

# SECTOR PROGRAMMING

by Albert Waterston\*

## *I. The Nature of Sector Programs*

### **A. Sector Programs versus Plans and Projects**

Although the preparation of sector programs antedated the preparation of macroeconomic plans in modern times,<sup>1</sup> sector programs commonly have been derived by disaggregation of macroeconomic calculations in national development plans. And while the sector programs have been important components of the development strategies in these plans, and vital for the achievement of global plan targets, discussions about plans have generally centered about the macroeconomic aspects of the development plans rather than the sector programs, with the sector programs generally relegated to a subordinate position. Perhaps this is why there is much less to be found in the literature about the techniques and problems of sector programming than about those of macroeconomic aspects of planning. Recently, however, the growing interest in microeconomic planning has made it increasingly clear that sector programming constitutes the logical link between macro- and microeconomic planning. This paper seeks to trace the nature of this relationship, explore forms which sector programs may take, and specify some conditions for sector programming.

The estimates in a medium-term plan which cover an entire economy are necessarily general in nature. They seek to estimate the effects of an assumed rate of growth in income or output on public and private consumption, savings and investment, exports and imports, employment and similar variables. These estimates require planners to make a series of projections to the last year of a medium-term plan to relate the amounts of labor, raw materials, land and capital needed to produce the goods and services required to achieve the assumed rate of growth. Sometimes, the estimates are divided between the public and private parts of an economy, or among regions within a nation. Even so, they remain generalizations in the sense that they apply to the entire portions of the economy covered.

At the other end of the planning process from macroeconomic plans are projects. A project may be defined as a facility for producing goods or services. Every project has

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\*Lecturer in the Economic Development Institute of The World Bank. In this paper, I speak for myself, not for Institute or the Bank.

<sup>1</sup> For example, the multi-annual Goelro Program of 1920 for the Soviet Union's power sector preceded the U.S.S.R.'s First Five-Year Plan for 1928/29-1932/33. The Monnet Plan, France's first postwar plan, was essentially a collection of 6, later 8, sector programs.

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economic and social repercussions which extend beyond the immediate sphere with which it is concerned. Thus, a project to construct a plant for processing sugar beets affects not only those who will benefit directly from it, but also those who may have to forego increases in income when investment funds are diverted from other projects or sectors in order to construct the sugar beet plant.

Because of the inter-relationships among projects in different sectors, it is desirable to weigh in a systematic manner the relative advantages and disadvantages of building one project as against other projects within a sector or as among different sectors. Attempts to do this when a macroeconomic, medium-term plan is being formulated require the reconciliation of the overall estimates in the plan with the projects which are proposed for inclusion in the plan. This is usually done by disaggregating, i.e., dividing the macroeconomic targets and other estimates in the medium-term plan, into sector estimates in accordance with a predetermined strategy, and comparing them with the projects in each sector in order to select those which individually and collectively contribute most economically to the achievement of national development goals. The sector programs thus become, as it were, a bridge between the overall targets and estimates in the aggregate development plan and the projects. Within each sector program, feasible alternatives then can be studied in a systematic way for the purpose of making rational choices.

If a sector program is seen as a bridge between the macroeconomic targets and other estimates in a development plan, on the one hand, and the projects required to implement the plan, on the other, a sector program should be easily distinguishable from either the macroeconomic estimates in a plan or from a project. It usually is, but not always. If the projects in one sector are interdependent with those in other sectors, as they often are, it is sometimes difficult to see precisely where a sector program ends and macroeconomic calculations in a plan begin. For example, it may not be clear whether to separate or combine the construction of an industrial plant for processing an agricultural crop from the production of the crop itself, the plant which produces power for the processing plant or the construction of roads which run from the farmlands to the processing plant. This is especially true when one government agency operates them all. A classification problem may also exist between projects and sectors. For example, if a project is big, say, for the construction of a steel complex, and especially if the country is small, or even if it is a large country at an early stage of development, one project may constitute the entire program for a sector.

But usually, a sector program is distinguishable from both the macroeconomic estimates in a plan and individual projects. Yet it is not easy to give a precise definition of a sector program. It can be described broadly as any set of calculations concerning a set of interdependent economic variables in any division of a national economy defined as a sector.<sup>3</sup> Or it may

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<sup>3</sup> Porwit, Krzysztof, *Central Planning Evaluation of Variants* (London: Pergamon Press, 1967), p. 140.

be defined more narrowly, as it is for the purposes of this paper, as a group of projects within a distinct functional division of an economy which embody a strategy and policies for coordinating investment and other development decisions in accordance with specific objectives.

### B. Ways of Preparing Sector Programs

Although sector programs are usually prepared as a part of an overall plan, they have also been prepared outside the framework of development plans. Where an overall plan is not in force, sector programmers sometimes make what they consider to be a set of plausible macroeconomic assumptions for the country or region concerned into which they fit their sector program. But often, few macroeconomic assumptions are made. The World Bank has sometimes participated in the preparation of transport and power sector programs in developing countries without reference to macroeconomic plans and with varying amounts of macroeconomic assumptions. Programs for agriculture, education, telecommunications and other sectors have also been prepared by others without the benefit of an overall framework. As already indicated, planning in the U.S.S.R. and France, as well as in other countries, started with programs for one or a few sectors with few connections to the macroeconomic aspects of planning. It must be said that the results obtained with sector programs outside macroeconomic frameworks have not been noticeably inferior -- and have sometimes been superior -- to those generally obtained from sector programs in macroeconomic plans.

But because the sectors of a society are interdependent, it is preferable to have an overall framework. Every economic and social sector obtains some inputs from other sectors and makes contributions from its own output to other sectors. In the absence of a macroeconomic framework, it is impossible to determine precisely the extent to which decisions made within a sector will be acceptable to, and desirable for, other sectors; as well as the entire economy<sup>4</sup>

One way of determining the effect of one sector program on other sectors, and on an economy, is to prepare sector programs for all sectors simultaneously. By adding the inputs and the outputs for all sectors and correcting, coordinating and balancing them, overall estimates for an entire economy can be obtained. But if the prime objective is an overall, balanced view of an economy rather than a view of balanced, intersectoral relationships, it is preferable to start with the preparation of a macroeconomic framework and to follow this with the preparation of sector programs. If this sequence is adopted, the overall investment and production targets can be disaggregated into sector investment and production targets which provide guidelines for the preparation of sector programs. These guidelines can facilitate the task of preparing sector programs and, by setting limits on the size of the programs, diminish the likelihood that overly-ambitious programs will be prepared.<sup>5</sup>

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<sup>4</sup> *Ibid.*

<sup>5</sup> *Ibid.*

## *II. Sector Programs as a Part of an Aggregate Framework*

The preparation of sector programs as a part of a macroeconomic plan involves certain procedures which can conveniently be grouped into two stages. In stage one, the central planning agency disaggregates the macroeconomic targets and other estimates into tentative targets and estimates for each sector and, with these as a basis, prepares preliminary sector programs in conformity with national development objectives. In stage two, the preliminary sector programs are reconciled with the projects and sector programs which government technical organizations and private entrepreneurs hope to carry out during the plan period, and the results are made consistent with the macroeconomic targets and other estimates.

### **A. Stage One: Disaggregation**

How macroeconomic plan targets are disaggregated in stage one depends on two major factors: The first is the policy-makers' notions of the development strategy to be followed to achieve plan objectives; the second concerns the constraints which limit increases in output in the short-run. Each of these deserve attention.

#### *1. The Development Strategy*

##### *a. Impact of Institutional Factors*

A country's development strategy is a formula for using resources, policies and measures in specific ways to achieve certain objectives for growth and change. Since a development strategy depends on a nation's political, social and economic institutions and aspirations, as well as its stage of development, it reflects these in various ways. Thus, at the international level, the strategy will embody the country's attitudes toward such subjects as the role of foreign trade, foreign loans and aid, foreign private investment, the importance of inter-regional cooperation and coordination and the desirability of achieving autarky; and at the national level, it will reflect the country's attitudes toward such matters as the role of the private sector in the economy, the need for differentiated regional development, the population problem, unemployment (and hence among other things, the choice of technology for public investment projects), the desirability of bringing about greater equalization of incomes, institutional reform (e.g., changes in the land tenure pattern) or conversely retention of cherished traditional forms, the tolerable level of consumption, the extent to which popular participation is desirable in planning for development, as well as the speed of development.

##### *b. Growth Theories*

The development strategy will also reflect what the policy-makers' and planners' think is the best way of allocating investment resources among sectors and sub-sectors. This, in turn, will depend on the growth theories espoused by the planners or their clients. Explicitly or implicitly, decisions about disaggregating overall investment and other targets among the sectors of an economy involve reliance on one or another theory for accelerating the rate of

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growth. While some planners may opt for an allocation of resources which is generally consistent with the classical or modern version of comparative cost doctrine and rely on specialization in primary exports and the efficacy of foreign trade to promote growth, many planners in low-income countries give greater weight to one of the modern, more dynamic, theories of growth which emphasize reduced specialization and increased production for domestic consumption. These newer theories often lead to investment criteria and resource allocation among sectors which are opposed to those derived from the principle of comparative advantage.<sup>6</sup>

One of the newer theories favors a development strategy based on balanced growth by the simultaneous expansion of several interrelated sectors, while another prefers sector allocations which purposively unbalance investment. A common subject of debate among development theorists and the planners influenced by them is the relative desirability of giving priority to investments in one sector, usually industry or agriculture, with some favoring the first, others the second, and still others varying combinations of the two. With regard to industry, some theorists and planners advocate forced rather than gradual development, special emphasis on increasing the output of products which replace imports rather than those which expand exports,

investment in capital goods rather than in consumer goods industries, while others prefer their industrial development the other way around. For agriculture, there are those who recommend that investment be concentrated in the modern rather than in the subsistence subsector, while others advocate the up-grading of subsistence agriculture, or that subsistence and modern agriculture be developed simultaneously. Finally, there are plans with sector programs prepared on the assumption that, at least in the early stages of development when much needs to be done in every sector and resources are scarce, investment in one sector is likely to produce as high a yield as investment in any other.

It is unnecessary for the purposes of this paper, and it is impossible in any event, to designate one theory which is applicable to all countries, or even to one country, at every stage of development. We do not have the experience to know with reasonable certainty whether one theory of growth is better than another. Nor does the record show that the speed with which development takes place is accelerated more than in any other way if countries start by emphasizing agriculture, heavy industry, light manufactures, infrastructure or some other sector or subsector.

The truth is that there are no major shortcuts to development. Regardless of the sector or other point where a country starts to develop, it soon runs into the political, social, administrative and other attitudes and institutions which are inherent in underdevelopment. It is these factors, rather than where development starts, which account for the long duration of the

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<sup>6</sup> Chenery, Hollis B., "Comparative Advantage and Development Policy", *The American Economic Review*, Vol. LI, No. 1, March 1961, p. 20.

development process. And since the transformation of traditional attitudes and institutions takes time, the take-off to self-sustaining growth is much more likely to be a gradual and see-sawing process than a point in time. At least until now, the dream that the less-developed countries can materially shorten the path to development which took the more developed countries a century to negotiate remains unfulfilled.

This does not mean that the use of one growth theory in a given country might not accelerate development more than others. However, even if one growth theory seems more appropriate than others in the long run, another may be more effective in the shorter run. Thus, the application of the balanced growth approach over the long run, does not preclude the possibility that initial or interim emphasis on agriculture, industry or infrastructure may be desirable in a medium-term period.

The probabilities are, therefore, that the best approach for planners is to evaluate the situation in a country as it is and to adapt to that situation the theory which promises to yield the most at the time. This implies that at various times the growth theory used may have to be changed. Because of this, and because the allocation of investment resources to functional sectors is likely to be more coherent than otherwise if decision-makers relate investment allocations to a clearly conceived development approach, it is desirable for planners to define explicitly the underlying assumptions on which the overall targets are disaggregated.

### *c. Implementing Development Strategies*

As with the choice of the approach for accelerating growth, policies and measures adopted to implement sector programs will generally reflect the political, social and economic milieu in a country. That milieu will largely determine the extent to which government will employ economic incentives instead of intervening administratively to achieve sector targets, as well as the type of monetary, price, credit and fiscal policies and measures adopted for this purpose. While progress toward development may lead in the long run to changes in institutions and attitudes and, hence, in the kind of policies and measures used to implement sector programs, only small deviations from customary practice are likely to occur in the medium-term.

### *2. Constraints on Sector Allocations*

Having selected a development strategy, decision-makers may allocate resources among sectors in conformity with it, but always within the limits imposed by the environment. The major limitation is the lack of resources. In the low-income countries, the greatest resource constraints are the scarcities of skilled manpower, the lack of natural resources, the small capacities of the construction and other capital goods industries, the lack of adequate domestic savings, and the short supply of foreign investment, loans and aid.<sup>7</sup>

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<sup>7</sup> Lewis, W. Arthur, *Development Planning. The Essentials of Economic Policy* (New York: Harper and Row, 1966), pp. 153-164.

If the disaggregation of the global targets is to be realistic, account must also be taken of the extent to which the size of each sector limits its expansion in the short-run. For example, if industry rather than agriculture is to be emphasized, more investment resources will have to be allocated to the industrial sector than would otherwise be allotted. However, the size of the industrial sector may set limits on the increased output which can be realized in the medium-term. Thus, to cite a slightly modified example of Arthur Lewis', if in a hypothetical but typical low-income economy, industry contributes 15 per cent of gross domestic output, services 35 per cent and agriculture 50 per cent, industrial production would have to grow by 10 per cent a year (which, as Lewis points out, is an unusually high rate of growth), to contribute an absolute increase of 1.5 per cent in gross domestic annual output. In contrast, services and agriculture could contribute the same annual increase of 1.5 per cent with growth rates of only 4.3 per cent and 3.0 per cent, respectively.<sup>8</sup> These hypothetical figures illustrate the truism that where a sector base is narrow, heavy investment in that sector which results in a reduction in investment in other sectors, is likely to produce a lower rate of growth than otherwise, at least in the short-run. Decision-makers may be prepared to accept this as the price for their development strategy. But the implications of such a course of action need to be weighed before it is adopted.

### 3. Use of Input-Output Tables

The procedure by which a set of coherent sector programs is prepared on the basis of disaggregated overall targets and estimates is necessarily a process carried out in stages. The first step is to allocate available investment resources tentatively to each sector and to set preliminary sector output targets in accordance with the predetermined development strategy. Then, it is necessary to estimate the input and output implications of these allocations and targets and to insure that they are consistent intra- and inter-sectorally. For these purposes, an input-output matrix is helpful. Such a matrix, prepared on the basis of empirical studies, is a presentation in tabular form which relates and equates sector inputs and outputs in the production process. By means of values noted vertically which show inputs, and values which are noted horizontally to show outputs, an input-output table gives the units of equipment, raw materials, power, transport and other inputs consumed by each of a series of economic and social sectors to produce its outputs in the year to which the table refers. This facilitates estimation of the inputs needed to increase outputs by a given amount or percentage in each sector in the table.<sup>9</sup>

<sup>8</sup> *Ibid.*, pp. 154-155.

<sup>9</sup> Before these calculations can be made, the input-output table must be refined. This is because an input-output table includes some duplication since each sector supplies some inputs to its own sector as well as to other sectors which contribute to the production of its own outputs. By setting up a series of production functions which show total inputs for the outputs of each sector as equations (with the duplication for each sector as the unknown) and solving the equations simultaneously, the duplication may be eliminated. From the results obtained, an "inverse" input-output matrix may be constructed which estimates the final (or net) demand of each sector for the inputs required to provide its output. Using linear assumptions (i.e., that the percentage input will change proportionally with changes in output), an inverse input-output matrix makes it possible to estimate the inputs required for each sector for the assumed increases in output which are to be included in each sector program.



#### 4. *Successive Approximations*

Inconsistencies between the amount of inputs required to achieve sector outputs are bound to emerge and these must next be eliminated. This is done by a series of iterative calculations which attempt to reconcile inputs and outputs until the sector programs are consistent with each other and the overall plan, and provide for optimal sector outputs. In the process of bringing this about by "successive approximations," it may be necessary to revise the targets of one or more sectors; modify the overall plan targets; or both. Or if targets are to be maintained, provision must be made for increased investment, either by reducing consumption or by importing capital. Eventually, by trial and error, a set of sector programs is produced, each with optimal inputs and outputs which are internally and externally consistent.

One way of accomplishing this is for the planners to prepare a series of inter-sectoral models to test the significance and implications of alternative rates of growth. The number of sectors incorporated in the models may vary from two to many more. The number of alternatives considered may be only three, or in this age of computers, may be considerably greater.

In achieving a consistent set of sector programs with the macroeconomic framework, planners seek to guard against the emergence of unforeseen production or other bottlenecks. If existing sector capacities are insufficient to produce the goods or services required, they must make the required adjustments to harmonize output with inputs, by reducing the output demands on the sectors, increasing investments to raise sector capacity and supply, providing for interim imports, or in other ways. Projections also make it possible for planners to estimate labor requirements for achieving sector targets and for comparing sector demands for labor with the supply. It is also possible to estimate the import component of sector inputs required to achieve sector outputs and, by aggregating total imports, to estimate the amount of foreign exchange required to achieve plan targets.

Thus, the program for each sector is essentially a framework for balancing foreseeable demand for it; output with the inputs of labor, materials and capital required to produce that output. If the capacity in a sector is inadequate to produce the goods or services required to achieve sector output targets, estimates are made of the extent to which additional investment is required to increase sector capacity to the necessary level.

### **B. Stage Two: Reconciling Sector Programs and Projects**

#### 1. *Obtaining Projects*

Sometimes, the planners themselves will suggest projects for increasing the capacity of one or more sectors, and there are countries where the central planning agency has sponsored and prepared projects for this purpose. But more frequently, central planners will rely on technical ministries, departments and agencies to prepare and carry out projects for the public sector and on private investors for the private sector.

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The technical ministries, departments and agencies may arrange their projects according to priority based on investment criteria and combine them into coherent sector programs in accordance with well-defined development objectives. But more frequently their projects constitute a diverse and incongruous list without a common framework. Moreover, the projects may be inconsistent with the requirements for added capacity in the various sectors as estimated in the sector programs obtained by the disaggregation process. This is not surprising since disaggregation starts from a set of macroeconomic estimates and, by a process of planning "from-the-top-down," leads to conclusions about the kind and size of projects which are required to provide the additional capacity for meeting sector and plan targets. In contrast, the projects proposed by the technical ministries, departments and agencies start at the other end of the scale as units to be built up into sector programs by a process of planning "from-the-bottomup."

## 2. *Investment Criteria*

This difference in approach makes it necessary to reconcile the projects proposed by sponsors with the sector programs prepared by the disaggregation process. For this purpose, a variety of investment criteria are available for evaluating projects.<sup>10</sup> If the project is in the private sector, it is usually not very difficult to determine whether the revenue it will bring at market prices will be greater than its cost to the extent necessary to pay off loans with interest and yield a return to its owner which he considers adequate. To an astute entrepreneur, however, only the highest possible profit on his investment will be acceptable. In choosing his investment projects, therefore, he will consider alternative projects; which implies that he will try to allocate his investments in accord with the principle of marginal productivity, i.e., in such a way that the last unit he invests will yield him a higher return than he can earn from any other investment.

But while this approach is economically sound for a private investor, it is too narrow for a national development planner. The national planner must think of the profitability of a project in terms of its net contribution to society's output or income. This may be substantially different than the yield to a private entrepreneur from the same project. To the national planner, then, it is the *social* marginal productivity that matters, i.e., the total costs and benefits to society of each project, taking full account of its external economies and diseconomies. To achieve this he will seek to select projects in which the productivity of the last unit of investment yields the highest marginal increase to the *nation's* output or income.

Since real and financial resources are scarce in low-income countries, it is essential to use resources most productively to increase national output and income at lowest cost. For this reason, every project must be compared with other projects to determine its prospective yield in relation to all others, i.e., to determine its opportunity costs. In the transport sector,

<sup>10</sup>These criteria are useable to allocate investment among projects in different sectors as well as among projects in one sector.

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this may mean making comparisons between the net costs and benefits of highways and railways; in the power sector, it may involve making comparisons between the net costs and benefits of a series of thermal plants to be constructed over several years with those of a large hydroelectric plant to be constructed at one time. Although a variety of techniques are available for estimating costs and benefits, these techniques are not foolproof. Different results are obtainable from different techniques and a great deal depends on the assumptions made.

One problem encountered in comparing projects is the difficulty of quantifying some costs and benefits. Indirect costs, i.e., those borne by the economy although not by a project, may not be easy to identify (e.g., the amount of investment in infrastructure required to support a project in a basic sector, or the amount of air or water pollution resulting from the construction of a chemical plant). But the greatest difficulties are encountered on the benefit side. For some kinds of projects, like schools, the supply of water or sewerage facilities, it is extremely difficult to calculate economic benefits. Frequently, this is also true of the associated or indirect benefits of an industrial project, e.g., the opportunities created by the project for related projects. For these reasons, the total costs and benefits of a project often cannot be determined quantitatively.<sup>11</sup>

These are not the only difficulties. Comparisons of cost and benefits generally rely on prices. In economies in which market forces operate freely in the presence of domestic and international competition, actual prices of all factors of production are useable for making the required calculations. But in the real world, and especially in the world of low-income countries, prices usually do not reflect supply and demand relationships. A variety of factors may distort the price system, including protective tariffs; quantitative restrictions on imports and exports; unrealistic rates of exchange which undervalue or overvalue a national currency; subsidies; government controls over interest rates which make it possible for public enterprises to borrow at rates below those prevailing in the open market; government or private monopolistic controls over production, prices and sales; wage rates depressed by large pools of unemployed or underemployed labor; or wage rates which are higher than they would be without government or union intervention.

These and other distortions can make an appraisal of the social or economic merits of a project based on actual prices both incomplete and inaccurate. Sometimes, enough information is available to adjust market prices to the level of "equilibrium" prices, i.e., to the point where supply and demand are equal. When equilibrium, or shadow prices as they are more commonly called, are substituted for market prices, costs and benefits expressed in market prices can be converted to quantities which represent their real economic value, thereby making it possible to compare projects. While it is theoretically possible to calculate shadow prices for

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<sup>11</sup>King, John, Jr., *Economic Development Projects and Their Appraisal* (Baltimore: The Johns Hopkins Press, 1967), p. 7.

most projects, in practice methodological problems and lack of adequate information may make it difficult or impossible to obtain dependable shadow prices for some projects in any sector and for most projects in the health and educational sectors.

Aside from pricing problems, project evaluation is sometimes made difficult because some projects may be considered socially desirable regardless of price. This is especially true in cases of projects which are considered essential for defense and it is true for certain prestige projects, like one for the construction of a presidential palace or for establishing a national airline.

The problem can also become great when a country wishes to achieve autarky. In this case, social marginal productivity may not enter into planners' discussions, except perhaps, to estimate the cost of ruling it out.

Some economists believe that social marginal productivity is the only logical investment criterion to apply to projects,<sup>12</sup> but many consider that other criteria must also be considered. Thus, where unemployment is a problem, the less profitable of two projects which employs a larger number of workers may be more desirable. In contrast, as Albert Hirschman has pointed out, where poor management or inefficient labor may waste more time and materials with hand labor than a machine would, it might be more desirable to choose the more capital-intensive project. In either case, the social marginal productivity criterion would not necessarily lead to the appropriate factor intensiveness.<sup>13</sup>

Those who believe in the use of the social marginal productivity criterion at all times, nevertheless justify their position by pointing out that the most profitable projects can contribute the greatest amount of resources with which to assist the unemployed through social welfare programs or through "make-work" programs. They contend that this is better than selecting projects on the basis of their employment potential because the employment criterion reduces output below a country's capacity. The difficulty with this is that it is not certain that governments will use part of the increased income to alleviate the effects of unemployment when scarce resources are needed for further investment.<sup>14</sup>

Another challenge to social marginal productivity arises from projects which require tariff protection during their early years of operation. Many economists consider a protective tariff economically justified until infant industries have had a chance to establish themselves. But the choice of projects which could not survive without such protection implies that

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<sup>12</sup> E.g., cf. Stolper, Wolfgang, *Planning Without Facts* (Harvard University Press, 1966), p. 138 ff.

<sup>13</sup> Powelson, John, *Latin America: Today's Economic and Social Revolution* (New York: McGraw-Hill Book Company), pp. 275-6.

<sup>14</sup> *Ibid.*

national income or output will be reduced below the potential level, at least in the short run and, therefore, that another criterion has been substituted for one which will produce the greatest possible output or income at least cost.

Walter Galenson and Harvey Leibenstein have also criticized social marginal productivity as a criterion for development. They have suggested that a project which is likely to lead to the greatest amount of savings for reinvestment is preferable to one which merely produces the greatest social marginal return, since in the latter case most of the income produced might be dissipated for consumption instead of being saved for reinvestment. Galenson and Leibenstein therefore recommend the choice of projects which yield larger amounts of profits to entrepreneurs and less in the form of wages than other projects do on the assumption that this will lead to more investment and the acceleration of development.

Albert Hirschman also implies that social marginal productivity may not be the best investment criterion when he recommends that developing nations select projects with the most forward and backward linkages.

Yet another challenge to social marginal productivity, but one which economists find easier to answer, is the use of foreign exchange earning capacity of a project as a criterion for allocating investment resources. It may seem reasonable enough when a country has a balance of payments deficit for planners to select projects which promise to earn more foreign exchange than others which do not, even if the latter promise to be profitable. But most economists, at least in the advanced countries, hold that when a developing country has a chronic balance of payments problem, it is almost always a sign that its currency is officially overvalued in relation to other currencies, and that this can be corrected best by an adjustment in the exchange rate. To which economists in the less developed countries reply that balance of payments deficits arise from structural rather than monetary causes, and that the problem cannot be solved by devaluations without unduly upsetting the price structure of the low-income countries.

It is clear from this brief discussion of investment criteria, one that skims the surface of the subject, that some investment criteria come into conflict with others. In practice, planners find it difficult to apply only one investment criterion to select projects because at different times one objective may be more important than others. Sometimes, it is fuller employment; at other times, foreign exchange shortages make it seem that projects which can earn more foreign exchange than others are more desirable whatever the theoretical arguments against them. Moreover, the social profitability criterion does not apply as a rule to social welfare projects in education, health, low-cost housing and the like.

Ultimately, planners have to make compromises among the different investment criteria, choosing projects which promise to yield the greatest social return while, on occasion, applying other criteria which meet other objectives. Rigid adherence to a single criterion implies

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a static situation, whereas development, being dynamic, may well require different criteria at different times. In practice, investment decisions are often made on the basis of political considerations. In large part, this is because good projects in adequate numbers are hard to come by. It is all very well for planners to equip themselves with an arsenal of alternative investment criteria to apply, and techniques for bringing market prices into line with supply and demand by the calculation of shadow prices. But these criteria and techniques are useful mostly if there are alternatives from which to choose. If, as is unhappily often the case, there is a dearth of well-prepared projects; if, indeed, there is only one project in a sector ready to go, it avails planners little to demonstrate that application of the social marginal utility criterion, or some other economic investment criterion, shows the project to be of low priority.

Application of economic criteria without reference to the administrative capacity of government organizations responsible for preparing and carrying out projects may, and frequently has, led to under-spending of available investment resources. In some countries, public funds allotted in a budget to one agency which proved to be unable to spend the funds because of administrative reasons have been reallocated to other agencies without adequate scrutiny of the economic return of the projects which benefit from the reallocation. Given the pervasiveness of administrative and organizational inadequacy in lessdeveloped countries, it is well to add to the economic criteria used to test investment projects, organizational, administrative and other non-economic criteria.<sup>14</sup>

### 3. *Components of a Sector Program*

At the conclusion of stage two, each sector program should contain the following six components:<sup>15</sup>

- a. A statement of the objectives for the sector and the structural changes which are to be achieved within it during the medium-term and, if possible, over a longer period.
- b. The strategy adopted for achieving the sector medium-and longer-term goals, including the major policies to be followed in carrying out the strategy.
- c. The allocations of financial and other resources made to achieve the sector targets.
- d. A list of the major projects under way, ready to start or proposed for achieving sector targets, their adequacy for this purpose, and the need for additional projects, if any.

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<sup>14</sup> E.g., projects should be tested to insure that through well-phased training or technical assistance programs, a sufficient number of skilled technical and other personnel will be available to operate the project efficiently when it is completed.

<sup>15</sup> Modified and expanded from a list originally suggested by George B. Baldwin.

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- e. An enumeration of the major preinvestment (e.g., feasibility) and investment (e.g., technical) studies to be undertaken, with timetables, and other pertinent information.
- f. A statement of the data and other requirements to permit continuous programming for the sector.

### *III. Sector Programs Under Conditions of Uncertainty*

#### **A. Shortcomings of Most Sector Programs**

If most medium-term plans contained sector programs with the six components outlined above, the art of sector programming probably would be far more advanced than it is to day. But an examination of the development plans prepared for less-developed countries will reveal that for every plan with reasonably good sector programs there are many more with bad ones. Frequently, sector programs found in development plans are little more than disaggregations of macroeconomic investment and output targets with little substance, and even less information about the projects required to achieve sector targets. Consequently, the reconciliation of sector programs outlined in Stage Two (Section II, B, above) may never take place. Indeed some development plans will announce a shortage of projects required to achieve sector goals and, sometimes, will call for renewed efforts to identify and prepare projects.<sup>16</sup> This is a certain indication that the plan will never be carried out because it is too late to start identifying and preparing projects to carry out a medium-term plan after it has been formulated.

Good projects take time to prepare. The lack of good projects is due in part to the fact that technical ministries, departments and agencies often are unable to identify, evaluate, prepare, carry out and operate projects of good quality in sufficient numbers to achieve sector targets; in part, it is also due to poor communications between central planners and those responsible for the preparation and execution of projects. Whatever the reasons, most sector programs in medium-term plans are prepared "from-the-top-down," as it were, by the central planners with very little of the planning "from-the-bottom-up" which is essential for producing a good sector program.

In theory, the preparation of projects and sector programming are supposed to be going forward on a continuous basis in technical ministries, departments and agencies. But in practice, they rarely are, partly because of the lack of institutional arrangements for these purposes and the scarcity of personnel trained in these techniques and partly because the need for continuous long-term sector programming and project preparation has been less understood than the need for continuous long-term macroeconomic planning.

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<sup>16</sup>E.g., cf. Bolivia, Junta Nacional de Planeamiento, *Plan Nacional de Desarrollo Económico y Social, 1962-1971: Resumen*, p. 24; and Ethiopia, Office of the Planning Board, *Second Five-Year Development Plan, 1955-1959 E.C.*, pp. 192-193.

Another important shortcoming of sector programs found in most medium-term plans, is the shortness of their time horizon. Since most national plans extend for about five years, most sector programs included in these plans are also for the same period. For programs in most economic and social sectors, a longer time horizon is needed. In industry, as in transport and power, ten years is likely to be desirable, while in agriculture, education and manpower, 20 years or more may be preferable. It takes a long time to effect fundamental changes in a sector and the gestation period of important projects may easily require 5, 10 years, or more.

Countries with perspective plans, which are for longer periods than medium-term plans, can look ahead for 15 or 20 years. But a perspective plan is no substitute for long-term sector programs because more project detail is generally needed than can be found in a perspective plan. Moreover, a perspective plan usually charts *one* course of development, subject to revisions which events may dictate. This is also true of a medium-term plan.

#### **B. Sector Programming Based on Alternatives**

But political instability and economic uncertainty make long-term and medium-term plans difficult if not impossible to carry out in many low-income countries. Moreover, the record demonstrates that acceptance of comprehensive, national development plans with a fixed list of projects for the public sector and specific strategies and policies often has been more formalistic than real, with political leaders unprepared to adhere to the discipline required to implement medium-term development plans. In many countries political leaders prefer to keep control of investment in their own hands and prefer to improvise rather than to follow a specific investment pattern. In these circumstances, the life expectancy of sector programs prepared only as part of the process of disaggregating the targets in a medium-term plan tends to be very short. There is something to be said, therefore, for the preparation of sector programs outside the framework of a medium-term plan where the prospect for such plans is poor, or where the probabilities are high that major plan revisions will occur. In these situations, it may be well to prepare contingency programs for sectors based on alternative development strategies, with projects and policies suited to the various alternatives.

A prime purpose of sector programming should therefore be the identification of several feasible development strategies and policies, and the different projects required to give effect to them. When feasibility and other pre-investment studies of these projects are carried out, a shelf of projects can become available to be drawn upon as circumstances require without great delay. This implies that more projects have to be studied than are likely to be carried out. While this may appear wasteful, it is in fact likely to be less costly ultimately than being caught short of viable projects a situation in which many low-income countries frequently find themselves. Where a shelf of studied projects exists for a sector, choices among alternatives become possible. Furthermore, the existence of a stock of projects would allow governments to arrange for their financing long enough in advance to insure their completion in accordance with a predetermined timetable.

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Since there is no telling exactly when each project on the shelf may be carried out, it is unnecessary and undesirable to complete studies for each project until a decision has been made to activate it. If a feasibility study indicates that a project is potentially viable, pre-investment and other studies need be carried out only to, say, about three-fourths of the preparatory work has been completed. In this way, last minute changes in projects can be made without undue delay in execution.

Even where no overall framework exists, and it is unfeasible to prepare one, it is desirable to prepare sector programs for all important sectors simultaneously in order to permit the coordination of sector inputs and outputs. It is especially important to prepare sector programs for agriculture, industry and other basic sectors prior to, or simultaneously with, programs for social overhead sectors. Yet, where the only practicable choice in a country is the preparation of a sector program for infrastructure, e.g., transport, it should not be ruled out because of misguided notions about the purity of principle. Experience has shown that even where things have to proceed, as they sometimes must, in topsy turvy fashion, enough can be done to advance the cause of development by partial planning to make the effort worthwhile. In this situation, sector programming based on variants becomes, more than ever, a reasonable course of action.

The preparation of a good sector program generally requires that two operations be carried out sequentially:

- (1) The first is to make a survey of the sector to marshal and analyze all available data about the natural, manpower and capital resources of the sector, its productive capacity, marketing problems and potentialities for expansion.
- (2) The second requires that programming of the sector be established on a continuing basis.

The survey made in the first stage may be compared to a still photograph taken on a certain date which reveals what the subject looked like at a fixed time or short time span in the past. The programming of the second stage may be compared to a motion picture which provides information about the subject on a continuing basis.

### 1. *The Sector Survey*

Of course, the nature of the surveys will vary with the sector. For agriculture, data on land use, water resources, production, marketing methods for crops produced for domestic consumption and export, commodity studies, etc., must be collected and analyzed. For electric power, estimates must be made of demand, and on the basis of these estimates, alternative sources of energy must be considered, as well as optimal relationships between hydroelectric and thermal plants, the need for transmission and distribution systems, and the most desirable sequence for building up regional and national grids. For transport, consideration must be given to the various means of moving persons and commodities, with the relative

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usefulness of highways, railways, waterways and airways. In the transport survey, as well as the other social overhead sectors, the needs of the basic sectors must be given high priority. For example, in making a highway survey, it is important to ascertain the requirements of the agricultural sector for farm-to-market roads as against the needs of other sectors for trunk roads.

a. *Prerequisites for Sector Surveys*

The preparations for making a sector survey require great care to insure that the results of the survey provide the data required for effective sector programming. An important prerequisite is a precise and detailed definition of the scope of the sector. This requires, first, the setting of clear limits for the sector. Economic and social sectors may be broadly or narrowly defined. They may be considered to include sub-sectors (major divisions of a sector), branches (divisions within a subsector), as well as sub-branches (the smallest part of a sector). For example, with this classification system, the industrial sector may be conceived of as having one sub-sector, among others, for the production of rawhides and skins, with a branch of the sub-sector for the production of leather, a sub-branch for the manufacture of leather luggage, another for the manufacture of shoes, and so on.

A good classification system which clearly divides a sector into coherent subdivisions is very useful, among other reasons because it is then easier to define precisely what is to be included and what is to be excluded in the sector survey or program. For example, a survey or program for the agricultural sector may be defined to include or exclude forestry, animal husbandry or fisheries; while one for the industrial sector may include or exclude construction, processing at early stages of the manufacturing process, of the extractive industries. A survey for the transport sector often excludes urban transport because it has unique problems separable from those of inter-city and rural transport networks. Nevertheless, although it may be excluded, urban transport has to be taken into account to the extent that it affects inter-city traffic (e.g., by providing for a by-pass where urban congestion may impede access to a port, or when estimating total requirements for vehicles).

The scope of a sector program must be fixed only after consideration of the advantages and disadvantages of including or excluding specific sub-sectors, branches and sub-branches. It is generally desirable to make a survey for all parts of a sector. But if one or more sub-sectors or branches in a country are unimportant and likely to remain so for a time, or if saving of time is a major consideration, the practical consequences of excluding one or more parts of the sector may not be serious. In a country where a few sub-sectors account for the major part of a sector's output (as, for example, is true in Uruguay where wool, hides and meat add up to most of the production in the industrial sector), it might be best to limit the sector program to these sub-sectors.

The territory to be covered by a sector survey or program must also be delimited. Usually, a sector survey and program covers a whole country, but sometimes it may be for only

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a part of a country. This may be desirable, for example, if a country is very large, as is Brazil; if it is composed of a federation of states, as in India; if it has two disparate provinces, as in Pakistan; if the development of a sector in one region is what is wanted, as in the case of the South of Italy, or of a group of regions not comprising an entire economy as is true in the Sudan.

Sometimes, sector surveys or programs are multi-national. For example, the Food and Agriculture Organization prepared a sector program for the integrated development of agriculture and forestry in ten Mediterranean countries. A telecommunications program has been prepared for the five Central American countries and Panama; and a transport survey for Central America was made in 1965 with a view to preparing a multi-national transport program for the five countries of that region. There have also been several multinational transport surveys made in Africa. Multi-national sector surveys and programs are useful where countries have joined in common market associations; or where, as in the case of the railways linking Mali and Senegal, the transport system of two or more countries are closely linked.

It is essential for good sector programming that the depth of the programming for each part of a sector be indicated. Thus, if a program for the industrial sector is to include both public and private investment, it may or may not be considered desirable for the public portion of the program to be prepared in greater detail than the private portion. Even where only the public sector is involved, some sub-sectors, branches and sub-branches are likely to be more important than other, and these may consequently require more detailed study. In determining the character of a sector survey, it is therefore essential to have a clear idea of the relative importance of each part as a preliminary to the start of the survey

#### *b. Sectors with Private Investors*

Where a sector includes both public and private investments or the extent to which some parts of the sector are to be open to private investors is, of course, a political question. The important thing for sector programming is to have governments indicate clearly which sub-sectors, branches or sub-branches are available to private investors and which are reserved for public investments. This is no easy matter to settle in some countries. But for the purposes of sector programming it may be possible to get a government to indicate which parts of a sector are reserved for the public sector on the understanding that the sector program will not be made public.

While the preparation of a program for the public investment portion of a sector involves the identification, evaluation, preparation and execution of projects; preparation of program for private investors involves mostly (1) provision for the elimination of obstacles-frequently, like licensing, of an administrative nature - to private investment, and(2) the creation of suitable economic incentives for such investment.

There is no need for the purposes of this paper to detail the varieties of impediments to private investment one may find in less developed countries. Suffice it to say that there are

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many. Moreover, where, as in Pakistan, the authorities have been persuaded to substitute regulatory restrictions for incentives, results have proved the desirability of the change. As for incentives, one need only refer to a couple which have demonstrated the efficacy of the right kind of economic incentives.<sup>17</sup> Pakistan has had no able success in stimulating new exports through its Export Bonus Scheme, under which all but traditional exports earn negotiable bonus vouchers for a certain percentage of their value. These vouchers can then be used to import a wide range of commodities which are in demand. Since these imports are very profitable, the bonus vouchers are much sought after and command a good price. This, of course, makes exports more profitable and stimulates producers to export as much as possible.

In Brazil, a tax credit makes it attractive for private entrepreneurs from the more developed parts of Brazil to seek out investment opportunities in the poverty-stricken Northeast. Under the terms of Article 34/18, any Brazilian corporation can reduce its annual income tax liability in half by investing the saved half of the tax in projects in the Northeast when approved by SUDENE, the regional planning agency. In addition to obtaining SUDENE's approval, the investor must combine the amount saved from taxes with fresh capital funds which amount to 25, 50, or 75 per cent, depending on the merits of a project for the development of the Northeast as determined by SUDENE. This incentive system has proven to be a powerful attraction for Brazilian investors and has greatly increased the amount of investment in the Northeast.

The question of incentives for stimulating private investments is a complex one. But there are some general guidelines in applying incentives which experience shows are useful, among which are the following:

- (1) First the economic incentives must be substantial enough to give promise of providing a windfall to those who take advantage of it. The prime requirement for an economic incentive is that it brings the desired results. If it is niggardly, it is unlikely to work well. It is better to provide a windfall at first than to make the incentive too small and find it necessary to increase it later. Where this is considered desirable, additional income received by those who benefitted from the incentive which is not reinvested can be reduced by government through taxation or charges on publicly-provided facilities.
- (2) This leads to a second guideline: It is better to give the necessary incentives at one time than to do it piecemeal. The piecemeal approach leads to bargaining between private investors who hold off in the expectation that the government will have to increase incentives if they are inadequate to produce the necessary results.

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<sup>17</sup>The discussion of impediments to, and incentives for, the private sector perhaps belongs more properly in the section on sector programming which follows, rather than in this section. It is included here to emphasize the importance of having the sector surveys provide the data required for stimulating private investment in sectors where this conforms with national objectives.

- (3) A third guideline: The incentives should be reasonably stable. While experience with an incentive may make it necessary to alter its terms instability of an incentive will make for uncertainty. It may also make for bargaining between governments and entrepreneurs.

*c. Duration of Surveys*

In preparing terms of reference for a sector survey, it is especially important to insure that those who will make the survey understand that what is wanted is a pragmatic document with salient facts, and *only those*, required for sector programming. Everything possible should be done to guard against the use of the survey as a means of collecting encyclopedic lists of peripheral information of little worth for practical sector programming.

Experience shows that it is possible to complete a sector survey in most cases in six to twelve months. It is best to keep the period short, even at the risk of making it too short, to put pressure on those making the survey to concentrate on essentials. Since basic data are likely to be inadequate or incomplete, it is important to obtain what is readily available without postponing unduly the start of continuous sector programming. This is important because the survey is only a means for getting continuous sector programming going. It is the programming which should have the highest priority, rather than the sector survey. It must be realized by those making the survey that the acquisition of reliable data in adequate quantities for each sectoral subdivision is likely to take a long time and that the accumulation of data will have to be a continuing task carried out concurrently with, and as a part of, the programming of the sector in the second stage which follows the completion of the sector survey.

Since studies usually have been made for all or part of a sector in most countries, and some potentially viable projects may have been identified or started, work on a sector survey should begin with a collection of all available studies and materials which can provide information about the sector and its development potentialities. After analysis of the data, attempts should be made to fill informational gaps to provide as complete a view of the sector as is possible. Where additional studies are required which would take much time, provision should be made for them in the sector program which will be prepared following the sector survey. If projects are uncovered which promise high yields for investment outlays, steps can be taken even before completion of the sector survey to begin feasibility or other pre-investment or investment studies so that their execution can start as soon as possible.

*2. Sector Programs*

*a. What Not to Do.*

With the completed sector survey as a basis, sector programming on a continuing basis can begin. This largely resolves itself into a matter of setting up an appropriate organization for the purpose and staffing it with persons qualified to do the job. The first question concerns

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the location of the organization. Given the disorganization, administrative inefficiency, and lack of trained personnel in technical ministries, departments and agencies of most low-income countries, it is understandable why central planning agencies in these countries sometimes prefer to establish sector programming, as well as project preparation, units within their own agency. This is or was true, for example, in Ethiopia, Mauritania, Pakistan, the Ivory Coast and Iran, among others.

But the record shows that programming units located in central planning agencies have almost always been ineffective. The projects and programs they prepare have generally been ignored or circumvented by the technical ministries, departments and agencies, which tend to greet with hostility what they consider to be attempts by the central planning agency to usurp the functions of the technical ministries, departments and agencies. Moreover, experience shows that planning agencies generally have all they can do to prepare the macroeconomic perspective, medium-term, and annual plans required of them. To add additional functions to these important ones only makes it more difficult for them to carry out the tasks they should be working on.

There are better ways of dealing with sector programming and the project preparation with which it is inevitably associated. This involves improvement of the ability of technical ministries, departments and agencies to perform the tasks which they should be doing. The central planning agency must, of course, set the preliminary sector targets and make investment allocations to each sector where sector programs form a part of a macroeconomic plan, with all that this implies for implementing a national development strategy with appropriate policies. The central planning agency also has the task of combining, coordinating and integrating sector programs into the macro-economic plans it prepares. But the preparation of the sector programs themselves, as well as the projects which form the segments of sector programs, is a task which must be done by the technical ministry, department or agency whose responsibility it is to carry them out.

#### b. *Programming Units for Technical Organizations.*

Experience demonstrates that the best way of programming for a sector or subdivision of a sector is through a programming unit established for this purpose in the organization concerned with the sector or subdivision.

Where several organizations are responsible for parts of the same sector, the creation of a programming unit must be preceded by a definition of the responsibilities of each which guards its integrity in carrying out its legitimate functions, while insuring that all the organizations will be governed by the objectives of any sector program approved by government. In Ghana, for example, where four entities operate in the industrial sector and none had the necessary authority to carry out effectively what it was supposed to do, the relative functions and

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powers of the entities has to be fixed before it could be expected to implement a sector program for industry. In many countries, many agencies are concerned with aspects of agriculture. For sector programming in agriculture to be effective in these circumstances it is essential to devise institutional means for coordinating their frequently disparate activities.

Once this is done, the organization authorized to set policy for the sector is the preferred location for a programming unit. The programming unit should be considered for its organization the virtual equivalent of a central planning agency for a national government. It should set standards and criteria for operating departments or other units to follow in preparing and carrying out projects; it should formulate the overall development program, as well as the recurrent budget for its organization on the basis of directives from the head of the organization; it should prepare alternative development policies for the consideration of the organization's head, after consulting the various operating heads of departments or other units; it should set standards for operating departments and units to follow in reporting on the progress of projects and, on the basis of reports from operating units, it should prepare regular, timely and reasonably complete reports and evaluations of its organization's overall program; it should coordinate the technical assistance program for its organization; and it should act as the liaison for its organization with the central planning agency.

In countries with a permanent civil service, the proper administrative location of a programming unit is immediately under the top civil servant in the organization. In other countries, it is immediately under the head of the organization. Indeed, if in most technical organizations the head of the organization or the highest official were not as busy as he generally is with day-to-day tasks, he would be the logical head of the programming unit because of its importance. But under the circumstances prevailing in most countries, it seems more practical to suggest that the head of a programming unit be the second in rank in an organization, immediately below either the top civil servant or the other head of the organization (as the situation dictates) and report directly to him.

It is desirable that the head of a programming unit outrank the heads of technical units in the organization where it is located because experience has shown that officials will not easily yield their prerogatives to other officials of the same or lower rank.

### *c. Personnel Requirements*

Programming in a technical ministry, like planning in a central planning agency, is a highly specialized field which generally requires specially trained technicians who have mastered enough economics and accounting to make cost-benefit analyses for projects and programs. While this training can be obtained abroad, arrangements should be made for most of the staffs concerned to obtain on-the-job training.

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#### *d. Technical Assistance Requirements*

Experience throughout the world has demonstrated that the establishment of effective programming units almost always requires outside technical assistance which can concentrate on the task of carrying out the initial sector survey, creating the programming unit, setting up appropriate procedures, and training its staff as well as those in the technical offices of the organizations concerned. It is desirable that those who are to staff the programming unit participate from the beginning in the preparation of the sector survey. If this is done, those who will make up the staff of the programming unit will be fully informed about all steps taken in the preparation of the sector program.

### *IV. Conclusions*

Sector programs can be carried out within or without an overall framework. While sector programming within a macroeconomic framework is the preferable way of preparing sector programs, it is not the only way. Whether prepared with or without relation to an overall plan, sector programming has often been done poorly. There is much to be learned about the art of sector programming, an art which is very much in its infancy. Largely neglected until now, at least in relation to macro-and even microeconomic planning, it now beckons those who see sector programs as the mortar needed to cement plans and projects.

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