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Methodological Problems in National Economic Planning and Data Needs

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Planning has come to be accepted in many countries as a pivotal means of speeding up economic development. The techniques of planning employed in different countries are due mainly to the political and institutional character of the economy, the level of economic development and the availability of statistical data and technical skill in each country. In the centrally planned economies where market mechanism has little part to play, the essential task is one of setting targets at the aggregate and sectoral levels and to obtain consistency all through the system. This is sought to be done through a process of successive 'iterations' and balancing techniques. In predominantly market economies, such as those of Western Europe, planning is essentially of indicative nature and planning methods used are mainly of the type of econometric models. These techniques are used for projections at macro level and also sectoral level. In developing countries, mostly having the mixed type of economies, the techniques used are adaptations of the ones employed in the market and non-market economies.

The limited space available here does not permit a detailed review of the techniques of planning adopted under different planning systems. In view of the increasing interest in and extensive economic debate on techniques of planning adopted in developing countries, it is proposed to concentrate in this paper on some of the methodological problems of these techniques.

Development planning in developing countries is a complex phenomenon due to the existence of a private sector, substantial dependence on market mechanism, the innumerable vicious characteristics of the economy and the imperative need of effecting structural changes. The steps in the formulation of a development plan for such a country include: setting up of a target of growth; working out details of this target in terms of private consumption, gross investment, government expenditure, exports, etc.; projecting the output levels and other economic magnitudes by the major sectors of the economy and by regions; and preparing programmes and projects within the framework of aggregate and sectoral levels. In most of the developing countries, a beginning towards plan formulation was generally made with a simple juxtaposition of projects. In some cases, an attempt was also made with the adoption of macro-economic models which aim at setting of targets

of economic development expressed in terms of national income or employment, and related aggregates, e.g., savings, investment. Subsequently, however, the planning process involved the adoption of more detailed and refined techniques and progress towards disaggregation of the macro-models. While various approaches have been followed, the technique of input-output analysis has received greatest attention since it provides an instrument for obtaining consistency at sectoral, project and commodity levels.

Methodological Problems of Economic Planning

It may be pointed out at the outset that no economic models, however, refined they may be, can be comprehensive enough to take into account all the variables that affect the growth of an economy. The variables influencing the economy may be both economic and non-economic in nature. Many of the non-economic variables as also some of the economic variables resist standardisation and quantification and cannot therefore be incorporated into a model. Further, for at least some of the economic variables which are otherwise quantifiable, the basic data may not be available in developing countries. Therefore, generally all the models that are now being used assume that 'other things remain constant'. The duty of the economic analyst who employs the economic models for plan formulation is to continuously arrange for more and more of relevant statistical data so that at least important variables can be incorporated, and also not to forget the possible effects of such variables as cannot be included in the model.

Apart from the above limitation, a number of methodological problems arise in any model, aggregative or disaggregative. In the case of aggregative capital-output model which has come to be used in many developing countries, the difficulties experienced are of the following types:

Firstly, the economies of many of the developing countries are generally so diverse and heterogeneous that aggregation of capital or output is not only not easy but also often misleading. Secondly, in such a model capital is assumed to be the major, if not the only source of development, while in actual practice, it may be possible to substitute, at least partly, labour (as also land in some countries) for capital. Thirdly, technical knowledge and improved strategy of production involving changes in factor proportion and product mix may contribute significantly to increasing the level of output even from the same amount of capital. Further, changes in the degree of utilisation of existing capital or the ratio of fixed capital to working capital or the quality of capital from the point of view of indirect and chain repercussions could throw out of gear the assumption of constancy of capital-output ratio. Fourthly, in many countries recourse is made to structural changes in several sectors of the economy as an important means towards future economic growth. The problem therefore arises as to how to 'revise the past values of structural parameters' and introduce 'structural coefficients consistent with the type of structural changes envisaged'.[1] Fifthly, in view of

1 United Nations Economic Commission for Asia and the Far East–Review of Long-Term Economic Projections for Selected Countries in the Economic Regions–Development Programming Techniques Series No. 5, 1964.

the existence of a private sector as also non-monetised sector in many developing countries, there would also be the difficulty of predicting the behaviour pattern of private investment and the effect of development policies and programmes on them.

The problem of aggregation is not exclusive to macro-economic models where the capital-output or the labour-production ratios are assumed to be fixed. Even in the case of neo-classical models where the law of variable proportions is assumed, where the capital and labour inputs are substitutable and where the ratio in which the two inputs are used, could undergo a change—there are problems of aggregation.

Most of the methodological problems enumerated above, will arise even when a disaggregative approach is adopted. A substantial part of investment in any developing country serves more than one sector. As a result, the calculation of sectoral capital-output ratio becomes even more difficult despite the fact that each sector represents relatively much more homogeneity than the overall economy does. The assumption of constancy of input and structural coefficients which may have to be made even in most of the disaggregative models, would remain an equally serious handicap. While it may be easier to visualise technical and other structural changes that might influence input coefficients in each sector, it would be possible to deal with them only within the framework of a dynamic input-output analysis. However, data requirements of this approach would be too detailed and exacting for developing countries.

At any rate, a disaggregative or multi-sector model will be preferable to an aggregative or one-sector model. However, the practical usefulness of a disaggregative model would depend very much on the degree of inter-sectoral dependence. Further, to improve the utility of a multi-sector model what is needed is a detailed forward looking study of each important sector, in which different technical exports should cooperate.

Methodological Problems of Agricultural Planning

Agriculture being the main sector in developing economies, agricultural planning assumes a special significance. Essentially, agricultural planning has to be undertaken as an integral part of a multi-sectoral approach to the planning of overall economic development. However, for establishing an agricultural plan, a detailed programming of this sector is also required. The main steps in agricultural programming include (i) projection of demand and supply of agricultural commodities and establishment of production targets; (ii) choice of programmes and projects for the achievement of targets; and (iii) establishment of consistency of the agricultural plan with the overall plan.

Projection of Demand and Supply and Establishment of Production Targets—Projection or estimation of demand is at present made in many developing countries primarily on the basis of projected rates of growth of overall population and levels of income. While such a procedure is consistent with the simple type of statistical data presently available in most developing countries, it needs to be improved upon to provide more realistic estimates of

future demand. Demand for human consumption should be estimated taking into account changes in the age structure and sex composition of population, break-up of the population between rural and urban sectors and changes in the pattern of distribution of income. Estimates also need to be framed of the requirements for pipeline and buffer stocks and requirements for seeds, livestock feeding, industrial use and finally, external demand. Such forecasting of demand would require detailed statistical data. This in turn would raise questions relating to the types of (a) surveys or studies to be undertaken to collect these data as also on income elasticity of demand, and (b) analytical tools to be adopted in using them. There is no doubt that over time progress would be made in the developing countries towards finding solutions to the above questions. However, one question for which a satisfactory answer has yet to be found in most countries, relates to the method of assessment of the effect on demand of structural changes that may take place in consumer tastes and habits or may be induced through consumer education or the availability of substitutable products. The income elasticity approach assumes that consumer tastes as also relative price structure will remain unchanged, which rarely happens over a long period.

The methodology for the projection of supply is far less satisfactory than for the projection of demand. The estimated demand provides the first approximation to production targets. However, this has to be adjusted with the potential that is capable of being created with the available resources and the various programmes and projects that may be followed by Government for improving farming efficiency and motivating the farmers to increase the use of inputs. The supply projection is, therefore, intimately linked with the next step in agricultural programming, viz., choice of programmes and projects in the field of agriculture. For assessing the likely effects of input use on production, the most appropriate approach is that of establishment of production functions which express the volume of output as a function of varying quantities of inputs used. However, such an approach is applicable more at the farm level than at the national level, and also more in commercialised agriculture where purchased inputs account for a substantial proportion of total inputs than in traditional agriculture where most of the inputs are available from within the farm. For establishing production functions, suitably designed farm management studies would have to be organised. In the developing countries there may be a great scope for increasing production through a shift in the production function, i.e., through the adoption of new technology such as high-yielding varieties. The production function approach therefore necessitates fresh farm management studies as soon as new technology is introduced.

In view of the limited application of the production function approach in the developing countries as also the high cost involved in conducting comprehensive farm management studies, the most popular approach adopted is that of 'yardstick' approach. This is a simple linear relationship which represents the increase in output from recommended or expected doses of different inputs. At the initial stages of development, these yardsticks are established on the basis of field experiments at the farm level, or in their

absence, on the basis of the expert knowledge that may be available in the country. This approach needs to be applied for different crops to homogeneous regions. While, in the past, yardsticks have been established generally for individual inputs, there is really the need to compute composite yardsticks in view of the high degree of complementarity among inputs. This necessitates a much greater programme of experiments so that representative data can be available on different combinations of inputs and resulting output.

The production function approach or the yardstick approach which gives the quantitative relationship between inputs and output assumes that cultivators would use the necessary inputs in requisite quantities. In actual practice, resort has to be made to various economic incentives and institutional reforms so as to induce cultivators to adopt these inputs and put in the necessary effort to raise agricultural output. It is necessary to quantify and thereby take into account the effects of such incentives and reforms on output. For making an assessment of these effects, the basic information that would need to be collected would be on the extent to which cultivators use various inputs with or without the introduction of these economic incentives and institutional reforms. Some rough assessments in this regard may be possible through sample surveys or case studies of a group of farmers or opinion surveys of knowledgeable persons. In the light of the information thus available, adjustments may be made in the targets of production established on the basis of response to material inputs. As more experience with economic planning is gained, time series data could also provide valuable light on this subject.

When demand and supply have been projected separately in accordance with the procedures stated above, the next stage of analysis would be the reconciliation of the two through adjustments in programmes and policies. The projected demand can be adjusted through trade or price changes or in the short period through changes in stocking policy. A realistic agricultural plan should be able to indicate a realistic and responsible forecast of what that trade will amount to or what the nature and order of changes in prices and stocking will have to be. So far as foreign trade is concerned, it is not always possible to treat it as a residual supply. The projection of trade, therefore, raises one of the most difficult methodological problems which calls for attention at the expert level. For indicating the order of price adjustment, information is needed on the coefficient of price elasticity of demand for different products. Very little information is presently available on this coefficient.

Choice of Programmes and Projects–For the achievement of established targets, a judicious selection has to be made of programmes and projects, the objective being to ensure as far as possible an optimum allocation of available resources. Capital-output ratio, labour-output ratio and benefit-cost ratio, among others, could provide the necessary criteria for resource allocation. Some of the problems relating to the application of capital-output ratio in the aggregative analysis have been discussed earlier. The use of this concept to agricultural planning presents even greater difficulties. Since agriculture is

subject to vagaries of weather, the estimation of the coefficient of capital-output ratio is not an easy task, and the effect of weather has to be isolated to arrive at a normal relationship between capital and output. Further, in many countries which are still at early stages of development, there is a lot of surplus farm family labour which can be used as a substitute for capital in agricultural development. Moreover, in these countries working capital (e.g., fertilisers) has to be used along with fixed capital for stepping up production. The proportion in which the two categories of capital are to be used as complementary to each other has to be carefully studied to arrive at the realistic capital-output ratio. In view of the new strategies of agricultural production, involving the use of high-yielding varieties and other scientific methods of production which are being increasingly adopted in developing countries, the assumption of constancy of technical input coefficient would not hold good; therefore, the likely effects of these new developments would have to be taken into account in modifying the aforesaid coefficient. Further, it is difficult to frame estimates of investment by a large number of farmers, big and small, in agriculture, particularly when such investment is non-monetised. Procedures need to be developed to make such estimates. The problems in the application of labour-output ratio are more or less akin to those encountered in the application of capital-output ratio.

The criterion of benefit-cost ratio also suffers from a number of limitations which need to be taken due care of in applying it to agriculture. It is not easy to measure precisely the total benefits and costs in respect of a programme or project. So far as benefits are concerned, evaluation has to be made not only in respect of direct or primary benefits but also of indirect or secondary benefits. Similarly, account has to be taken not only of direct costs but also of associated costs. Such evaluations of benefits and costs raise special problems. The real benefits and costs may be different from monetary values. The application of 'shadow' or 'accounting' prices which is considered most appropriate for determining the real cost entails an element of arbitrariness in evaluating 'true' prices. There is no finality about the techniques of estimating these prices and it is difficult to predict shifts in such prices over time. The relative scarcity of the relevant statistical data in developing countries required for calculation of such prices also constitutes an obstacle to the appraisal of programme and projects on this basis.

Besides, for a proper appraisal of any programme or project, its impact on all aspects of the Government's development policy including national income, savings, employment, public health, etc. has also to be ascertained. This raises problems of assigning suitable values to the different spheres of development.

In most of the developing countries, very little experience is available in the use of this criterion for determining investment priorities. In view of this, to begin with, the application of this criterion can be based on rough and crude data and intuitive judgments.

Establishing consistency of Agricultural Plan with overall Plan—The targets of production established on the basis of detailed agricultural programming indicated above will have to be finally integrated into the framework of

an overall plan embracing different sectors of the economy. The input-output analysis or inter-sectoral analysis would ensure the necessary balance and consistency between agricultural and non-agricultural sectors. If it is found that the targets of agricultural production established through detailed agricultural programming cannot be achieved with the resources that might be allocated through inter-sectoral analysis, these would have to be modified.

It is, however, to be emphasised that in many of the developing countries there are certain limitations in the application of input-output analysis in relation to agriculture. These limitations arise mainly because (a) non-agricultural inputs constitute only a small proportion of total inputs used in agriculture and thus there is only limited inter-sectoral relationship, and (b) agriculture is composed of heterogeneous activities with wide variations in input coefficients which hardly remain stable over time. In view of the limited interdependence between agriculture and other sectors, for the purpose of inter-sectoral analysis, inputs may better be classified into two categories, such as those which are used both in agriculture and industry (e.g., cement, steel) and those which can be used only in agriculture (seeds, farm yard manure). The problem of heterogeneity of agriculture could be overcome to a large extent by breaking down agriculture into a number of sub-sectors, all of which may be considered along with other sectors in the construction of input-output table. The availability of reliable statistical data and also computational facilities would, however, be a limiting factor in the consideration of a large number of sub-sectors.

To sum up: In this paper an attempt has been made to identify some of the problems of the application of various techniques to economic planning in general and to agricultural planning in particular. There would be many more problems connected with other aspects of planning such as spatial planning, perspective planning, implementation and evaluation of plans, etc., which have not been dealt with in this paper. New sophisticated planning techniques are being evolved in several countries and international organisations, which are expected to provide suitable answers to some of the methodological problems. However, these techniques are likely to require more detailed and exacting statistical date. Until the requisite data becomes available, reliance would have to be placed mainly on the techniques which are simpler in nature and can be used with the available data. At the same time, steps need to be taken to fill up the gaps in the existing data so that economic planning can be systematised through the adoption of refined techniques.

SPECIAL GROUP E REPORT

The chairman opened the session by stressing that the subject under discussion was the methodological problem of planning and not mere description of planning processes and achievements in different countries. The main focus was the problems faced in the mixed-economy-countries. Those of the centrally-planned economies had already been discussed in the

session of Section A.

The main speaker, in presenting his paper emphasized the important aspects of methodological problems in national economic planning, including provision of basic data, in a developing country.

The first item taken up for discussion was the fact that the methodological problems differ considerably from one country to another. In understanding the methodological problems, one must make a distinction between (a) the basic principle or the philosophy of planning, and (b) the technique of planning. Other aspects which needed elaboration in the discussion of planning were the problems concerning (a) the preparation, and (b) the end stage of a plan.

Economic analysis was considered to be the building block in planning. An example of such an economic analysis is the study of supply and demand. A difficult aspect in such an analysis is the study of the consumption function.

The social structure of the society was considered to be an important factor to be taken into account in planning, especially in the developing countries.

Very often conflicts arose in making a synthesis between macro- and micro-planning, and consequently, a gap existed in the planning methodology. To avoid such a gap a suggestion was made for the use of a block-diagonal model, in which, in an iterative process, the optimum relation between the macro- or central administration and the micro- unit or regional administration could be achieved. The World Bank is experimenting with such a model with data from Mexico and Ivory Coast.

The conflicts of goals in the different sectors were reported as one of the planning problems in the USSR also. As a consequence, the synthesis of the different components in planning was considered to be very crucial in order to achieve an optimum plan.

Lack of data was one of the main problems reported in planning in Indonesia. Studies and analysis of planning were often not published due to unreliability of data. In view of the lack in the necessary data, simple planning procedure was applied instead of a sophisticated one.

In the course of the discussion on data problem, the experience in Bulgaria was described, in which the use of normative labor costs and the evaluation aspects of planning were elaborated. The normative data should be continuously adjusted with the achieved data.

The various aspects of production indices used in planning in the USSR were explained in relation to the preparation of the desired optimum plan.

In his concluding remarks, the chairman noted that (a) the appropriate methodology necessarily differed for various stages and development, and (b) there was an interdependence and interaction between planning methodology and data situation which led to mutual improvement from one stage of planning to the next stage.

Among the participants in the discussion were Ram Saran, *India*, G. Bublot *Belgium*, T. Trifonov *Bulgaria*, G. G. Kotovsky *USSR*, H. F. Breimyer *USA*, P. S. Ivaschenko *USSR*, K. Sabudiasih *Indonesia*, L. M. Goreux *IBRD*, F. Sawizki *USSR*, A. Gilshon *Israel*, W. Boev *USSR*, A. T. Birowo *Indonesia*.