscellaneous Crops	3,230	(184)#
Increased Transplantation	994	1,242
More Intensive Weeding, Fertilization, and Irrigation	6,300	1,575
II. Bhabanipur		
Additional HYV Rice	7,095	2,318
Additional Miscellaneous Crops	1,425	(52)#
Increased Transplantation	265	414
More Intensive Weeding, Fertilization, and Irrigation	4,500	1,125

* A Maund is approximately 82 pounds.

Values in thousand Taka at 1979 prices.

Source: A. R. Khan et al., Employment, Income and the Mobilization of Local Resources: A Study of Two Villages (Bangkok: ARTEP, ILO, 1981), p. 111.

Table 4.7 Additional Production and Employment Possibilities in
Two Villages in Bangladesh

Activity	<u>Bhatpara</u>		<u>Bhabanipur</u>	
	Additional Employment (Man-Days)	Additional Income (000's Taka)	Additional Employment (Man-Days)	Additional Income (000's Taka)
Crop Production	24,020	1,567	13,285	727
Fishery and Horticulture (Rehabilitation of Ponds)	4,789	106	18,972	396
Handloom, Cottage Industries, Smithy, Carpentry, Masonry	19,791	724	18,270	673
Trade, Transport, & other Services	24,739	866	29,617	1,037
Capital Construction in Social Infrastructure, Roads, etc. and Residuals	16,622	199	16,015	240
Total	89,961	3,462	96,159	3,073

Source: A. R. Khan et al., Employment, Income and the Mobilization of Local Resources: A Study of Two Villages (Bangkok: ARTEP, ILO, 1981), p. 116.

mechanical mills is more nutritious than the refined products from modern, large scale, mechanical mills (although the demand for the two types are different in urban and rural areas); (3) in most of these cases initial investment costs in fixed assets are too high for large scale, capital-intensive techniques to be widely used in the poorer LDCs; (4) in most of these cases, the labor-displacement effect of more capital-intensive, large-scale operations and the potential for employment generation in small-scale operations are significant; (5) in most of these cases, the lack of necessary technical expertise for operation and maintenance of large-scale, capital-intensive technologies gives a decisive advantage to smaller-scale ones; and (6) in all of the modern large-scale, capital-intensive operations, the technologies are borrowed directly from the industrialized countries and used without any adaptation, which causes significant dependence on the source countries for daily operations as well as for maintenance.

A summary of the comparisons among five different technologies in use in the case of rice milling indicates that neither the two most labor-intensive techniques -- hand pounding and the wooden *chakki* (wheel) -- nor the most labor-saving technique in a multi-stage mill is profitable or economically viable [see Tables 4.8 and 4.9]. On the basis of the initial investment cost in fixed assets for a modern, multi-stage mill, a calculation of the potential output and employment of low-skilled labor at a low rate of

Table 4.8 Summary of Comparisons of inputs and outputs
among Five Rice-milling Technologies (1976)

Process Type	Hand- pounding ¹	Hand- milling ²	Small Mechanical Mill A ³	Small Mechanical Mill A ⁴	Large Mechanical Mill C ⁵
Scale: kg/hour/input	4	20	333	333	2,000
Utilization (day/year)	240	240	240	240	240
Low rate utilization (hour/day)	6	6	4	4	6
Low-skill labor required at low rate util.	1	2	3	3	18
Output (Rice) tonnes/year at low rate utilization	3.97	19.9	215	219	1,785
Milling out-turn (percent) ⁶	69	69	67	68.5	62
Output quality ⁷	(coarse)	(coarse)	(medium)	(medium)	(medium)

¹Pestler & Mortar (husker); ²Wooden Chakki (husker); ³Engelberg Steel Roller Mill (husker-polisher); ⁴Japanese Rubber Roller Mill (husker-polisher); ⁵Multi-stage Mill (husker-polisher with accessories); ⁶"Milling out-turn" = weight of whole plus broken rice kernels, expressed as percentage of the weight of paddy input (The maximum possible does not usually exceed 70-75 per cent; ⁷Rice output is termed "coarse" or "medium" according to the degree of polish normally achieved.

Source: Adapted from ILO, Appropriate Technology for Employment Creation in the Food Processing and Drink Industries of Developing Countries (Geneva: ILO, 1978b), p. 35.

Table 4.9 Summary of Economic and Employment Aspects of Five Rice-milling Technologies (1976)
(US \$)

Process Type	Hand- pounding	Hand- milling	Engelberg Mill	One-pass Rubber Roller Mill	Multi-stage Mill
Low rate utilization (hour/day)	6	6	4	4	6
Output quality	(coarse)	(coarse)	(medium)	(medium)	(medium)
Price/tonne	232	232	259	259	259
Revenues	920	4,600	56,000	57,000	473,000
Costs, high wage	1,700	6,100	52,000	54,000	996,000
Annual profitability after deduction of interest costs	-700	-1,500	4,000	3,000	-50,000
Initial investment costs in fixed assets	384	845	8,340	11,800	165,000
Manning requirement per 5,760 tonn/year of paddy input	750	n/a	27	27	18

Source: Adapted from ILO, Appropriate Technology for Employment Creation in the Food Processing and Drink Industries of Developing Countries (Geneva: ILO, 1978b), p. 36.

utilization is presented in Table 4.10.⁵ For US\$165,000 initial fixed investment in one multi-stage mill, 19 units of Engelberg mills or 13 units of Japanese roller mills can be built. Output and employment potentials for Engelberg mills are 128 percent and 500 percent, respectively, higher. In the case of Japanese roller mills, output and employment potentials are 59 percent and 333 percent, higher.

According to the ILO report, the common conclusions that emerge from these case studies are that "there is a choice of technology, that it is possible to weigh each choice systematically if not always quantitatively for its economic, social, and environmental merits, and that the uncritical adoption by developing countries of expensive, sophisticated, or highly mechanized industrial technology guarantees the best returns neither for its proprietors (though this depends on the industry, and sometimes on the particular economic conditions assumed) nor for those countries at large" [ILO, 1978b, pp. 71-72].

A similar study [K. M. Rahman, 1986] of the rural industries in Bangladesh investigated technologies used in five agro-rural industries: namely, gur(molasses)-making, oil pressing, handloom weaving, pottery, and bamboo products. The sample consisted of 154 enterprises of which 30 were in gur making, 30 in oil pressing, 29 in handloom, 34 in pottery, and 30 in bamboo products. For all the five industries, three or four different types of technique, ranging from

⁵Since large-mills usually run much below their capacity, the study assumed low rate of utilization to make the comparison conservative.

Table 4.10 Comparisons of Potential for Generating Employment

(Potential for Additional Mills, Output, and Employment with Alternative Mills at the Cost of One Multi-stage Mill in Parentheses)
(1976)

Process Type	Multi-stage mill	Engelberg mill	Japanese Roller mill
Initial investment costs in fixed assets (US \$)	165,000	8,340	11,800
Number of Mills	1	1 (19)	1 (13)
Output (tonnes/year, at low rate of utilization)	1,785	215 (4,085)	219 (2,847)
Total possible low- skilled employment at low rate of utilization	9	3 (57)	3 (39)

Source: Computed from Tables 10-11 in ILO, Appropriate Technology for Employment Creation in the Food Processing and Drink Industries of Developing Countries (Geneva: ILO, 1978b).

primitive to modern, were identified. The study focused on labor productivity, capital productivity, and capital intensity for different technologies in those selected industries.

Three different criteria -- (a) maximization of current employment, (b) output (measured by value added) per unit of capital, and (c) the rate of surplus per unit of capital -- were used to evaluate each choice of technology. The study found that in some cases, such as gur making, the criteria conflicted with each other; while in other cases, such as handloom and pottery, both current and future employment could be maximized simultaneously without sacrificing surplus per unit of capital. The findings of Rahman's study corroborate the conclusions of the ILO study cited above. The fundamental conclusion of Rahman's study is: "These results suggest that there are no inherent trade-offs between employment and output or employment and generation of economic surplus. Therefore the apprehension that preoccupation with short-run employment may lead to a loss of future employment and output seems to be unfounded" [K. Rahman, 1986].

In Biogas

A study on a renewable energy technology -- gobar-gas, a form of biogas from cow-dung, which has drawn special attention in many LDCs, including India and Bangladesh -- has established a significant potential for generating employment in the agro-rural sector [see Table 4.11]. C. Prasad, K. Prasad, and A. K. Reddy's study on Indian gobar-gas indicates that, at a capital cost comparable to a modern

Table 4.11 Benefits of Producing 230,000 Tonnes of Nitrogen

	Large-scale, Coal-based, Fertilizer Plant	Bio-gas Fertilizer Plant
Number of units	1	26,150
Capital cost (mill. \$)	100	90
Foreign exchange cost (mill. \$)	42	Nil
Employment	1,000	130,750
Energy	Uses about 35 MWH	Generates about 6.3 million MWH

Source: Adapted from C. R. Prasad, K. K. Prasad, and A. K. N. Reddy, "Bio-Gas Plants: Prospects, Problems, and Tasks," Economic and Political Weekly, Vol. 9, No. 32-34 (August 1974), pp. 1347-1363.

fertilizer plant and at zero foreign exchange cost, employment generated by small-scale bio-gas plants can be 130 times that in fertilizer plants. Such small-scale biogas plants also generate significant quantities of energy, as opposed to the consumption of energy by modern fertilizer plant. The benefits of such small scale, labor-intensive plants go much beyond generation of employment and energy [see Figure 4.2]. A similar study on biogas in Bangladesh [M. N. Islam, 1980] corroborates the findings of the Indian case.

Further Issues

Three other issues related to AT deserve special attention. First, employment-generating ATs do not automatically ensure fulfillment of basic needs. Access to employment and income should be "matched by a corresponding availability of basic wage goods" [Bhalla, 1979b, p. 26]. Indeed, the type of product-mix "largely determines the choice of technology" [Bhalla, 1979b, p. 37; Edwards, p. 28]. That appropriate product-mix and technology-mix are inexorably linked has been elaborated in chapter II.

Secondly, so far this section has dealt with the scope and potential from an economic viewpoint. However, an economic evaluation leaves the scenario incomplete because -- for example, in the case of gohar-gas -- serious social disruption may occur in the rural areas by depriving a segment of the rural population of "their only source of fuel and house plaster" [Mayhew and Neale, p. 22]. Mayhew and Neale also indicate some possible inappropriateness of the Green Revolution in some areas of India. Therefore "institutional"

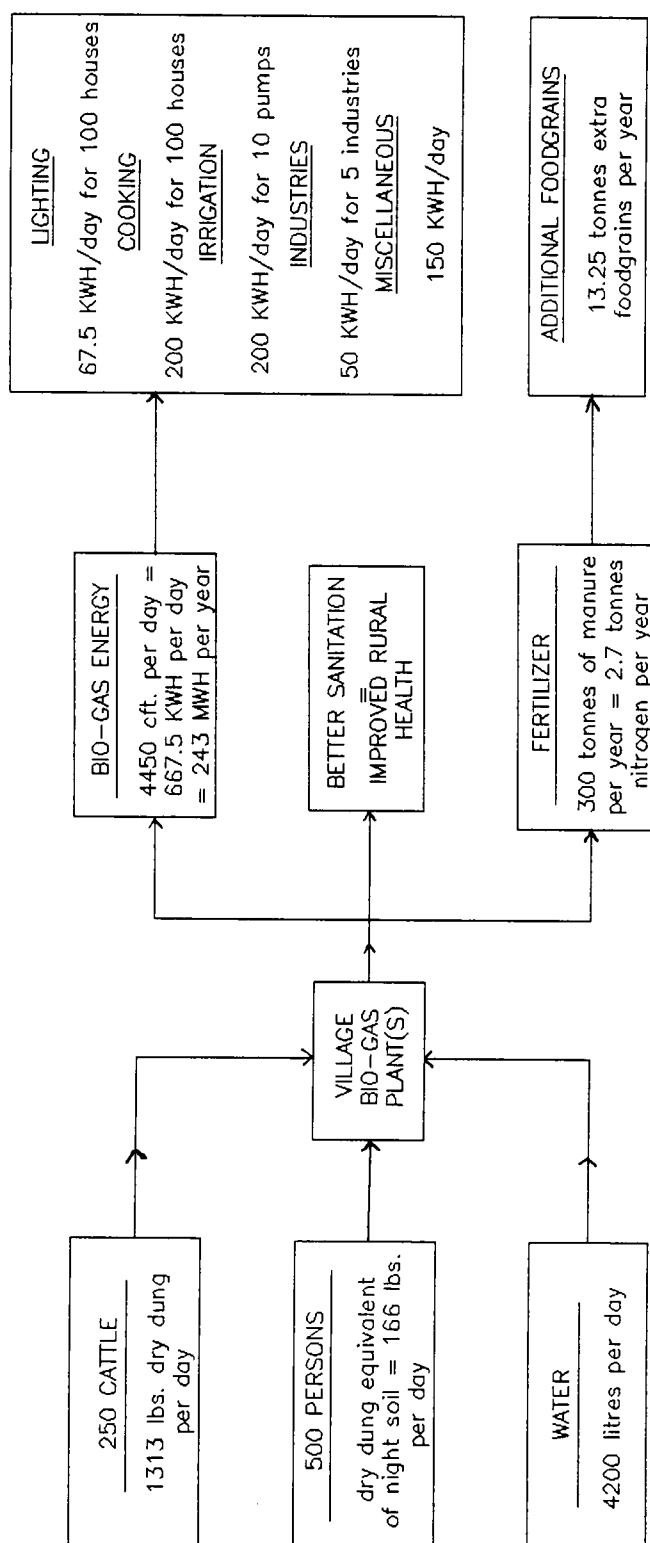


Figure 4.2 Benefits Accruing to a Village Through the Adoption of Bio-gas Plant
(A low gas yield of 3 Cft per pound of dry dung is assumed.)

Source: C. R. Prasad, K. K. Prasad, and A. K. N. Reddy, "Bio-Gas Plants: Prospects, Problems, and Tasks," Economic and Political Weekly, Vol. 9 (August 1974), pp. 32-34.

appropriateness has to be an integral part of evaluation of technologies in a particular context. However, the institutionalist view of AT can be reconciled when one deals with AT in the context of an integrated planning process that recognizes such social disruption and can turn it into one that is socially desirable [M. Farooq, 1988].

Thirdly, the technological problem is not merely lack of ATs, but also their adoption and diffusion. There are instances where "appropriate" technologies have not been adopted even when they were available [S. Biggs, 1976, p. 3; Alamgir, 1975, p. 275]. The problem of adoption and diffusion is at the core of technological development. No technology is appropriate for LDCs until the technology is adopted by the users. Tables 4.12 and 4.13 present the adoption pattern of selected agricultural inputs. The tables show that, except for chemical fertilizer and pesticides, use of power or mechanical irrigation in Bangladesh is negligible. Part of the reason for the lack of adoption is that such types of irrigation, though they increase yields, have a significant labor displacement effect. The farmers in Bangladesh have shown greater interest in highly productive, low-cost indigenous techniques that have spread almost of their own accord. In the last decade, irrigation by handpumps and bamboo tubewells has spread rapidly, with little or no subsidy or assistance from government or other organizations. Biggs [1975], in a study on Bangladesh, reports that rural credit is being found by small farmers to invest in irrigation technology that is suitable to their production needs. In such cases, they look for

Table 4.12 Use of Selected Agricultural Inputs by Owners and Owner-cum-Tenants on Their Own Land

Input	Owners		Owner-cum-Tenants	
	Number of Households (000's)	Percent	Number of Households (000's)	Percent
Chemical Fertilizer	2,535.9	64.20	1,414.1	62.76
Pesticide	1,130.3	28.62	620.8	27.55
Power Irrigation	40.7	1.03	28.7	1.27
Mechanical Irrigation	77.3	1.96	21.8	0.97
Other Irrigation	325.6	8.24	140.2	6.22

Source: F. T. Januzzi and James T. Peach, The Agrarian Structure of Bangladesh: An Impediment to Development (Boulder, Colorado: Westview Press, 1980), p. 114.

Table 4.13 Use of Selected Agricultural Inputs by Tenants and Owner-cum-Tenants on Their Tenant Land

Input	Tenants		Owner-cum-Tenants	
	Number of Households (000's)	Percent	Number of Households (000's)	Percent
Chemical Fertilizer	338.0	62.83	1,400.7	62.17
Pesticide	168.8	31.36	619.4	27.49
Power Irrigation	6.2	1.15	29.3	1.30
Mechanical Irrigation	5.2	0.97	30.4	1.35
Other Irrigation	73.9	13.73	153.3	6.80

Source: F. T. Januzzi and James T. Peach, The Agrarian Structure of Bangladesh: An Impediment to Development (Boulder, Colorado: Westview Press, 1980), p. 115.

suitable technology and size of equipment within the limits on the resources or credit available to them.

Planning and Policy-Making for Technological Development

Why Plan?

There are at least four reasons for planning rather than leaving technological development to chance. (1) The typical presence of externalities and uncertainties involved in technological change, especially in a technologically backward economy, makes the market mechanism unsuitable for the development and introduction of new technologies. (2) Since the effects of technological development only become observable in the longer run, the strict financial discipline of private firms and the high rates of private discounts may systematically undervalue the long-run value of a new or modified technology. (3) Interdependencies, even when they are market-based, are important in the development of new technology because they necessitate co-ordination between many different sectors over a long period of time. (4) The market mechanism increases risk-aversion in cases of uncertain investments in technological development, especially when the market mechanism is rudimentary, as it is in most of the LDCs [UNCTAD, pp. 256-257].

How To Plan

Since overall planning has shown systematic biases that work against giving adequate attention to the development and use of technology, technology planning should be separate and explicit.

Three kinds of such biases are: (1) a tangibility bias, or the emphasis of traditional development planning on tangible achievements -- such as irrigation dams, sugar mills, new roads, and canals -- rather than on understanding the more subtle, less quantifiable aspects of technology; (2) a simplicity bias, or the focus on those variables which can be dealt with more easily in a planning exercise -- such as easier quantifiability, simplicity of assumed relations between inputs and outputs -- rather than on an understanding of the complexity of technology as an entity, process, and influence; and (3) an articulation bias, meaning that "technology has often been neglected, largely because of failure to articulate the need to take it seriously" [UNCTAD, p. 258].⁶

These biases in development planning have led toward a new emphasis on more explicit and detailed articulation of technology planning and policy. "Technology policy is not synonymous with technology planning but is a basic function of government aimed at creating a framework in which decisions concerning technological choice can be made and implemented. Technology planning implies the existence of a formally constituted and internally consistent set of goals, objectives, and instruments."⁷

⁶"One of the main arguments for technology planning is to provide appropriate attention to technology in development through reasoned articulation. The point is not so much that overall development planning cannot take full care of technology planning, but that it does not. Hence the need for special attention" [UNCTAD, p. 258; emphasis added].

⁷UNIDO, p. 126; emphasis added.

It is not enough to articulate the goals of a technology policy; the instruments of implementing technology policies also need reevaluation. One such instrument is project appraisal using social cost-benefit analysis. The methods used in project appraisal can show systematic bias and may reinforce the already severe inequalities in the society. Project appraisal can and should be modified to address these problems.⁸

Four sources for appropriate technologies are: (1) revival of older technologies, (2) transfer and adaptation of existing technologies to a scale suitable for the receiving countries, (3) adaptation and improvement of indigenous technologies, and (4) invention of new technologies that are appropriate for the LDCs [Betz, p. 8; Stewart, 1977, pp. 102-103]. A successful planning for technological development must accommodate all of these sources. Although different LDCs, depending upon their current technological capabilities, resources, needs, and goals will have different priorities, the generation of new technologies by the poorer LDCs can be only a long-run goal. In the short-run these LDCs can emphasize building indigenous technological capabilities to deal with the first three sources. Only as these LDCs become adept and their indigenous technological capabilities become more mature, can they count on inventions. However, this should not mean that the fourth source

⁸The role of project appraisal in the context of a technology policy under BNA will be discussed in greater detail in the next chapter.

should be abandoned altogether in the present; but, rather, that it cannot be counted on as a primary source in the early years.

Chapter V

LINKING FINANCIAL INSTITUTIONS AND TECHNOLOGY POLICY

The previous two chapters having dealt with rural credit and technology policies in the LDCs, this chapter will examine three issues: (1) the nature and impact of conflicts between credit policy and the technology policy under GA (Growth Approach) and BNA (Basic Needs Approach); (2) the institutionalized technology policy proposed by B. B. Bhatt and how it might be extended to link macro-level technology policy with agro-rural development; and (3) the catalytic role of financial institutions, especially development banks, and the use of social cost-benefit analysis in inducing proper choice of technology.

Conflicts Among Credit and Technology Policies

Once the macro-goals of development are defined at the national level, other policies need to be harmonized with those goals [Bhatt, 1980b]. Tables 5.1 through 5.3, which are based upon the previous two chapters, present three scenarios comparing credit and technology under different approaches to development. In all three it is assumed, consistent with the situation in most LDCs, that currently there is no institutional link between decision-making about credit and about technology.¹

¹Bhatt [1980b] argues that in LDCs financial institutions and technology policies lack suitable link.

Table 5.1 Roles of Credit and Technology under the Growth Approach

	Credit	Technology
Final goal	Improving the living standard	Improving the living standard
Intermediate goal	Raising productivity	Raising Productivity
Process assumed	Adoption of new technology	Modernization through increasingly mechanized production process
Primary policy Instrument	Subsidized lending through specialized credit institutions	Incentives to import modern technologies by domestic and multinational producers
Observed effects	Lack of diffusion of new technologies	Greater capital intensity
	Increased inequality	Increased inequality
	Increased poverty and landlessness	Labor displacement/landlessness
	Increased dualism	Increased dualism
Goals & policies	Conflicting	Conflicting
Credit policy & technology policy	Reinforcing each other	Reinforcing each other

Note: Based on Chapters II-IV.

Table 5.2 Roles of Traditional Credit Programs and
Appropriate Technology Policy

	Credit	Technology
Final goal	Improving the living standard	Meeting basic needs
Intermediate goal	Raising productivity	Generating productive employment
Process assumed	Adoption of new technology	Planned technological development through institutionalized technology policy
		Building indigenous technological capabilities
Primary policy instrument	Subsidized lending through specialized credit institutions	Incentives to select/adapt from the existing shelf, or to generate new ATs
Observed effects	Lack of diffusion of new technologies	Greater diffusion and adoption of ATs
	Increased inequality and poverty	Decreased inequality and poverty
	Labor displacement and landlessness	Generation of employment in agro-rural sector (landless are absorbed in agro-rural industries)
	Increased dualism	Decreased dualism
Goals & policies	Conflicting	Harmonious
Credit policy & technology policy	Conflicting	Conflicting

Note: Based on Chapters II-IV.

Table 5.3 Roles of Rural Credit Programs under BNA
and Traditional Technology Policy

	Credit	Technology
Final goal	Meeting basic needs	Improving the living standard
Intermediate goal	Generating productive employment	Raising productivity
Process assumed	Adoption and Diffusion of ATs	Modernization through increasingly mechanized production process
Primary policy instrument	Mobilization of local resources for productive investment in the agro-rural sector Subsidized lending only as the last resort	Incentives to import modern technologies by domestic and multinational producers
Observed effects	Lack of diffusion of new technologies	Lack of diffusion and adoption of technologies
	Increased inequality and poverty	Increased inequality and poverty
		Labor displacement and increased landlessness
		Increased dualism
Goals & policies	Harmonious	Conflicting
Credit policy & technology policy	Reinforcing each other	Reinforcing each other

Note: Based on Chapters II-IV.

Scenario I -- Credit and Technology under the Growth Approach

Under GA both credit and technology are regarded as two important tools for achieving the final goal of improving the living standard of the people. But the observed effects [Table 5.1] of the policies designed to achieve the final goals indicate that there are conflicts between goals and policies for both credit and technology. Generally the effects of credit and technology policies are increased inequality, poverty, landlessness, and dualism. The policies designed for credit and technology reinforce the general goal-policy conflict. Since the credit policy and technology policy are designed under the same GA and the existing institutional structure supports GA, there is no conflict between credit policy and technology policy; they reinforce each other. Scenario I suggests a lack of harmony between national goals and the policies designed to achieve those goals.

Scenario II -- Traditional Credit Programs and Appropriate Technology Policy

When there is an articulated technology policy consistent with the goals of BNA, there is no goal-policy conflict [Table 5.2]. The intermediate goal of raising employment without an undesirably large sacrifice of efficiency, the process of institutionalizing appropriate technology policy, and the policies to promote indigenous technological capability -- the abilities to select and adapt from the existing shelf or to generate new AT (appropriate technologies) - are harmonious with the goals of development. However, the credit

policy being the same as under Scenario I -- promoting traditional rural credit projects -- there is a goal-policy conflict between the credit policy and the final goal. In addition, credit policy is now in conflict with the articulated technology policy for meeting basic needs. In such a scenario technology policy by itself -- i.e., without the necessary incentives and financial support for research, development, and adoption of AT -- cannot yield the desired result.

Scenario III -- Rural Credit Programs under BNA and Traditional Technology Policy

A third scenario, in which credit policies are tuned to a BNA without any change in technology policy, yields results similar to Scenario I [Table 5.3]. But in this case there will be goal-policy conflict between technology policy and the final goal, and also a conflict between technology policy and credit policy. Scenario III suggests that even if the credit policies are consistent with the final goal, and even if there is support from the financial institutions for adopting new technologies, the technologies would not be widely adopted because they are inappropriate -- they yield results inconsistent with the final goal of both credit policy and technology policy.

Such scenarios of goal-policy and policy-policy conflicts ought to be inconceivable because the LDCs spend so much in development planning; but that it is a reality is gradually being recognized. There are at least four reasons underlying such conflicts. First, the intimate linkage between finance and

technology has not been understood [Editorial Staff, World Development, 1973; Bhatt, 1980b]. Secondly, as in Scenario I, the final goal of development was more in the mode of a political speech than a guide to policies. Of course, whenever the planning process and its products merely serve the powerful, the result would be the same under BNA as well. Thirdly, as in Scenarios II and III, the inter-policy conflicts arise because the views in the formulation of policies for each aspect of development are most often myopic. Since the linkage between finance and technology was not well-understood, the policies were sometimes formulated without adequate attention to such potential conflict and, at other times, even when such conflicts were identified, they were ignored.

Finally, institutional barriers often prevent resolution of such conflicts. For example, as long as credit is available to the well-to-do segment of the population, and the modern labor-saving technologies serve the more well-off producers, there is no effective demand for a change of the *status quo*. National regimes, political parties, bureaucracy, planning apparatus, and rural elite protect the *status quo*.

Successful implementation of BNA in LDCs requires that these conflicts between the financial and technology policies be removed and a more harmonious policy-mix be formulated. From the technology side, the "starting point must be the improvement of the technological and organizational base of the traditional sector, the primary requirements for which being design and engineering ability, the type of ability that prevailed in the developing countries of the

nineteenth century with regard to the then technology. The other element of the strategy must concentrate on the growth of the modern sector that subserves the requirements of the traditional sector and is, in its basic design, complementary to traditional-sector development. This requires indigenous scientific and technological capability in order to identify, select, and adapt modern technology to specific needs and to innovate on the basis of the growing body of scientific and technological knowledge" [Bhatt, 1975, p. 655].

Project Appraisal in the Past

The macro-planning process, prevalent in most of the LDCs, consists of four basic components: (a) formulation of a macroeconomic policy based on a set of national goals; (b) translation of those policies into growth rates of various sectors; (c) allocation of resources to various sectors based on the planned growth rates; and (d) project formulation and appraisal [TAT, 1987a, p. 12]. The primary instruments of development planning for achieving stated overall goals are investment analysis and an assumed optimal allocation of resources -- in most cases based purely on the neoclassical paradigm.

Project appraisal has been an integral part of the planning mechanism of the LDCs. It is used in different ways by public agencies as well as private institutions and enterprises. Evaluation of projects has special relevance to this study because such appraisal is directly related to the process of making decisions about allocating resources against the background of goals (final and

intermediate), policies, and processes of development. Different socio-economic biases are ultimately reflected in alternative patterns of resource allocation.

Market prices are often used in cost-benefit analysis, though they are not useful for appraising projects where actual market prices do not reflect the true scarcity value of a resource. Instead, social cost-benefit analysis on the basis of accounting (shadow) prices should be used because, for instance, "if the employment objective is given high weighting, then labour-intensive techniques, even if they are not least-cost ones in terms of market prices, may be considered justifiable. What this means is that techniques which seem uneconomic on the basis of private cost calculations may score over capital-intensive ones if evaluated on the basis of social cost-benefit criteria. For example, ILO studies on road construction in the Philippines, Thailand, and Iran found that, when labour-intensive and capital-intensive methods were compared, shadow pricing showed the former to be less costly in social terms" [Bhalla, 1976, p. 192].

Different approaches to development have different implications for social cost-benefit analysis. If an LDC chooses GA, then projects would be chosen according to their viability and maximum possible contribution toward achieving economic growth and productive efficiency. If a country chooses BNA, then the social cost-benefit analysis would allocate resources according to the potential of specific projects to meet basic needs. Therefore, whether national goals of development would be achieved or not,

through decisions both by the government and by private investors and lenders, would depend upon whether the social cost-benefit analysis used were in harmony with the goals of development.

Another, often unnoticed dimension of project appraisal is technology choice. Every economic project, public and private, involves a choice of technology. If explicit and adequate attention is not given to technology choices, the projects may yield results contrary to the social goals of development. Therefore, decisions about resource allocation are linked with the choice of technology. However, "very rarely has the change in technology, involving change in technical knowledge manifested in new forms of physical capital and organization of the production process, been considered explicitly in planning" [TAT, 1987a, p. 12]. It is not surprising, therefore, that technology is usually "assumed away" and not treated as a crucial planning variable.

The problems of project appraisal as part of development planning, however, go much further. One of the most serious problems is lack of implementation of project appraisal. In a study of 110 randomly sampled USAID related projects in LDCs [G. Ellis, 1981], it was found that 49 percent of the projects did not perform either a benefit-cost or internal rate of return analysis.² In 25 percent of those projects, no analysis was done because the project designers lacked data and pertinent information [Ellis, p. 252].

²This study, quoted by Ellis, is particularly significant because USAID, being a donor organization, has stringent formal and bureaucratic requirements. If USAID's projects have such problems of implementation, then the problem for LDCs must be far greater.

First of all, data and information have to be gathered at all levels. Many LDCs do not adequately arrange for gathering and maintaining data and information, or for sharing data and information among different administrative and research agencies [TAT, 1987a, p. 12; TAT, 1987b, p. 35]. But lack of data and information is not an argument for avoiding project appraisal, but is, rather, an argument for a different and more relevant method.

Appropriateness of technology cannot be determined for a project unless potential alternative technologies are subjected to cost-benefit analysis. In reality, for those 110 projects, thorough evaluation of even one technology was unusual. The study found that "even when benefit-cost and internal rate of return analysis are conducted and presented, the assumptions are often such as to vitiate the analysis; alternative technologies are not considered, and technologies are demonstrably inappropriate" [Ellis, p. 251].

In comparing technologies, it is wise to recognize that the resource requirement for complete evaluation of each separate alternative technology would be prohibitive, while the search for AT should not and cannot be a search for some "perfectly" appropriate technology. There is always uncertainty about any technology, especially about its "institutional" appropriateness [Mayhew and Neale; Farooq, 1988; Ellis, p. 259]. Such uncertainty makes it difficult to subject the "institutional" appropriateness of a specific technology to formal, replicable methods of evaluation.

Appraisal processes in the LDCs suffer from three other serious problems. First, the bureaucratic process of project

appraisal leading to an approval or rejection takes a long time. Ellis noted a study on Central America which found that the minimum period from first application to a contract signing was two years; there was an additional long period before actual disbursement began. Secondly, the choice of techniques very frequently reflects a bias in favor of the planners and consultants. And, thirdly, the problem of information is acute, especially about technologies that are considered potentially appropriate for agro-rural development.

Given these problems, there is a need to develop appraisal processes that are grounded in the search for more appropriate technologies and can "provide more useful information to planners, provide needed analysis while circumventing local planning bottlenecks, reduce lag times in planning, allow more administrative control and evaluative feedback, and give more rein to local LDC planning" [Ellis, p. 252]. In addition, financial institutions have to play a technologically more-informed role in project appraisal.

Role of Financial Institutions in Technological Development

The agro-rural sector, at the farm or small enterprise level, is not expected to be the primary source of technological innovation in the LDCs. The primary target of any planning for agro-rural development should be to create an environment conducive to adoption of ATs. The RFMs (rural financial markets), both formal and informal, can provide a resource link between the national financial markets and successful diffusion and adoption of ATs in the agro-rural sector. If the process of technological development is divided

into two stages -- (a) generation and adaptation of technology and (b) diffusion and adoption of technology -- then RFMs can play a crucial role in the diffusion and adoption of ATs. Without an institutionalized technology policy which successfully generates and/or adapts technologies appropriate for particular sectors within a particular LDC, the RFMs will fail to help the agro-rural sector, whether adopting new technologies under GA or under BNA. This failure of the planners and policy-makers to recognize the connection of AT with the financial institutions in general and with RFMs in particular has caused the underachievement or often non-achievement of the goals of financial policies. Since diffusion and adoption of technologies by farms and small enterprises in the agro-rural sector is dependent upon the whole financial system, the policies and conditions related to RFMs have to be evaluated in the context of the national financial policies and institutions of the each LDC.

"The financial system (including the government, when it acts as a financier) has a pervasive impact on the processes and patterns of resource mobilization, allocation, and use" [Bhatt, 1980, p. 813]. In most of the LDCs, the government is the biggest financier of both economic and technological activities [H. S. Choi, p. 347]. Even many private financial institutions are significantly dependent on government.

Both the public agencies as well as the private financial institutions use some criteria for selecting projects for financing. Such criteria are related to a specific system of relative (accounting) prices and social cost-benefit analysis. Currently

financial institutions, public and private, usually evaluate a specific project or a set of alternative projects in which the technology choice has already been made. The fundamental choices about products, processes, and techniques are made at the stage of project design. "Once these choices are made, the financial system has merely the option of accepting or rejecting the project; its criteria cannot, however, affect the real choices to any meaningful extent" [Bhatt, 1980, p. 813]. Even at the stage of designing a project, the technology may have been chosen without any real evaluation because of incomplete information about the range of possible choices of technologies. Without better information about the range of choice, use of accounting (shadow) prices and social cost-benefit analysis may be misdirected.

Since (a) technology choice is crucial, (b) every decision about resource allocation involves an explicit or implicit choice of technology, (c) meaningful selection of technology is possible only when information about a fuller range of technology choice is available, (d) technological development as well as adoption and diffusion of new AT require financial support, and (e) the financial institutions, public and private, have the final say about the implementation of specific projects. Since all these are the case, there is a need for an appropriate, institutionalized technology policy that links the technology-related institutions and the production system through the financial system [Bhatt, 1980, p. 813]. Such an institutionalized technology policy, to develop indigenous technological capabilities and promote and diffuse ATs, would enhance

the usefulness of the project appraisal process and social cost-benefit analysis.

The entire financial system including the public and private sector cannot play the same level of role at the early stage of technological development. Since (a) the private sector is small in most LDCs, (b) the private sector does not currently play a significant role in research and development, (c) private enterprises are guided strictly by the profitability of their investments to themselves, and (d) the risk in technological research is high, the prospective contribution of the private sector to technological development is small. For the same reasons, private financial institutions would be unwilling to assume any important role in this framework, at least in the early stages. Therefore the primary thrust of an institutionalized technology policy has to come from the government and the public sector financial institutions i.e., the development banks [R. Evenson, p. 67].

An Institutionalized Technology Policy

B. B. Bhatt has made a valuable contribution to developing operational technology policies for the LDCs. His framework for an institutionalized technology policy has three aspects: (a) clearly defined national goals of development (in this case, meeting basic needs) and their relationship to technological development; (b) a set of policies identifying priorities, functions, processes, and incentives; and (c) an organizational framework for implementation of those policies.

Bhatt's macro-framework is based on the propositions that (a) human society must try to eradicate the problem of poverty, (b) "poverty can be removed only through full employment -- employment of each individual family at progressively rising levels of productivity," and (c), given the above two propositions and "given the natural resources, the problem becomes very specific and concrete: how to choose organizational forms and technology so as to fully employ the available and growing labour force and at the same time ensure each family initially a decent minimum level of living and later on a progressively rising minimum" [1980, p. 814]. These propositions are fundamentally the propositions of a BNA.

"The crucial problem," according to Bhatt, "is that of promoting the viable growth of the traditional sector and organically linking the modern sector growth with that of the traditional in a manner that supplements and reinforces the growth and the development of the latter. It is not possible to supplant the traditional skills and techniques by the modern ones; they cannot solve the poverty problem. Therefore, in terms of technology choice there are two problems: (1) the problem of upgrading the traditional technology; and (2) the problem of adapting and improving modern technology in a manner that is consistent with the development objectives, changing institutional structures and natural resources" [1980, p. 814].

The fundamental policy issues related to technological development appropriate for LDCs are: (a) reduction of technological dependence on the developed countries; (b) identification, selection, and adaptation when necessary, of foreign technologies according to

the context and need of a country; (c) developing an indigenous technological base, with necessary science-and-technology manpower, to become more capable of choosing foreign technologies and adapting them, and upgrading traditional technologies; (d) developing an institutional framework to link the functions of the technologists and of the allocators of resources. LDCs also need to devise incentives for (1) the developers of technology to develop profitable, cost-reducing ATs, (2) the entrepreneurs and their financiers to make proper choices of technology and help diffuse such technology, and (3) the users to adopt these profitable technologies; and (4) making technological development and social institutions mutually responsive to each other [UNIDO, 1984; Bhatt, 1980; H. J. Rush, 1984].

To harness the full potential of technology for development, an institutionalized technology policy should be based on a classification of national development projects according to three "technology domains": (a) the importing technology domain, (b) the traditional or indigenous technology domain, and (c) the exporting technology domain [TAT, 1987a, p. 16].

Projects belonging to the imported technology domain should be limited to those which are vital to a successful BNA, but that would require long periods and large amounts of funds to develop indigenously. Projects belonging to the second domain should be the primary emphasis in an institutionalized technology policy. The third domain, initially, would not be of much significance for most LDCs. However, as an LDC develops its indigenous technological base

and becomes successful in generating ATs through innovation or adaptation, it may find markets for those ATs in other LDCs.

Organizational Structures

The organizational structure of a technology policy proposed by Bhatt [Figure 5.1], consistent with BNA and the above "domain" classification, has five core components: (1) Project Identification Centers (PICs), (2) Technical Consultancy Service Centers (TCSCs), (3) domestic and foreign Technological Research Centers (TRCs), (4) the financial system, and (5) the production system or Project Implementation Agencies (PIAs).

Project Identification Centers: The problem of technology choice is encountered only after initial identification of the concrete ideas relating to the projects or project-complexes that have to be undertaken. PICs institutionalize identification processes for both the agro-rural and the modern sector. Identifying project ideas is the first step in the search for ATs.³

Technology Consultancy Service Centers: Once a project idea is identified, the functions of a TCSC are to select design machines, processes, and products and to select technologies. This requires: (1) knowledge of the initial conditions of both the production and the organizational structures; (2) identification of current knowledge and the ways in which that knowledge can be applied to solve the problem; and (3) identification of specific research

³See also J. Gatuirira, p. 113; V. S. Barrios, p. 115.

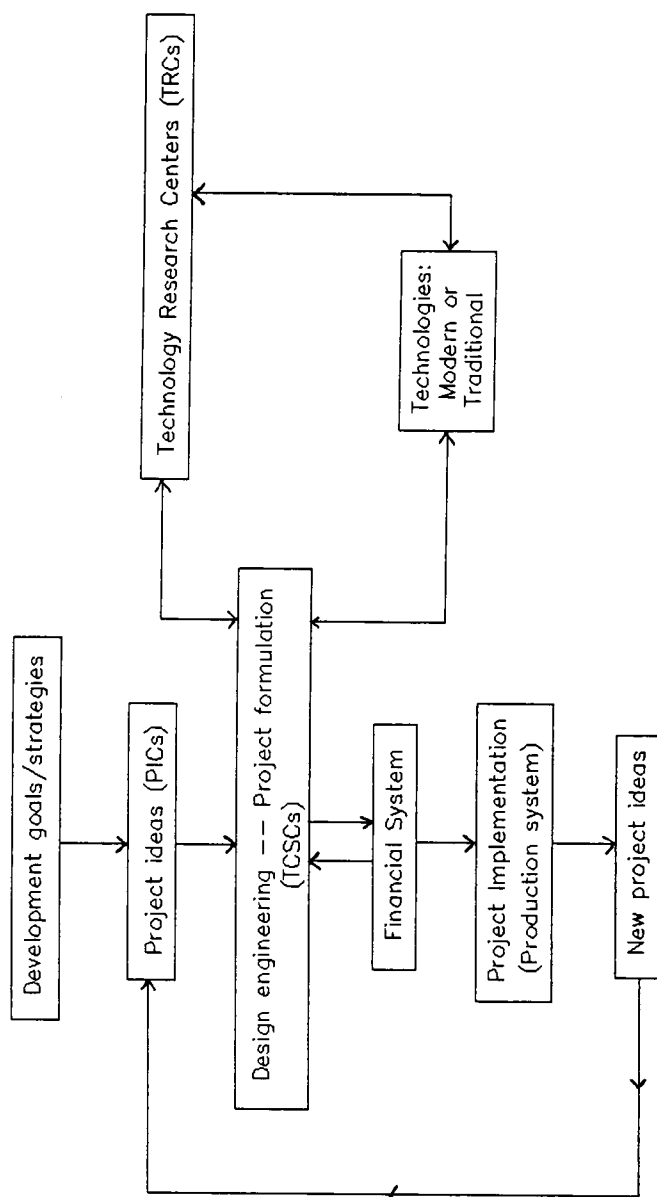


Figure 5.1 A Framework for an Institutionalized Technology Policy

Source: Adapted from B. B. Bhatt, "Financial Institutions and Technology Policy," World Development, Vol. 8 (August 1979), pp. 813-822.

problems and the ways in which they can be tackled within the country, or with necessary help from abroad.

The TCSCs reflect a country's level of indigenous technological capability. TCSCs should be developed with the capacity to: (a) "identify technological choice problems; (b) search for their solutions with the assistance, when necessary, of foreign TCSCs and domestic and foreign TRCs; (c) adapt creatively the suggested solutions to actual project making; (d) upgrade technology in the traditional sector (agricultural, cottage, and small industries); and (e) identify technological research problems and thus link the TRCs with the production system" [Bhatt, 1984, p. 815].

The primary function of *Technological Research Centers* (TRCs') is to carry out the technical research to solve the problems related to a specific project identified by PICs and designed by TCSCs. TRCs have meaning and purpose only when they work in the context of the design-engineering function of a TCSC and in relation to actual projects to solve specific problems as integral parts of a development strategy.

The *Financial System* is the entire spectrum of financial institutions and mechanisms that facilitate the process of financial intermediation and serve as the main channel of resource mobilization and allocation. Since the informal financial market is difficult to bring into an institutional structure, the policy-making and decision-making bodies have to focus primarily on the formal institutions. However, by lowering bureaucratic hurdles and thereby lowering transaction costs, and by mobilizing resources from the

agro-rural sector and allocating those resources primarily to the development of the agro-rural sector, the financial system may induce the informal RFMs to operate within a more formal structure.

Project Implementation Agencies (PIAs) are the administrative and technical apparatus at all levels, including village level project administration, that actually put a specific project into operation.

In Bhatt's model there are two possible functional sequences in an institutionalized technology policy. The first is: goals and strategy of development --> project identification (PICs) --> design-engineering in search for AT (TCSCs) --> financing --> project implementation (PIAs) --> new project ideas. This sequence can be applied to those cases where particular technologies are already identified as ATs that do not require further technical adaptation. The second sequence that links all these components is: goals and strategy of development --> project identification (PICs) --> design-engineering (TCSCs) --> technical research (TRCs) --> TCSCs --> financing --> project implementation (production system) --> new project ideas. According to Bhatt, the "central and crucial" significance in these sequences is the design and engineering function of TCSCs.

How such core components of an institutionalized technology policy are functionally interlinked with each other and contribute toward meeting basic needs of the LDCs is shown in Figure 5.2, which extends Bhatt's conceptual framework. The PICs identify project ideas relevant for a particular development strategy. Under a BNA,

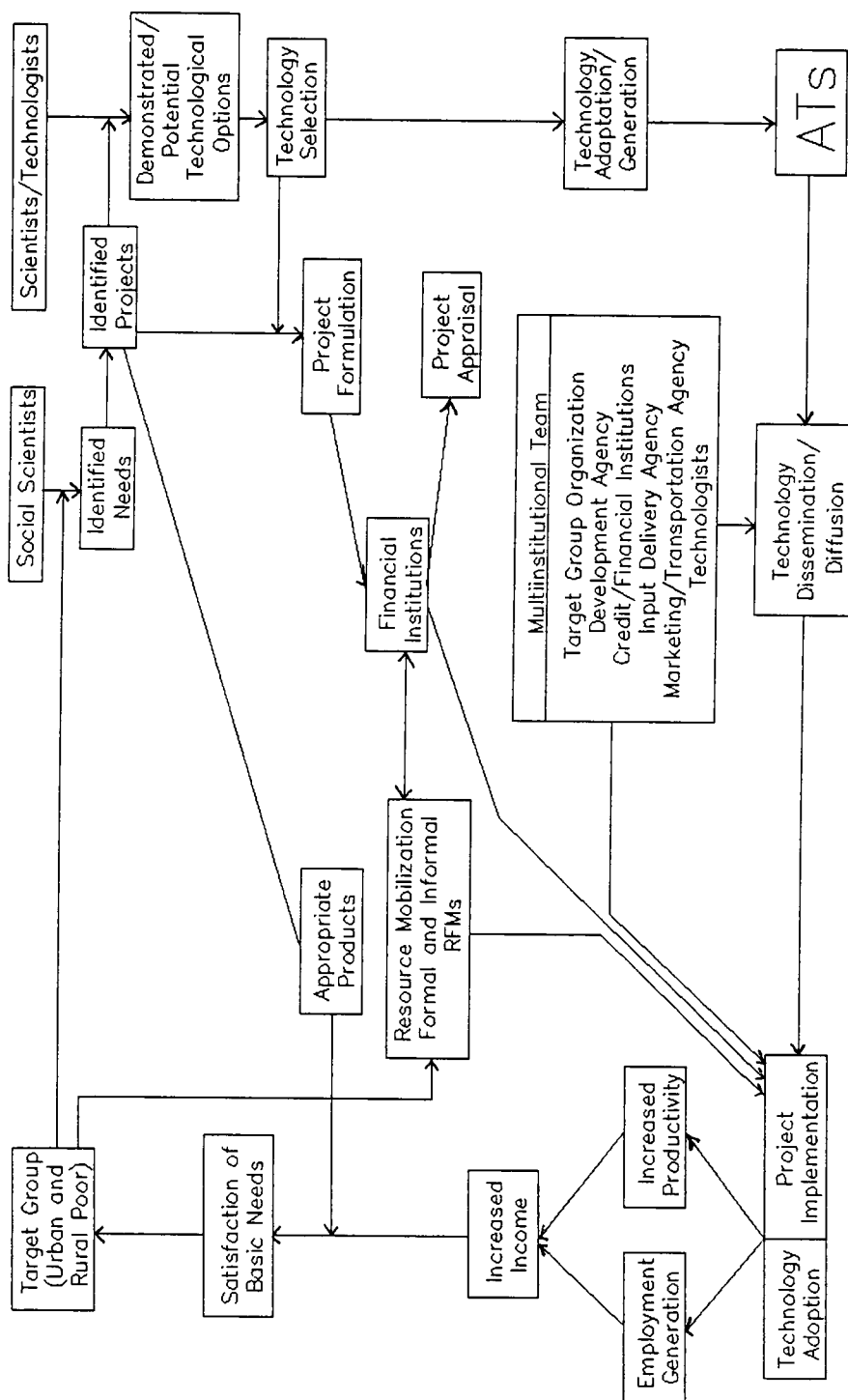


Figure 5.2 A Framework for the Promotion of ATs for Meeting Basic Needs

Source: Adapted from A. K. N. Reddy, "National and Regional Technology Groups and Institutions: An Assessment," in A. S. Bhalla (ed.), Global Action for Appropriate Technology (Geneva: ILO, 1977), pp. 63-137, at p. 99.

PICs would focus on potential projects that could help to fulfill the basic needs of the target groups by generating productive employment at rising levels of income and by producing basic-needs products. Social scientists, working within or outside the PICs, and with inputs from the target groups themselves, should actively identify, sort, and order the basic needs. Identifying a need or its relative importance also helps to identify a product -- "appropriateness" of products is defined in the context of the needs of a society.

Once a project idea is identified, scientists and technologists should search for technological options for that project, thus assuring that the technological input is incorporated at an early stage of decision-making and so allowing social goals as well as technological options to be considered in project formulation. These functions of identifying and selecting as well as of designing for adaptation are performed by TCSCs.

A formulated project is then submitted to relevant financial institutions for appraisal of the economic viability of the project. If the project as formulated and based on the selected technology is found to be economically unsound, then further research and development in technology is probably needed. For this reason, TCSCs must be functionally linked with the TRCs that carry out the actual technical research. Given the guidelines and designs from TCSCs, TRCs perform the necessary research for adaptation or improvement of an existing technology or for generating a new technology. Some countries -- for instances, Brazil, Mexico, and India -- have TRCs without TCSCs. TRCs without TCSCs in these countries have resulted

in problem-irrelevant research and thus have failed to forge any links with the financial system [Bhatt, 1980, p. 815]. Whenever and wherever the TCSCs are not functionally linked with PICs, the financial system, and the production system, technology policies have proven unsuccessful.

TCSCs thus provide the crucial link among all the components of Bhatt's framework. TCSCs "can function as a vehicle for absorbing and diffusing relevant modern technology, serving as an effective communication link with the foreign as well as the domestic sources of technology. At the same time, they can support and improve machine building capacities by providing machine industries with designs as well as links with the evolving production structure. Thus such TCSCs are an essential link between modern technology and domestic and foreign TRCs on the one hand and the financial system and the production system on the other" [Bhatt, 1980, p. 815].

From the functional sequences in Bhatt's framework it is clear which institution or function can and/or should play the "catalytic" leadership role. According to Bhatt, "since a project cannot be implemented without finance, the vital decision rests with the financial system (including the government when it acts as a financier). Hence the leadership function has to be assumed by the financial system; and this would be even more so when the financial system -- like the development banks -- has to play a promotional role in the development process" [Bhatt, 1980, p. 816].

In the following sections, I shall first, develop Bhatt's argument in greater detail and then subject his optimistic views

about the role of financial system in general and development banks in particular to a critical examination.

The Catalytic Leadership Role of the Financial System

As an essential part of the development process, almost all the LDCs have established development banks (in some cases, specialized banks for different sectors). Through their project selection criteria based on social cost-benefit analysis or economic evaluation of projects, these development banks are supposed to perform a promotional role of inducing enterprises to make proper technology choices. But such a role is usually inadequate or unable to meet its purpose because the projects that they evaluate are already formulated with specific technology choices at the project design stage. The primary emphasis of the financial institutions is, in most cases, limited to the economic viability and profitability of the project; development banks are not tied to PICs that identify problems or ideas. Furthermore, both the project identification and formulation task is performed primarily by foreign TCSCs or the domestic counterparts for large multinationals. Their project design usually is not based on shadow prices. Their choice of technique is primarily shaped by their experience in the modern industrialized countries. The comments, in this regard, of I. Little and J. Mirrlees, two leading authorities on project appraisal for LDCs, are quite illuminating.

[A] large number of economic choices will have been made already, either at the level of the initiating department, commission, or other decentralized public authority, or by

design engineers. Now industrial engineers -- good ones, anyway -- are economists, but they are not usually the kind of economists who are trained to look at matters from the point of view of the economy as a whole. They will, or should, have profitability very much in mind. But they will, of course, assess profitability in the light of actual prices.

The value of choosing from a list of projects according to a criterion using accounting prices, supposed to reflect real scarcities and benefits better than actual prices, is clearly greatly reduced if each such project has in effect been chosen from a long list of variants by a criterion (profitability) which uses actual prices. For instance, if it is desirable to put stress on employment by using low accounting prices for labour, then clearly this stress should take effect at the level of project design and not merely at the level of final project selection [emphasis added]. Indeed, it may be at the former level that a low accounting price for labour would have its main effect. . .

Of course, the sheer unfamiliarity will make for difficulty at first . . . where outside, especially foreign, firms of consultant engineers are involved, the difficulties may be greater. First, their psychological objections to accounting prices may be stronger as a result of private enterprise laissez-faire training, which does not sufficiently admit the possible divergence of social and private interest. Secondly, they generally have something to sell, which has usually been involved in the light of actual prices. Designs are not all made afresh, from the bottom up, for the project on hand. . .

Only very few western firms appear to have made any effort to adapt their designs to the different scarcities prevailing in developing countries. . . . Sometimes, indeed, the plant which western engineers design for a developing country is more 'modern,' -- i.e. capital intensive, potentially labour saving -- than anything that exists in their own country. There are two obstacles to overcoming the problem. The first, and possibly more important, is often the lack of an informed and critical client, determined to get a plant which will be very profitable. . . .⁴

⁴Bhatt, 1980, citing I.M.D. Little and James A. Mirrlees, Manual of Industrial Project Analysis in Developing Countries (Paris: Development Center of the OECD, 1968), pp. 64-66.

Little and Mirrlees, of course, emphasize that making proper choice of technology requires more than using accounting prices. Even if accounting prices are routinely used in project appraisal, "the range of choice is usually limited to actual alternatives already in use in the developed countries, especially with regard to the core processes and products" [Bhatt, 1980b, p. 817]. Such range of choice can be broadened only through active search for and creative adaptation of various alternatives from the world-shelf by indigenously capable institutions such as TCSCs.

A TCSC with mature indigenous capability can serve as an informed, vigilant, and critical client of foreign TCSCs or of the domestic counterparts of the multinationals. The existence of capable TCSCs may even induce many foreign firms to respond to the technological needs of the LDCs in a more relevant manner. Since the development banks play the primary promotional role, they can and should "actively support and/or help promote TCSCs that have adequate technological competence to ask the right type of questions to all the possible sources of technology -- TCSCs, TRCs, and enterprises anywhere in the world -- and evaluate the suggested solutions with regard to upgrading of traditional technology and creative adaptation of modern technology. The financial system without such domestic TCSCs would not be able to induce and enforce appropriate technological choices -- the very purpose for which it is using economic evaluation techniques to select projects for financing" [Bhatt, 1980b, p. 817]. Thus an institutionalized technology policy

can serve as the most effective means to make international transfer of technology relevant to a BNA path.⁵

Bhatt's argument for an institutionalized technology policy linking the financial system and the technology-related institutions is indeed well-expressed in an extended excerpt:

This vital link between the financial system and the TCSCs is even more essential in a context where the development banks have to play a promotional role in initiating a viable and widely diffused process of industrialization through the development of small and medium enterprises. This small-medium enterprise development is essential for several reasons: to develop latent entrepreneurial and managerial ability on a widely functional and geographical basis; to create employment opportunities on a viable basis for whole families and particularly for workers without much training and literacy in rural and semi-urban areas (to save on overheads and distribution costs); to improve the distribution of wealth and income.

Such small enterprise development requires an institutional machinery (i.e. TCSCs) -- linked to the financial system (development banks) -- for the identification of project ideas, preparation of feasibility studies, making appropriate technological choices, formulation of detailed projects with specification for machines, processes and products and providing assistance in project implementation and operation.

TCSCs can help the financial system in its promotional role as well as in appraising projects that the financial system would get directly from the project promoters. The centres should be autonomous; the financial system should support and/or help promote them but should not interfere in their functioning. Further, the financial system should not finance projects formulated by the TCSCs, without independent evaluation in terms of its social cost-benefit criteria. Such independent evaluation by the financial system serves a very essential function of appraising the soundness of the TCSCs themselves. The latter would have a compulsion to be up to date and alert; for, since the financial system

⁵For a detail discussion on international transfer of technology, see the "Draft Code of Conduct on Transfer of Technology," Pughwash Conferences on Science and World Affairs, World Development, Vol. 2, No. 4/5 (April-May 1974), pp. 77-82.

personnel would have experience of appraising a wide variety of projects, they would be able to judge effectively the performance with regard to technology choice of the TCSCs. Many government-operated TCSCs such as the Indian Small Industry Service Institutes have failed in their main purpose because of the lack of such a vital link between them and the financial system.

. . . If the TCSCs are indeed successful in their functioning, they should be able to enhance the profitability of projects, which obtain their assistance; this is in fact their very purpose. If so, they should be self-supporting in their operations as well as their growth. Hence, they should charge reasonable fees to both the promoters as well as the financial system. Further, the capacity of the TCSCs to generate their own resources is a good index of their fruitfulness and efficiency [Bhatt, 1980b, pp. 817-818].

Such a catalytic leadership role was performed by many banks in various countries of 19th century Western Europe. Bhatt refers to cases from France, Germany, and Sweden where development banks were, directly or indirectly, involved in the roles of identifying, designing, and formulating projects with the available design-engineering capabilities, supplemented when necessary by foreign sources. In Sweden, three large banks were more responsible than the technologists in formulating the national technological strategy, although none of the decision-makers in these banks were scientists or engineers. The banks themselves filled the gap of institutions such as PICs and PIAs and also partially performed the role of TCSCs, linking the people and institutions involved in technological research with the financial institutions. "Now, with the much greater complexity of these tasks and with the imperative need for domestic technological capability to adapt, modify, and improve both traditional and modern technology, the banking system cannot perform

these tasks without establishing TCSCs in relevant fields" [Bhatt, 1980b, p. 818].

Bhatt provides several instances of success of such a partially institutionalized technology policy in India ("although India did not have and still does not have a sound technology policy as an integral and vital part of development strategy") [1980a, p. 66; also see Editorial Staff, World Development, 1973]. These successful projects include ones dealing with bio-gas, baby-food, protein isolation, steel, and the Swaraj tractor [Bhatt, 1975, pp. 658-659].

The Swaraj tractor project is to the point. The Industrial Development Bank of India provided leadership in "establishing: (a) relevant TCSCs for performing the various tasks related to project-design work; and (b) their close and direct links with the banking system so as to enable the latter to perform its promotional role in stimulating a viable yet diffused process of industrialization in the backward parts of the country" [Bhatt, 1980b, p. 818]. When the Indian Ministry of Agriculture and the public sector decided to import tractors from the Soviet Union and Czechoslovakia, the Central Mechanical Engineering Research Institute (CMERI) came forward and convinced the national planners that India had the indigenous capability to design, engineer, and manufacture a 20 hp tractor appropriate to the specific Indians conditions. A prototype called "Swaraj" passed the tests of the Tractor Testing and Training Station. Yet the Ministry of Agriculture decided to import from outside. Then a provincial institution, the Punjab Industrial

Development Corporation, was attracted to this Swaraj design because it was indigenously designed and also because the tractor would be manufactured using expertise, materials, and equipment available in India; and the project ultimately succeeded beyond expectation. Bhatt showed that the project is "relevant to the process of creative adaptation of modern technology. The success of this experiment was primarily due to the organic and sequential relationship among the following tasks and functions. Identification of a project idea was the critical first stage. This was done by the Planning Commission in this case. The identification of available technological choices was the second; this was the function of a TCSC, in this case the CMERI performed this function. Identification of a research problem by a TCSC (in this case by the CMERI) was the third stage. The research on this problem by a TRC (again the CMERI) and the transmission of the research result to the TCSC (M/S Suri and Associates⁶) was the fourth stage. The detailed project report by the TCSC to the project promoter (Punjab Industrial Development Corporation) and the financial system (Industrial Development Bank of India) was the fifth stage.⁷

⁶A consulting firm associated with the Central Mechanical Engineering Research Institute.

⁷Bhatt's example of CMERI could be misunderstood in this context. In the Swaraj case, CMERI performed all the technological functions of a TCSC and a TRC. This shows the lack of institutional framework not allowing these functions to be performed by separate institutions. The case of CMERI only identifies and illustrates the technological functions. Bhatt did not articulate but the technological functions need independence not only from the financial institutions, but also within the technology institutions, TCSCs and TRCs.

In this organic sequential relationship, the critical functions were performed by the TCSC and the financial system (Industrial Development Bank of India) -- the functions of identifying relevant problems, embodying the research results meaningfully into a concrete project and facilitating its implementation. Without the TCSC, neither the relevant research problem nor a concrete project would have been identified; without the link between the TCSC and the financial system, the project would not have become an operational project. It appears from *a priori* reasoning as well as from this case study that the critical links in the process of creative adaptation of modern technology are the TCSC and the financial system; these two provide the essential links between the production system on the one hand, and the TRC and modern technology on the other. Without these two functional agencies, the production system and the technological research system are likely to evolve on parallel lines -- as it seems to have happened in a number of countries with TRCs [Bhatt, 1980b, pp. 819-820].

A Critique of Bhatt's Views

Although Bhatt's institutional framework provides a good foundation for institutionalization of technology policies, it is oversimplified. Firstly, he assigns the catalytic leadership role to the financial system in general and development banks in particular. However, the role of development banks in LDCs is now at the crossroads [UNIDO, 1980, p. 45]. Development banks in LDCs primarily function as the financing agents of the governments. The bias toward government policies is an essential dimension of development banks, but exposes these banks to ill-considered interference by government in their decision-making process. Development banks are often charged with finding shadow prices to justify proposed projects [J. S. Raj, p. 20].

If the development banks move away from government support, they may have to diversify their activities and also seek funds in a

financially competitive environment. Because of the very nature of the development banks, there cannot be total institutional independence from their governments. However, their role and operation must enjoy a fairly high degree of autonomy. Minimization of government influence on development banks is now considered proper and necessary; the idea seems to be that the relationships of development banks to their governments should be cooperative rather than one of dependence [UNIDO, 1980, p. 45]. Measures have been suggested that may allow such positive cooperation but with increasing independence of development banks in performing their roles. LDCs should adopt constitutional or legal charters with explicit and precise terms of reference that restrict the areas of government influence. LDCs should also adopt policies to insulate the declared functions of development banks from the obligation to finance projects or become involved in areas of development that reflect immediate political considerations at the expense of longer-term socio-economic goals [H. F. G. Leembruggen, p. 35]. But these measures, while easy to enact, may be ineffective because, in many LDCs, governments do not always behave according to their political or legal charters.

Three other measures suggested by Leembruggen appear more effective if successfully implemented: (1) ensuring, as far as possible, a significant private shareholding of the capital of development banks; (2) insistence on government to government guarantees (where foreign aid is involved) for investment that satisfy socio-economic criteria (consistent with national goals)

rather than the normal economic criteria; and (3) mobilizing their own funds and thus gradually becoming financially less dependent on governments.

Development banks can be financially more viable and less dependent on government funds if they are allowed to mobilize financial resources. Currently the development banks usually do not mobilize savings. Since many development banks are specialized to serve private enterprises, allowing some private shareholding may serve as a source of funds for development banks, may allow more interaction between private enterprises and development banks by including some representatives of private enterprises in the board of directors, and may add more respect and credence for the views of the banks.

Who should play the crucial role in social cost-benefit analysis is an important issue pertinent to Bhatt's framework. In his framework, development banks not only promote development activities and provide funds, but they also make the judgment about which projects to fund. Combining these roles together puts too much power in one body. Furthermore, since the development banks have been frequently alleged to misuse the process of project appraisal in justifying specific projects, it might be wise to put some checks on the power of the development banks. One such option ignored by Bhatt is assigning the function of estimating shadow prices to TCSCs. TCSCs, as non-financial institutions, are less susceptible to commercial bias. Although technologists will be the largest group in the TCSCs' staffs, since evaluating and selecting technologies are

multi-disciplinary tasks, TCSCs' staff should also include people with expertise in shadow pricing. Shadow prices computed by TCSCs should then be used by the development banks in their thorough social cost-benefit analysis. Also, it could be required that the TCSC certify that the project has made a reasonably acceptable choice from the available technologies and that no better alternative is clearly available. In addition, since calculation of shadow pricing of a particular resource is costly, TCSCs should maintain and provide up-to-date information on appropriate shadow prices of commonly used resources.

Bhatt does not articulate a role for RFMs in an institutionalized technology policy. Since BNA, AT, and agro-rural development are closely interlinked for poorer LDCs, RFMs need to play a more active role in the financial system. Currently development banks specialized for agriculture or small agro-rural industries function only as lending institutions. Studies on RFMs (mentioned in Chapter III) emphasize the role of RFMs in mobilizing resources. Also RFMs, when linked with the larger financial system to lend as well as mobilize financial resources, are vital for adoption of ATs [Figure 5.2, p. 155]. Since the informal markets play a larger role in rural finance, especially in adopting technologies, policies have to be devised to induce these markets to operate more formally.

The above criticisms are not intended to undermine Bhatt's framework, but rather to strengthen it. Table 5.4 summarizes the relationships between credit and technology under BNA.

Table 5.4 Roles of Rural Financial Markets
and Appropriate Technology under BNA

	Credit	Technology
Final goal	Meeting basic needs	Meeting basic needs
Intermediate goal	Facilitating BNs-oriented productive activities in agro-rural sector	Generating productive employment
Process assumed	Adoption and Diffusion of ATs	Planned technological development through institutionalized technology policy
Primary policy instrument	Mobilization of local resources for productive investment in the agro-rural sector Subsidized lending only as the last resort	Incentives to select/adapt from the existing shelf, or to generate new ATs
Observed effects	Adoption and Diffusion of ATs Decreased inequality and poverty Better utilization of borrowed funds Decreased dualism	Generation and promotion of ATs Rise of income of target groups Greater employment and decreased landlessness Decreased dualism
Goals & policies	Harmonious	Harmonious
Credit policy & technology policy	Reinforcing each other	Reinforcing each other

Note: Based on Chapters II-IV and the preceding sections in this chapter.

The Role of Private Sector

Both private financial institutions and private enterprises can utilize the services of a TCSC. Furthermore, when technologies are chosen to solve a particular problem for a specific project, the risk can be reduced by close interaction between the financial institutions and enterprises on the one hand, and the TCSCs on the other. Successful ATs that are widely adopted and prove profitable may give more confidence to the private financial institutions and enterprises to use indigenous capabilities and to adopt ATs themselves.

Although private enterprises may not be expected to take an active role in technological development, they do use cost-benefit analysis for their projects (although, of necessity, using market rather than shadow prices.) The government can formulate policies to make the private enterprises conform to the guidelines for making technology choices appropriate for the development goals of the country. Such policies may include, similar to the development banks, provisions requiring that the TCSCs' certification about acceptability of choices made about technologies. The government can also provide special tax incentives to enterprises for using local skills, resources, and equipment while removing incentives to use techniques that use imported inputs or equipment [Bhalla, 1976, p. 193].

Some Obiter Dicta on AT and Appropriate Institutions

The suggestion of an institutionalized technology policy linked to the financial system should not be read to imply an underestimate of the complexity of the problems in both planning and implementation. Neither an appropriate technology policy nor a BNA can be successfully implemented without institutions that simultaneously support the policy and are suitably "socially disruptive." Appropriate institutions in the sense of a broad array of behaviors, attitudes, norms, and rules embodied in the laws, organizations, and relationships were discussed in the previous chapter. Appropriate institutions that are conducive to social change -- toward something better, of course, but not for everybody in the same way -- are based on fundamental principles of social change such as "parental bent," "workmanship," and "creative destruction." Also, fundamental human values that reflect a genuine concern for the society in general and for individuals in particular are highly desirable. How to bring about such changes in society's attitudes, folkviews, and norms is beyond the range of this dissertation; indeed, beyond the abilities of economists alone. However, these fundamental problems needs recognition.

Similarly, problems such as land reform, inappropriate elitist rural institutions, and a non-participatory socio-political structure have to be dealt with to create an environment conducive to BNA and appropriate technology policy; but again, these problems are beyond the scope of this dissertation as well as beyond the boundaries of economics. For the success of BNA, the leadership of

the government is essential, but the very political structures and organizations in control of the LDCs today are the foremost barriers to meaningful and progressive change. Figure 5.3 shows how different power structures of a society and its other institutions influence agro-rural development through technology choice and distribution of income. Ultimately, success of agro-rural development depends on the commitment of the national political regime and on the power of the target groups within the local power structure to force an allocation of resources to technologies that meet basic needs, generate income and employment, and improve income distribution.

Among other institutions important for development of LDCs are the educational system and science and technology institutions. If the educational systems of the LDCs do not reshape their curricula, focus sensitively on the problems of each LDC, and develop scientific and technological expertise and facilities, then even the best technology policy would not be able to bring meaningful change to the LDCs.

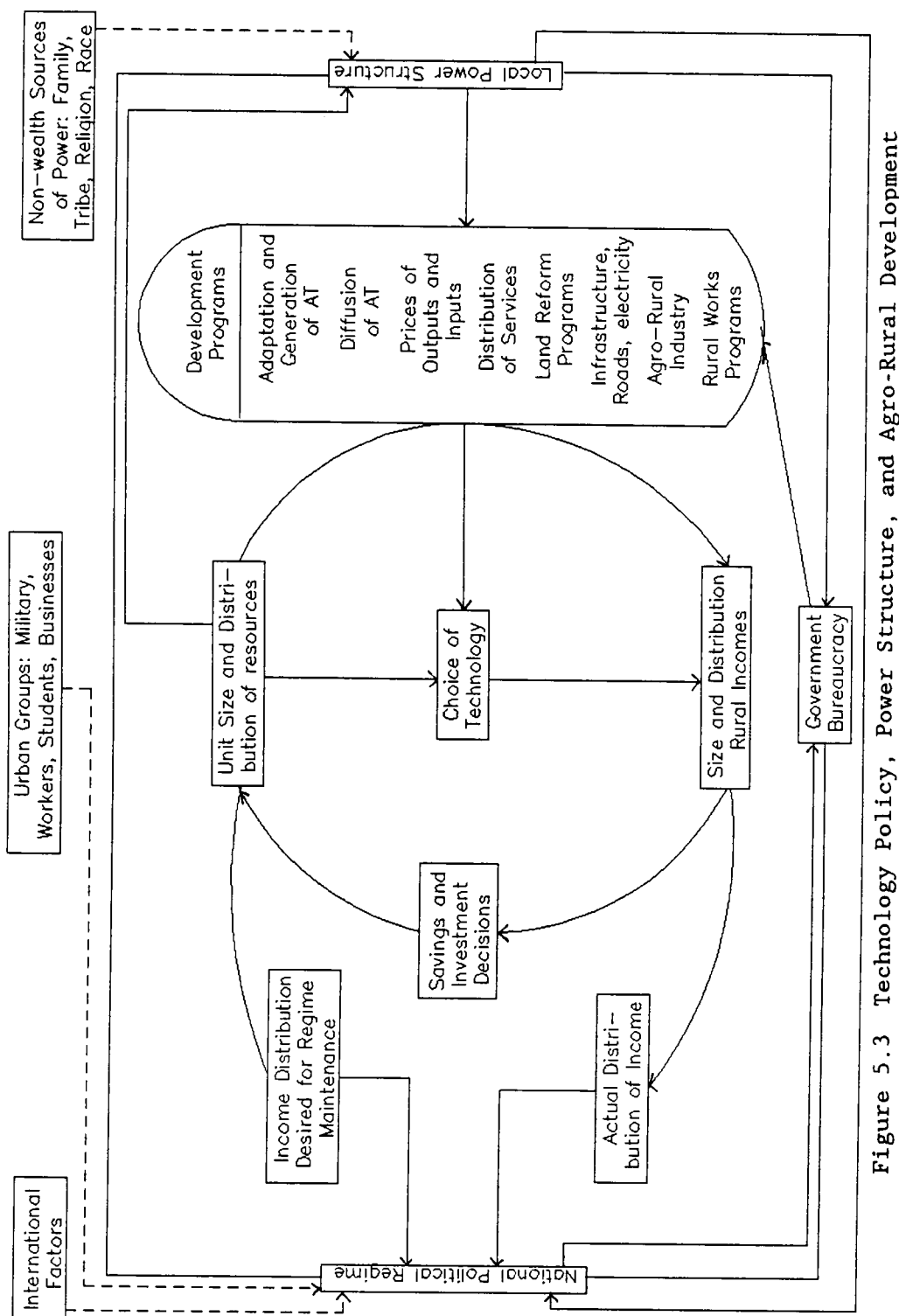


Figure 5.3 Technology Policy, Power Structure, and Agro-Rural Development

Source: Adapted from Carl Gotsch, "Economics, Institutions, and Employment Generation in Rural Areas," E. Edwards (ed.), Employment in Developing Nations (New York: Columbia University Press, 1974), pp. 133-160.

Chapter VI

TECHNOLOGY POLICY AND FINANCIAL INSTITUTIONS IN BANGLADESH

This chapter examines Bangladesh's evolving technology policy and financial institutions in the light of the argument in Chapter V and the performance of the existing system in contributing toward meeting basic needs, and then discusses some important successes and shortcomings where Bhatt's framework may prove useful.

Technology Policy and Planning in Bangladesh

Since its inception in 1971, two five year plans (1st FYP and 2nd FYP) and one two year plan have passed and development efforts are now continuing under the Third Five Year Plan (3rd FYP). Although all the previous plans, under Pakistani rule and since independence, have included statements about the role of technology in development, no specific policy was formulated to deal with technology as a strategic variable. It was not until 1980, under the 2nd FYP, that the first-ever attempt was made to formulate a national policy for science and technology [APCTT, p. 12].

Broad aspects of the 1980 draft policy include the intention:

- (1) To create a condition favourable to the development of science and technology [S & T];
- (2) To develop scientific and technological capability to generate, select, absorb, use, maintain, and operate technology;
- (3) To identify national needs where (S & T) are to be applied for socio-economic development and to tailor S &

T to those needs particularly in the area of agriculture, food, energy, power, water, petroleum and mineral exploration, population control, education, health, housing, industry, environment, etc. Some basic research is also essential to keep abreast of S & T development in outside world;

- (4) To identify the most appropriate technologies for utilization of major indigenous resources (people, their educational level, minerals, climate, soils, etc.) [emphasis added];
- (5) To develop close interaction and co-operation between scientist/technologists, planners, policy-makers, and executives;
- (6) To link S & T development to an effective manpower planning and integrate it into the overall national development plan;
- (7) To develop close link between producers and users of technology; and
- (8) To develop capacity for innovation among the citizens and give them the means to try out their new ideas and build self-confidence [GOB, 1980, p. 604].

Three major decisions were made to implement this policy: that (1) "Science and Technology be given topmost importance in national development process; (2) Science and technology be coordinated at the highest national level; (3) One single National Council of Science and Technology (NCST) be constituted for the overall formulation, implementation, and coordination of the national scientific and technological research and development activities and all existing national research councils in the country be reorganized into sectoral coordinating research agencies/organizations and function under the general guidance of the NCST" [GOB, 1980, p. 604].

Although explicit, this draft was no more than a brief statement of broad objectives and good intentions containing some

"ambitious investment and organizational proposals" [APCTT, p. 12]. The grand organizational proposal was to create an S & T Ministry to coordinate diverse research organizations around the country. It ultimately did not turn out to be feasible: lacking support from the research institutions, the 1980 draft policy did not make headway. None of the broad aspects of the draft were realized. However, this "first ever policy declaration regarding recognition of technology for national development" [APCTT, P. 13] has served as a guideline for all subsequent development in technology planning.

In 1985 a Science and Technology Division was created under the Ministry of Education. The Division prepared another draft S & T policy and submitted it to the newly constituted National Committee for Science and Technology (NCST). This time the Division undertook to solicit inputs from the scientific and technological community in the country before the approval and implementation of the policy. In this draft policy, the role of technology was once again explicitly recognized.

According to the draft, among the existing major constraints to development of the country are: "the limitation of resources, shortage of skilled scientists, technologists, and technicians, inadequate research facilities and skill development programmes, lack of coordination among scientific organizations, outmoded science curricula, dependence on foreign technology, brain drain and mass exodus of trained manpower, and poor social recognition of the role of science and technology in national development" [APCTT, p. 13, emphasis added].

The draft policy further recognized that "a national priority should, therefore, be the integration of scientific and technological considerations with the overall development strategy of the country."

Basic objectives of the Technology Policy will be to:

- (a) guide the formulation of a Technology Plan which is to be integrated with the National Plan;
- (b) attain national capacity for autonomous decision making in technological matters through promotion of technological competence and self-reliance;
- (c) ensure transfer and utilization of results of research in the production sectors of the national economy;
- (d) ensure provision of facilities for transfer and productive utilization of research results through the institutionalization of engineering design, prototype development, and commercialization of products in the relevant sector corporations and individual units in both public and private enterprises;
- (e) reduce vulnerability, particularly in strategic and critical areas, making optimal blending of indigenous and imported technological resources;
- (f) devise appropriate legal, fiscal, and financial instruments for selection, importation, absorption, and adaptation of foreign technology;
- (g) ensure establishment of institutional facilities for relevant knowledge assimilation and skill development for the learning-absorption process for imported technology;
- (h) generate technologies which are internationally competitive, particularly with export potential;
- (i) ensure development of support facilities like information and documentation services, computer service and software packages, standardization and quality control;
- (j) ensure proper appreciation of ecological, environmental, energy conservation, employment generation, and social justice consideration while importing technology; and

- (k) provide support to emerging technologies like biotechnology, genetic engineering, micro-electronics, new and renewable source of energy, etc. [APCTT, pp. 13-14].

The fundamental emphasis of this draft is on the "establishment of a national capability for development of indigenous technology and attainment of a national capacity for the assessment, selection, acquisition, adoption, and adaptation of foreign technology" [APCTT, p. 13]. According to the draft, "the major elements of Science and Technology Policy include organization and coordination of existing research laboratories and scientific institutions, careful selection of problems facing the country in different economic sectors including Agriculture, Industry, Energy, Health, Transportation and Housing" [APCTT, p. 13].

Although 1985 draft is clearer and more concrete than the earlier, 1980 draft, there is no fundamental difference between the two. In fact, both are so all-embracing that they could not provide guidance, so it is no surprise that the draft is yet to be translated into an operational technology policy. Only such a technology policy can give meaningful direction to the country's technological development. The commitment to adoption of "appropriate" technology for economic development still remains at the level of sporadic mentions in the medium term plan documents. However, many interim steps have been taken since the 1st FYP, supposedly toward better management of technological development.

Broad Perspective of the 1985 Draft S & T Policy

The 1980 and 1985 Draft recognize that the country's economic development has suffered in the past due to lack of integration of technology planning into national development planning. The absence of national priorities, combined with the lack of a matured indigenous technological capability, has encouraged the import of capital-intensive foreign technologies, most often without any search for alternatives and without any regard to the social objectives of development.

The 1985 Draft has been formulated against the backdrop of the 3rd FYP (which is currently at the early stage of its implementation). The five primary long-run objectives toward which the 3rd FYP is expected to make significant contributions are: (a) reduction of poverty through meeting basic needs using a target-group approach; (b) achievement of healthy economic growth consistent with the basic needs approach; (c) population control; (d) elimination of illiteracy; and (e) energy development through conservation as well as generation of energy harnessing the renewable resource base. Three other intermediate objectives are: (a) self-sufficiency in foodgrains by the end of the 3rd FYP; (b) major progress in employment generation through continued building of rural infrastructure and the encouragement of non-farm rural industries; and (c) an adequate supply of safe drinking water and sanitation in rural areas.

When the 1985 Draft is evaluated¹ against the background of the broad objectives of the 3rd FYP, major shortcomings seem obvious. First, the Draft fails even to mention meeting basic needs and reducing poverty as two primary objectives of the future S & T policy of Bangladesh. Although it makes a commitment to "ensure proper appreciation of ecological, environmental, energy conservation, employment generation, and social justice consideration while importing technology," it fails to establish a hierarchy of priorities for the nation [APCTT, p. 14]. Because not all the objectives can be achieved in the same period, given the resource and institutional constraints, technology planning must have a set of priorities in terms of national goals so that those goals can guide the process of making choices unambiguously.

Secondly, the aims of the 1985 Draft fail to establish sectoral priorities. Although it calls for an "optimal blend of indigenous and imported technological resources," it fails to ensure a sense of urgency about the development of indigenous technological base for agro-rural development. "Reduction of poverty" through BNA (Basic Needs Approach) cannot be achieved without primary emphasis on those small-scale technologies relevant to agro-rural development. The constraints of indigenous institutions and the limited capacity to mobilize resources require such technologies [N. Islam, 1978, pp. 46-47]. Since the beginning of the 1st FYP, the government has felt the need "to transform . . . agriculture with a view to attaining

¹Essentially all criticisms of the 1985 draft are applicable to 1980 draft as well.

self-sufficiency in food grains" [APCTT, P. 16], but there seems to be no correspondence between the development objectives and the draft S & T policy.

Thirdly, the Draft does not provide any time frame for the implementation of the technology policy. Its focus ranges from technological blending to such high technology as genetic engineering to internationally competitive or exportable technologies. It does not indicate any priorities among these technology domains. It also fails to set a target for technological development during the 3rd FYP. As has been argued in Chapter IV, LDCs need to set time-phased priorities for particular domains of technology. For instance, LDCs need technologies that are most suitable for domestic adoption, and only in the long-run can poorer LDCs such as Bangladesh become generators of internationally competitive technologies.

Fourthly, the Draft fails to address the problems of institutional bottlenecks. The Draft uses "lofty" words such as "giving the highest national grade of pay and status to the scientists and technologists," but it does not explain why such has not been the case in the past or how is it to be achieved in the future.

Current Organizational Framework for Technological Development

To better understand the implications of the proposed technology policy, it is important to examine the evolution of technology-related organizations and the interim steps taken by the government toward a more planned technological development.

The 1st FYP prepared in 1972 was designed to help the economy recover from the devastation of the 1971 civil war that brought the new nation into existence. In planning for different sectors of the economy, the technological aspects were left without directions. However, a few research and administrative organizations were created or reorganized to meet immediate needs. Among those organizations were: (a) a National Consultative Institute to function as a clearinghouse of information and a guiding body; (b) a National Productivity Council to serve as a clearing house of information on productivity for the "federated unit of all industrial research and development institutes;" (c) an Institute of Industrial Technology to foster engineering capability; (d) an Institute of Chemical Technology; (e) a Leather Development Center; (f) a Jute Industries Development Center under the Jute Mills Corporation (jute was Bangladesh's largest source of export earnings until the late 1970s); and (g) an Agricultural Research Council and a Rice Research Institute to serve as in-house research facilities.² The respective public sector development corporations were supposed to manage these organizations. Unfortunately, most of organizations were not even initiated during the 1st FYP, and many of them were discarded or drastically reorganized during the 2nd FYP.

Without explanation of the failure to implement the technology-related programs under the 1st FYP, a new set of programs was formulated for implementation during the 2nd FYP. These new

²APCTT citing GOB, 1st FYP, pp. 245-247.

programs included establishment of: (a) an Institute of Technology and Engineering Consultancy; (b) separate design-development offices at engineering enterprises; and (c) closer linkages between research establishments, academic engineering institutions, and industry.³ These programs too, unfortunately, were not fully implemented. The projects undertaken under the 3rd FYP and the ideas behind those projects are basically the same as under 2nd FYP.

One might hope that the S & T policy drafts of 1980 and 1985 represented the beginning of the government's evolving commitment toward integration of technology as a "strategic" variable of development. However, those drafts have not even yet been made operational. Until that happens the country truly lacks an articulated technology policy with the necessary institutional framework [APCTT, p. 20].

Currently the focal point for technology related decision-making at the national level is the National Committee for Science and Technology (NCST). Figure 6.1 presents the organizational structure of the NCST after several restructuring in 1972, 1974, 1976, and 1984. Initially the Science and Technology Division, currently under the Ministry of Education, had the primary control over all other technology-related bodies. Although the last restructuring in 1984 decentralized and placed those institutions under several ministries, the number of ministries and people involved suggest that the structure may be unworkable, even with the

³APCTT citing GOB, 2nd FYP, pp. XII-26.

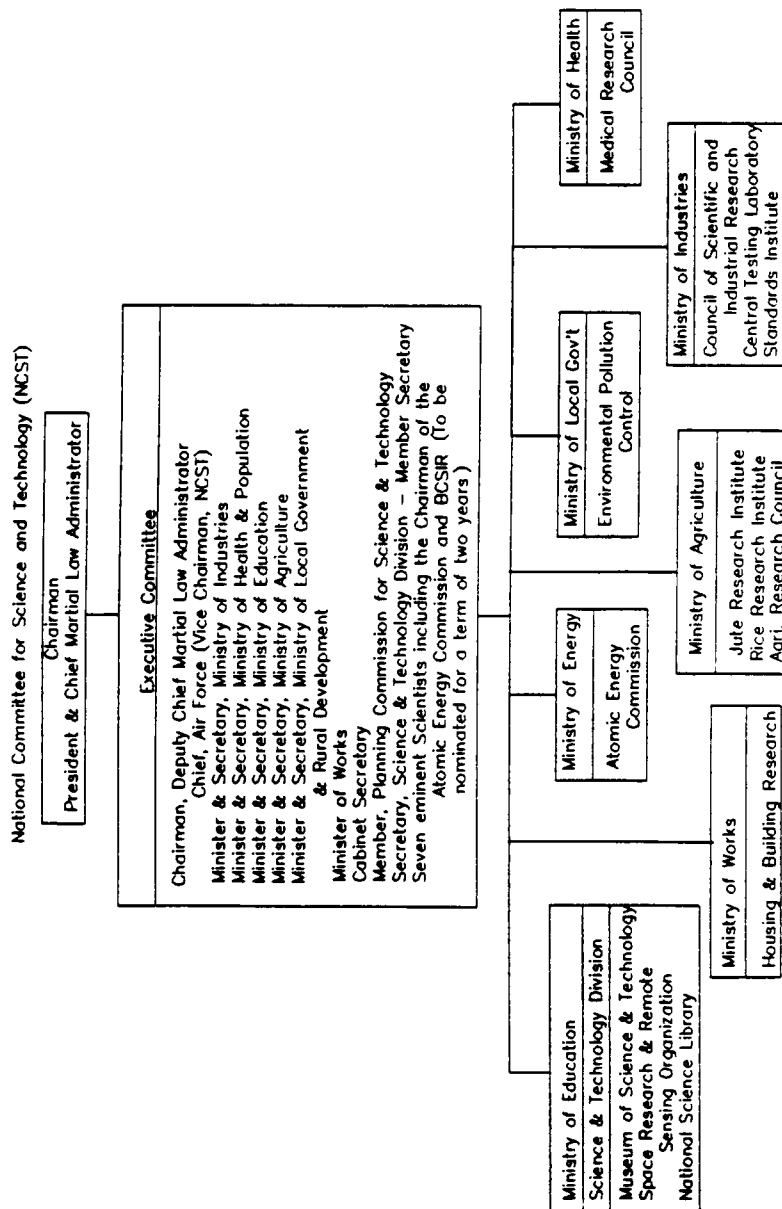


Figure 6.1 National Technology Authority in Bangladesh

Source: Based on Chapter 3, APCTT, Technology Policies and Planning: Bangladesh (Bangalore, India: APCTT, 1986).

best of will in the world. The S & T Division functions as the Secretariat of the NCST and is responsible "for all matters connected with the growth and promotion of Science and Technology in the country" [APCTT, P. 24]. Although the S & T Division's direct administrative control has been reduced significantly, the following list shows that this Division still shoulders a range of responsibilities that are beyond the capacity of even the most capable, efficient, and resourceful organization. These broad functions of the S & T division include:

- (a) Formulation and review of National Policies on S & T in pursuance of national objectives and plans;
- (b) Implementation of the recommendations of the NCST;
- (c) Coordination of areas of S & T in which other Ministries have interests and capabilities;
- (d) Undertaking and financial sponsoring of scientific and technological surveys, research, design, and development wherever necessary;
- (e) Administering grants to national research institutions, scientific associations, and other scientific bodies;
- (f) Promoting indigenous ATs especially the commercialization of such technologies;
- (g) Maintaining liaison with relevant international organizations and guiding the process of transfer of technology from abroad; and
- (h) Cooperating with all other national level S & T bodies in pursuance of their specialized role [APCTT, pp. 23-24].

Current structure of the S & T organizations in the country indicates that the bureaucracy reigns strong. Since the development banks and the Department of Industries, with the co-operation of the Chambers of Commerce and Industries, play an instrumental role in

determining the technological priorities of the private sector, the lack of participation of the development banks, the private financial institutions, or the entrepreneurial community in the Executive Committee of the NCST is noticeable. Although a national Consultative Committee, which consists of the scientific, technological, and business community, collaborate with the government in determining the national investment schedule, it does not have a formal role in technology-related decisions.⁴

The public sector has total control of technology-related decisions for the country. One primary reason for such control of the public sector is the country's overwhelming dependence on foreign aid and foreign investors. The international donor agencies, foreign experts and consultants, and the local organs of Multinational corporations are the primary sponsors of the major development projects. Their role in choice of technology is overriding.

Mechanism for Implementation of Technology-Related Decisions

Although no formally articulated technology planning or policy is currently in operation, there is an established but diffuse and fragmented mechanism for implementing technology-related

⁴The Consultative Committee is composed of the following members:

- (a) President, Federal Chamber of Commerce and Industries;
- (b) President, Metropolitan Chamber of Commerce and Industries;
- (c) Secretary, Ministry of Industries;
- (d) Director General (DG) and Deputy DGs, Industries Department;
- (e) Chief Controller, Imports and Exports;
- (f) Representatives, Development Finance Institutions;
- (g) Representatives from Bangladesh Standard Institute; and
- (h) Bangladesh Agricultural Development Corporation.

decisions and policies. Since the development projects that have major implications for generation of ATs are funded through the public sector, the decision mechanism in the public sector has direct relevance to technological planning and development of the country. Figure 6.2 presents the process of such decision making in the public sector.

Public sector projects are initiated at the enterprise or departmental level by preparing and submitting a Project Proforma (PP). A "PP" is a standard form prescribed by the Planning Commission. All public sector projects must be initiated by submitting a PP to the respective ministry: if it is an agricultural project, then to the Ministry of Agriculture; if a forestry project, then to the Ministry of Forestry; and so on. The Planning cell of the particular ministry, called the Departmental Project Evaluation Committee (DPEC), evaluates the investment proposal and decides whether to reject or approve it and send it forward to the respective sectoral division of the Planning Commission.

The Sectoral Division examines the documents, adds its comments and queries, and presents it to the Project Evaluation Committee (PEC) meeting for further discussion. In the PEC meeting all the concerned governmental departments are represented. [The structure of the PEC is presented in Figure 6.2]. If the from the Economic Council, the Project Proforma goes to the External Resources

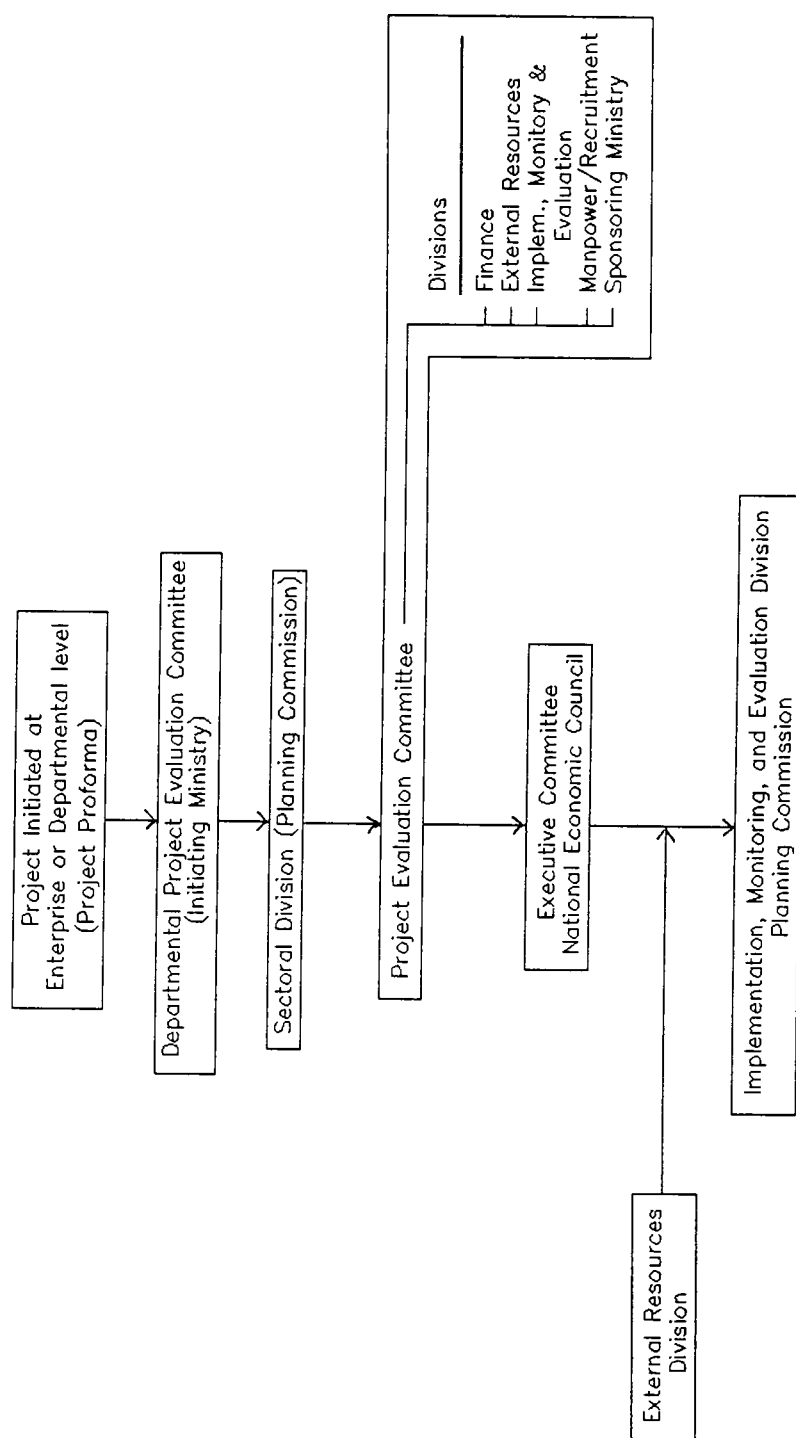


Figure 6.2 Mechanism for Formulation and Implementation of Public Sector Projects in Bangladesh

Source: Based on Chapter 3, APCTT, Technology Policies and Planning: Bangladesh (Bangalore, India: APCTT, 1986).

Division of the Planning Commission.⁵ Once the project is finally approved, the Implementation, Monitoring, and Evaluation Division of the Ministry of Planning shoulders the overall responsibility for monitoring and evaluation during the implementation phase of the project.

This organizational structure may not mean much if the mechanism of project planning does not explicitly and adequately incorporate technological considerations. "The technology-related strategies, implied or otherwise, are supposed to be incorporated in the Project Proforma (PP) document. . . . However, the PP has only one item of enquiry which can be considered to raise the issue of choice of technique, albeit in an indirect way. The particular question asks whether all the alternative means for producing the desired goods or services have been studied while preparing the project document. It is presumed that the technological issues were given due consideration in the feasibility studies undertaken by the agencies prior to preparation of the PP" [APCTT, p. 29-30, emphasis added].

However, a study of Bangladesh conducted by the Asian and Pacific Center for Transfer of Technology (APCTT) has found that, without exception, the answer given by all the agencies to this question has been affirmative. However, the answers do not list the

⁵The External Resources Division of the Ministry of Finance helps to coordinate "foreign credits, negotiations for project and commodity aid. . . . The Division often serves as the first filter for inflow of technology along with aid" [APCTT, p. 30].

"other alternatives."⁶ Part of the problem is a conflict between the priorities of the ministerial bureaucracies and of the Planning Commission in project evaluation. Projects are initiated and primary feasibility studies are conducted by the ministerial bureaucracies. They systematically ignore the strict guidelines of the Planning Commission [N. Islam, 1977, p. 76]. The tension between the ministerial bureaucracies and the Planning Commission resulted in a simplification of the PPs so that it would be sufficient for the departments to indicate that they have considered all possible alternative techniques in preparing and initiating the project idea.

There is no explicit mechanism for adoption of foreign technologies and their adaptation through the development of indigenous technological capability.

Presumably the project sponsors expect that technological spin off would be a natural phenomenon once the concerned project is implemented. It is also often claimed that such issues are taken care of in the feasibility studies undertaken prior to the submission of PP. However, such appraisal reports are usually discussed only within the agency itself.

PP has the potential of becoming an important instrument for incorporating some predesigned technology development goals in a project. . . . It is the PP which is discussed most by the Project Evaluation Committee. . . . The PP becomes the official document and has the seal of authority for disbursement of funds, appointment of personnel and monitoring and reviewing the project. Explicit commitment for technology transfer and elaboration of plans and programmes for such activities is absent in the PP document itself. Without such written commitment in the government approved document it would be difficult to implement any

⁶This Country Study confirms the general conclusions of Gene Ellis [see Chapter V] about the irregularities and inadequacy of the process of project evaluation in most LDCs.

technology plan if and when such a technology plan is considered by the government [APCTT, p. 30].

The mechanism for project level decisions in the private sector is not much different either. All the financial institutions, including the Development Banks and the private financial institutions, use customized documents similar to the PP used in the public sector. In the private sector, there is less bureaucracy but, as far as technological consideration of particular projects is concerned, the situation is similar to the public sector. The project appraisal process does not yet pay explicit and adequate attention to alternative choice of techniques. For the development banks, "there is no built-in mechanism for examining the project from any technological points of view" [APCTT, P. 30].

The Director General of Industries is responsible for supervising the development and importation of technology in the private sector according to the guidelines set by the national plan. Three major specialized development banks -- Bangladesh *Shilpa* (Industrial) Bank, Bangladesh *Shilpa Rin Shangstha* (Industrial Credit Corporation), and Bangladesh *Krishi* (Agricultural) Bank -- are the major financiers for industrialization and agricultural modernization. These Banks are supposed to contribute toward enhancing the indigenous technological capability of the country.⁷

⁷The credit distribution pattern of all these banks in general, and of the *Krishi* Bank, which serves the agro-rural sector, in particular, was discussed in Chapter 3, but without reference to technological considerations.

Table 6.1 presents the sectoral distribution of loans sanctioned by the BSB and BSRS. The average per project credit disbursement by BSB (the Industrial Bank) and BSRS (the Industrial Credit Corporation) during 1973-74 and 1982-83 was Taka 6.73 million. However, average investment in small scale projects in the agro-rural sector was much less than one million Taka. Thus both of these two major development banks actually serve mainly the modern-urban sector. Furthermore, evaluations of the projects show that for the overwhelming number of projects, the foreign component is substantially higher than the domestic component.⁸ "From analysis of individual projects," APCTT's country study found, ". . . that the Development Finance Institutions (i.e., BSB and BSRS) tend to prefer high cost projects which are capital intensive" [APCTT, p. 53].

Cost of generating employment opportunities is another indicator of a basic needs oriented development policy. Table 6.2 shows that the total employment generated in the industrial enterprises during 1973-83 was 93,835, a very small number given the growth rate of the labor force and the rate of unemployment. On average, only 71 jobs were created by each industrial unit. More important, the average amount of credit per new job was about Taka 100,000 during the same period, and over the years this indicator has shown an upward trend. These figures suggest that "beneficiaries of the loan are capital intensive industries" [APCTT, P. 54] -- despite

⁸Much of the foreign exchange component is related to projects tied to foreign aid or investment.

Table 6.1 Loans Sanctioned by Bangladesh Shilpa Bank & Bangladesh Shilpa Rin Shangstha
Showing Foreign and Local Currency Components -- Distribution by Sectors
(in million Taka)

Sectors	Total (1973-74)			Total (1982-83)				
	No. of Projects	Foreign Currency	Local Currency	Total	No. of Projects	Foreign Currency	Local Currency	Total
Food & Allied Products	6	0.49	0.36	0.85	1	2.54	4.48	7.02
Specialized Textiles	10	59.48	14.98	74.46	28	127.60	83.22	210.80
Jute and Jute Goods	6	1.76	5.59	7.35	-	-	2.96	2.96
Forest and Wood Products	-	-	-	-	-	-	-	-
Paper Board, Printing and Packing	5	2.96	1.95	4.91	-	-	-	-
Leather and Rubber	-	-	-	-	1	17.37	25.80	43.17
Chemicals & Pharmaceuticals	-	-	-	-	-	-	1.58	1.58
Glass, Ceramic & Other								
Non-metallic Products	3	1.60	0.80	2.40	1	5.45	7.50	12.85
Engineering	2	0.54	0.52	1.60	6	54.94	12.85	67.79
Transport	1	1.50	-	-	-	-	-	-
Services	13	1.51	4.46	5.97	3	18.62	31.82	50.44
Miscellaneous	-	-	-	-	1	3.94	10.40	14.34
Total	46	68.84	28.66	98.50	41	230.46	180.49	410.95

Source: Annual Reports of BSB & BSRS, quoted in APTT, Technology Policies and Planning: Bangladesh (Bangalore, India: Asian and Pacific Centre for Transfer of Technology, 1986), p. 52.

Table 6.2 Investment and Employment Generation through the Bangladesh Shilpa Bank
and Bangladesh Shilpa Rin Shangstha

	Investment (in thousand Taka)			Employment Generation (in number of people)			Loan per Employment Opportunity (in thousand Taka)
	BSB	BSRS	Total	BSB	BSRS	Total	
1972-73	19,170	47,630	66,800	92		92	na
1973-74	143,950	50,000	193,950	2,112	323	2,435	40
1974-75	475,270	212,200	687,470	4,717	572	5,289	60
1975-76	122,000	377,670	499,670	1,530	3,244	4,744	40
1976-77	282,230	605,700	887,930	2,858	3,023	5,981	60
1977-78	737,690	834,000	1,571,690	5,508	4,268	9,776	80
1978-79	894,430	815,160	1,709,590	7,165	5,159	12,324	70
1979-80	1918,650	2070,890	3989,540	10,159	9,166	19,325	110
1980-81	2689,550	2531,650	5221,200	11,870	9,498	21,368	120
1981-82	1904,820	134,310	2039,130	8,417	480	8,897	130
1982-83	164,790	582,880	747,670	1,079	2,595	3,674	110
Total	9352,550	8262,090	17614,640	55,507	38,328	93,835	110

Source: Annual Reports of BSB & BSRS, quoted in APCTT, Technology Policies and Planning: Bangladesh (Bangalore, India: Asian and Pacific Centre for Transfer of Technology, 1986), p. 53.

the fact that the preference should be and is claimed to be toward labor-intensive enterprises.

APCTT's Bangladesh Study also found that the scenario is strikingly similar for the private commercial banks as well. Two major recipients of credit from these commercial banks during 1979-83 were the garment industry and the food processing industry. Although both of these sectors are labor intensive and use low levels of technology, they are nearly 80 percent dependent on technology and capital goods imported from outside the country [APCTT, p. 55].

Since the agro-rural sector is the foremost priority sector in the national development plan of Bangladesh, it is important to examine the role of the Bangladesh Krishi Bank (BKB) in the country's technological development as overwhelmingly the largest among the formal rural financial institutions. BKB's portfolio includes short, medium, and long-term credit. The short term loans (for up to 18 months) are primarily for on-farm credits to target borrowers for seasonal agricultural production purposes. Medium term loans (for up to five years) are for farm implements, including farm machinery, power tillers, shallow tube-wells, bullock carts, and other agricultural implements as well as for some off-farm activities such as dairies and poultry. Many of the off-farm credit programs are funded through foreign aid.

The long term loans are targeted toward providing heavy capital equipment or items of fixed capital for agricultural and other agro-rural activities. These loans have much longer amortization periods and are usually for tractors, deep tube-wells,

low lift pumps, construction of ice plants, investment in tea gardens, development of horticulture, fisheries, and so on [APCTT, p. 56]. Many of the agricultural implements and their spare parts are imported and thus use up Bangladesh's small foreign exchange earnings and reserves [N. Islam, 1978, p. 21].

Although the BKB has an explicitly stated commitment to promote small-scale agro-rural industries, to help generate and adopt suitable agricultural technology, and create more off-farm employment, the credit lines for these purposes are only partially utilized; disbursements are far below the targets.⁹ As far as the technological implications of BKB's credit are concerned, "none of the credit packages has any definite incentive that can generate and mobilize resources, and encourage the use of local technology. There is a strong bias towards more mechanized appliances for agriculture which are in most cases capital-intensive as against manually-operated agricultural equipments or appliances, or locally appropriate methods or techniques" [APCTT, p. 56].

A portion of the BKB's long term credit lines are tied to foreign aid or bilateral trade agreements that effectively excludes local competitors and products. In many cases the specification of the agricultural projects and equipment are such that the local firms cannot compete with foreign bidders [APCTT, p. 57]. Since these externally funded projects, almost without exception, come with

⁹Some of the reasons behind low rate of disbursement by the BKB were discussed in Chapter 3.

modern capital intensive technologies, they are inappropriate in scale for the country, they run well below capacity.

As for fiscal incentives, the BKB's agricultural loans in most cases do not have a differential interest rate for different types of technologies. No interest incentive is given if a technology is indigenously generated or indigenously adapted from a foreign technology. Even R & D investments do not enjoy fiscal incentives [APCTT, p. 63]. Much of the R & D funding for agriculture comes through foreign grants. As shown in Table 6.3, the share of foreign grants for the agricultural sector during 1980-83 was approximately 75 percent of total R & D grants.¹⁰ Also the BKB does not offer credit support for local level experimentation with appropriate agricultural technologies. Since the level of education is low and the rural population strongly tradition-bound, and since there is no training system even for "model" farmers,¹¹ there is virtually no on-farm innovation of ATs. "Initiatives and policy support from the government in this matter is missing" [APCTT, p. 57].

The informal RFMs (rural financial markets) play an even more negligible role in technological development than does the formal financial sector. As argued in Chapter III and V, the RFMs generally play a role only in adoptive aspect of technological development. Given the small size of the formal RFMs in Bangladesh and the lack of

¹⁰R & D shares for industries came entirely from the private sector.

¹¹In Bangladesh an annual Presidential award is given to model farmers under different crop categories for unusually good performances.

Table 6.3 Source of Funds for Research & Development Activities
(in million Taka)

Sector	1980-81			1981-82			1982-83		
	Foreign Grants	Govt. Grants	Total	Foreign Grants	Govt. Grants	Total	Foreign Grants	Govt. Grants	Total
Agriculture	210.34	71.74	281.10	284.39	96.23	380.62	161.75	54.93	216.48
Industries	-	-	74.10	-	-	58.94	-	-	72.07
Energy	.32	81.00	81.32	.52	84.05	84.77	.21	85.02	85.03
Communication			Nil			Nil			Nil
Transportation	-	.75	.75	-	-	-	-	4.50	4.50
Construction	-	10.87	10.87	-	17.49	17.49	-	16.55	16.55
Total			448.15			541.71			395.83

Source: APCTT, Technology Policies and Planning: Bangladesh (Bangalore, India: Asian and Pacific Centre for Transfer of Technology, 1986), p. 90.

policies to make the formal RFMs operate competitively, the informal RFMs perpetuate the existing technological stagnation in the agro-rural sector. Informal RFMs can be induced to operate competitively by reducing the transaction costs of rural credit and removing the subsidy in the form of low interest rates.¹²

Indeed, the existing incentive framework is lopsided. On the one hand, the government has neither a set of negative sanctions to limit import of technologies that are unadapted to the local conditions of Bangladesh nor a set of positive incentives for generating ATs through an evolving indigenous technological capabilities. On the other hand, the credit institutions operate under a set of fiscal rules that encourage adoption of unadapted imported technologies. According to a World Bank evaluation report, ". . . at present it is unclear whether the existing incentives are working towards meeting the stated objectives. Indications are that the incentive system may not have resulted in industrial growth in the desired direction, may not have promoted regional development . . . and has actually encouraged capital intensity in Bangladesh's industry" [APCTT, citing World Bank, p. 63].

Government funded research facilities are not doing enough to meet the technological needs of the country nor are the current incentives encouraging entrepreneurs to invest in developing indigenous technological capability. Neither the tax structure nor the tariff structure nor the patent system supports the kind of

¹²The implications of these issues were discussed at length in Chapter 3.

technology transfers relevant for basic-needs oriented development in Bangladesh. "There is no provision in the tax or tariff structures which provides additional incentives to an innovator or adaptor of better and appropriate technology. . . . Provision of risk capital and institution of financial intermediaries for commercialization of indigenously developed technologies have not yet been initiated in the country. The development finance institutions make no distinction between imported and indigenously developed technologies while sanctioning loans for setting up industries" [APCTT, pp. 63-71].¹³

Bhatt's Framework and Bangladesh: Problems and Potentials

The analysis above already makes it clear that so far Bangladesh lacks an articulated technology policy integrated with development planning and implementation. A technology policy requires an institutional framework tailored to a particular country, but there are some basic functions that must be covered by any technology policy. In the previous chapter, a general-purpose framework based on Bhatt's contribution was developed to cover these basic functions:

(1) *Project Identification*. In Bhatt's framework, this is the function of Project Identification Centers (PICs). In the

¹³The negative implications of adoption and diffusion of such inappropriate technologies for income distribution, landlessness, employment generation, and institutional change were discussed in Chapter 4.

current organizational structure of technology planning in Bangladesh, there are no such PICs. Their functions are performed, indirectly and inadequately, by the Ministry of Planning. Determination of the needs of the society and corresponding identification of relevant projects are done by specialized departments of the Ministry of Planning. The Ministry of Planning is politically insulated because it is not tied into the political process of the country and because the government is heavily dependent upon powerful bureaucrats, both civil and military [N. Islam, 1977, pp. 52-62].

The Planning Commission has been composed of a multidisciplinary staff mostly, from the top echelons of academic and research communities. However, they themselves, part of the upper-middle class and insulated from the political process, failed to develop a working relationship with the bureaucracy or with the rural target groups. The role of the Ministry of Planning since the inception of Bangladesh in 1971 provides no indication that the Ministry has been successful as substitute for a PIC. Although a PIC does not necessarily have to be one gigantic national organization, as I indicated in extending Bhatt's framework (Chapter V), target groups of the country as well as social scientists of various backgrounds should have their input in identifying needs.

(2) *Technology Consultancy Service (TCSCs)*. Although Bangladesh has a National Scientific and Technical Documentation Center and a Council of Scientific and Industrial Research, their services do not go beyond providing technical information and

research material for the science and technology community. There is no organized institution for promoting the design-engineering function; this function is performed by various technical research institutions that are not linked with any PIC and, furthermore, most fall into the next category of technology research. There is no coordination among these diverse research organizations to ensure that their priorities and directions are meeting the basic-needs-oriented development objectives of the country.

(3) *Technology Research.* This function is performed by Technology Research Centers (TRCs). In Bangladesh there are a large number of specialized research institutions engaged in technical research under the control and guidance of different ministries. The majority of these research institutions specialize in different areas of agricultural research and do their own design-engineering function. In the absence of TCSCs, there is no mechanism to ensure that the selection of projects and technologies by these research institutions meet the criteria for appropriate technological development for the country [N. Islam, 1978, p. 57].

Recently, an Institute of Appropriate Technology has been established under the University of Engineering and Technology in Dhaka. It gathers information about and assesses foreign technology, and does limited design-engineering to adapt imported technology as well as to upgrade traditional technologies. The Institute, in terms of its purpose and capability, falls somewhere in between a TCSC and a TRC. Its primary focus is on energy and small-scale technologies to serve the agro-rural sector. The nature of its research is

technology-oriented, but not project specific. So far the institute has not received adequate R & D funding for technical facilities or manpower to acquire national importance. Also no steps have yet been taken to create more such institutions around the country.

In the late 1970s an Appropriate Technology Cell was established under the Bangladesh Agricultural Research Council. The Cell was given the responsibility to develop small-scale technologies for the agricultural sector, especially to upgrade simple indigenous tools and implements used in the rural areas. It had some success, but greater emphasis was given to develop high-yielding varieties suitable for Bangladesh. Among the various agricultural research institutions in Bangladesh, only the Rice Research Institute and the Bangladesh Agricultural Research Institute have shown significant success in developing and introducing better seed varieties of rice, wheat, pulses, and mustard. Indeed, only in the agricultural sector and only in the case of seed technology has Bangladesh developed an indigenous technological capability and effective institutional links with farmers [APCTT, p. 105].

The Bangladesh Rice Research Institute uses extensive on-farm research to determine the problems of the farmers in adopting its varieties [APCTT, p. 102]. Its link with the Bangladesh Agricultural Development Corporation, which is an autonomous organization under the Ministry of Agriculture and responsible for extension services, including providing irrigation equipment to the farmers, has helped to diffuse high yielding varieties [N. Islam, 1978, pp. 20-21]. Among these varieties Boro has been adopted quite

widely and has helped to increase the rice production of the country significantly. However, even with the increase in yield, these varieties could be considered, at best, "mixed blessings."¹⁴

The success with high yielding varieties did not contribute to reducing poverty or fulfilling the basic needs of the target groups because, due to the existing distribution of land and asset holdings in the rural areas, the farmers with large landholdings were the primary recipients of the benefits of the increase in crop yield. Without significant change in institutions or without a built-in mechanism that induces institutional change as economic development occurs, the target groups of the country will continue to be bypassed by economic progress [N. Islam, 1978, p. 21].

(4) *Financial Institutions.* In Bhatt's framework financial institutions play the role of "catalytic leadership." However, the formal financial institutions, including Bangladesh's development banks, currently performs no technological function. They have no technological capability of their own to determine the technological dimension of a project. They have no access to a TCSC for consultancy services. The project appraisal process of these financial institutions (discussed earlier) does not incorporate technological issues and, thus these institutions fail to play the role of "catalytic leadership" in the appropriate technological development of the country.

¹⁴The implications of the Green Revolution were discussed in Chapter 4.

The industrial development banks (BSB & BSRS) disburse a significant portion of the credit available for industrial development. But their role is limited in respect to small-scale agro-rural industries and they neither discourage the import of technology nor encourage generation of ATs through indigenous technological institutions. The Bangladesh *Krishi* Bank does not provide loans for R & D in technological development for the agro-rural sector. R & D in agriculture primarily comes through research institutions controlled, financed, and guided by different ministries. The efforts of the BKB to help adopt either modern technologies or indigenously adapted or upgraded technologies have not met much success due to (a) the inappropriate nature of those technologies; (b) the current institutional structure (including the distribution of land); (c) the credit disbursement policies, incentives, and mechanisms; and (d) the failure to mobilize resources in the agro-rural sector and to spend those resources in the same sector.

The informal RFMs are systematically ignored even though they have great potential to fill a significant part of the resource gap. According to Islam (1978, p. 50) and Rahman (1980), a group of large farmers with surplus to invest already exists. The Green Revolution has also brought surpluses to many medium farmers. Creation of opportunities to invest their savings is a critical determinant of their willingness to save. Their resources and entrepreneurial capability are suitable for small scale agro-rural industries. Also the village traders and moneylenders, who constitute a large portion

of the informal RFMs, would find such new and expanding investment opportunities highly profitable as demand and marketing prospects improve with a higher growth rate in agriculture as well as in agro-rural industries. That such motivation exists on the part of the surplus-generating farmers and the moneylenders and that there is great potential for resource mobilization in agro-rural areas have been confirmed by quite a few studies on Bangladesh, India, and Pakistan [N. Islam, 1978; A. Rahman, 1980].

(5) *The Production System.* This is a diffused function, carried out by all organizations down to the household level. However, there should be specialized agencies to bridge the gap between technological innovations and their adoption as well as the gap between national objectives and the pattern of production. The problem has been that many times the wrong choices of techniques were made, not because of the absence of more appropriate alternatives, but because of other economic and institutional factors [N. Islam, 1978, p. 58].

Although Bangladesh does not have any such fully developed, well-coordinated, and diffused agencies, many experiments were made in the late 60s during the Pakistan period and in the 70s to develop such schemes based on the agro-rural sector. One case, famous throughout South Asia, is the Comilla Model.¹⁵ "One of the basic components of this model was technology transfer through a 'Model

¹⁵For a detail study on the Comilla Model, see A. R. Khan, "The Comilla Model and the Integrated Rural Development Programme of Bangladesh: An Experiment in 'Cooperative Capitalism'," World Development, Vol. 7, No. 4/5 (April-May 1979), pp. 397-422.

Farmer' who would be selected from each village cooperative and trained at the *Thana*¹⁶ headquarters by agricultural and other officials stationed there. It was hoped that at the Thana level (now upgraded to the more spatially extensive *Upazila* level), there would be interdepartmental coordination such that the Thana Training and Development Centre would act as the institution where training in adoption and adaptation of the new seed-fertilizer-irrigation technologies would be imparted to the 'Model Farmer'" [APCTT, p. 104]. However, the village cooperatives gradually fell into the hands of the locally influential persons and the selection process as well as the extension services were usurped by the village leaders. There were some documented success stories, which encouraged the government to replicate the model around the country through an "Integrated Rural Development Program" (IRDP).¹⁷ The IRDP kept the Model Farmer approach alive as a part of the extension services.

In 1977 the World Bank, in collaboration with the Government of Bangladesh, initiated another program called the "Extension and Research Project." Four primary aspects of the World Bank project were:

- (a) Strengthening the extension system through the training and visit system where at the village level the extension agent would regularly visit certain contact farmers and transmit to them certain 'impact points' containing new technological innovation for agricultural modernization. These impact points would be generated

¹⁶A local administrative unit comprising a few villages in rural area or some neighborhoods in urban areas.

¹⁷For a detail study on IRDP, see N. Islam, p. 23-30; M. Alamgir, 1976, pp. 23-28.

by subject matter specialists at district or subdistrict level through interaction with agriculture research workers. The extension workers would be regularly trained in new technologies which they would later transfer to contact farmers through the stipulated 'impact points'.

- (b) Establishment and upgradation of research substations in the main agro-ecological zones for engaging in local problem oriented research and getting feedback from technology transfer efforts in the surrounding regions.
- (c) Command area development of irrigation facilities.
- (d) Establishing training units and providing a built-in system of monitoring and evaluation [APCTT, p. 105].

The World Bank project is being carried out under the Agricultural Extension Department while the Model Farmer Approach is being operated by the IRDP under a different ministry. No effort has been made so far to integrate them. In the last two decades neither "has taken deep roots in the agricultural scene in the country" [APCTT, p. 105]. As mentioned above, Agricultural research in seed-fertilizer technology as well as related extension services has attained some maturity, but little has been achieved in upgrading or developing agricultural implements to be used at pre-and post-harvest periods. Although there appears to be a shift of attention in developing the capacity to design and fabricate irrigation pumps and to build improved, manually-operated agricultural implements, the allocation of resources and support for facilities and manpower for these purposes remains insignificant.

Manpower and Indigenous Technological Capability

No factor is more important for a mature indigenous technological capability of any country than the manpower that becomes increasingly skillful at the art of "problem solving." Since the problems of a society have different dimensions, a country needs people who can solve socio-economic as well as technical problems. In the last two decades LDCs have started paying attention to their S & T manpower. Now, with the collaboration of the member countries, UNESCO gathers and publishes data on the evolving technological manpower of the member countries. Of course, poorer countries have proportionately smaller S & T manpower. This is also true for Bangladesh. However, it is not only the size, but also the quality and capability of the manpower that is important.

As far as the existing S & T manpower is concerned, one of the useful indicators of its ability to solve problems and innovate is the number of patents registered by its citizens. Table 6.4 shows that the record of the S & T manpower of Bangladesh is extremely poor. But the true dimension of this indicator is revealed when the registered patents are classified according to the residency status of the persons or institutions involved. The number of patents registered by the non-residents in Bangladesh (shown in parenthesis) is overwhelming. Also among the categories by fields of endeavor, very few patents have been registered in agriculture.

There is no effective enforcement of patent laws in Bangladesh, a situation that reduces the incentive of inventors significantly. In addition, the inventors receive very little

Table 6.4 Number of Patents Granted to Citizens of Bangladesh
(Number of Non-Resident Patent-Holders in Parentheses)

Field	1978	1979	1980	1981	1982
Physical Sciences	57 (55)	6 (6)	30 (29)	10 (8)	54 (49)
Medical Sciences	28 (28)	80 (76)	16 (16)	52 (52)	20 (20)
Engineering & Technology	15 (10)	18 (6)	28 (23)	23 (18)	17 (15)
Agriculture & Livestock	7 (6)	3 (2)	2 (2)	4 (4)	4 (2)
Biological Sciences	1 (1)	-	-	-	-

Source: Adapted from APCTT, Technology Policies and Planning: Bangladesh (Bangalore, India: Asian and Pacific Centre for Transfer of Technology, 1986), p. 91.

recognition, socially or monetarily, for their contribution. Despite the government's proposal in the 1985 Draft to give the highest pay on the national grade to scientists and technologists, it is next to impossible to implement this proposal because of the attitudes of the society toward innovation.

Innovation is further stifled because the educational process does not focus on, nor have a mechanism to build-in the development of "problem-solving" manpower.¹⁸ The regular educational curriculum does not instill an attitude of problem solving among the students, nor do the vocational institutes prepare people with the capability to innovate. The current educational system may make people good users of existing knowledge and technology, but does not prepare them to handle new problems. If educational institutions for engineering have shown more awareness and enjoyed more success, still, as the table on patents shows, they do not contribute much in the field of engineering. Although discussions about educational reform has been going on since Bangladesh became independent, no reform has yet taken place. The programs for manpower development in Bangladesh have not shown much success in integrating the programs with S & T development.

As the above sections show, Bangladesh currently does not have an institutionalized technology policy. The current organizational framework and policies are not conducive to BNA. If the government truly accepts fulfillment of basic needs as one

¹⁸For a relevant and succinct review of educational problems, see N. Islam, pp. 73-78.

primary priority, then the technology-related organizations need a thorough overhaul.

Chapter VII

SUMMARY AND CONCLUSION

During the last decade, the Basic Needs Approach (BNA), as an alternative to the Growth Approach (GA), has attained a prominent position in development thinking and efforts. BNA emphasizes poverty-minimizing growth. Advocates of BNA call for the elimination of urban bias in both product and technology and for the reorientation of development efforts in at least two ways: (a) more emphasis on producing those goods and services consumed by the poor, and (b) creation of employment for the target groups by using appropriate technology (AT) and providing public services, especially in the areas of education, health, and housing, until the poor can themselves pay for these basic needs. LDCs now recognize the importance of fulfilling basic needs of their population; however, LDCs' performances in implementing BNA vary significantly, depending upon their commitment to BNA and upon the specific institutional bottlenecks in each LDC.

This dissertation examined two fundamental problems in adopting BNA: planning for technological development and organizing the financial system of a country in a way consistent with BNA. Throughout this dissertation, Bangladesh has been used as a case for illustration. The Government of Bangladesh has made a public commitment to basic needs in its planning documents and declarations.

Under the Growth Approach, financial systems, due to an in-built bias toward the urban sector, tend to contribute to underdevelopment. Rural Financial Markets (RFMs) in Bangladesh provide a good illustration. One primary objective of providing ample, subsidized credit to the agro-rural sector has been to help the farmers adopt new technologies. But that objective was not achieved. When new technologies have been adopted, those technologies have often improved the conditions of the well-to-do landholders and exacerbated the conditions of the poor and marginal farmers. Those technologies have been blamed for increasing labor-displacement and landlessness.

Recent, market-oriented views of RFMs challenge the old supply-led financing through traditional agricultural credit programs (TACPs). TACPs have failed to meet the needs of the majority of the farmers who cannot offer collateral and who find transaction costs of borrowing from institutional sources high. Fungibility of credits is a major reason for high rate of delinquencies among the borrowers. Non-institutional sources still dominate the RFMs. TACPs have also failed to bring these non-institutional sources to the institutionalized market because, most TACPs do not engage in savings mobilization. These problems are widespread in Bangladesh.

Market-oriented views of RFMs have made significant contribution to rural finance by identifying the shortcomings of the TACPs. However, these views lack a broader perspective of development; these views do not address the issue of how the problems of poverty and deprivation can be solved. Market-oriented views also

fail to identify the links between finance and technological development.

A major cause of the failure of rural finance under the Growth Approach is "inappropriateness" of technologies and absence of a technology policy consistent with the goals of BNA. Bangladesh, though apparently committed to BNA, continues to adhere to the old financial institutions and policies without an institutionalized technology policy.

Technology, a prime force in development, should be planned to seek specific goals and solve specific problems. Since BNA involves a different product-mix, it also requires technologies appropriate for meeting BNA. Technologies for BNA should be assessed according to a wide range of criteria, including economic as well as institutional criteria in the context of particular LDCs. Also the roles of finance and technology have to be integrated for two reasons. Resources, incentives, and leadership are needed for technological development, and financial institutions, especially the development banks, can provide such leadership. Secondly, even an abundant supply of credit cannot ensure adoption of appropriate technologies.

Bhatt's institutional framework provides a general guideline for linking the roles of financial institutions and technology policy. His framework identifies five distinct functions related to technological development: project identification, technology consultancy and design engineering, technological research,

financing, and project implementation. Separate institutions are needed to carry out these distinct functions.

Bhatt argued that in the sequence of those functions, financial institutions, especially the development banks, should provide catalytic leadership. He provided illustrations of technology-related decision-making in developed countries and one concrete illustration from India -- the Swaraj case. Bhatt's framework is oversimplified; nevertheless, it provides a good, flexible foundation for linking the financial and technology-related institutions.

Bhatt's framework gives too much power to the financial institutions. Since development banks function as the financing agent of the governments, these banks require functional independence from ill-considered influences of statesmen. Development banks often use shadow pricing to justify specific projects. As a check, Technology Consultancy Service Centers (TCSCs) are suggested for conducting socially-relevant shadow pricing which has a broader focus than the specific project. Bhatt's framework, when placed in a broader perspective, explains how appropriate technologies that seek specific goals and solve specific problems contribute toward BNA. By extending Bhatt's framework, RFMs can be brought into the picture.

On the basis of Bhatt's framework and its extension, technology policy and financial institutions in Bangladesh are examined. Although Bangladesh has begun paying greater attention to planning for technological development, it currently does not have an integrated technology policy with suitable institutional framework.

Existing policies are not conducive for developing indigenous technological capability. Although there are many technology-related research institutions, there is no Technology Consultancy Service Centers and Project Identification Centers. In the absence of links between development banks and technology-related institutions, project evaluations routinely ignore technological dimensions of development projects.

Lack of an institutionalized technology policy permits the import of technologies and their adoption without any consideration to their appropriateness for Bangladesh. As a result, technological development has become biased against the needs of the agro-rural sector. Good intentions alone, stated in planning documents, cannot fulfill basic needs and generate employment.

Financial institutions, at one end of the basic research-applications continuum, can provide leadership in building and using indigenous technological capability for the development of new technology and the adaptation of existing technologies, imported or indigenous; and, at the applications end, they can provide resources through the RFMs for adoption of new, appropriate technologies.

Institutionalization of a technology policy with necessary links to the financial institutions would remove the existing conflicts in policy-mix and integrate these two fundamental aspects of development effort under BNA. The framework proposed and examined in this dissertation is one possible framework. An effective framework can be devised only through a trial and error process.

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