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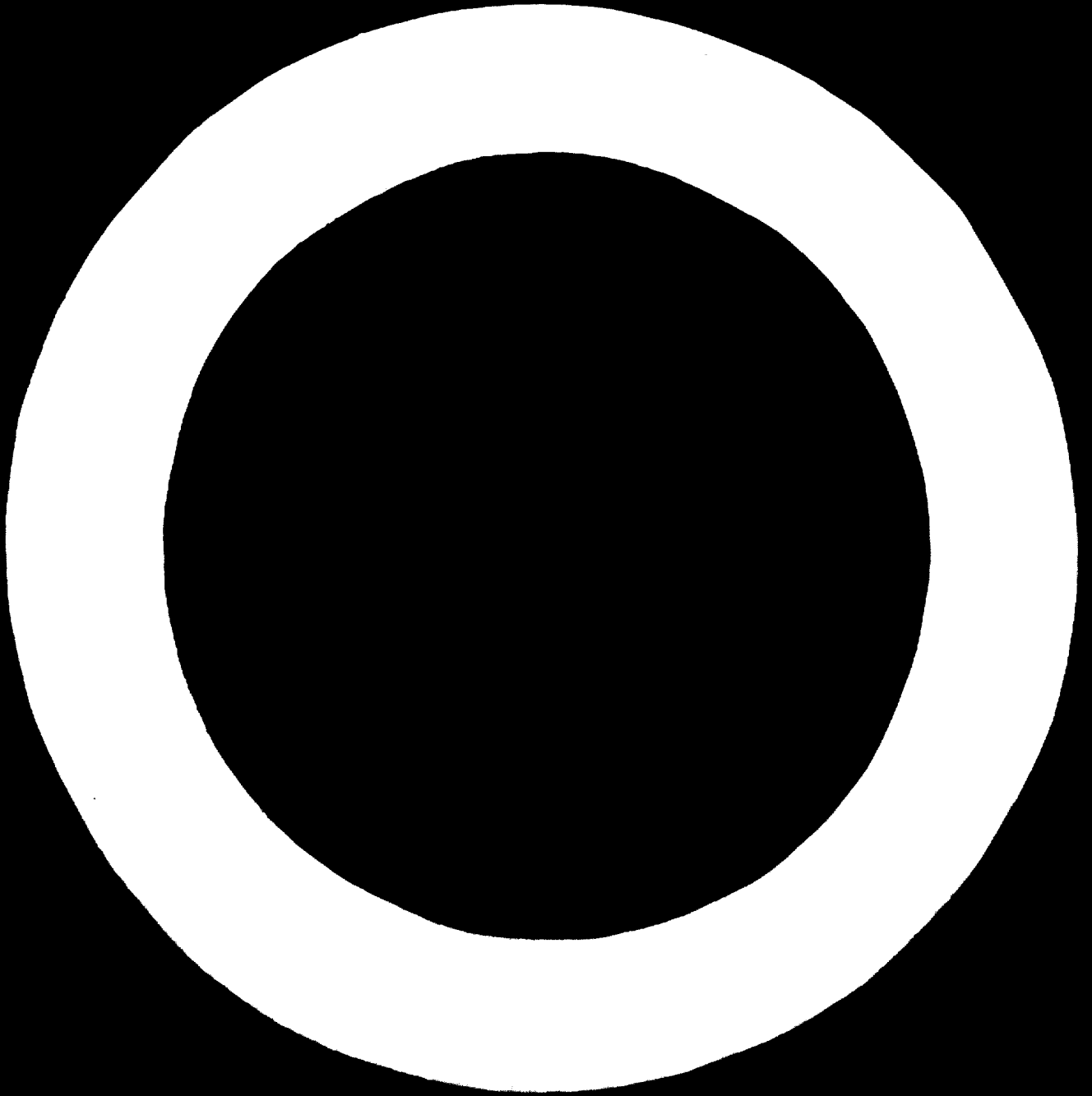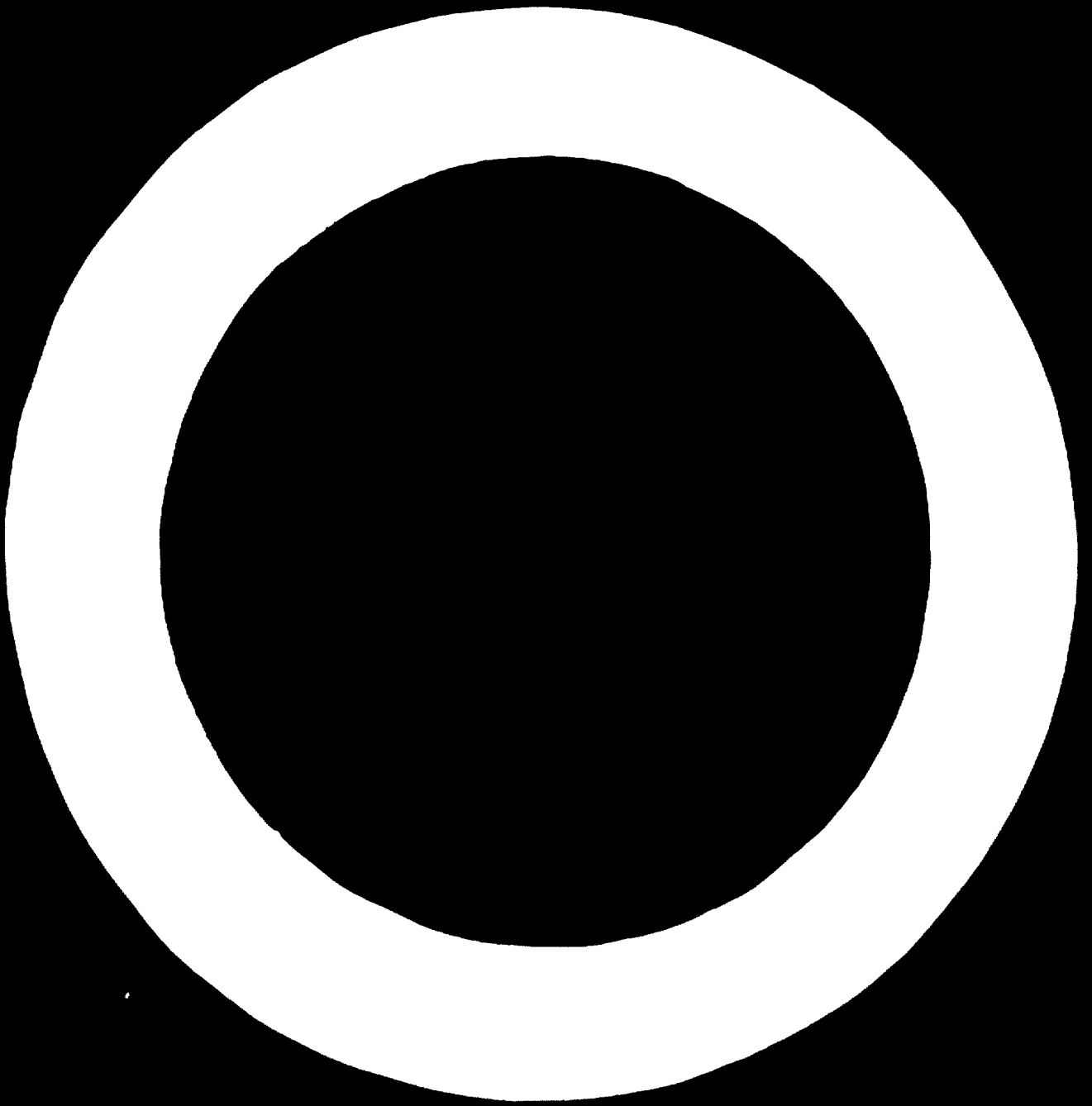
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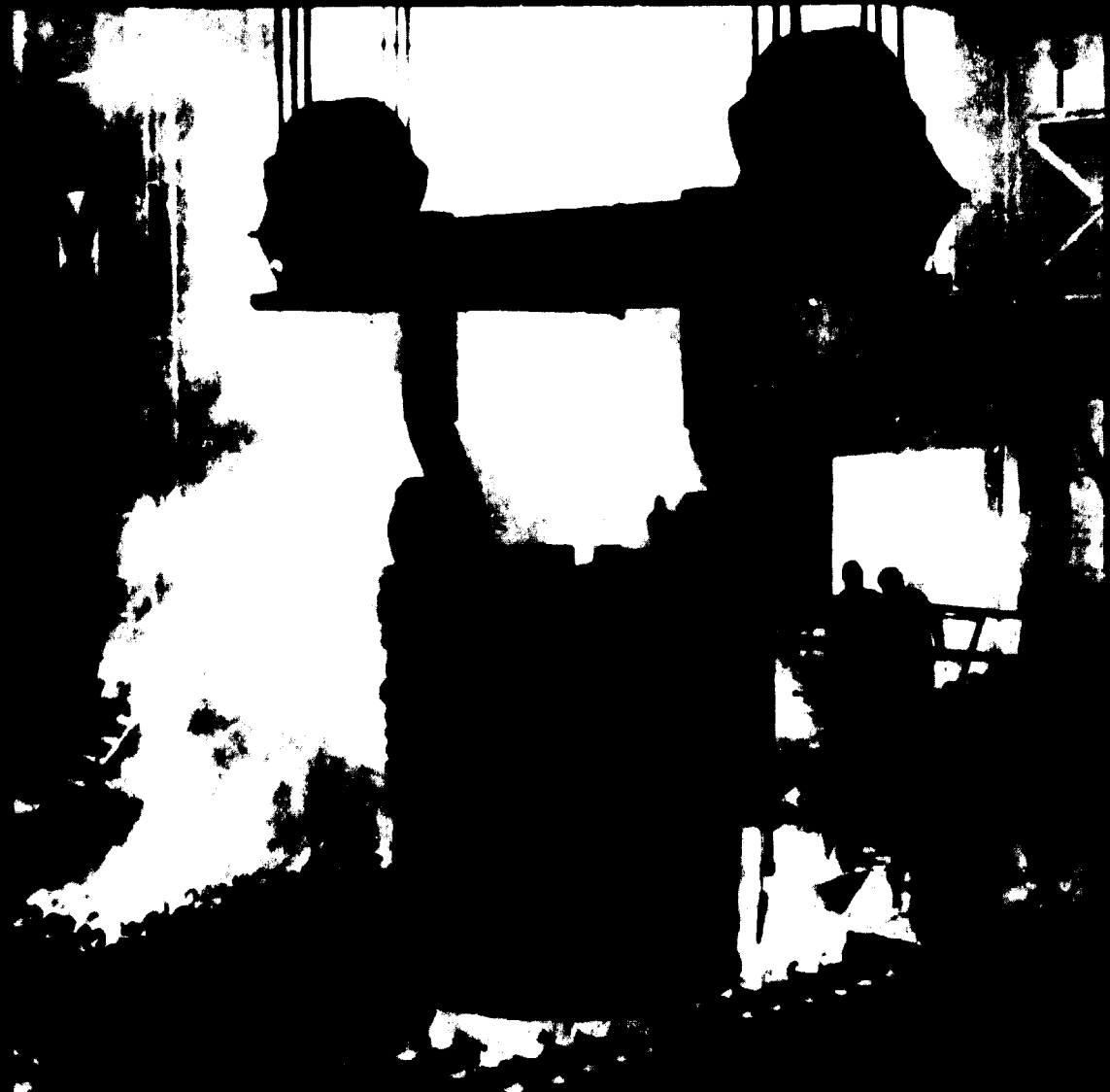
INDUSTRIALIZATION
AND
PRODUCTIVITY

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In this issue
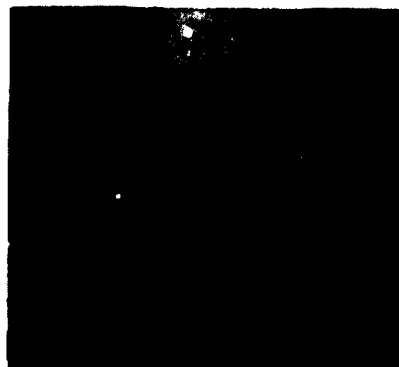
Cover illustration: Ingot teeming in the Sisak steelworks in Yugoslavia. An article in this issue discusses methodological problems in long-term economic development programming, with examples from the Yugoslav economy

INDUSTRIALIZATION AND PRODUCTIVITY

BULLETIN 5

Preface

A LARGE PART OF THIS ISSUE of the *Bulletin on Industrialization and Productivity* is devoted to studies and bibliographical material on planning and programming of industrial development—a subject of basic importance to the developing countries and on which increasing emphasis has been laid, in recent years, by the General Assembly, the Economic and Social Council and the Committee for Industrial Development of the United Nations. This subject has already been dealt with, in some of its aspects, in the fourth issue of the *Bulletin*, and further studies are being prepared for publication in subsequent issues.

In the first article on this topic, "Evaluation of Projects in Predominantly Private Enterprise Economies: Selected Procedures, Based on Case Studies", an analysis is made of the procedures for selection of industrial projects which have been proposed for use or actually applied in case studies relating to seven countries. The article contains an appraisal of the methodology to be used for evaluation of projects in industrial planning.

This article is followed by a note on the meeting of an expert group which was convened by the United Nations Secretariat to make recommendations on the elaboration of programming or pre-investment data, particularly those on inputs and investment costs in certain industries. The note contains a summary of the recommendations of the group.

An article entitled "Methodological Problems in Long-term Economic Development Programming with Examples from the Yugoslav Economy", by Mr. B. Horvat, deals with programming techniques, the scope and goals of long-term programmes and the pace of economic development under the conditions of that particular economy. This subject should be of interest to economists and planners in countries with different economic and social structures and at different stages of development.

The first part of a preliminary bibliography for industrial development programming, relating to industries in general, is published at the end of this issue of the *Bulletin*. The second part, concerning chemical and related industries, will be published in the next issue.

The *Bulletin* also contains a note on a seminar on industrial estates in the region of the Economic Commission for Asia and the Far East, which summarizes the seminar's main conclusions and recommendations.

Finally, another note presents the United Nations work programme on industrialization, including an outline of the projects undertaken or scheduled to be undertaken in the three-year period 1961 to 1963.

Limestone storage bins at the Pucarmayo cement plant in north western Peru

Evaluation of Projects in Predominantly Private Enterprise Economies

SELECTED PROCEDURES, BASED ON CASE STUDIES

Prepared by the
Division of Industrial Development of the United
Nations Department of Economic and Social Affairs

GOVERNMENTS are continuously faced with the problem of evaluating projects. Development plans are frequently being elaborated in terms of macro-economic magnitudes and production targets by sector; they have subsequently to be spelled out in terms of concrete projects. Conversely, the first approach may be at the micro-economic level, where projects are selected for inclusion in a development programme. In both cases, projects are evaluated simultaneously, at the time the comprehensive plan or programme for a given period is being prepared. In addition, decisions on approval or rejection of projects have normally to be taken on a continuous and *ad hoc* basis.

The need for project evaluation and allocation of priorities arises both for those projects carried out by the public sector itself and financed with government funds and those in the private sector which are subject to gov-

ernment permits. It arises also in the case of private projects which require some kind of government assistance, such as tariff protection, tax relief, duty free imports of machinery or raw materials, or foreign exchange allocation. This means that, in practice, especially in developing countries, a substantial part if not the vast majority of all projects are within the sphere of government influence.

This article is primarily concerned with the application of evaluation methods in under-developed countries.[1] In part one, a number of selected case studies are presented exemplifying methods which field experts have applied in evaluating projects.[2] The presentation is followed in part two by an appraisal of these methods. On the basis of this appraisal, an attempt is made in part three to formulate some recommendations with regard to procedures and methods of project evaluation suitable for countries in the process of development.

[1] Several of the theoretical aspects of project evaluation are dealt with in United Nations, *Manual on Economic Development Projects* (Sales No.: 58.II.G.5), prepared by the Economic Commission for Latin America, and in two United Nations reports, prepared by groups of experts convened at Bangkok in 1959 and 1961 by the Executive Secretary of the Economic Commission for Asia and the Far East, entitled, respectively, *Programming Techniques for Economic Development* (Sales No.: 60.II.F.3) and *Formulating Industrial Development Programmes* (Sales No.: 61.II.F.7).

[2] Only seven case studies are presented in this article. There are two reasons for this limited number; first, the methods used

in project evaluation are seldom explicitly stated in the available documentation. Second, some of the available case studies relate to identical or similar evaluation methods and a selection has to be made in order to avoid duplication. The information relates mainly to evaluation criteria recommended for use, and it is not always possible to ascertain to what extent actual practice conforms to these proposals. It may be stated that the benefit accruing from shared experience would be greatly enhanced if the evaluation methods recommended for use were stated in explicit terms, the reasons for their adoption explained, and the measure of success in applying them in practice assessed, by the experts concerned.

Part One
CASE STUDIES

THE SEVEN CASE STUDIES presented in this part of the study relate, respectively, to Burma, Peru, the West Indies, Turkey, the Philippines, Pakistan and Israel. The first and third are concerned with allocation of priorities within the industrial sector; the second, with allocation within a sub-sector—a group of industries; the fourth, fifth and seventh with the evaluation of projects having a marketable output, within a given sector as well as between sectors. The sixth case study is somewhat different from the others: it is mainly concerned with the difficulties encountered in the application of a set of objective criteria to the evaluation of specific projects.

BURMA[3]

The expert was required to advise the Government of Burma on the economic feasibility of establishing new industries, and on the setting of priorities in the long-range programme.

"The main purpose of industrial development," states the expert, is "to increase the national income for the benefit of the people as a whole." The question is in which branches will it be most favourable to expand, and which new industries can most profitably be established. According to the expert, two factors are "almost decisive": the natural resources (especially raw materials) of the country, and the needs within the country. Thus, it is possible to distinguish between raw material-based industries and market-based industries. The former are favoured by ready access to cheap raw materials supplied at low transport costs which may enable them to compete on the foreign market; the latter, which dispose of the domestic market, may be protected by customs duties.

To determine which specific industries in these two groups can most profitably be developed, the expert suggests for the raw material-based industries, an analysis of the export statistics over time and a survey of natural resources, in order to find fields where export is in the form of industrially processed raw materials, and for the consumption-based industries, a survey of present demand not satisfied by domestic production, as indicated by import statistics, current production and future domestic demand. An analysis of import statistics will suggest "areas of consumption where domestic production could advantageously replace importation. This should be the immediate goal of development, and here there is a much firmer basis for calculation than in estimating future demand". The latter, according to the expert, depends on: (a) the rate and volume of investment and the *materials* required for this; (b) the availability of raw materials for new industries to be established, and (c) the rise in the standard of living and the resulting increase in demand for consumer goods. These

data are presumably indicative of the demand for investment goods, intermediary goods and consumer goods, respectively.

Other statements by the expert suggest, however, that the resources and domestic needs criteria are not always "almost decisive" in establishing priorities. Other factors are to be taken into account, and these may well induce a change in priorities. The effect of a given investment on the balance of payments, for example, is a factor to consider. Thus, with respect to production for export based on natural resources, a very high priority should be assigned to industries yielding large sums of foreign capital on favourable terms; this category takes into account many of the ore deposits in Burma, such as tin, zinc, lead and tungsten. Furthermore, according to the expert, at the present stage of industrialization in Burma, with many resources still to be exploited, it is in principle not advisable to give much attention to the establishment of industries whose requirements of raw materials and semi-finished products have to be imported and which require experienced technicians and much skilled labour.

The capital intensity or labour intensity of an investment is another factor to be considered because "in a country such as Burma where there is a lack of capital for investment, and a great part of the population is not fully employed, it is of great importance to keep investment per employed worker as low as possible".

A question which arises in planning for increased industrial output is, according to the expert, whether to expand the capacity of established factories or to establish new ones, because, "frequently much greater increases (in output) are achieved by improvements in existing plants (for instance, by easing bottlenecks in the existing production equipment), than by establishing entirely new plants". An estimate of operating costs and income can, according to the expert, be based on experience in other countries and industries. From both an economic and a social point of view, the effect of newly established industries on the operations of old factories and their employment is a very serious consideration, and every attempt should be made to prevent the establishment of new factories putting out of production existing industries and causing unemployment.

The criteria which should be taken into account in establishing priorities are summarized as follows:

(a) The existence of natural resources, such as agricultural and forestry products, minerals, oil and water;

(b) The existing domestic demand shown by imports, and the estimated future demand;

(c) The foreign exchange to be saved or earned;

(d) The total capital investment and the foreign exchange component, per worker employed and in relation to the increase in national income;

(e) The effect of new industries on employment in existing industries;

(f) The possibilities of expanding existing industrial enterprises, and

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[3]   E. Slaato, "Industrial Development in Burma" (United Nations mimeographed document, TAA/BUR/16).

*(g)* The possibilities of operating at a profit.

The expert points out that no assessment of priority is intended in this list. Thus, no indication is given as to the relative weight to be assigned to each of these criteria. Nor is it possible to ascertain from the contents of the report to what extent the expert has been able to apply these criteria quantitatively. The expert presents two tables showing, respectively, capital investment per worker and value added per unit of capital investment in Norwegian industries. He points out that "the figures themselves may be of less value, but the list showing the relationships should be of some help in considering priorities". Apart from these data, the expert has estimated for a number of projects, "savings to be effected in foreign currency". Judging by these premises, it may be assumed that intuition and subjective judgement have been major complements to the criteria stated by the expert.

PERU[4]

The case study concerns the metal transforming industry. The aim of the study was to determine, "on the basis of certain criteria and without a thorough analysis of profitability ..., possible percentage relationships between production and domestic demand" in 1965. Domestic demand in 1965 was estimated "on the basis of consumption data for 1955 . . . and of assumed rates of growth for agriculture, industry in general, mining, generation of electricity, construction, population, the motor vehicle park, consumption of durable goods, etc.". No consideration was given to export prospects, although it was recognized that the prospects existing for certain products which could be marketed in neighbouring countries are very promising.

Probable demand for various products or groups of products in the metal transforming industry having been determined by macro-economic projections, the problem was to estimate the proportion of such demand that could be met by domestic production. A distinction was made between existing industries and new industries. In considering the prospects for the expansion of existing industries three factors were taken into consideration: first, the variety of shapes or forms in which the product is manufactured and the complexity of the processes involved, both these factors tending to have an impact on the above-mentioned proportion; second, the "organicity" of the industry concerned, that is, the extent to which the industry is "essential or necessary for the development of other industries or other economic activities, inasmuch as it will either help to broaden the market for the products of such activities, or will tend to promote the manufacture of items indispensable for their development, or will serve as a link between other industries

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[4] This case study is based on material selected from a report "the ultimate aim of which is confined to a preliminary examination of the development and prospects of Peruvian industry". One of the questions discussed in this connexion is "what changes have to take place in the composition of industrial production, in terms of the greater or lesser development of given branches or specific sectors?". United Nations, *Analyses and Projections of Economic Development, VI. The Industrial Development of Peru* (Sales No.: 59.II.G.2), page 247.
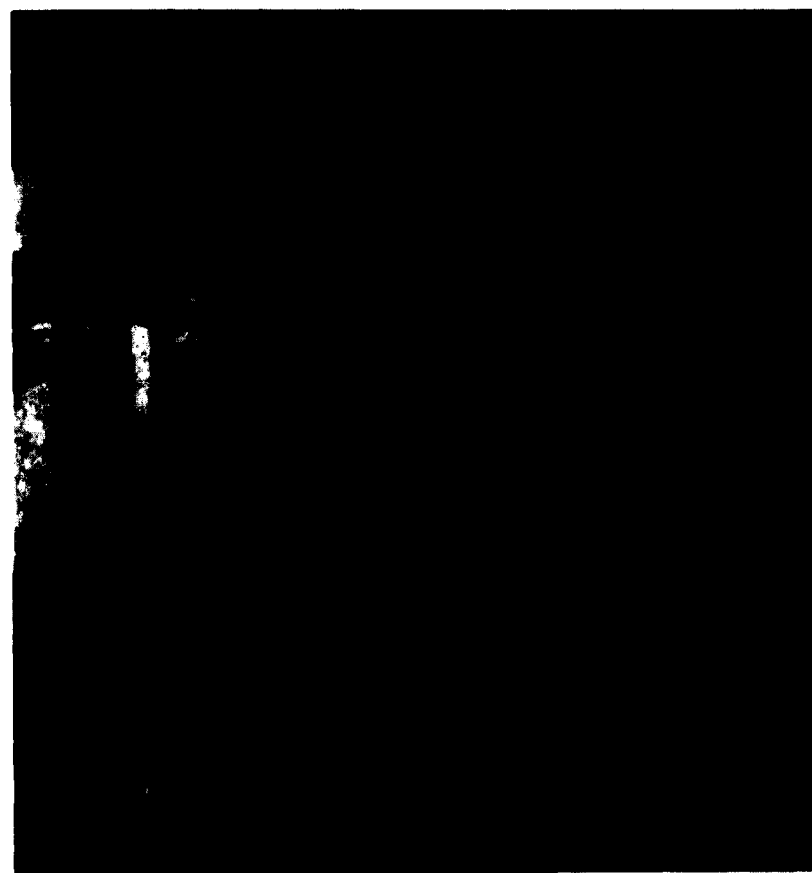
TOP: *Rolling sheet breakdowns in a steel mill near Rangoon, Burma*

BOTTOM: *A teak log is conveyed to a band-saw which cuts it into planks in a Burmese sawmill*

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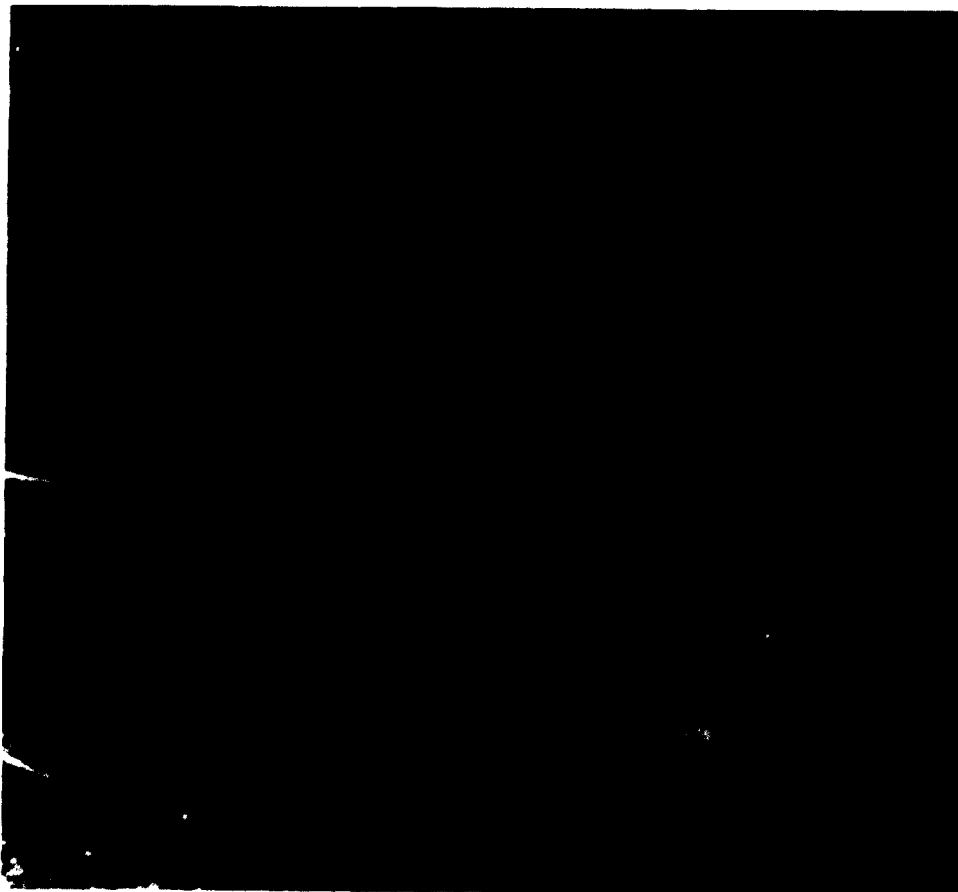
Constructing an irrigation canal in Peru

so as to complete an internal industrial integration process"; third, the extent to which the industry will employ domestic raw materials. The objective of the two latter elements was, according to the expert, to incorporate into the criteria an element relating to the development of other industries, which would contribute towards improving the over-all industrial structure.

As regards the establishment of new industries, all manufactures which would obviously involve a scale of production too large for the Peruvian market, such as internal combustion engines, passenger cars, aircraft and spare parts, typewriters and calculating machines, textile machinery and tractors, were eliminated at the outset. Furthermore, in addition to the criteria which were set up for the expansion of existing industries, four additional criteria were proposed. First, value added to the metal used as raw material as a percentage of gross value of output; second, value added to the metal per unit of investment; third, investment in machinery and equipment as a percentage of investment in total fixed assets and, fourth, investment in machine tools (lathes, drills, milling and planing machines) as a percentage of total investment in machinery and equipment.

Value added to the metal was calculated as the difference between the price per kilogramme of the imported article and the estimated price per kilogramme of the metal imported for its manufacture. It was thought preferable to use value added to metal, rather than value added to manpower, "because the latter figure . . . differs little from one item to another, within the range of

products of the metal transforming industry" and also "because the value added to metal gives a clear indication of what the country would gain by manufacturing the article concerned, even if imported raw materials were used".

The second and third criteria were to provide an indication of capital intensity. The fourth criterion was intended to indicate requirements for skilled labour.

A qualitative rating "A", "B", or "C" was assigned to any particular industry in respect of each criterion. Thus, for example, in relation to the use of domestic raw material, "A" implies a high percentage; with regard to diversity of products or complexity of manufacture, the same rating indicates that little or no diversity or complexity exists. Again to quote the study, ". . . all these criteria, plus a certain unavoidable element of subjectivity, came into play in the final determination of domestic production considered possible" by the end of the plan period. Thus, in the case of gas cylinders, domestic production might perhaps reach 100 per cent of domestic demand "since the diversity of products is slight in relation to the low degree of complexity of this line of manufacture, and the activity is of some national interest, since it helps to improve the fuel distribution and uses domestic raw materials. Furthermore, in this branch of manufacture, the value added is quite high and requirements in respect of technique or skilled labour are modest, although it calls for a relatively high proportion of machinery and equipment." In the case of the hand tool industry, which commands a large market,

this was found to combine average characteristics in regard to nearly all criteria; it was considered that domestic production should be put at 40 per cent of domestic demand, concentrating on tools with a very wide market and a narrow range of models, such as hammers, axes, pliers and screwdrivers. Production of pumps and compressors, which command a wide market, was assigned a high index for "organicity" and moderate indices for diversity of products, complexity of manufacture and use of domestic raw materials; in spite of substantial requirements for machinery, complexity of technique and not very high figures for value added, it was considered that at least 60 per cent of domestic demand could be met by national production in the case of pumps, and 35 per cent in the case of compressors. Finally, production of electric motors and of relatively low-power transformers was considered desirable in nearly all respects; since many of the components of this equipment are embodied in imported machinery or equipment, it was decided that 70 per cent of demand should be met domestically.

WEST INDIES[5]

The expert proposed that the suitability of each candidate industry be assessed on the basis of the following eight indices: ratio of wages to gross output; ratio of wages to net output; net output per person employed; horsepower per person; fuel consumed per person; weight of material used per person; number of persons per establishment, and coefficient of localization.

The criterion of *wages to gross output* was justified by the fact that "one of the chief competitive features of

[5] W. A. Lewis, "The Industrialization of the British West Indies", *The Caribbean Economic Review* (Port of Spain, Trinidad), vol. II, No. 1, May 1950. The expert was concerned with the question of how it is possible for newly industrializing countries to contemplate producing and exporting manufactures in competition with old and well-established rivals. According to him, "the secret of success, for any country, is to specialize in those [industries] to which its resources are most appropriate, and to avoid the others".

the West Indies is its relatively low wage level", so that industries with a high wage component of costs were likely to have a competitive advantage.

The criterion of *wages to net output* was supposed to indicate the importance of expenses other than those relating to raw materials and wages. The most important of these is the cost of machinery and of other capital equipment; where this is high, the ratio of wages to net output will be low. To quote the expert: "Since the West Indies are short of capital, it is best to use what there is to give employment to as many persons as possible, so we are interested in isolating the industries which require relatively small capital per person employed. Besides, since the machinery has to be imported, it costs more in the West Indies than in the countries where it is produced, and the Islands cannot hope to compete with such countries in industries where machinery cost is a heavy item."

Net output per person employed was used mainly as a substitute for the two previous indices. In general, this ratio according to the expert "is high when the costs other than wages are high, and low when there is very little to be added to wages cost. But this is not invariably so. For example, net output is lower in industries where the proportion of women is high, because women's wages are lower than men's".

The criterion of *horsepower in use per person* was supposed to give "some idea of the importance of capital in industry, and to be fairly closely correlated with the ratio of wages to net output". The expert considered that although the correlation is not complete, "we have to use such indices as we can find".

Fuel consumed per worker is self-explanatory. "Since industrial power is rather expensive in the Islands, it is necessary to avoid industries which are heavy consumers of power. Fortunately, there is a wide range of industries where fuel costs are such a small part of the total that the Islands are not gravely handicapped if they try to compete."

The weight of materials handled and the extent to which there was a loss of weight as a result of industrial

New industries in Jamaica, British West Indies: LEFT: *Making corrugated sheeting from aluminium produced from local bauxite* RIGHT: *Manufacturing boys' wear for export to North America*

processing was considered to be a "rough" but "very important" index.

The average number of workers per establishment was considered again by the expert as a "rough" indicator of the scale of production, since it conceals differences in the size of individual establishments. "There is a slight presumption that industries in which the average establishment is very large are unsuitable for the Islands", both because the Islands are not well experienced in operating large establishments, and also because such establishments are likely to have a larger output than the Islands can easily market. However, "too much weight must not . . . be placed upon this index of size, because . . . in most industries the units of less than average size seem to be able to produce just as cheaply as larger units".

The last index, *the coefficient of localization*, was intended to indicate whether an industry is widely distributed throughout the region, or is highly concentrated. If an industry is very widely dispersed, it usually favours, according to the expert, working on the spot for a local market, and is therefore *prima facie* very suitable for the Islands. If, on the other hand, it is very heavily concentrated, there may be some special factor which ties it to a particular place, although industries are often highly localized for historical reasons.

Each industry was given a qualitative rating ("a", "b" or "c", in order of priority) with respect to the various criteria mentioned above and an over-all rating ("A", "B" or "C") indicating whether the industry fell within the upper third, the middle third, or the lower third group of possible projects. Since an industry may be high in regard to one index, and low in relation to another, it was necessary to use personal judgement in assessing its final class. No quantitative indication of relative weights used was given. Apparently the ratio of wages to gross output was given the largest weight. A high ratio was presumed to be an indication of an industry suitable for the Islands, but it was subject to further check in reference to indices of fuel consumption, horsepower and average size of plant, in order of importance.

TURKEY[6]

"The need for assessing priorities for investment," according to the experts, "arises in part from the fact that the benefit of an investment to the country as a whole does not always coincide with the rate of profit to the investor, public or private". In so far as the social benefit of an investment can be quantitatively assessed, it is measured by "the increase in national income produced per unit of investment," or the social rate of return. The experts point out that in addition to the measurable rate of return, there are other factors which must be weighed in determining investment priorities.

Since the major part of the increase in national income which results from an investment accrues to the investor

in the form of profit, an approximation to the rate of social return may be obtained, according to the experts, by making additions to or subtractions from the rate of private profit to compensate for artificial prices and other elements which cause social value to differ from value to the private investor. The more important among these elements are as follows.

(a) *The exchange rate.* All imported elements in the cost of the investment and its operation and any part of the output which is exported or any substitutes for imports should be recomputed using an "equilibrium" rate of foreign exchange.

(b) *Protected industries.* Domestic prices of home produced goods should not exceed the alternative c.i.f. cost of the import, valued at the equilibrium exchange rate. A similar correction should be made for export subsidies where they exceed the adjustment to be made for foreign exchange, and for industries which use domestic materials whose price is artificially high.

(c) *Unused resources.* Factors of production should be valued at their alternative earnings in other uses. In some cases this "opportunity cost" will be less than the amount actually paid for the use of these factors. When the supply of a factor is in part unused, this as a rule indicates that the market price of such factor exceeds its "opportunity cost".

(d) *Social overhead facilities.* The value of goods and services for use in other productive sectors is not necessarily measured by their prices. The most important examples are power, transportation and other overhead facilities. The measure of their social benefit is the increased value of commodity production which they make possible. When an increase in social overhead is required, it is necessary to take into account the indirect capital requirements as well as the direct investment.

All these factors enter into the calculation of the social return. There are, in addition, other factors less susceptible of quantitative evaluation which must also be considered in the final evaluation of investment programmes.

(a) *Rate of completion.* First, when the time gap between investment and the increased production of goods and services for one project is substantially longer than for another, the fact that the investment will not yield a production during this additional period will, *ceteris paribus*, obviously put the first project at a disadvantage. Also, the time lag between income creation by the investment in a project and the increased production of goods and services has an important bearing on the generation of inflationary pressures that may arise from the investments and on the balance of payments. If projects are started at a rate which is above that of the availability of investment resources required for their completion the productivity of the whole programme is lowered.

(b) *Regional balance.* While some dispersion of investment is necessary for non-economic reasons, it should

[6] Chenery, Brandow and Cohn, "Turkish Investment and Economic Development", 1953 (mimeographed).

be kept to a minimum. The greater increases in national output which may be secured through concentrated development of a single region provide a larger volume of investment resources in the future and lead to a more rapid development of the rest of the country, although initially the development of some areas will be slower.

(c) *Stability*. Some weight should be given to the possible variation in world prices of the commodity to be produced. As is well known, the price of exports of basic materials are subject to wide fluctuations, while import costs of manufactured goods vary to a much less degree. While these factors argue for less international specialization and more diversified development, the cost in terms of additional investment requirements should be made explicit and compared to the reduction in risk which is expected of a more diversified development.

(d) *Technical complexity*. The productivity of investment resources in the initial stage may be lower in the more complex industrial processes because of the lack of skilled labour, experienced supervision, or specialized ancillary materials and services. This is less likely to occur in the cases where there is an element of foreign investment which brings with it technical and managerial skills.

(e) *Labour training*. Since skilled labour is a scarce factor, a special allowance should be made for projects which also result in labour training. Where it can be valued, this training may be added to the social benefit of the investment.

(f) *Nature of the product*. It is generally agreed on social grounds that less essential commodities and "luxury" goods should not be given priority, even though the market-determined return on their investment is high.

Having stated these principles, the experts set themselves the task of measuring the social productivity of

investments by applying corrections to the calculations of profitability made on purely market grounds. Of the various corrections which were suggested to determine the social return of investment, those for which quantitative estimates were possible were the balance of payments effects and the differences between domestic prices and alternative costs of imports. Corrections were also applied for the price of labour, although to a limited extent.

In the opinion of the experts, the most important correction was to be applied to the foreign exchange rate whose real value was considerably higher at that time than the official rate indicated. It was estimated that foreign exchange costs and earnings of an investment should be valued at 30 per cent above the official rate.

Domestic prices for commodities were used in calculating costs and benefits, except where they were higher than the c.i.f. cost of imports plus the 30 per cent correction applied to foreign exchange. In the latter case, the "social" valuation of a commodity was taken at the c.i.f. cost of imports, plus 30 per cent, plus a normal profit to the importers.

Regarding unskilled labour, it was considered that whatever development may take place in the labour market in Turkey in the next few years, there would be an excess supply of that type of labour. The benefit to the economy of economizing on the use of unskilled labour was, therefore, negligible. In view of this, a correction was applied in particular to agricultural investment in labour-saving devices.

These corrections were applied to costs and benefits whenever the available data permitted; in cases where the detailed information required was not available, the experts based their judgements "on the general technological nature of the industry, market conditions, and other factors". The most detailed analysis was made of projects approved by the Industrial Development Bank

Surge tanks of the new 36,000-kilowatt power station at the Seyhan dam in Turkey

of Istanbul (IDB) which had contributed about 40 per cent of private investment in industry between 1950 and 1953. A questionnaire for loan applicants was developed by the IDB to secure the information required to calculate the productivity of the investments to be financed.[7]

The market prices used in these calculations were in almost all cases those which were applied by the Bank in reviewing the projects, and reflected the expectations over the period of the bank loans—namely, five to ten

years. The corrections applied to these market prices have been discussed earlier. The foreign exchange costs were computed from the detailed breakdown of investments and operating costs. The annual cost to the economy of the foreign exchange components of new investments was computed from the terms of the International Bank for Reconstruction and Development (IBRD) loan to Turkey, which was somewhat lower than the marginal cost of new loans. Foreign exchange earnings were credited to exports and to import substitutes. On the basis of these corrections it was found that the average private return on all the IDB's loans was 30 per cent, and the average social return, 23 per cent.

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[7] The questionnaire included the following items:

A. INVESTMENT

    1. Value of fixed assets
       a. Site
       b. Buildings and construction
       c. Machinery and equipment
       d. Installation costs
    2. Working capital
    3. Total investment
       a. Domestic cost
       b. Foreign exchange cost

B. SALES

    1. Value of sales, by product
       a. Exports
       b. Substitutes for goods at present imported
       c. Other domestic goods

C. COSTS (All costs are included except for purchase of office supplies and other miscellaneous overhead items which amount to less than one per cent of total costs. Imported components of each item are tabulated separately)

    1. Raw materials
    2. Energy
    3. Auxiliary materials
    4. Maintenance
    5. Labour
       a. Administrative
       b. Technical
       c. Skilled
       d. Unskilled (less than six months' training required)

D. FOREIGN EXCHANGE EFFECTS

    1. Foreign exchange costs
       a. Annual cost of the foreign exchange component of investment, computed at 9 per cent for interest and amortization of loan
       b. Cost of imported materials (from C)
       c. Indirect import component of domestic materials (computed on the basis of 10 per cent for steel and power purchased, 8 per cent for coal, 5 per cent for other industrial materials, 2 per cent for agricultural products)
    2. Foreign exchange earnings (from B.1.*a*)
    3. Net foreign exchange effect (D.2 minus D.1)

E. SOCIAL PRODUCTIVITY

    1. Gross private profit (sales minus costs, exclusive of taxes and interest)
    2. Corrections for social value
       a. Price correction for protection, subsidies, etc.
       b. Foreign exchange value (computed at 30 per cent of D.3)
    3. Increase in social value (E.1 plus E.2)
    4. Rate of private return on investment (E.1 divided by A.3)
    5. Rate of social return on investment (E.3 divided by A.3)

THE PHILIPPINES

In determining industrial priorities under the five-year economic and social programme for the Philippines, it was proposed that a priority formula be applied "as an over-all instrument of allocation of resources to effect the structural adjustments desired".[8] The formula was intended to ensure consistent treatment by various government agencies of requests for foreign exchange, transfer and tax privileges, loans and other action involving some form of government assistance, and to relieve them of pressure by providing a ready device for evaluating applications from private industry. The formula was to be applied to the private sector as well as to government profit-making enterprises, as well to allocation between sectors as within a given sector. It was not considered to be applicable to non-profit service undertakings of government, such as agricultural extension, health services, research and social overhead projects, which produce indirect and intangible benefits.

The formula reflects the following policy objectives:

1. To direct resources towards the most productive uses;
2. To conserve foreign exchange;
3. To reduce unemployment;
4. To promote economic growth.

The guiding principles of project evaluation based on these objectives were stated as follows. Other considerations being equal, preference will be given to an industrial project that (i) will, per unit of scarce resources expended, give the highest contribution to national income; (ii) will, per unit of scarce resources expended, produce the greatest improvement in the country's balance of payments position; (iii) will make the greatest use of domestically produced raw materials and operating supplies; (iv) will make the most use of domestic labour; (v) will produce goods to meet the more basic needs of the people and will produce the greatest effect on the external economies.

These guiding principles were embodied in the following formula:

$$IP = R_1 + R_2 + R_3 + R_4$$

where: *IP* is industrial priority; R_1 = the value added to

[8] Government of the Philippines, National Economic Council, *The Five-Year Economic and Social Development Programme for 1957-1961* (Manila, 1957).
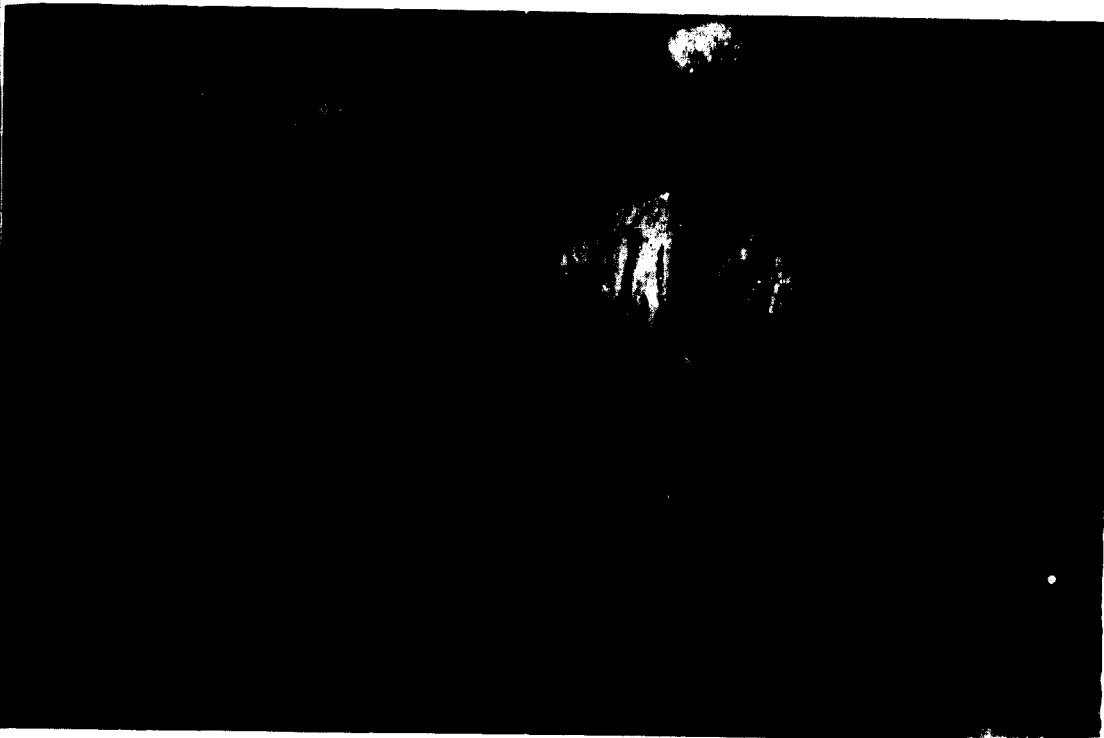
national income by the factors of production involved in the project, including labour, land, capital and entrepreneurship, as corrected by an essentiality factor to account for the impact of the project on external economies and for other social benefit considerations, the whole per unit of capital resources utilized;[9]

R_2=the impact of the project on the country's balance of payments position. This is measured by the annual foreign exchange value of the product minus the value of foreign exchange directly or indirectly used in production, per unit of investment;[10]

R_3=the extent of additional economic values derived from the use of domestic raw materials and supplies, per unit of investment;[11]

R_4= the social value derived from employment of labour. This was measured by the annual value of such labour per unit of investment.[12]

The purpose of the formula was to compare annual benefits to annual costs in terms of scarce resources. Two types of resources were obviously in short supply, namely, capital and foreign exchange.[13] Although entrepreneurs, managers, technicians and skilled labour were also scarce, the Government was not prepared, at this stage, to adopt policies which would involve direct allocation of human resources.[14]

Since the purpose of the formula was to measure the social profitability of a project, contribution to national income was taken as a measure of the benefits arising from the project. This contribution was, in a first approximation, estimated on the basis of market prices. Since, however, market prices, in the opinion of the expert, reflected "a socially unhealthy economic relationship", the national income profitability calculated at such prices was to be corrected. The correction for the balance

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[9] $$R_1 = \frac{e(w + r + i + p)}{k}.$$

where: e = essentiality factor; w = wages; r = rent; i = interest; p = profit; k = capital.

The determination of the essentiality factor for a given project is based on the following considerations: (a) if the product is for export, how near to the finished stage is it? If for domestic use, is it destined for consumption or for use in other industries, and, if for consumption, is it a luxury good or an essential one? (b) what is the proportion of the domestic component in the total of (i) materials and supplies used; (ii) capital equipment; (iii) financing? Each item is rated within a range of 0.5 to 2.5 points according to a check-list.

[10] $$R_2 = \frac{FEs/e - FEc}{k}$$

where: FEs/e = the foreign exchange saved or earned arising from the project; FEc = the foreign exchange cost incurred in the project.

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[11] $$R_3 = \frac{0.5 \times rmd/rmt \times rmd}{k}$$

where: rmd = the value of domestic materials and operating supplies used in production, excluding the value of the imported component of domestically processed intermediate products whenever such imported component exceeds in value 50 per cent of the value of these products; rmt = the value of the total raw materials and supplies used in production.

[12] $$R_4 = \frac{ld \times 2,000}{k}$$

where: ld = the number of paid Filipino workers employed for at least 300 days a year. A uniform average of 2,000 pesos per annum is to be used in determining the social value arising from the employment of each Filipino worker.

[13]   Capital is defined as total investment in the project, which is equal to fixed assets plus circulating capital.

[14]   B. Higgins, *Economic Development, Principles, Problems and Policies* (W. W. Norton and Company, Inc., New York, 1959).

of payments effect was intended to reflect the scarcity of foreign exchange; it is positive or negative, depending on whether the project results in net savings or earnings or in net cost. The corrections for the use of domestic raw materials and for increasing employment are always positive. The former was included to stimulate domestic production of such materials; the latter, to provide for a preferential treatment of employment creating projects. It would obviously only relate to unskilled labour which was in abundant supply. This was achieved by including only Filipino workers in the employment factor.

An "essentiality multiplier" was used in an attempt to take into account the external economies of a given project and its effect on the distribution of income. A higher rating was given to essential producer goods in primary industries than to such goods in secondary industries, or to semi-essential producer goods in primary industries, and so on. This was done under the assumption that production of goods with higher priority ratings will have a greater impact on the over-all output of the economy as a whole.[15]

Consumer goods were similarly classified as essential, semi-essential or non-essential, and each group was assigned a priority in this order. A consumer good was considered "essential" if it figured prominently in the budgets of lower-income groups. The purpose of this priority system was to improve the supply of goods consumed by the low-income groups.

It was understood that the determination of industrial priorities would be based not entirely on the quantitative method discussed above, but also on considerations which, although they do not easily lend themselves to quantification or are difficult to reduce to a fixed measure, yet are pertinent to the question. Among these considerations were covered:

1. Overcrowding of an industry; that is, if the aggregate productive capacity in the industry was in excess of the demand for the product, defined as the effective demand as of the period of execution of the project, plus 20 per cent to allow for additional demand. This principle was disregarded, however, if the new projects would improve the competitive conditions in the country for the benefit of the public;

2. Established government policy for specific industries;

3. Abnormal factors of pricing of labour, materials and products which may have unduly affected the priority order of projects.

PAKISTAN

The concepts of efficiency, consistency and administrative feasibility were adopted as the basic criteria for selecting projects to be included in the first five-year plan of Pakistan.[16] The concept of efficiency was defined in terms of an allocation of resources among different uses in such a way that there was no possibility of increasing the total value of output by transferring resources from one use to another. The concept of consistency implied that the various parts of the plan were consistent with each other and with the total availability of resources. The concept of administrative feasibility implied that a development programme must be workable, in the sense that "the recommendations are capable of execution; that the organizational arrangements required either existed or could be created, and that the necessary changes in customs and practices implied in the planned rate of development could be made".

By adopting the criteria of efficiency and consistency, the planners sought to base resource allocation on an objective standard instead of on a subjective judgement. The difficulties encountered in this attempt and the measure of success that was achieved are discussed in the context of the three following problems: (a) the incommensurability of returns; (b) the inadequacy of data, and (c) the multiplicity of objectives.[17]

The problem of incommensurable returns

The planners were faced with two questions: first, what proportion of the total resources available for development should be allocated to education, health and social services? Second, given the allocation to each sector, how should it be distributed among the various sub-sectors and projects? The efficiency criterion could not be applied to projects in these fields because they have no marketable product and therefore cannot be compared on the basis of their benefit-cost ratios. No satisfactory answer was found to the first question, although an attempt was made, at least in the case of education, to achieve a measure of consistency by applying some input-output relationships, such as that the number of engineers to be provided by the training programme should relate to the projected increase in industrial output. A rule of thumb applied was to the effect that the social sectors comprising education, health, housing and social welfare should absorb not more than 20 per cent of the available public resources, this proportion being the order of magnitude assigned to the corresponding sectors in the existing development plans in India and elsewhere.

As for allocations within these sectors, education may be taken as an example. Allocations were made by the Planning Board, on the recommendation of its Education Section, to a number of major sub-sectors, such as primary education, secondary education and teacher training; and, within these sub-sectors, to a series of individual projects, such as the establishment of new teacher training colleges and improvement of existing training colleges. The establishment of priorities was guided by three major aims: "first, to obtain maximum results from the use of scarce resources; second, to ensure as perfect an integration as possible of the educational plan with the general development plan; and third, to

15   Ibid.

16   Government of Pakistan, National Planning Board, *The First Five Year Plan, 1955-60* (Karachi, 1957), page 72.

17   The following presentation is based on an article by David E. Bell, "Allocating Development Resources: Some Observations based on Pakistan Experience" in the yearbook, Harvard University Graduate School of Public Administration, *Public Policy* (Cambridge, Massachusetts, 1959).
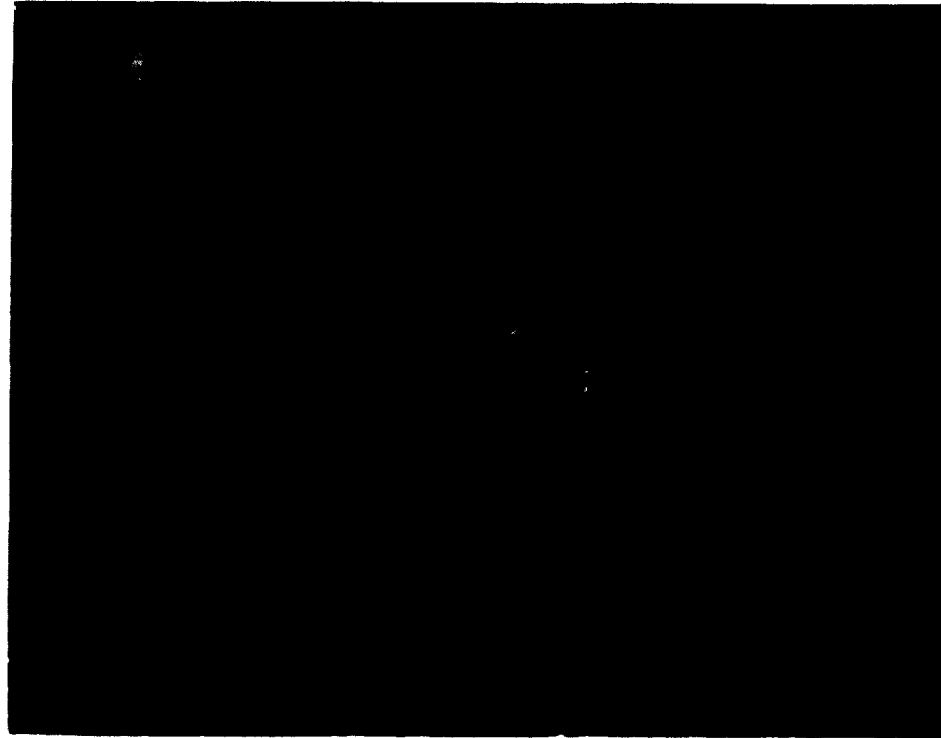
LEFT: *Storing fibreboard range in a Turkish synthetic wood factory*
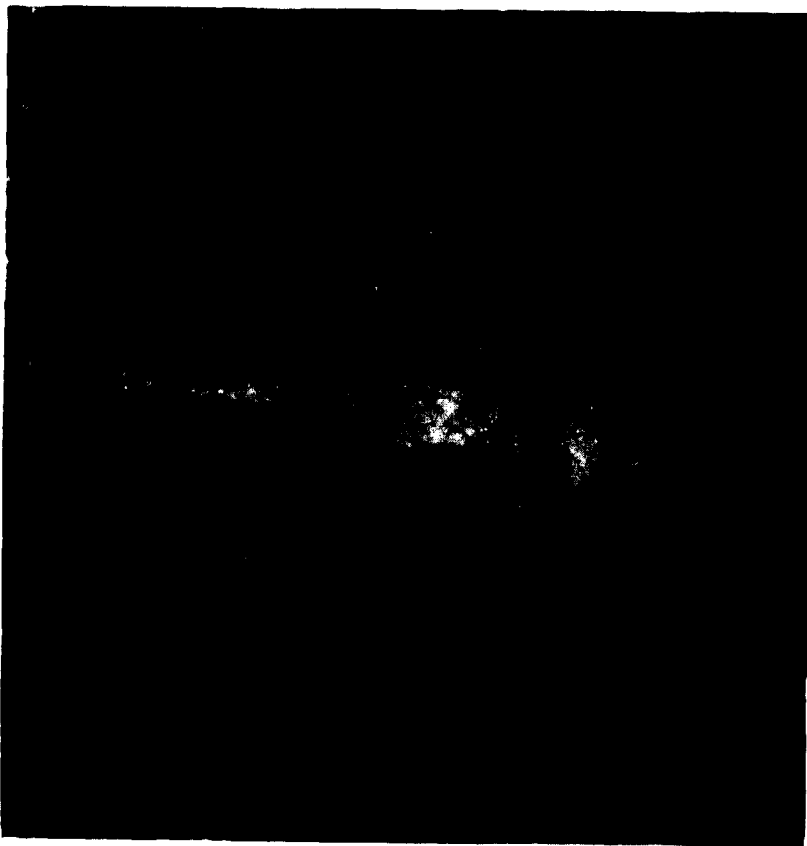
RIGHT: *Filipino worker operating an electric marble polishing machine*

LEFT: *Checking the slipway blocks in a shipyard at Mariveles, the Philippines*

RIGHT: *Constructing the Binga hydroelectric plant in the Philippines*

17

Traditional irrigation method on the edge of the Thal desert, in Pakistan

achieve an equilibrium within the educational plan itself".[18] The priorities themselves were summarized as follows: "It is necessary first to consolidate, that is, to fill up the gaps and make up the qualitative deficiencies that exist in the present educational structure, and secondly, having regard to the resources available, to make a modest expansion in the system".[19] These statements suggest that the planners were seeking to apply the criterion of efficiency, the immediate objective apparently being efficiency in educational results, rather than in terms of national income.

The problem of inadequate data

While the concepts of efficiency and consistency are in principle applicable to projects with marketable products, whether or not this could be done depended on the availability of data—such as market and cost data on individual projects and data on the economic system as a whole. Market and cost data were available in relatively few cases—predominantly in large-scale public projects in industry, irrigation and power. Rough estimates were made in a number of other cases—notably, cotton and jute textiles. Even where market and cost data were available, their reliability was low.[20] Furthermore, the

available data did not include estimates of comparative costs involved in the use of alternative technological processes, of indirect costs or benefits or of external economies and diseconomies that were likely to arise from the projects. Only in two or three dozen cases, chiefly for large-scale industrial projects in the public sector, was calculation of comparative returns on alternative investments possible. Even so, these projects accounted for 30 per cent of the total expenditure in the plan.[21]

For the vast majority of projects in small and medium-scale industry, agriculture, small-scale irrigation projects and transport, the data were inadequate to provide reliable quantitative estimates of anticipated returns, and other bases for decision were explored. For example, agriculture was assigned a very high priority on the following grounds: the existence of a significant margin for increase in agricultural output in view of the low yields per acre; the impact on the balance of payments of saving in foreign exchange resulting from a reduction of food imports; the fact that agricultural exports provided the only possibility in the short run to increase earnings in foreign exchange. In the absence of the necessary data to permit an evaluation of prospective returns on investment in individual agricultural projects, such evaluation was based, in most cases, on subjective judgement as to whether a given project was likely to make a substantial contribution to the development objectives per unit of resource input. A similar procedure was applied to projects in the fields of small and medium-sized industries, small-scale irrigation and transport.

The deficiency of project data was paralleled by the scantiness of information on the economic system as a whole. Data on the balance of payments, the banking system and the money supply were fairly good. On the other hand, data on prices and on income, consumption, saving and investment were inadequate. Making use of the available information, the Planning Board was able to prepare: (i) estimates of total requirements for development expenditure which were consistent with changes in income, saving and capital inflow; (ii) estimates of foreign exchange requirements which were consistent with expected changes in exports, imports and external sources of financing, and (iii) estimates of availability of certain resources (notably, cement and professionally trained workers) which were consistent with anticipated requirements. Furthermore, the three sets of estimates were consistent one with another.

The selection procedure was pursued up to the point where there were no apparent opportunities for making

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[18] Government of Pakistan, National Planning Board, *The First Five Year Plan, 1955-60*, page 544.

[19] *Ibid.*, page 544.

[20] A recent survey of several large-scale industrial projects included in the plan indicates that actual costs were on an average 60 per cent, and in some cases up to 160 per cent, higher than anticipated in the project proposals.

[21] Two types of returns were normally calculated: first, the anticipated return (profit and interest) per unit of total capital (borrowed and equity, fixed and working); second, anticipated net saving or earning of foreign exchange per unit of total capital. Some of the early calculations used a shadow rate for foreign exchange, but this was discontinued subsequent to the devaluation of the Pakistan currency, which brought the new official rate close to the previously used shadow rate. Even though important elements of cost or return were usually lacking, the calculations were helpful in differentiating among projects. It appeared, for example, that it would be far more profitable to invest in cement and fertilizer than in steel and jute.

more rapid progress by replacing an included project with an excluded one; however, with data so scarce and inadequate, the actual allocation of resources was far from ideal. The allocation procedure was sufficient only to establish relative priorities among certain projects—and even so a considerable degree of uncertainty attended the allotment of these priorities. Relative priorities among individual projects did not carry the Board very far toward the objective of allocating resources among sectors, and provided only a partial solution to the objective of allocations within particular sectors.

The problem of multiple objectives

Five objectives were stated in the plan:

(*a*) To raise the national income and the standard of living of the people;

(*b*) To improve the balance of payments of the country by increasing exports and by production of substitutes for imports;

(*c*) To increase opportunities for useful employment in the country;

(*d*) To make steady progress in providing social services: housing, education, health and social welfare, and

(*e*) To increase rapidly the rate of development, especially in East Pakistan and other relatively less-developed areas.[22]

The Board was not able to reconcile the first three objectives through the use of mathematical programming methods involving "accounting" prices (although, as indicated earlier, some use of accounting prices was made in evaluating certain individual projects). However, some practical reconciliation of these three objectives was achieved without great difficulty. Only in few cases was the ranking of a project in terms of one objective

[22]   Government of Pakistan, National Planning Board, op. cit.

different from its ranking in terms of another objective. Where the ranking in terms of the national income objective differed from the ranking in terms of the balance of payments objective, priority was given to the latter; and where it differed from the ranking in terms of the employment objective, the national income objective was given priority. The relative ease with which these three objectives were reconciled was due in part to the paucity of data on alternative investments.

The increase in social services was listed as a separate objective for two reasons: first, the Planning Board was impressed by the difficulties of treating the output of social services within the national income framework; second, it wished to emphasize that such services were an end in themselves as well as a means. The operational significance of this objective cannot, however, be ascertained, since allocation to social services was made on the basis of subjective judgement rather than objective measurements. It is not possible to determine whether these allocations would have been different had social services not been listed as a separate objective; neither is it possible to ascertain whether there was a conflict between this objective and the others.

The fifth objective reflected the Government's concern to achieve a greater geographical equality in income. In order to promote a more rapid economic development in the eastern region, certain projects located in the east were given priority even though they were less profitable than competing projects located in the west; which means that the goal of achieving maximum contribution to national income was qualified by this objective.

ISRAEL

In proposing projects for inclusion in the development budget of Israel, the various ministries concerned were requested to follow a standard procedure outlined by

A major irrigation work in Pakistan: Clearing the ground at the Gudu barrage construction site on the Indus River
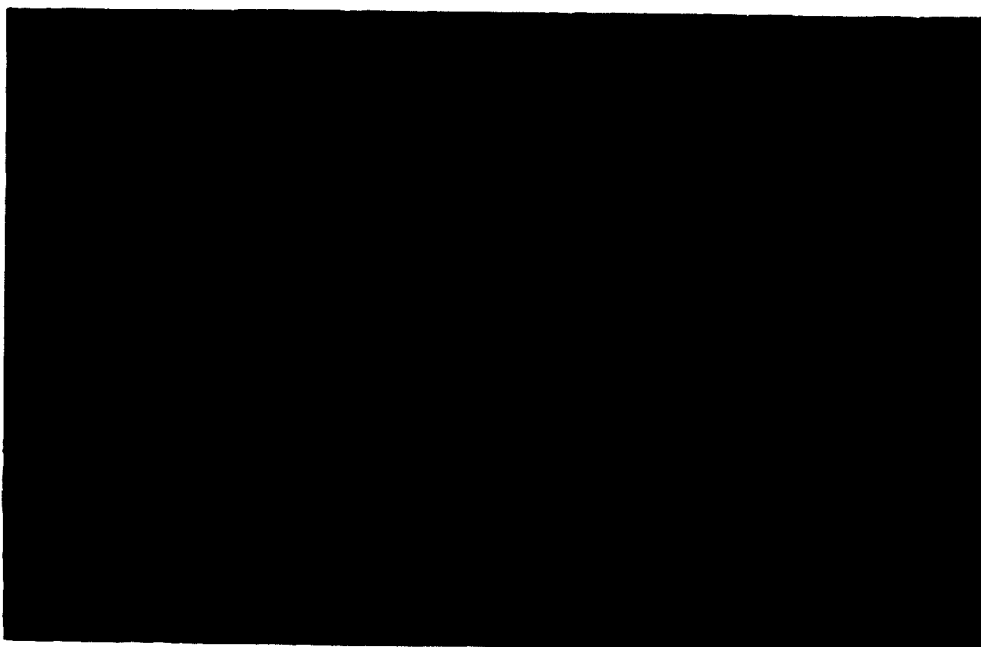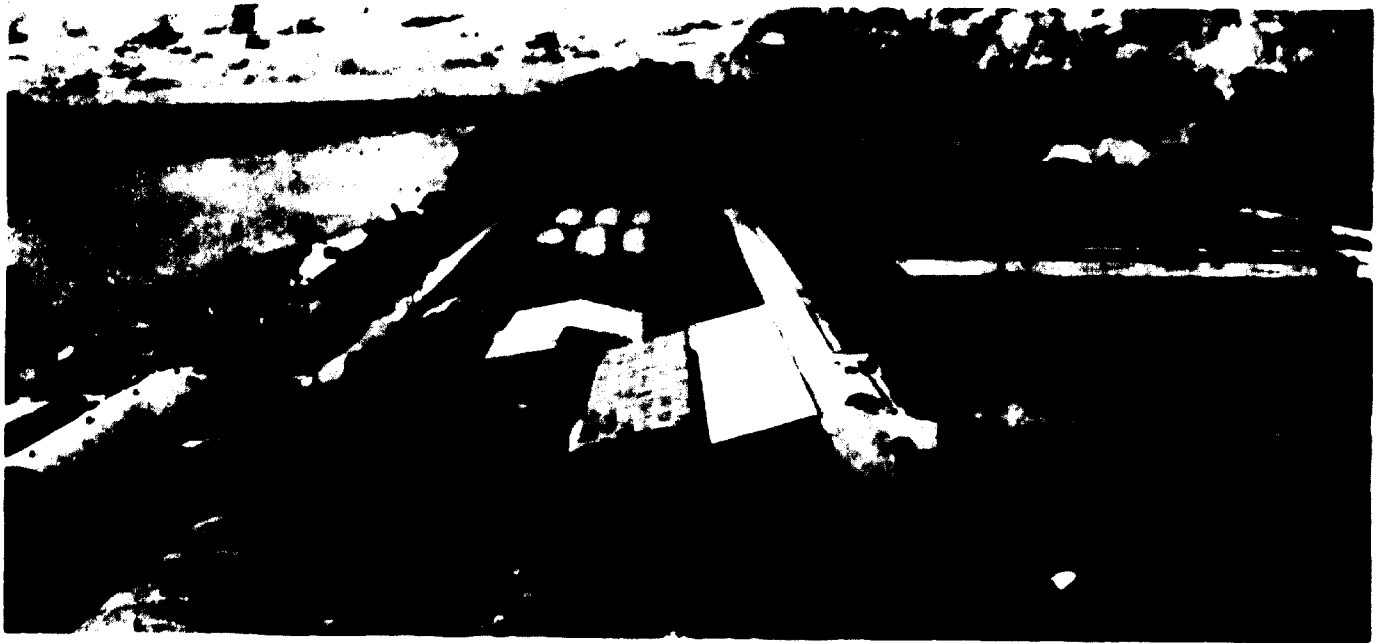
View of a paper mill near Chittagong, East Pakistan

the Budget Division of the Ministry of Finance. This procedure involves, *inter alia*, the preparation of a detailed memorandum on each project proposal in response to a questionnaire which presumably encompasses the criteria on the basis of which projects will be accepted or rejected. Although "the majority of the questions have been framed on the assumption that they apply to a plant producing manufactured goods for sale . . . most of them can also be suited to other investment projects, such as services provided against payment, other services which are paid to a certain extent (such as housing) or even services which are given free, such as education".[23] The main items in the questionnaire are summarized below.

Markets

What is the location and size of the markets in which the goods or services to be produced will be sold and what changes in market conditions are likely to occur in the foreseeable future? In the case of projects with a non-marketable output, to what extent is such output required, taking into account present as well as anticipated needs?

Present state of planning

In what stage of planning is the project now? Who is initiating the project and who is responsible for working out the technical, economic and other aspects of its implementation? How much detail is available about the project?

[23] Government of Israel, Ministry of Finance, Budget Division, "Instructions for Preparing Development Budget Proposals for the Financial Year 1962/63" (Jerusalem, 15 June 1961) (mimeographed).

Size and location of plant

Is the proposed size optimum in relation to the planned output? Is the proposed location the most desirable one, if not, what is the difference in transport or other costs between the alternatives?

Financing the investment

From what source and on what terms will the investment be financed? What assurance is there that the funds anticipated from non-governmental sources will be secured and what is the stage of negotiations with the parties concerned?

Know-how

Is the know-how required for the construction and operation of the plant available in Israel? If not, has contact been made with a foreign firm to secure the requisite know-how, and what are the terms of the contract? Does the foreign firm permit the use of its techniques and patents in Israel? Does the responsible firm bear part of the risk through financial participation?

"Worthwhileness" of a project

The "worthwhileness" of a project is assessed by comparing the relevant costs and benefits. Income, current expenditure and capital expenditure are first estimated on the basis of current prices for each year throughout the useful life of the project. Since, however, annual receipts and outlays at different times are not equivalent, they are converted to present worth in the final year of investment. The rate of interest used in this conversion is 8 per cent; it is a shadow rate representing, in the estimation of the Budget Division, the real cost of capi-

tal for the economy. A project will be worth while if the present worth of annual incomes after deduction of annual costs exceeds the present worth of total investment. This relationship may be expressed in the following formula:

$$\sum_{t=0}^{n} (S_t - C_t)(1 + i)^{-t} \geqq \sum_{t=0}^{m} K_t (1 + i)^{-t}$$

in which S is the value of annual sales, including subsidy and local taxes; C is current annual costs, excluding depreciation and interest; K is the annual expenditure on capital goods; i is the rate of interest; m is the period of investment (in years), measured from the reference year ($t=0$); n is the useful lifetime of the project (in years) measured from the reference year.

The above formula may also be expressed as a benefit-cost ratio:

$$\frac{\sum_{t=0}^{n} (S_t - C_t)(1 + i)^{-t}}{\sum_{t=0}^{m} K_t (1 + i)^{-t}} \geqq 1$$

Projects which are worth while are assigned priority ratings on the basis of their respective benefit-cost ratios.

The above formula is applied in evaluating projects which are expected to have no balance of payments impact or which are expected to have an unfavourable one. In the latter case, the rate of exchange used in conversion to local currency is the official rate (£I 1.8 to the dollar). Projects with an expected favourable balance of payments impact, on the other hand, are given priority ratings on the basis of the cost in local currency per dollar saved or earned arising from each project. This cost is calculated as follows:

$$\frac{\sum_{t=0}^{n} (C_t' - S_t')(1 + i)^{-t}}{\sum_{t=0}^{n} (S_t' - C_t')(1 + i)^{-t}}$$

in which $C\frac{I}{t}$ = total costs in local currency; $S\frac{I}{t}$ = total receipts in local currency; $S\frac{I}{t}$ = total receipts or savings in foreign exchange; $C\frac{I}{t}$ = total cost in foreign exchange; i is the rate of interest, and n the useful lifetime of the project (in years) measured from the reference year.

These rates will, as a rule, be positive, since projects which improve the balance of payments are usually characterized by the fact that total cost in local currency exceeds total income in local currency, while foreign exchange income or savings exceeds foreign exchange cost.
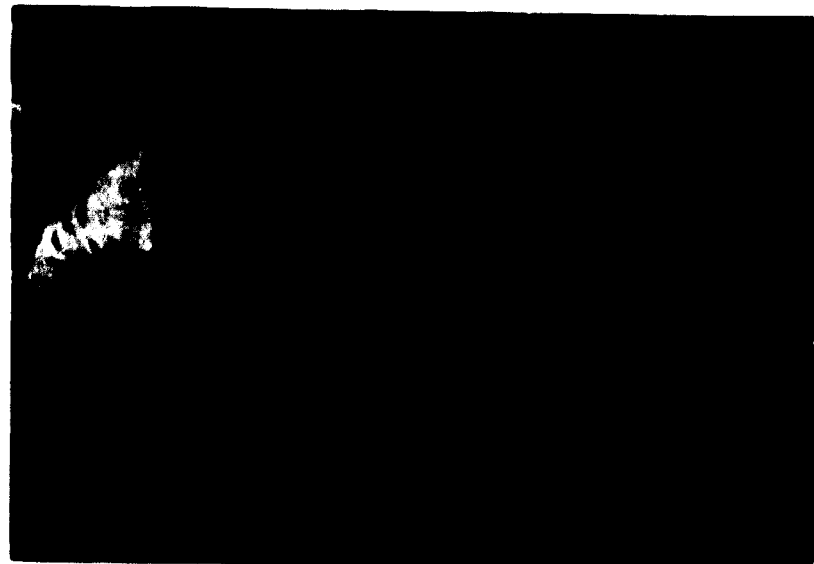
TOP: *Taking a sample of gushing for tests in an Israeli oilfield*

CENTRE: *New housing project under construction at Ramat Aviv, Israel*

BOTTOM: *General view of a copper works near Eilat, Israel*

21

ANALYSIS OF THE CASE STUDIES

THE OVER-ALL IMPRESSION emerging from the case studies is that the experts were attempting to assign priority rankings to projects under consideration by comparing their anticipated effects throughout the economy, that is, the costs—including alternative or opportunity costs—and benefits from the point of view of the economy as a whole.

Since a project will, as a rule, involve an evaluation of a multiplicity of alternative costs and benefits, the experts are faced with the problem of passing from this multi-dimensional comparison into a single over-all rating for the assignment of priority rankings. This, in turn, requires that the various costs and benefits be assigned relative weights.

In evaluating projects, the experts are faced with two questions which have a bearing on the validity of the resulting priority rankings. First, among the many effects of a project, which are significant and should be taken into consideration? Second, given the effects to consider, what relative weights should be attached to each effect? The solutions proposed by the experts vary from case to case but two types of approach may be distinguished; the first is exemplified by the case studies relating to Burma, Peru and the West Indies; the second, by those relating to Israel, Turkey and the Philippines.
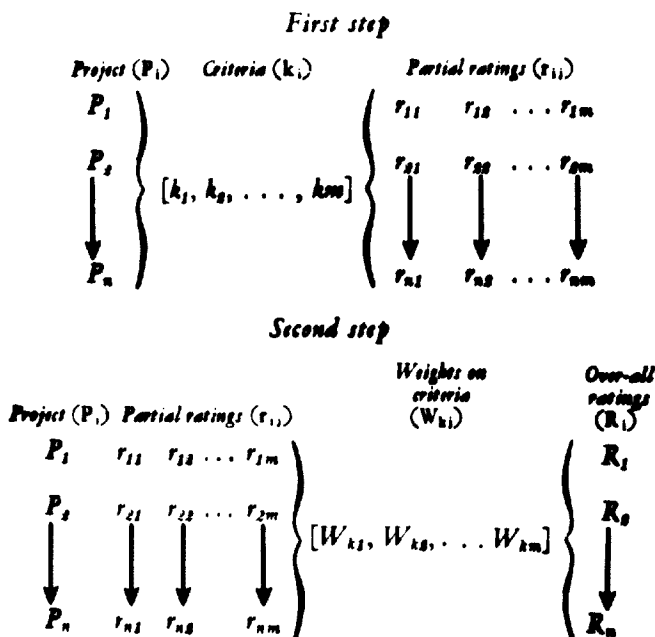
BURMA, PERU AND THE WEST INDIES

The evaluation methods proposed in these case studies involve multiple criteria, as may be seen from table 1. Since each criterion is concerned with a limited aspect of a project's effects, a system of multiple criteria will yield a number of partial ratings. In order to achieve an over-all rating on the basis of these partial ratings, the several criteria in the system had to be assigned relative weights. The logic of this procedure may be expressed schematically as follows.

First step

| Project (P_i) | Criteria (k_i) | Partial ratings (r_{ij}) |

$$P_1 \quad\quad\quad\quad r_{11} \quad r_{12} \ldots r_{1m}$$
$$P_2 \quad [k_1, k_2, \ldots, k_m] \quad r_{21} \quad r_{22} \ldots r_{2m}$$
$$P_n \quad\quad\quad\quad r_{n1} \quad r_{n2} \ldots r_{nm}$$

Second step

| Project (P_i) | Partial ratings (r_{ij}) | Weights on criteria (W_{ki}) | Over-all ratings (R_i) |

$$P_1 \quad r_{11} \quad r_{12} \ldots r_{1m} \quad\quad\quad R_1$$
$$P_2 \quad r_{21} \quad r_{22} \ldots r_{2m} \quad [W_{k1}, W_{k2}, \ldots W_{km}] \quad R_2$$
$$P_n \quad r_{n1} \quad r_{n2} \ldots r_{nm} \quad\quad\quad R_n$$

In assessing this procedure as it is applied in the three case studies under consideration, a number of questions need to be explored. First, what specific aspect of a project's effects are related to a given criterion and how do the several criteria in the system complement each other in assessing the over-all effect? Second, what weights should be assigned to the several criteria in the system? Third, what ratings, partial and over-all, should be assigned to projects? And finally, what is the validity of the resultant priorities?

An attempt is made in table 1 to classify the criteria in three groups according to the effects which they are intended to assess; the residual criteria are contained in the fourth (other considerations) group. It must be noted that the determining factor in assigning a given criterion to a given category is the significance attached to it by the expert concerned.

The criteria in the first group are intended to measure the intensity of a factor or factors required by a project. Most of them, however, are substitutes involving various assumptions which are not in all cases easy to unravel. The wages-gross output ratio, which is one of the criteria used in the West Indies case study, may be taken as an example. This ratio is designed to measure the labour intensity (in terms of unskilled labour) of a given project. It is premised on the assumption, among others, that all wage earners are low-paid unskilled labourers and that differences among projects in respect of this factor are attributable solely to differences in intensity of unskilled labour. Similarly, the ratio of labour per number of establishments in industry in the same case study is intended to measure requirements for certain types of skilled manpower. This is based on the assumption that the ratio is indicative of the scale of operations of a typical unit in an industry, which also determines the requirements of a project for skilled manpower, notably managers. Other criteria involving more complicated assumptions could be quoted.

The criterion "complexity of products" probably implies more than requirements for skilled manpower although for the sake of simplicity, it has been indicated in the table under this category.

Of the two criteria in the second group relating to raw materials, the first, availability of cheap domestic raw materials (Burma), is used qualitatively; it implies that a project which uses "cheap" domestic raw materials is likely to be profitable. The value of the second, "weight of materials handled-labour" (West Indies), which is nominally a quantitative criterion, is very much weakened by the vagueness in the treatment of the most important aspect, namely, the loss of weight in processing. In the final analysis, it resolves itself into a qualitative evaluation.

The criteria in the third group may be related to an assessment of the indirect benefits arising from a project aside from its direct effects. "Organicity" and "domestic

Table 1

CLASSIFICATION OF CRITERIA ACCORDING TO THE EFFECTS WHICH THEY ARE INTENDED TO ASSESS—BURMA, PERU AND THE WEST INDIES

Criteria used by experts	Factor inputs[a]				Non-factor inputs		Indirect benefits	Other considerations
	K	L	S_L	FE	R_m[b]	$Fuel$[c]		
BURMA								
Demand	—	—	—	—	—	—	—	X
Cheap domestic raw materials	—	—	—	—	X	—	—	—
Capital—labour	X	X	—	—	—	—	—	—
Value added—capital	X	—	—	—	—	—	—	—
Value added—foreign exchange	—	—	—	X	—	—	—	—
Foreign exchange—labour	—	X	—	X	—	—	—	—
Effect on employment in the existing industries	—	—	—	—	—	—	—	X
Possibility of expanding existing enterprises	—	—	—	—	—	—	—	X
PERU								
Variety of models	—	—	—	—	—	—	—	X
Complexity of products	—	—	X	—	—	—	—	X
"Organicity"	—	—	—	—	—	—	X	X
Domestic raw materials used[c]	—	—	—	—	—	—	X	—
Minimum scale	—	—	—	—	—	—	—	X
Value added—gross value of output	X	X	—	—	—	—	—	—
Value added—total investment	X	—	—	—	—	—	—	—
Investment in machinery and equipment—investment in fixed assets	X	—	—	—	—	—	—	—
WEST INDIES								
Wages—gross output	—	X	—	—	—	—	—	
Wages—net output	X	—	—	—	—	—	—	
Net output—labour	X	X	—	—	—	—	—	
Mechanical horsepower—labour	X	X	—	—	—	—	—	
Weight of materials handled—labour	—	—	—	—	X	—	—	X
Labour—establishments in industry	—	—	X	—	—	—	—	
Localization ratios	—	—	—	—	—	—	—	X

[a] K = capital; L = unskilled labour; S_L = skilled manpower; FE = foreign exchange.

[b] R_m = raw materials.

[c] Although domestic raw materials used represent non-factor inputs, this is not indicated in the table, since it would appear that the experts were primarily concerned with the effect of a demand for domestic raw materials on the output of such materials.

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raw materials used" (Peru) may be classified under this category. These criteria are qualitative, since the benefits are difficult to quantify.

The last group contains a combination of criteria which are difficult to identify separately. The criteria relating to "demand" and "effect on employment in existing industries" (Burma), "minimum scale" (Peru) and "localization ratio" (West Indies) are closely related. They are essentially concerned with the question of whether there will be a market for the commodity to be

produced. This question is relevant in the early stages of project screening which precede evaluation proper. The item "possibility of expanding existing industrial enterprises" (Burma) is not properly an evaluation criterion. It relates to the alternative which arises in planning for additional outputs of either expanding existing establishments or creating new ones; there is no indication as to how the expert expects to provide a reply to this question.

The objective of the preceding classification of criteria

23

proposed for evaluation of projects was to facilitate the examining of their relevance and internal consistency. The discussion above suggests a number of observations which apply in varying degrees to the three cases. First, the proposed criteria are not equally relevant; second, some of them overlap, in some cases to the extent of almost complete duplication; third, some of the criteria are quantitative, others are qualitative, and it is not easy to see how they could be combined; fourth, among the quantitative criteria, some are substitutes involving assumptions which have not always been explicitly stated. Finally, some quantitative criteria, in particular those relating to evaluation of factor input are based on data borrowed from developed countries.

In the particular case of Burma, the expert provides a list of criteria, but no indication as to how the partial ratings would be determined, what relative weights should be attached to the various criteria, or the way in which the over-all rating will be made. In the case of Peru and the West Indies, partial ratings are given in the form of rankings (a, b or c); the weighing of the criteria is also indicated in the form of ranks; for example, criterion C_i is deemed more important than criterion C_j and so on, and the over-all ratings provide no adequate indication as to how any one project ranks in relation to another.

ISRAEL, THE PHILIPPINES AND TURKEY

Although, as may be seen in table 2, the evaluation methods proposed in these case studies also encompass systems of multiple criteria, an attempt has been made here to combine the more important criteria into three formulae. A quantitative rating of each project under consideration is achieved by aggregating on the one hand all elements of cost, and on the other hand all benefit elements, and by combining the former with the latter in a single benefit cost ratio. The inclusion of other criteria in the system indicates, however, that this was not considered sufficient to provide an adequate solution. Nevertheless, it is significant that most if not all of the measurable effects of a project are being assessed here in terms of a single quantitative criterion.

As was pointed out in the discussion of the case studies of Burma, Peru and the West Indies, the various costs and benefits must be assigned relative weights. In this case, weights are applied not to partial criteria as in the former examples, but to well-defined costs and benefits, that is, directly to inputs and outputs. In so far as it can be assumed that market prices for factors and products adequately reflect their social value, they are the proper weights to use. When this is not the case, so that evaluation based on market prices would lead to misallocation of resources, the experts propose that an appropriate correction be applied to compensate for the divergence between market and social values.

Thus, the first step in this procedure is to calculate for each project the return on investment, using market prices as relative weights. This is calculated according to the formulae given below.

The next step is to apply a correction to compensate for discrepancies between market and social values, as the need arises. Two methods are used. The first is to correct the market prices of certain factors and products which are under-valued or over-valued: for example, the price of capital (Israel); the price of foreign exchange (Turkey and the Philippines), and the price of home produced goods destined for domestic use (Turkey). These corrections are tantamount to using, instead of market prices, "equilibrium" or accounting prices, which measure the social value of factors and products. The determination of these "equilibrium" prices is discussed in part three of this article.

A second method of correction, which has been applied in the case of the Philippines, consists of attributing additional benefits to a project which uses an abundant factor (for example, unskilled labour) or has a beneficial impact upon the rest of the economy, either forward or backward. The "essentiality" factor mentioned above was intended to take into account the benefits arising mainly from the "forward" effects; the correction for the use of domestic raw materials, on the other hand, was concerned with benefits arising from the "backward" effects. The rationale underlying these corrections is that, in so far as a project produces commodities which are used as inputs elsewhere in the economy, or uses commodities which are produced by other sectors, it stimulates economic activity and consequently gives rise to additional benefits which should be attributed to the project considered.

A closer examination of the formula suggests, however, that in some cases the indirect effects are taken into account *twice*, so that their impact is exaggerated.

ISRAEL:
$$\frac{\sum_{t=0}^{n} (\text{value of output} - \text{cost of materials and labour}) \ (1+i)^{-t}}{\sum_{t=0}^{m} \text{investment} \ (1+i)^{-t}}$$

PHILIPPINES:
$$\frac{\text{value of output} - \text{cost of purchased materials and depreciation}}{\text{investment}}$$

TURKEY:
$$\frac{\text{value of output} - \text{cost of materials, labour and depreciation}}{\text{investment}}$$

Table 2

CLASSIFICATION OF CRITERIA ACCORDING TO THE EFFECTS WHICH THEY ARE INTENDED TO
ASSESS—ISRAEL, THE PHILIPPINES AND TURKEY

Criteria	Direct effects	Indirect effects			
		On factor use	On other projects	Secondary effects	Other considerations
ISRAEL					
$$\dfrac{\sum\limits_{t=0}^{n} (S_t - C_t)(1+i)^{-t} *}{\sum\limits_{t=0}^{m} K_t (1+i)^{-t}}$$	X	X	—	—	..
Nature and size of markets	—	—	—	—	X
Size and location of plants	—	—	—	..	X
Sources of financing	—	—	..	..	X
Availability of know-how	—	—	—	—	X
PHILIPPINES					
$$\dfrac{e(w+r+i+p)}{K} + \dfrac{FE/es - FE/c}{K} + \\ + \dfrac{0.5\,rmd\ \ rmt \times rmd}{K} + \dfrac{ld \times 2.000 +}{K}$$	X	X	X	—	..
Overcrowding of an industry	—	—	—	—	X
Abnormal pricing of labour, materials and products	..	..	..	—	X
Possible effect on increased domestic production of raw materials		..	X	—	—
TURKEY					
$$\dfrac{S - (w + o + rmd + rmt)}{K} \\ + \dfrac{(FE/es - FE/c)\,30\ 100}{K} + \dfrac{s\ddagger}{K}$$	X	X	—	..	..
Regional balance (external economies)	—	—	X	—	—
Rate of completion	—	—	—	X	—
Nature of product	—	—	—	X	—
Technical complexity	—	—	—	—	X
Labour training	—	—	X	—	—
Stability	—	—	—	X	—

* S_t = value of annual sales; C_t = current annual costs, excluding capital costs; K_t = annual expenditure on capital goods, including working capital; i = interest rate; m = period of investment (in years), measured from the reference year ($t=0$); n = useful lifetime of the project (in years) measured from the reference year; Σ indicates aggregation of annual values.

† See text.

‡ S = gross value of sales; w = wages; o = other operating costs, excluding rmd, rmt; rmd = domestic raw materials; rmt = imported raw materials; FE/es = foreign exchange earnings or savings; FE/c = foreign exchange costs; s = correction for home produced goods; K = total investment.

For example, in addition to assuming the cost of domestic unskilled labour to be zero, a benefit is assigned to projects for the use of this labour. A further benefit is assigned for the use of domestic raw materials regardless of the cost element.

Among the other criteria that are being used to complement the three basic criteria represented by the formulae, those grouped under the category "other considerations" in table 2 are, in most cases, relevant in the early stages of project evaluation which precede evaluation proper. The criteria of "external economies", "labour training", "rate of completion" and "nature of product", proposed in the Turkey case study and the criterion of "possible effect on increased domestic production of raw

materials", proposed in that of the Philippines, are intended to assess indirect effects. The criteria of "external economies", "labour training" and "possible effect on increased domestic production of raw materials" relate to effects arising from the interdependence of the projects.[24] The criterion of "rate of completion" implies that the phasing of projects will affect, on the one hand, the domestic supply of commodities and, on the other hand, domestic income; consequently, it may affect domestic

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[24] The criterion of "possible effect on increased domestic production of raw materials" proposed in the Philippines case study is redundant, since the backward effect of a project is taken into account through the basic formula.

prices or, if unmet domestic demand gives rise to imports, the balance of payments, or both. The criterion "nature of product" relates to a project's impact on commodity supply and consequently on prices of goods consumed by low-income groups. These indirect effects, some of which may be referred to as secondary effects, are difficult to assess; hence the qualitative nature of the criteria which relate to them.

In the final over-all rating of each project, the basic criteria, that is, the formulae, must be combined with the other criteria in the system. This has to be achieved along the lines of the procedures which have been described in connexion with the discussion of the case studies relating to Burma, Peru and the West Indies.

Part Three

SYNTHESIS AND CONCLUSION

A S WAS NOTED in the introduction to this article, the decision regarding acceptance or rejection may be taken on an *ad hoc* basis in connexion with individual projects or it may involve the simultaneous choice of the projects to be implemented within a certain time period, that is, the elaboration of a project programme. In either case, the evaluation will be based on a comparison of the resources that would have to be given up in the implementation of the project and its anticipated benefit.

The difficulty in project evaluation consists, as was observed earlier, of the fact that the problem has to be determined on a multi-dimensional basis and that from this a one-dimensional decision pattern has to be derived. The multi-dimensional character is related to the fact that the project has to be considered in the context of its impact on a variety of fields, such as anticipated yield in terms of an increase in national income or in national consumption—with, moreover, the distinction between the immediate effects and those obtained in the longer run; provision of remunerative employment; impact on the balance of payments and possibly also the impact on the distribution of income and on regional distribution of productive activity. Also, the production factors to be used are basically incommensurable: capital; foreign exchange; labour, skilled and unskilled; the various categories of natural resources, such as land, minerals, hydro-power. The decision pattern, on the other hand, is by its nature one-dimensional: for the elaboration of a programme of projects, the candidate projects are ranked in a single line priority order and the decision regarding an individual project can either be acceptance or rejection.

The transition from the multi-dimensionally determined problem to a one-dimensional decision is, in general, resolved by the automatic operation of the price and market mechanism. Thus, for the private entre-

preneur, operating in a fully market-oriented economy, the multi-dimensional nature of the problem does not come into the open, since for him sacrifices as well as yields are appropriately assessed at the common denominator of money value in terms of market prices of his estimated outlays and anticipated yields. The problem of evaluation arises precisely because of the fact that, especially in the developing countries, for a variety of reasons of an institutional, social and economic nature, the price mechanism cannot in itself be considered as an acceptable criterion in all cases where decisions on matters of investment and production are involved. This brings in the problem of multi-dimensionality referred to above.

ELABORATION OF A PROJECT PROGRAMME

The problem of project evaluation will primarily be discussed in the context of the elaboration of a project programme for execution during a given period of time. It is, in fact, only in this context that the problem can, in principle, be adequately solved; when a project is evaluated on an *ad hoc* basis as and when it is presented, its adoption will always imply the risk of precluding the execution of more profitable projects that may come up afterwards.

For the problem to be defined, the following data have to be known: the "universe of candidate projects"; the availabilities of the various resources during the given time period, and the objectives of economic policy against which the desirability of the candidate projects has to be considered.

The programme can refer to the national economy as a whole or to a particular sector, for example, to manufacturing industry or an individual branch of industry. It can comprise public as well as private projects, or it

can be confined to the public sector only. The data referred to above should, of course, relate to the area to be covered by the programme.

The candidate projects of the universe are the building stones of such a programme at the micro-economic level. Conversely, the data on objectives and resource availabilities have been spelled out in macro-economic form under an existing plan. The project programme will constitute a bridge between the macro-economic targets and the level of implementation.

Resource availabilities and policy objectives

If project evaluation is conducted by individual sectors or is confined to one or a few sectors, the plan should specify the resources to be allocated to the sectors concerned and preferably the targets to be attained by each sector during the programme period.

The procedures and methods used in the elaboration of a macro-economic aggregate plan and its subdivision into sectoral plans are outside the scope of the present study; they have been extensively dealt with elsewhere.[25] Normally, it will be necessary to estimate the resource availabilities for each consecutive year of the period, in particular as regards the availability of raw materials and natural resources, manpower, capital, foreign exchange and the like. The resources which will be generated under the plan—foreign exchange, for example— will, of course, be taken into account.

The *objectives of economic policy* have to be known, since it is in terms of achievements in the realization of these objectives that the yields of the projects considered have to be measured.

Some of the most important objectives have been referred to earlier. Normally, a maximum increase in national income is, explicitly or implicitly, recognized as the principal objective to be pursued. Along with this, other objectives may relate to the strengthening of productive capacity so as to make possible a more rapid increase in national income in the future, including the broadening of the productive basis through greater diversification; a greater equality in the distribution of income; the provision of employment for those at present unemployed and for the new entrants into the labour market; the strengthening of the balance of payments position; the development of the more backward areas of the country, etc.

The definition of the objectives to be pursued depends basically on the policy maker. In many cases, various objectives may be pursued simultaneously. If projects had identical ratings with respect to the different objectives, no problem would arise. It will be recalled that in the Pakistan case, the Development Board was able to reconcile the national income objective with the em-

ployment and foreign exchange objectives with no great difficulty. This, however, is exceptional, since the various objectives will generally prove to be competitive—if not conflicting. Thus, the most acute problems which governments of developing countries invariably face are on the one hand to improve as rapidly as possible the generally inadequate levels of present consumption, and at the same time to provide for future accelerated growth. This may conflict with a programme of providing substantial employment; and all these goals may be achievable only at the cost of the foreign exchange position.

In such cases, it will be necessary, in order to arrive at a definite priority rating, to define quantitatively, and as precisely as possible, the relative importance attached to each objective. Thus, it is not enough to decide that projects which earn or save foreign exchange should be given priority; it will be necessary to define exactly the amount of foreign exchange that is considered to be equivalent to one unit of the domestic currency. As was seen in the case studies, the quantification of the relative importance of the various objectives is, in practice, not always observed.

The relative importance to be allocated to the different objectives can be expressed through appropriate weighting coefficients. Thus, when comparing two projects, one of which would be located in a certain backward region and the other in the metropolitan area, the yield of the former could be increased in a certain pre-determined ratio which expresses the "weight" of the objective of developing the backward area. In several instances, the weighting factors with respect to the objectives may take the form of "accounting" or "shadow" prices, in the same way as in the case of production factors, as will be discussed later. Thus, the relative importance of a given increase in national income after five years, as compared with the same increase now, can be reflected in the "accounting rate of interest".

When the evaluation of projects is carried out on a sectoral basis, it is, furthermore, of basic importance that the same set of general objectives is applied in the various sectors with the same relative weight.

The "universe of candidate projects"

The procedure of evaluation should be preceded by the establishment of a "universe of candidate projects".

An important prerequisite is that the "universe" should be as complete as possible, that is, that all relevant projects should be included: by leaving out possible projects, a distortion of the programme may result. The first task will be to conduct a broad inquiry regarding proposals for projects. Of course, only those projects proposals will be included in the "universe" that stand a reasonable chance of being selected. This is important, because at this stage of final selection, it will be necessary to determine with sufficient precision costs and yields for each one of the candidate projects; and this will require the conducting of costly feasibility studies. It will, therefore, be advisable to subject the project proposals to a pre-evaluation screening. Such screening will,

[25] Compare, for instance, the ECAFE reports referred to in footnote 1: *Programming Techniques for Economic Development* and *Formulating Industrial Development Programmes*; also the article on "Use of Models in Programming" in *Bulletin on Industrialization and Productivity*, No. 4 (Sales No.: 60.II. B.2), and J. Tinbergen, *The Design of Development* (Johns Hopkins Press, Baltimore, Maryland, 1958).

in general, be confined to an appraisal of the merits of a project proposal in itself and thus will not involve a comparative analysis of different projects. The screening will be based on rough, though realistic, estimates as regards yields and costs of the projects.[26] The case studies relating to Burma, Peru and the West Indies exemplify procedures which are, in varying degrees, appropriate to this stage. In the Pakistan case, considerations of feasibility were applied for the same purpose. Aspects of pre-evaluation screening are also discussed in the *Manual on Economic Development Projects*.[27] Judgement will of necessity play an important part.

The pre-evaluation screening process should, however, not be pursued too far: this would again incur the risk of discarding possible projects that, on closer examination, would have proved to be profitable. Thus, in case of uncertainty, the project idea should be given the benefit of the doubt and be retained at this stage. (As a practical rule, the universe of candidate projects could comprise from one and a half times to twice the number of projects that could be included in the programme.[28] The candidate projects should, moreover, have a wide range of variation as regards the relative use of resources.)

Project data

The possible projects that are retained for inclusion in the universe of candidate projects should be studied in greater detail. This will, in general, necessitate feasibility studies in the full sense, so as to estimate with sufficient precision the resource requirements, both for the construction and the operation stages, as well as the yields. These studies will involve a variety of aspects, such as, market research to determine the present and future demand for the commodity or service to be produced on the domestic and the foreign market; the choice of technology; location problems and the size of plant.[29] In some instances, the demand will have to be derived from projections beyond the period covered by the pro-

gramme; power plants are a typical example in this respect. Technical asistance experts working in the fields of economic and industrial programming and especially in project evaluation report almost invariably a deplorable deficiency in the pertinent information, which makes it difficult to reach a justified decision with regard to the acceptance or rejection of a possible project.

The problems involved in obtaining the relevant project data have been described before in several studies,[30] for this reason, they will not be discussed in the present article.

Selection of projects with marketable product

The next problem is to select, among the candidate projects with marketable output, the set of projects that together will yield the maximum benefit as measured against the agreed-upon objectives of economic policy. This may be achieved by assessing the yield-cost ratio of each candidate project and by ranking the projects in declining order of their respective ratios, until the available investment resources have been exhausted.

Given the nature of the objectives and, in most cases, the relative weights that should be attached to each objective, the evaluation will consist of assessing the contribution of a given project to the several objectives, and of determining the proper relative weights that should be attached to factors and products. The first task involves identification of effects which relate to a given objective and the assessment, quantitative, if possible, of such effects. In some cases, this may raise no particular difficulty: for example, the employment effect can be identified and measured readily. In other cases, it may not be possible to identify or assess quantitatively, with any reasonable degree of accuracy, a project's impact in terms of a given objective—for example, a project's impact on economic stability. The measuring of a project's contribution to national income, which is usually considered the most important factor in project evaluation, also faces many problems: certain components of this contribution may be assessed quantitatively—for example, the project's direct contribution to national income—while others, such as external economies attributable to a project, are difficult to identify and even more difficult to assess quantitatively.

[26] For a number of industries, coefficients for estimating investment and operating costs at the pre-investment stage are at present being collected in a study conducted jointly by the Secretariats at Headquarters and of the Economic Commission for Latin America. The study includes for each industry the variation of the coefficients with the circumstances as regards the relative factor prices, size of operations, etc. It is intended to publish the first results of the study in the course of 1962.

[27] Op. cit.

[28] It is clear that the total requirements of the universe of candidate projects must, at least for any or all investment resources, exceed the available supply of such resources for the problems of evaluation to arise at all.

[29] The assumption that these aspects can be studied individually for each possible project prior to the final simultaneous evaluation is, strictly speaking, not correct, since the choice with regard to some aspects—in particular the choice of technology and to some extent also the location and size of the plant—will depend on the prices used, and the latter, as will be seen later, will only be obtained simultaneously with the final evaluation. For practical purposes, however, the consecutive process will be useful, at least in a first approximation.

[30] Compare, for instance, the *Manual on Economic Development Projects*, op. cit.; the paper "Some Notes on Industrial Project Evaluation", recently prepared by Forrest E. Cookson for the Working Party on Economic and Social Development, 15 to 27 January 1962, organized by the Economic Commission for Africa; the articles "Capital Intensity in Industry in Underdeveloped Countries", "Choice of Technology in Industrial Planning", by J. Tinbergen, and "Capital Intensity in Heavy Engineering Construction" in *Bulletin on Industrialization and Productivity*, No. 1 (Sales No.: 58.II.B.2); "Capital Intensity and Costs in Earth-moving Operations", "Working Party on Earth-moving Operations" and "Choice of Industrial Technology: The Case of Wood-working", by G. K. Boon, in *Bulletin on Industrialization and Productivity*, No. 3 (Sales No.: 60.II.B.1); and "Problems of Size of Plant in Industry in Under-developed Countries" in *Bulletin on Industrialization and Productivity*, No. 2 (Sales No.: 59.II.B.1).

For the private entrepreneur, the relative weights to be attached to factor inputs, as well as factor yields, are the market prices of these factors. A problem that is basic to project evaluation in the context of the national economy arises from the fact that market prices of factors do not always reflect adequately their value from the point of view of the national economy as a whole.

The divergence between market prices and social values reflects imperfections in the operation of the market mechanism. Although, as stated earlier, such imperfections occur in all economies, they are, for a variety of historical, political, institutional and social reasons, far more widespread and severe in under-developed economies than in most developed economies. A complete enumeration of such imperfections is not intended here, but some of them may be mentioned: imperfect mobility of factors, including economic or institutional restrictions on access to occupations; monopolistic elements in the various sectors of the economy; legal provisions affecting prices such as excise taxes, subsidies, foreign exchange controls, import restrictions, monetary policies, credit controls, frozen rents for dwellings and agricultural land and the like. Wages may also be affected by institutional influences, such as minimum wage legislation and activities of trade unions. The result is that in some cases, such as, for instance, unskilled labour, the market price—that is, the wage rate (including fringe benefits) legally prescribed or fixed in the collective labour contracts—may often be higher than the marginal real product of the factor involved; and in other cases, such as capital, foreign exchange or agricultural land, the intrinsic value is frequently higher than the corresponding officially fixed market price.

Under the circumstances, a selection of projects based on market prices will result in a misallocation of resources, in the sense that there will be a heavy strain on the resources that are under-priced while part of the resources that are over-priced will be left idle, so that the aggregate yield of the selected projects will fall short of the maximum yield that could have been obtained from the available resources.

It is thus necessary to introduce into the evaluation procedure a device intended to restrain the use of the under-priced factors and stimulate the use of the over-priced ones. This can be accomplished, as in the case of the objectives of economic policy, by the use of weighting coefficients, which should be high for the under-priced, relatively scarce factors, and low for the over-priced ones. A device which amounts essentially to the same thing is to base the evaluation on "shadow" or "accounting" prices instead of the market prices. The accounting prices are intended to reflect as accurately as possible the intrinsic values of the factors involved.[31]

Theoretical characteristics of accounting prices

To begin with, the theoretical characteristics of accounting prices will be defined. As a first definition, it can be

stated that these prices should be such that, when candidate projects are selected in accordance with the priority rating based on them, the aggregate yield of the set of projects selected will be maximum within the limits of the given resource availabilities. The problem of selection based on this criterion and that of the simultaneous determination of the accounting prices can, in principle, be solved on the basis of a complete model of the economy, for example, by the use of the technique of linear programming, provided that all the parameters in the set of equations of the model are known. In practice, however, because of the lack of data and the degree of accuracy of the available data, this procedure is inapplicable.

The criterion of full use of all resources

A second criterion is that the accounting prices, when uniformly used in the selection of projects from among the "universe of candidates", will simultaneously exhaust the various resource availabilities.[32] In view of this criterion, accounting prices are sometimes denominated "equilibrium prices".

In practice, it will be necessary to work with accounting prices which are reasonable approximations of the theoretical magnitudes. In the following section, a few procedures are indicated for the determination of such approximate values.

A trial and error method based on the maximum aggregate yield criterion has been suggested for the estimation of accounting prices.[33] It consists of the following: a random set of accounting prices is assumed; the profitability of all candidate projects of the "universe" is calculated on the basis of these prices and the projects are ranked in the order of declining profitability. A set of projects is then selected in this order, until one of the resources is exhausted, and the aggregate yield of these projects is determined. The same process is repeated with different assumptions as regards the set of accounting prices, and the resulting aggregate yields are compared. The procedure is continued until the maximum aggregate yield is reached; the respective set of projects will then represent the optimum set and the corresponding prices the accurate accounting prices. This procedure is, however, very tedious. Its efficiency can be increased by applying the criterion of full use of all resources: when projects are selected in the order of declining prof-

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[31] See, for instance, the articles "Choice of Technology in Industrial Planning" and "Capital Intensity in Heavy Engineering Construction", op. cit.

[32] It can be proved mathematically that both definitions are congruent, under condition that the "universe" covers a sufficiently wide range of candidate projects as regards the input mix of the factors. In fact, under this condition, the optimum set of projects will exhaust all available resources (if this were not the case, the factor not used to the limit of available resources would be a "free good" and the corresponding accounting price would be zero); and, vice versa, if, through selecting projects in the order of declining profitability calculated for all candidate projects on the basis of one and the same set of prices, the factors prove to be simultaneously exhausted, then the resulting set of projects will be optimum in the sense of yielding the maximum aggregate benefit, and the prices used will represent the accounting prices.

[33] See J. Tinbergen, The Design of Development, op. cit.

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itability, calculated on the basis of an assumed combination of factor prices, it is only by pure chance that all factor availabilities are exhausted simultaneously (this would mean that one has hit right away on the correct set of accounting prices). In all other cases, the fact that one factor is exhausted before the others indicates that its assumed price was too low and that of the other factors too high; moreover, in the latter case, the proportional excess of the leftover factors involved will be indicative of the discrepancy between their assumed prices and the correct accounting prices. This will provide a means of adjusting the assumed prices in the right direction and arriving more rapidly at an acceptable combination of accounting prices.

Accounting prices may also be roughly estimated on *a priori* considerations relating to the general circumstances bearing an impact on their magnitude. These estimates will in some cases already provide a workable basis for final application. They can also be used as the starting point in the procedure of further adjustment through successive approximation described above; in this case, a careful first choice may considerably shorten the process.

For the estimates to be as correct as possible, an insight into the way in which the accounting prices are influenced by the circumstances will be useful. Some aspects are illustrated in a numerical example given in the appendix to this article. In the following, a few considerations are presented separately in connexion with some of the most important factors.

Accounting prices for *capital* may be approximated by interest rates somewhere between the rates prevailing in the organized capital market and those obtaining in the "parallel" market. The structure of these respective markets and the volume of transactions which take place in each are important factors to consider. Since a low-interest credit policy will tend to lower the rates in the organized market and, indirectly, in the "parallel" market, allowance must be made for its influence. Furthermore, it has been suggested that some indication of the equilibrium interest rates may be obtained from the rates at which it would be possible to attract new capital; and also from the profitability of marginal projects, corrected for risks involved (for example, risks of inflation). More specifically, it has been suggested that accounting interest rates may be set at at least double the rates on government securities or on international loans, and possibly at as high as 20 per cent.

Accounting prices should be estimated for *foreign exchange* when there is present or anticipated disequilibrium or artificial equilibrium in the balance of payments. They may be set at a rate above the legal rate but below the "black" or "parallel" market rates. When control measures are effectively enforced, the divergence between the equilibrium rate and the official rate will tend to be greater than when they are lax.

The market rates for *skilled labour* should probably be corrected upwards, as this type of labour is generally scarce in under-developed countries. As regards *unskilled labour*, on the other hand, a downward correction will be indicated in countries having large-scale structural unemployment. It has been suggested that the cost of labour in a good number of cases should be put at zero or at some level reflecting the displacement cost. This statement is defended on the ground that the marginal productivity of unemployed labour being zero, its employment will entail no sacrifice in output. While this argument may seem logically valid, it overlooks certain important points. First, once unemployed labour has been put to work, its consumption level is likely to increase; the resultant claim on production factors and other resources, such as imports, will thus have to be taken into account. Secondly, since wages have in practice to be paid at market rates, the wage bill for a given project will represent a demand on the total funds available for development and thus reduce the amount available for other development expenditure. Thirdly, frequently the marginal productivity of labour in under-developed countries, though low, is not nil. Thus, for instance, despite the prevalence of rural under-employment during most parts of the year, seasonal peak requirements for manpower may be heavy. Under the circumstances, a withdrawal of manpower from agriculture may well result in a loss of output. These considerations indicate that the application of too low an accounting price for labour is not advisable; it is suggested that it may be estimated at not lower than about 80 per cent of the market wage rates under circumstances of moderate unemployment and at not lower than 50 to 60 per cent in cases of heavy unemployment.

Projects having no marketable product

The evaluation of projects, both in the pre-evaluation screening and in the final selection, is based essentially on evaluation of yield in relation to costs.

The application of this criterion presupposes that the yields of the projects can be expressed in comparable quantitative terms. There are, however, certain categories of projects with respect to which this is, as is well known, not possible. These include, in the first instance, the projects in the social overhead sector which have no marketable product: schools, hospitals, sport parks and the like; furthermore, defence projects and, in some cases, those projects which are only indirectly productive, such as roads and other public works.[34]

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34 In certain circumstances, projects with marketable product should, with respect to project evaluation, be regarded as falling into the same category: this will be the case when governments decide to promote certain projects as a matter of policy. For example, one of the objectives in the Indian second five-year plan was to develop basic heavy industries for the manufacture of producer goods to strengthen the foundations of economic independence. The highest priority in the industrial sector was therefore assigned to the expansion of the iron and steel industry on the ground that, more than any other industrial product, the levels of production of these materials determine the tempo for the progress of the economy as a whole. Government of India, Ministry of Information and Broadcasting, *Second Five-Year Plan, The Framework* (Government of India Press, New Delhi, 1955), page 13. *See also*, for an appraisal of this policy, J. Sandee, "A Long-term Planning Model for India" (United Nations mimeographed document TAO/IND/22/Rev.1).

The decision with regard to accepting or rejecting such projects will of necessity involve an important element of subjective judgement. It seems advisable, however, to retain to the extent possible an objective basis. In the first place, an estimate can be made of the benefit in terms of additional income that could be obtained if the resources to be sacrificed in the project were used for a marginal project in the directly productive sphere. Furthermore, in some cases, such as projects involving transport or technical education, it may be possible to impute an economic value to output by assessing the advantages which are expected to accrue to the productive sectors of the economy with which the project is directly or indirectly related; this procedure implies the existence of an input-output relation between the project and the sector or sectors in question. Also, with respect to the allocation of resources to the various categories of the projects involved, the practice in other countries in comparable conditions may provide guidance.[35]

Ad hoc *evaluation*

As indicated earlier, it will be advisable to carry out the evaluation, whenever possible, on a simultaneous basis with respect to all projects to be included in a programme covering a given period of time. Only on this basis will it be possible to arrive at a justified allocation of available resources.

New project possibilities may, however, come up in the course of the programme period, and if they prove to be highly profitable it would obviously not be justified to discard them on the ground that they are not included in the programme. In practice, the profitability of such project possibilities may be evaluated on the basis of the accounting prices obtained in the prior simultaneous evaluation; this will be justified on the condition that the new project possibilities have no major impact on the relevant features of the "universe" used in the original simultaneous selection. It will be clear, moreover, that the acceptance of new projects may require the exclusion of some marginal projects contained in the original programme.

[35] For further discussion of the problems involved in the evaluation of these categories of projects, reference may be made to the report on *Programming Techniques for Economic Development*, op. cit.

Frequently, project evaluation is carried out on a purely *ad hoc* basis, without the elaboration of a consistent programme or the existence of an over-all "root" plan within which such a programme is integrated. This procedure, however, should be regarded, as has been stressed, as definitely inferior to simultaneous evaluation. In this case, accounting prices can also be used in the evaluation, they can then be estimated on the basis of *a priori* considerations as indicated above.

FINAL REMARKS

In the foregoing, the suggested procedure of project evaluation has, for the sake of clarity, been described along the lines of a series of consecutive stages. In many instances, however, estimates that can be made with sufficient precision only at a later stage will already have to be used at an earlier one; a typical example was referred to in connexion with the use of accounting prices in the comparative evaluation of the objectives of economic policy. This will imply, as was already indicated, a process of successive approximations, in which the tentative conclusions reached at the earlier stages on the basis of first estimates of prices or other items are later adjusted in accordance with more accurate estimates obtained in the subsequent phases.

Considerable emphasis has been given to the use of accounting prices since it is considered that these constitute a device that can be profitably used in project evaluation in the context of the national economy as a whole. The practical experience with this device is, however, scant up to the present. It would seem advisable that available information on experience in the practical application of accounting prices and the methods used in their estimation be disseminated.

The purpose of this study has been to put project evaluation on as objective a basis as possible. The device of accounting prices is illustrative in this respect: it serves the indicated purpose by making possible a quantitative evaluation of the impact of a given project on the economy as a whole. It should be observed, however, that, in the present state of knowledge, no method or procedure is completely foolproof in itself. Aside from the application of a quantitative procedure, an element of good judgement, based on a host of factors not amenable to quantitative evaluation, is a necessary and important component of the decision making process.

Appendix

GRAPHICAL EXAMINATION

In the following analysis, the factors for which the market prices do not adequately reflect their real or intrinsic values will be denominated "special" factors; for these factors accounting prices have to be estimated. It is thus assumed that all other factors can be valued at market prices.

For the problem to be defined, the following data have to be known:

(*a*) The "universe of candidate projects";
(*b*) For each candidate project:
    (*i*) The yield to be imputed to the "special" factors combined, that is, the total yield minus the payment at market prices for the other factors required;
    (*ii*) The quantities required of each one of the "special" factors;

Chart 1

Graph A

Graph B

Graph C

$$\text{or:} \frac{C_i}{R_i} \times P_c + \frac{L_i}{R_i} \times P_L \leqslant 1$$

$\dfrac{C_i}{R_i}$ and $\dfrac{L_i}{R_i}$ represent, as will be clear, the requirements of capital and labour per unit of yield in candidate project i.

In graphic presentation this means that, if candidate projects are indicated by points with co-ordinates $\dfrac{C_i}{R_i}$ and $\dfrac{L_i}{R_i}$, all candidate projects corresponding with points within the triangle formed by the axes and a hypotenuse intersecting the axes at the inverses $\dfrac{1}{P_c}$ and $\dfrac{1}{P_L}$ of the equilibrium prices would be profitable, and all candidate projects corresponding with points outside this triangle would not be profitable; the projects corresponding with points inside the triangle thus constitute the optimum programme.

As an example, it will be assumed that the "universe" comprises sixteen candidate projects, numbered 1 to 16, of which the data are given in columns (2), (3) and (4) of table 3. Furthermore, it will be assumed that the total availability of capital (C) equals 500 and of labour (L), 1,000.

The requirements of capital and labour per unit of yield are given in columns (5) and (6) of table 3 and are represented in graph A in chart 1 by points with these requirements as co-ordinates.

It will be obvious that in the chart:

Candidate projects will be more labour intensive in the degree that the line connecting the corresponding point to the origin is closer to the horizontal axis, and more capital intensive in the degree that the connecting line is closer to the vertical axis. Thus, candidate project 8 is the most labour intensive in the "universe" and candidate project 16 the most capital intensive;

Two candidate projects having the same degree of relative intensity are represented by points on one and the same line through the origin—for instance, candidate projects 4 and 5; of these, candidate project 5 corresponding with the point closer to the origin is the more profitable;

The location of the points is indicative of the degree of capital intensity and of the relative profitability but not of the size of the candidate project; for this reason the absolute figures of the requirements of capital and labour are indicated in the chart by the numbers above and at the right-hand side, respectively, of each point.

The line I-I is drawn in such a way as to form with the two axes a triangle including the points corresponding with the candidate projects 1, 5, 7, 8, 9, 10, 11, 13 and 14. These candidate projects comply with the twofold condition that:

(1) Their aggregate requirements of capital and labour equal the total availabilities of these factors, and

(2) The profitability of each of them when calculated at uniform factor prices equal to the inverses of the intercepts of the line I-I with the axes is higher than the profitability of any other candidate project in the "universe" calculated on the same basis.

The projects mentioned thus constitute the optimum set that can be selected from among the "universe of candidate projects" within the limits of the given resource availabilities, and the prices referred to are the corresponding accounting prices. They

are: $P_c = \dfrac{1}{0.67} = 1.5$ and $P_L = \dfrac{1}{1.67} = 0.6$.

The corresponding calculations are given in table 4. In column (3) of this table the costs of all sixteen candidate projects are calculated at the accounting prices. A comparison between these cost figures and the yields given in column (4) of table 3

(c) The total availability of each one of the "special" factors.

The examination will be based on the second criterion of accounting prices given above: that a selection of candidate projects in declining order of profitability based on them will simultaneously exhaust the availabilities of the various "special" factors.

It will be assumed, for simplicity, that there are only two "special" factors, say, capital and labour.

Let C_i and L_i be the inputs of capital and labour required in candidate project i, and R_i its yield in the sense as defined above. If the accounting prices P_c and P_L for capital and labour were known, $C_i \times P_c + L_i \times P_L$ would represent the total "cost" of capital and labour of candidate project i. Therefore, candidate project i will be profitable if:

$$C_i \times P_c + L_i \times P_L \leqslant R_i$$

Table 3
DATA ON CANDIDATE PROJECTS OF THE "UNIVERSE"

Project (i)	Project data			Derived data	
	C_i	L_i	R_i	$\dfrac{C_i}{R_i}$	$\dfrac{L_i}{R_i}$
(1)	(2)	(3)	(4)	(5)	(6)
1	80	120	200	0.4	0.6
2	30	125	100	0.3	1.25
3	250	125	417	0.6	0.3
4	150	250	250	0.6	1.0
5	120	200	400	0.3	0.5
6	160	40	200	0.8	0.2
7	35	140	175	0.2	0.8
8	5	70	50	0.1	1.4
9	50	100	250	0.2	0.4
10	10	30	33	0.3	0.9
11	150	90	300	0.5	0.3
12	100	160	200	0.5	0.8
13	10	50	50	0.2	1.0
14	40	200	400	0.1	0.5
15	175	25	250	0.7	0.1
16	85	10	100	0.85	0.1
17	240	240	1,200	0.2	0.2
TOTALS:					
Projects 1 to 16	1,450	1,735			
Projects 1 to 17	1,690	1,975			

Table 4
OPTIMUM PROGRAMMES OF PROJECTS

All candidate projects		Programme A[a]				Programme B[b]				Programme C[c]			
		Cost of candidate project[e]	Projects included			Cost of candidate project[f]	Projects included			Cost of candidate project[g]	Projects included		
i	R_i[d]		C_i	L_i	R_i		C_i	L_i	R_i		C_i	L_i	R_i
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	200	192	80	120	200	192	80	120	200	220			
2	100	120				136				122.5			
3	417	350				400	250	125	417	562.5			
4	250	375				380				425			
5	400	300	120	200	400	304	120	200	400	340	120	200	400
6	200	264				224				340			
7	175	136.5	35	140	175	154	35	140	175	140	35	140	175
8	50	49.5	5	70	50	62				45	5	70	50
9	250	135	50	100	250	140	50	100	250	150	50	100	250
10	33	33	10	30	33	36				35			
11	300	279	150	90	300	252	150	90	300	345			
12	200	246				240				280			
13	50	45	10	50	50	52				45	10	50	50
14	400	180	40	200	400	208	40	200	400	180	40	200	400
15	250	277.5				230	175	25	250	362.5			
16	100	133.5				110				175			
17	1,200									600	240	240	1,200
TOTAL			500	1,000	1,858		900	1,000	2,392		500	1,000	2,525

[a] Based on "universe" comprising candidate projects 1 to 16; total availabilities: $C = 500$; $L = 1,000$.
[b] Based on "universe" comprising candidate projects 1 to 16; total availabilities: $C = 900$; $L = 1,000$.
[c] Based on "universe" comprising candidate projects 1 to 17; total availabilities: $C = 500$; $L = 1,000$.
[d] From table 3, column (4).
[e] Calculated at accounting prices $P_C = 1.5$; $P_L = 0.06$.
[f] Calculated at accounting prices $P_C = 1.2$; $P_L = 0.8$.
[g] Calculated at accounting prices $P_C = 2.0$; $P_L = 0.5$.

(and repeated in column (2) of table 4) indicate that, in fact, for all projects included in the optimum programme the cost is less than the yield and for all candidate projects excluded from the programme the cost is more than the yield. The requirements of capital and labour in the projects included in the optimum programme are given in columns (4) and (5) of table 4. They add up to the total amounts available. Finally, in column (6) the yields of the projects included are repeated; they add up to 1,858; this figure therefore represents the maximum yield that can be obtained within the given limits of available resources of the "special" factors through appropriate selection from among the "universe of candidate projects".

The accounting prices as well as the optimum programme are, as stated above, determined by the project data and the availabilities of the "special" factors and thus will change when these data change. As an illustration it will be first assumed that the availability of capital is increased by 400 to 900 while the availability of labour remains constant at 1,000. As can be seen in graph B in chart 1, the optimum set will now include the additional projects 3 and 15 and exclude the projects 8, 10 and 13. The accounting prices will be $P_C = 1.2$ and $P_L = 0.8$. The calculations indicated above in connexion with programme A are repeated for programme B in columns (7) to (10) of table 4. The aggregate yield amounts in this case to 2,392, an increase of 534 in aggregate yield as compared with programme A. It should be noted that as a result of the additional availability of capital, the yield per unit of labour shows, as could be expected, an increase (from $1,858 : 1,000 = 1.86$ to $2,392 : 1,000 = 2.39$) and the yield per unit of capital a decrease (from $1,858 : 500 = 3.72$ to $2,392 : 900 = 2.66$).

As another alternative, it will be assumed that a new candidate project, No. 17, is included in the "universe" and that the availabilities of capital and labour will again, as in the first case, equal 500 and 1,000, respectively. It will be seen in graph C in chart 1 that the optimum programme will now be composed of projects 5, 7, 8, 9, 13, 14 and 17; project 17 has thus taken the place of projects 1, 10 and 11 in programme A. The corresponding accounting prices are $P_C = 2.0$ and $P_L = 0.5$. The calculations are given in columns (11) to (14) of table 4. In this case the total yield will be 2,525, which represents an increase of 667 as compared with the aggregate yield of programme A, resulting from the introduction of the favourable new candidate project 17. This illustrates the importance of the statement made in the text that care should be taken that the "universe of candidate projects" indeed comprises all possible projects that might prove to be profitable.

Finally, a change in the relative importance attributed to the various objectives should be considered. This will reflect in modifications in the values of the yields of the candidate projects, including, in general, changes in the relations between these values. It will be clear that, as a consequence, the optimum

programme of projects, as well as the corresponding set of accounting prices, may undergo certain changes.[*]

Graphical determination of the optimum programme and the corresponding accounting prices

In the foregoing, it was assumed that the hypotenuses of the triangles were given so that the optimum programmes and the corresponding accounting prices could be immediately derived from the chart. The chart also provides, however, a simple way of finding the hypotenuse when it is not given. This may be illustrated in the case of graph A in chart 1.

The method consists of two steps. In step one an arbitrary line I'-I' is drawn and moved parallel to itself until the candidate projects included in the triangle exhaust the availability of one of the "special" factors—say, capital. This will be the case when the line has reached the position I"-I". It will be noted that the triangle includes candidate projects 9, 11, 14, 15 and 16 with aggregate capital requirements of 500 which equals the given availability. It would be pure coincidence if at the same time the given availability of labour were exhausted; this is in fact not so in the present case since the candidate projects included require an aggregate amount of labour of only 425 whereas the total availability of labour was given at 1,000; the programme thus would not nearly provide full employment. This indicates that too many capital intensive candidate projects have been included; in other words that the slope of the hypotenuse has been drawn too steep.

The second step consists of turning the line I"-I" in this case counter-clockwise, and in such a way that when candidate projects at the left-hand top side are excluded, candidate projects with the same amount of required capital are included at the right-hand bottom side, so that the balance between the requirements and availability of capital is retained. This is continued until the aggregate labour requirements of the candidate projects included—thus the sum of the figures at the right-hand side of project points—also equal the given availability of labour. This will be the case when the line has reached the position I-I, as indicated above, with which both problems of determining the optimum combination of projects and the accounting prices of the "special" factors are simultaneously solved.

[*] This can be verified by assuming that the yields of the candidate projects are not given as such, but are expressed for each candidate project in terms of the anticipated proceeds relating to two or more different policy objectives separately. Different combinations of weights can then be allotted to the policy objectives (as regards the value of one unit of proceeds) and these can be applied in the calculation of the total yields of the candidate projects. The relation between these yields of the candidate projects will, in general, change with the combinations of weights assigned to the policy objectives, and, consequently, the optimum project programme and the corresponding accounting prices will also change.

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A few observations have to be made in connexion with the method described.

First, it will be clear that the method can only be used when the number of "special" factors is not more than two.

Second, it should be noted that the method can only be used when the candidate projects are all mutually independent and thus substitutable for one another; this, however, is a basic condition to the stage of simultaneous project evaluation and therefore does not put a special limitation on the applicability of the suggested method to this stage.

Third, in the example given, it was assumed that all candidate projects are "indivisible"; the dropping of this restriction will, however, not introduce a major additional difficulty in the application of the method.

Fourth, it should be noted that in practice it will not always be possible exactly and simultaneously to exhaust the given availabilities of the "special" factors; if this is not the case, it

may be necessary to choose among a few alternatives for the inclusion of some marginal candidate projects; the choice should not be difficult since the number of alternatives will be small; it may be observed, moreover, that this difficulty is not related to the method suggested, but is inherent in the problem itself.

Finally, it will be noted that the hypotenuse of the triangle is not exactly determined but may shift and turn somewhat between the borderline project points at either side. This means that the accounting prices may also vary within certain margins; each set of accounting prices within this range will comply with the criterion that all projects included in the optimum programme, when evaluated on the basis of these prices, will show a profit and that none of the candidate projects excluded from the programme will do so. Also, it will be clear that the range of variation of the accounting prices will be smaller in the degree that the "universe" comprises more candidate projects and the chart is more densely filled with project points.

Expert Working Group on Industrial Development Programming Data

A MEETING OF THE EXPERT WORKING GROUP on Industrial Development Programming Data was convened at United Nations Headquarters from 17 to 19 May 1961, under the joint sponsorship of the Department of Economic and Social Affairs at Headquarters, including the Bureau of Technical Assistance Operations (BTAO), and the secretariat of the Economic Commission for Latin America (ECLA).[1] The terms of reference of the working group were: to review and appraise the material which had been prepared by the United Nations Secretariat under a joint Headquarters/ECLA industrial development programming project and by certain participants in the meeting; to make suggestions for the improvement and co-ordination of further research work under this project, and to make recommendations for longer-term research in this field.

The purpose of the project was to obtain detailed data on inputs and investment costs in individual industries. Such data are needed at the different stages of industrial development programming, especially for studies on pre-

selection of industries, feasibility studies, and inter-industry studies and resource balances. At each of these stages, it has been the general experience that the available data were not adequate, in particular, for linking planning and programming at the aggregate and project levels.

It was anticipated that, as a first stage in the implementation of the joint project, a small number of pilot studies would be carried out by the Secretariat units concerned and submitted to an expert working group for review. Further research would be undertaken at a later stage on the basis of the experience gained and of the recommendations of the group.

Studies on cement, food canning and chemicals, prepared by the Secretariat, and on petroleum and metal working, prepared by some of the participants, were presented to the expert working group. These industries were selected on the basis of availability of data, complexity of processes, and importance from the point of view of the structure of industry in under-developed countries.

The approach adopted in some of these studies is frequently referred to as activity analysis. In this procedure, an industrial activity is broken down into technological unit processes, the level of disaggregation depending upon the availability of data, the technological characteristics and the purpose of the analysis. For each unit process, inputs and outputs are expressed whenever possible in physical units.

The expert group felt that the approach adopted in the various studies submitted to it was appropriate for programming in the case of industries characterized by continuous flow-operations or by operations leading to relatively homogeneous products, for example, the food canning, cement, petroleum refining and chemical industries. The group recommended that research be undertaken in a systematic and uniform way in the power, textile, steel and pulp and paper industries, on which

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[1] The following experts participated in their individual capacities: Professor M. A. Adelman, Massachusetts Institute of Technology, Cambridge, Massachusetts; Mr. J. L. Almeida Bello, Chief, Department of Petro-chemical Equipment, Companhia Brasileira de Material Ferroviario (COBRASMA), São Paulo, Brazil; Dr. Anne Carter, Harvard Economic Research Project, Cambridge, Massachusetts; Professor Richard Eckaus, Center for International Studies, Massachusetts Institute of Technology; Mr. Daniel Gallik, Columbia University, New York; Dr. Robert N. Grosse, Rand Corporation, Santa Monica, California; Professor Alan Manne, Yale University, New Haven, Connecticut; Professor Seymour Melman, Columbia University; Mr. Carlos Quintana, Chief, Programming Division, Nacional Financiera, Mexico; Mr. Erwin Salomon, Chief, Industry Division, Central Planning Board, Belgrade, Yugoslavia; Mr. Hans Hugo Wolff, Institute for Machine Tools and Factory Organization, Technical University, Aachen, Federal Republic of Germany. Members of the Secretariat of the United Nations at Headquarters and ECLA and a regional ECLA/BTAO expert also participated in the meeting.

there is a considerable amount of information. Studies should also cover certain industries of special importance to the developing countries. These include food processing, fertilizers and other industries providing support to agriculture, construction materials, certain resource-based industries, such as the aluminium industry, and others important from the point of view of import or export substitution.

As regards capital inputs, the group recommended that, in further studies, investment be broken down into construction, equipment and services such as design and engineering; that depreciation rates be specified in terms of rates of physical consumption of appropriate categories of capital assets during their lifetime, and that studies be undertaken of the lags between capital outlays and the beginning of production.

The group also recommended that, where appropriate, "ancillary" processes be differentiated from "core" processes, and that studies be undertaken of capital-labour substitution in the former.

The group agreed that technological relationships should be expressed in physical units to permit a comparative use of the data originating in different countries. Inasmuch as the choice between possible technical combinations is affected by relative price and wage levels and interest rates, data on these factors should also be collected. The use of social accounting prices might be necessary in this connexion.

Finally, the group suggested that information be provided on the skills involved in alternative technologies and on the time required for educating and training labour in each skill.

The collection of programming data on such industries as metal working and assembly raised special methodological problems. Several approaches had been proposed, none of which was fully satisfactory. One method involved a two-stage analysis: in the first stage, input requirements were calculated for specified metal working operations; in the second stage, the output of final products was broken down into its component operations. The method had been applied in a study of industrial practices in one economically advanced country and the transferability of the coefficients obtained to the

conditions of under-developed economies appeared to be questionable. Furthermore the study appeared inadequate to allow for the technological changes involved by labour-capital substitution.

A second method, developed for machine operation only, involved the defining of metal working tasks for specific machine tools and the linking of the tasks to end products. The procedure was incomplete, but it held promise for analysing alternative production techniques.

A third approach, applied in a study of heavy machine building, involved estimates in money value of the main equipment requirements for individual industries. The method was useful for programming machine using industries, but a more detailed equipment classification was needed for programming machine building industries.

As to longer-term research in the field of metal working, assembly and similar industries, the group found itself unable, at this stage, to recommend an appropriate methodology. This would have to await the completion of further studies, a task for which the co-operation of different national and international agencies would be useful.

The group recommended that further studies be undertaken on specific industries in different countries. In these studies, attention should be given, in decreasing order of priority, to the following points: (a) applicability of the methods to economies at different stages of development; (b) applicability of the methods for computation of both labour inputs and capital investments; (c) quantification of effects of alternative degrees of mechanization (labour and capital input-mix); (d) effects of standardization, batch size and stability of operation upon productivity. It also recommended, as an urgent measure, that a selective bibliography on industrial development programming be issued and brought up to date periodically.[2]

The studies presented to the working group will be published by the United Nations in the course of 1962 under the title *Inputs and Investments in Selected Industries*.

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[2]   The first part of a preliminary bibliography on the subject is published in this issue of the *Bulletin*.

Methodological Problems in Long-term Economic Development Programming

With examples from the Yugoslav economy   By BRANKO HORVAT

SCOPE OF A LONG-TERM PROGRAMME

Need for, and conditions of, long-term programming

IN A NUMBER OF COUNTRIES, economists have become aware of the inadequacy of annual and medium-term economic plans as an instrument for getting a thorough insight into the mechanism of economic growth and achieving optimum economic programming. The realization of this inadequacy and of the need for long-term programming rests on two sets of considerations.

(a) Politico-economic considerations

Economic policy is very often directed primarily towards solving current economic and political problems, a factor which may be detrimental to the long-run economic development of the country. In fact, a clear perspective of long-term development is essential if the current problems are to be correctly assessed and the necessary steps taken towards their solution. Further, planning on relatively short terms, say, from one to five years, may be a cause of discontinuity in economic development. When attention is concentrated on a five-

year period, all the measures undertaken aim at achieving the goals set for that period, while the effects which these measures may have beyond it may not be taken into consideration. Besides, any short-term plan is rigid, and the endeavour to "fulfil and surpass" its goals regularly results in a surge of activity towards the end of the period, for instance, in the course of the fifth year, followed by a slackening in the subsequent year.[1] As a result, investment and production cycles are systematically built into the economy, and the instability and disequilibria which they cause reduce the potential efficiency of the planned economy and hamper economic growth.

(b) Methodological considerations

Because of the cumulativeness of economic growth, small changes in current economic activities, which seem insignificant in the short run, may lead to very important long-term changes. To give an example, inadequate care about the training of personnel may seriously hamper future economic development. The same is true of insufficient housing construction, which is often thought to present little danger in the short run. Some day, however, a sharp disproportion may be discovered, the solution of which would take a number of years. A similar problem—although of a very specific nature—is that of the relative pace of agricultural and industrial development. There are many examples of this type, most of which are only too well known.

Besides the *need* for long-term programming, it is essential that there should be a *possibility* for setting it

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The views expressed in this article are the author's personal views and are not necessarily those of the institution with which he is associated.

[1] In the case of an annual plan, the maximum is usually reached in November and December, and economic activity rapidly slackens in January and February.
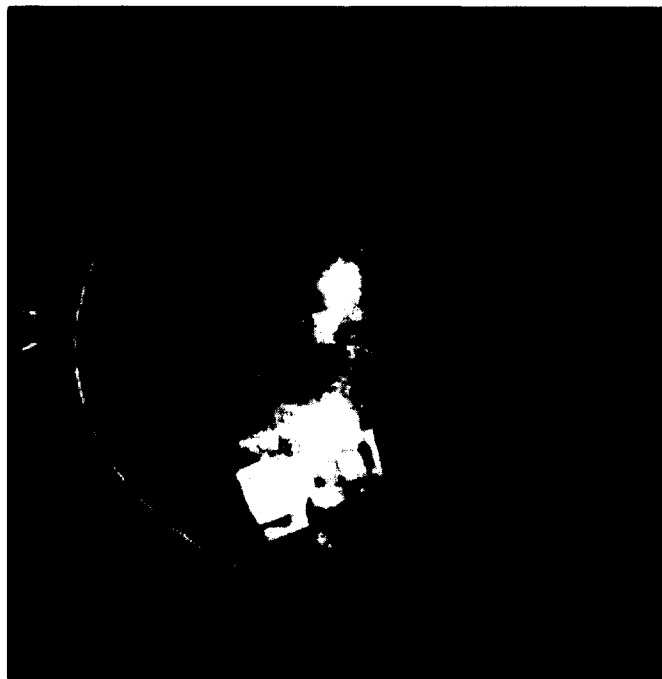
Assembling the field coils of a large generator in a Zagreb factory

on a realistic basis. In the Yugoslav economy, such a possibility has come up only recently. Earlier, the country had been going through a process of revolutionary changes. It is only now that the economic and social system has taken on more lasting features which permit realistic forecasting and planning. This country, which previously had a low rate of capital accumulation, now has a highly accumulative economy. An appreciable pace of growth has been achieved, together with a stabilization of the economic structure and the elimination of the greatest economic disproportions. In particular, adequate measures have been adopted for the social organization of agriculture, as a result of which agriculture no longer lags behind and the related economic disequilibria are disappearing. Finally, and of particular importance, the workers' self-government—and the decentralization which always follows it—has provided a lasting foundation for building up a more efficient institutional system, the first results of which may already be observed. All this has made it possible to get an insight into the mechanism of the continuous growth of the economy as a whole, including all the social services, and thereby to determine the pace and lines of production, distribution and consumption.

Period of programming

The following general criteria may help in deciding on the period of time which a long-term programme should cover.

(*a*) The lower limit is set by the maturation period of the strategic factor of development with the longest

gestation period. If this factor happens to be skilled manpower—as is the case in Yugoslavia—evidently no substantial changes in the skill structure of the population can be expected before the expiration of the period needed for retraining the existing labour force or educating a new generation of highly skilled personnel.

(*b*) The upper limit of the period is given by a point in time in the future at which the economy appears to be so flexible and planning so uncertain that any additional information which could be obtained by shifting the planning horizon for another year does not essentially improve the quality of the economic decisions to be taken. As a rule, a period of twenty to twenty-five years would represent the upper limit for the programme as a whole. Longer periods of observation may be needed for certain economic activities; for example, in forestry, forecasts are done for a period of forty years.

In addition to these general criteria, a number of considerations special to each individual country and depending on its socio-economic targets, have a bearing on the determination of the programming period. In Yugoslavia, the relevant targets are: modernization of agriculture and substantial reduction of the difference in living standards between town and country; optimum nutrition; raising the health standards of the population; solving the housing problem; eliminating illiteracy and, as is envisaged now, introducing compulsory ten-year schooling; building a modern communications network and mitigating the inherited discrepancies in the economic development of individual regions of the country, an endeavour which will not only settle a social and political problem, but will also make it possible to use fully all the economic resources of the country. Most probably, the attainment of these targets will take some twenty years. It should also be considered that the effects of the less important changes in the current investment policy will not manifest themselves in a significant way before twenty years or more (see appendix). These methodological and didactic considerations therefore also have a bearing on the problem.

The function of long-term over-all programming is to settle the basic determinants of economic development. A long-term programme may be broken down into several medium-term plans defined as legal acts of Parliament which should engage the economic resources of the country in a concrete way. These can further be broken down into annual or shorter operative plans whose function is to ensure the realization of a dynamic economic equilibrium, that is, the absence of various economic discrepancies in permanently changing conditions of development.

In order to make the system work, the agencies concerned with planning should shift the horizon of the current medium-term plan for a year in advance, when they begin to work on the annual plans; they should correct the long-term plan when working on the medium-term one.

Placing field coils into an electrical generator in a Zagreb factory

GOALS OF LONG-TERM PROGRAMMING AND PACE OF ECONOMIC DEVELOPMENT

Long-term goals

IN A SOCIALIST ECONOMY, the growth of production is not a goal in itself. In such an economy, the over-all goal of long-term programming may be defined as achieving maximum satisfaction of the needs of the people during a given period of time, the expression "people" being taken as distinct from "state" or any other bureaucratic category. Ideally, the length of the period should not exceed the life-time of a generation, that is, thirty-five to forty years, although a period of fifteen to twenty-five years would, in all probability, be more acceptable to citizens called upon to vote on the introduction of such a long-term programme. This aspect is still a matter for consideration.

A technical analysis of the economic process shows that, in the long run, the goal of maximization of economic welfare (personal consumption and social welfare) coincides with that of maximization of production. In the conditions of Yugoslavia, this means that, due to the faster rate of capital accumulation in relation to production, *over-all consumption at the beginning should not lag by more than half a year behind the level which would be achieved if the rate of accumulation remained unchanged*. Such a lag could without doubt be easily tolerated if it were the condition for achieving all the favourable effects of the maximum acceleration of economic growth. The effects on production and consumption of varying assumed rates of increase of capital accumulation are examined in the appendix with the help of numerical data.

These considerations lead to the conclusion that, as a rule, no serious discrepancies would develop between the rapid growth of consumption and production. In a socialist economy, these two targets would be identical and attention would be devoted to analysing the factors determining the acceleration of production.

Although investment is not the unique factor influencing the increase of production, it is the basic prerequisite of production. Consequently, the rate of growth of production is maximized at the point at which further investment is of no consequence for the growth of production. In other words, at a given level of total production, a maximum rate of growth in production is achieved when the marginal productivity of investment falls to zero. Experience shows that this limit of dynamic investment saturation can be achieved relatively soon, at a rate of growth of investment of some 10 to 15 per cent per year.

Pace of long-term development

In a non-controlled capitalist economy, the capacity of accumulation of investment is relatively small, not because of lack of voluntary saving,[2] but because of the inadequacy of investment opportunities for the savings. When central planning is introduced, the accumulative capacity of the economy is automatically increased, because the co-ordination of economic activities removes market limitations and the elimination of private ownership of the means of production permits a better use of all the economic resources of the country.

The transition from an economy with a low accumulation rate to a highly accumulative one can be graphically represented, as is shown in chart 1.
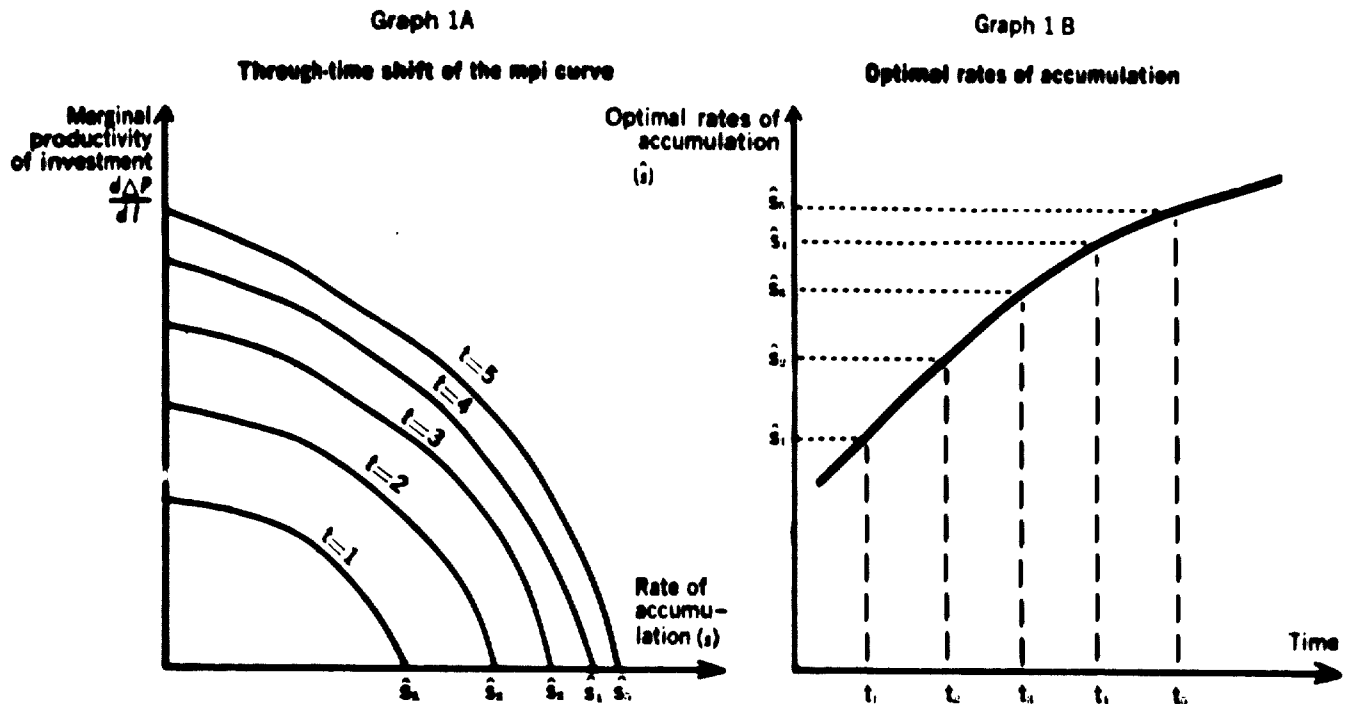
In this chart, ΔP denotes the over-all increase of production in the course of the period considered, let us say in the course of twenty years, and *mpi* denotes the marginal productivity of investment, $\dfrac{d\Delta P}{d\,I}$ being equal to *mpi*. The accumulative capacity of the economy is represented by the accumulation rate s (the share of investment in production). In the beginning, the accumulative capacity is low, but due to the dynamic adaptation of the economy in the course of time, it grows continuously. That is represented in graph 1A by shifting the *mpi* curve to the right, so that the optimum accumulation rate s, at which the marginal productivity of investment becomes zero,[3] increases. When all these points are connected into a continuous line, as is done in graph 1B, it becomes evident how, in the course of time, accumulative capacity increases, at first rapidly and then more slowly. If the *mpi* curve shifts in such a way that the average efficiency of investment does not decrease, then the pace of economic development is accelerated.

This leads to the important conclusion that, in a planned economy, it may be assumed that the rate of growth of production will be increasing in the course of time. In this connexion, it may be argued that, when a formerly under-developed country reaches the level of the most advanced ones, it cannot any more borrow from them the technologies they have developed and that, as a result, the rate of growth will slacken. This argument is not groundless, but the Soviet experience tends to indicate that the phenomenon has no great quantitative significance and, consequently, does not influence the assumed general regularity in the rate of production. In any event, the Yugoslav economy will not reach by 1980 the level of development which the most developed countries of the world are expected to have at that time.

It is necessary further to define the possibilities for in-

[2] This is implied by some apologists of the system who allege that the high pace of development in planned economies is exclusively due to compulsory saving.

[3] Strictly speaking, the optimum rate of accumulation is slightly smaller. The graph depicts the situation in which consumption is maximized with respect to infinity. If it is to be maximized within a period of, say, twenty years, then in the current year—which is always the first year of the planning horizon—slightly less of the total social product should be absorbed by capital accumulation. However, this difference is so small as to have no empirical significance whatsoever. For a systematic discussion, see the author's article "The Optimum Rate of Investment", *Economic Journal* (London), December 1958, pages 747 to 767.

Chart 1

CAPACITY OF CAPITAL ACCUMULATION

Graph 1A

Through-time shift of the mpi curve

Graph 1B

Optimal rates of accumulation

Note: Optimal rates are the rates at which $d\Delta P/dl$ equal zero, as shown in Graph 1A

creasing the accumulative capacity of an economy and thereby setting some limits to its development. From a given initial economic level, the expansion of the accumulative capacity will be determined by two groups of factors: exogenous and endogenous.

The exogenous factors are given and escape conscious control. They include demographic conditions, natural resources and the international position of the country as determined by geography and the over-all political situation in the world.

The endogenous factors are, as a rule, subject to control, or should be so in a socialist system. Technically, these factors come under the heading of economic policy, but essentially they can be reduced to the question of social relations and over-all economic and social organization.

In the case of Yugoslavia, an analysis of the first group of factors would show that this country cannot be considered to be exceptionally rich. It has neither the large home market nor the considerable possibilities for autarkic development which exist in the Soviet Union and the United States. It does not have high-grade coal

or sufficient iron ore of high quality, and oilfields are not particularly abundant. Its territory and population are small. Yet, its natural resources—food, minerals, timber and so on—are sufficiently diversified to ensure it a certain amount of economic independence. As regards the second group of factors, that is, the efficiency of the social system, there are indications that speak in favour of it.

These general considerations lead to the conclusion that in Yugoslavia, a pace of economic development similar to that of the countries which so far have been most rapidly developing is possible. Whether it will eventually be possible to achieve a faster pace of development will depend more on the advantages of the endogenous factors than on the disadvantages of the exogenous ones.

The preceding discussion has aimed at stressing the importance for long-term programming of elaborating an over-all theoretical framework and having a general idea of the order of magnitude of the development possibilities. In the following paragraphs, it is attempted to make this general approach more concrete.

41

CONSTRUCTING AN INITIAL DEVELOPMENT MODEL

The methodological approach

THE PROBLEM OF FORECASTING future developments can be approached by the usual method which consists of extrapolating the known trends of determined economic magnitudes in a two-dimensional space. However, this is a very unreliable approach inasmuch as it assumes a correlation of the examined magnitude—the ordinate—with the time—the abscissa—which, when dealing with magnitudes over a long period of time in the course of which they may be subject to structural changes, is bound to give very arbitrary results. This deficiency can be somewhat corrected if a multi-dimensional space is substituted for the two-dimensional one, so that the behaviour of the examined magnitudes would be studied not only in relation to time, but also to a whole matrix of relevant factors. This approach is, however, too mechanical and not too reliable for long-term programming; besides, it is complicated and time-consuming.

A system of permanent structural coefficients may serve the purpose better. It permits a model to be constructed which changes its structure by itself, with respect not to time but to the relative changes of the basic determinants of production. Furthermore, it makes it possible to take advantage of the statistical feature of the aggregates, namely, that they have a more stable development path than their component parts; work can be done on a highly aggregated model which can later be disaggregated to the extent desired.

In constructing the model, the following principles may be applied:

(a) The model should preferably be an elementary one, and should be coherent enough to provide for logical verification without being endangered by lack of statistical data and a serious methodological basis for structural analysis;

(b) It should be sufficiently flexible to permit quick and easy changes of assumptions;

(c) It should be constructed in such a way that it could be easily introduced into the existing planning methodology and thereby make possible any verification of separate projections;

(d) It should be realistic enough to lead to reliable economic conclusions.

The simplest possible model consists of three elements: an objectively given parameter, an economic policy variable and a result. This is the case of the well-known identity $r = \frac{s}{k}$ where r is the rate of growth, k the capital coefficient (the relation between investment and the increase of production) and s the rate of accumulation (the share of investment in production).[4] While this identity is being transformed into a model, a preliminary statistical identification of its elements should be carried on; this would be followed by a theoretical interpretation along the lines of the considerations in the second part of this article.

From a statistical point of view, a consecutive rate of development should be substituted for an instantaneous one, and a technological capital coefficient including the investment gestation lag for the imaginary instantaneous net capital coefficient.

The rate of accumulation s should not be considered simply as a statistical relation between investment and production, but also as representing the accumulative capacity of the economy in the broadest sense of the word. The coefficient k is not a constant, but a function of the rate of accumulation, $k = f(s)$. It is theoretically and empirically proved that k (at least starting from a certain point) is an increasing function of the accumulation rate, $\frac{d^2k}{ds^2} > 0$; consequently, there will exist an optimum magnitude s that produces a maximum rate of growth r. Thus the initial identity is converted into a thoroughly determined system which has a maximum. This maximum is achieved when the marginal produc-

Capping penicillin bottles in a plant at Zemun: the workers wear rubber gloves to prevent contamination of the drug and dark glasses to shield their eyes from the ultra-violet light inside the cabinet

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[4] This formula was applied for the first time by the Soviet planners at the end of the nineteen twenties.
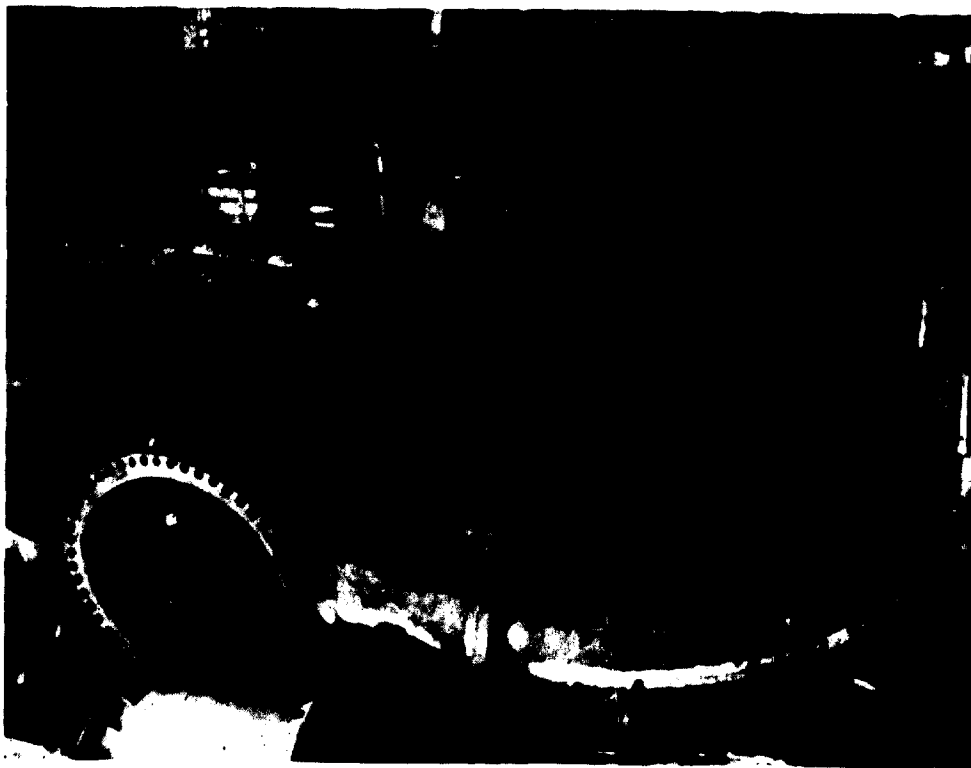
Assembling the casing of a water turbine in a Ljubljana plant

tivity of investment—determined by the accumulative capacity of the economy—falls to zero.[5]

Acceleration of the rate of growth

The target of production is maximization of net product, or, as it is usually called, national income. Consequently, the pace of economic growth is adequately measured by the rate of income growth. Again, the increase of production is a function of accumulation, that is, of net investment. In view of the fact that the model under consideration—and its later disaggregation—is based on gross magnitudes, that is, social product and gross investment, it is necessary to indicate the relationships between the magnitudes and the type of distortions introduced in the procedure.

In order to simplify the mathematical analysis, it will be assumed that technology and prices do not change, the capacity of fixed assets remains constant until they are fully scrapped, the value of the scrapped assets equals zero and the maturation period of investment in a weighted average is m years. Let us denote the annual gross investment by I, the annual replacement of scrapped capacities by R, the constant rate of continuous growth of gross investment by r, the average life span of fixed assets by n. If one unit is invested in the year 0, gross investment in the year $t+m$ will be $e^{r(t+m)}$ and the gross value of fixed capital (reflecting production capacity) will equal the sum of all matured gross invest-

[5] In this context, the author is apparently referring to what might be called a "marginal short-run" k (applicable at a given point of time or at a given level of gross national product) and not to the "average long-run" k (adjusted to successively increasing levels of gross national product) which he assumes to be constant. (*Editor's note.*)

ment (I''), less the value of scrapped assets.

$$K_{t+m} = \int_0^{t+m} I'' dt - \int_0^{t+m} R \, dt \qquad (1)$$

The maturation period of investment being m years, the *matured* investment in the year $t+m$ equals the investment carried out m years before: $I''_{t+m} = I_t \cdot e^{rt}$. The life span of fixed assets being n years, the replacement of fixed assets in each year equals the matured assets n years earlier, that is, equals the gross investment $n+m$ years before:

$$R_{t+m} = I_{(t+m) - (n+m)} = e^{r(t-n)}.$$

Finally, the replacement up to the year $t+m$ being equal to all gross investments up to the year $t-n$, the sum of gross investments starting from that year represents fixed assets matured in the year $t+m$, that is:

$$K_{t+m} = \int_{t-n}^{t} e^{rt} dt = \frac{e^{rt}}{r} (1 - e^{-rn}). \qquad (2)$$

Let us use the following figures as approximations to the structural coefficients of the Yugoslav economy:

Life span of fixed assets	n 30 years
Weighted maturation lag	m 3 years
Continuous rate of growth	r 8 per cent
Average capital-output coefficient (relation between gross value of fixed assets and gross national product)	$k = 2.3$

43

General view of the Zenica iron and steel works with one of the blast furnaces in left foreground

Consequently, the gross national product in the year $t+3$ will be:

$$P_{i+3} = K_{i+3} \cdot \frac{1}{2.3} .\qquad (3)$$

If net product or net national income is defined as gross national product minus the value of the replaced scrapped assets, then the relation between R and P shows the extent by which the national income is smaller than the gross national product:

$$\frac{R_{i+3}}{P_{i+3}} = e^{r(t+n)} \cdot \frac{2.3\,r}{e^{rt}(1-e^{-rn})} = \frac{2.3\,r}{e^{rn}-1} .\qquad (4)$$

Inserting the empirical magnitudes into equation (4) gives:

$$\frac{R_{i+3}}{P_{i+3}} = \frac{2.3 \cdot 0.08}{e^{0.08 \cdot 40}-1} = 0.018.\qquad (4a)$$

This means that under the given assumptions, the net product is less than 2 per cent smaller than the gross product. If the restrictive assumptions mentioned earlier

are not taken into account, the difference will most probably be even smaller, because the scrapped assets have some positive value, and because the technological improvements have brought about a cheapening of the replacement of the scrapped assets. Consequently, in the concrete conditions of the Yugoslav economy, the gross product approximates the net product (income) so well quantitatively that for all practical purposes the dynamics of those two aggregates can be identified.

Another important dynamic effect should be pointed out. From equation (4) it follows that the replacement cost per unit of product will be the smaller the faster the pace of economic growth. That means that similar investment (that is, in same proportion to the gross product) brings very different results in different economies, even if the productivity of labour, the techniques applied and the like are quite the same.[6]

In this connexion, it is essential to note that an addi-

[6] For a systematic theoretical discussion of this phenomenon, see B. Horvat, "The Depreciation Multiplier and a Generalized Theory of Fixed Capital Costs", *Manchester School of Economic and Social Studies* (Manchester), 1958, pages 136 to 159.

tional effect will result from the choice of statistical aggregates. In a stationary economy, the over-all investment serves the end of simple maintenance of production and nothing remains for "enlarged reproduction" (new capital formation). In an economy of the Yugoslav type—an economy that expands continuously at a rate of 8 per cent per year—the maintenance of the capacity absorbs only

$$(\frac{R_t}{I_t} = \frac{e^{r(t-n-m)}}{e^{rt}} = e^{-r(n+m)} = e^{-t.n4} = 0.07)$$

that is, some 7 per cent of the investment, whereas 93 per cent represents the accumulation which helps to increase the fixed capital of the economy. Consequently, the gross capital-output coefficient will automatically decrease as the pace of growth accelerates, even if the net capital coefficient is unchanged.

Thus, in a planned economy, the pace of development will be not only considerably higher than in a non-controlled capitalist economy, but also self-accelerating, owing to the technical features of the process of capital formation.

Disaggregation

The initial model may be disaggregated into two autonomous sectors: industry and agriculture. In the case of Yugoslavia, the estimate of the rate of increase of in-

dustrial and agricultural production is based on the development achieved so far in that country and abroad, especially in the countries with centrally planned economies. Investment in industry is obtained by using the capital-output coefficient of the initial model. Investment in agriculture is obtained by applying the proportion of such investment in the over-all investment of countries with a similar level of economic development and the share which agricultural production is expected to have in fifteen to twenty years in the over-all production of Yugoslavia.

Further disaggregation of the model is done by deriving the development of the non-autonomous sectors (transport and communications, handicraft, construction, commerce and catering) from the autonomous sectors with the aid of structural coefficients. The structural coefficients are assessed on the basis of regression analysis of time series. In such a way, a consistent seven-sector model of production and investment is obtained, which should provide initial guidance and working assumptions for elaborating the first draft of a long-term programme.[7] In elaborating this draft the basic assumptions of the model are put to a check.

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[7] This model has been fully described in the author's paper "A Restatement of a Simple Planning Model with Some Examples from Yugoslav Economy", *Sankhyā, The Indian Journal of Statistics* (Calcutta), vol. 23, 1961, pages 29 to 48.

CHECKING THE ASSUMPTIONS OF THE INITIAL MODEL AND ELABORATING THE FIRST DRAFT OF THE PROGRAMME

Checking the assumptions

IN ELABORATING the first draft of the programme, as in other stages of planning, some *a priori* assumptions should be made. The following apply to Yugoslavia.

(a) In the period under observation there will be no radical changes in the over-all international situation, in international economic relations, or in the prospects for international exchange.

(b) Science will develop further but there will be no revolutionary changes in techniques of production. (In this respect the programme is conservative.) As a starting point, it is assumed that the already known achievements of modern technology will be applied in the economy of the country under consideration, and that those individual technological problems which are complicating the development of some branches of production will eventually be solved (for example, those concerning use of substitute and waste materials in certain industries).

(c) The programme is conservative also because it does not take into account resources which have not yet been discovered, for instance, mineral deposits, but assumes that reserves will be thoroughly explored.

(d) It may also be assumed that social relations do not constitute any obstacle to production and that the exist-

ing socio-economic system is sufficiently flexible to permit adaptations to the requirements of maximum and accelerated development of the productive forces.

The *a priori* assumptions and the model itself are a testing ground on the basis of which individual projections of industries (sector projections) may be worked out. This may be done in the following way.

The model determines the direction and magnitude of changes in investment and production. At the same time, it determines the level of consumption from which the structure of consumption is deduced. This deduction is based in part on an analysis of the physical magnitudes, such as estimates of optimum nutrition and housing standards, and in part on an analysis of the value structure of consumption in those countries which have already achieved the level of consumption that the country under consideration is expected to have at the end of the term, say, in 1980. (The analysis is based on the relative prices of these countries.) In this part of the analysis, correlation analysis may help to correct to some extent unreliable value structures and to make projections in physical terms. The components of collective consumption are projected on the basis of different criteria. In doing this, it should be considered that, in the conditions of a normal economic development, the part

of collective consumption which is not directly related to living standards expands much slower than either personal consumption or investment. Consequently, accelerated economic growth brings about a reduction in the relative magnitude of the non-productive outlays (social outlays).

To begin with, productive investment is broken down into two component parts: equipment and construction. Then the equipment and construction programmes are supplemented by projects in the fields of housing, health and education. The projection of investment in schools may be based on the assumption that a maximum pace of development of education should be achieved, and that it should not be limited by material factors, but only by the age structure of the population and the availability of teaching staff. The investment programme for health services aims at achieving a given general target. The only restriction to the construction programme as a whole would be the inability of the construction industry to expand its activities at the desired rate.

The production programme for the final goods industries is derived from the level of consumption and investment. Input-output analysis will be used to elaborate the production programme for the industries producing intermediate goods.

Limiting factors

In principle, the individual projections and the over-all programme should achieve maximization of production, taking into consideration the four limiting factors—labour force, technology, natural resources and foreign

Final inspection of a tractor at a plant in Babovika

trade. The questions of technology and natural resources have been discussed above. It may be added in this connexion that, in an open economy, natural resources are a limiting factor only for some extractive industries but not for production as a whole. The questions of labour force and foreign trade remain to be considered.

In the conditions of Yugoslavia, the conventional method of deriving production from the demographic factors, and on the basis of a given average increase in the productivity of labour, would prove to be very unreliable. In Yugoslavia, as in many other under-developed countries, production and employment are not closely connected, but are largely autonomous. As a result, the productivity of labour fluctuates very irregularly. Therefore, in the case of Yugoslavia and similar economies, production and employment should be projected separately, and the two projections compared so as to obtain additional information on the feasibility of the programme, an indication of which is to be given by the index of increase of production.

As regards employment, the most difficult problem is that of the transfer of agricultural population. It may be convenient to start from the assumption—subsequently to be checked—that this transfer will proceed at the same pace as in the past. Further, one may take into account the regular tendency of economic development over the last half century which warrants the conclusion that the productivity of labour in agriculture increases faster than in manufacturing. In view of the trend of transfer from agricultural occupations, and given the technological and socio-organizational conditions of the country, it is unlikely that employment in agriculture would fall to the minimum essential for implementing the desired programme of production, a conclusion which is corroborated by a comparison of the expected levels of technology and the projection of agricultural population in Yugoslavia and countries with similar economies. Thus, it is to be expected that, in the coming period, unskilled manpower will not be a scarce factor of production and will not prove to be one of the limiting factors.

The situation is completely different as regards skilled manpower, which is a well-defined and decisive limiting factor. In spite of an extensive schooling system, Yugoslavia is not able to educate the needed personnel in the period of time covered by the programme. This is hardly surprising when it is considered that about one-fourth of the present population above ten years of age is illiterate, the percentage of semi-illiterate persons being even higher. Moreover, spreading literacy does not solve the problem of vocational training. Yugoslavia has not only to expand basic education, but also to provide schooling for adults, if it is to adjust the tempo of change in skill structure to the desired pace of economic development. It needs hardly to be stressed that expenditures on education are to be regarded as a productive investment of first priority. The same applies to expenditures on public health and medical care.

As regards the fourth category of limiting factors—foreign trade—the assumption has already been made that no dramatic turns, for better or for worse, are to be expected in the general conditions of international

Building apartment houses for the workers of the Zenica mill

Manufacturing sprocket wheels in a factory at Kruševac

exchange. In view of the relatively small share of the exports from Yugoslavia in world exports, it can be assumed that the country's export elasticities are great, provided, however, that there is sufficient time for adaptation. When the time factor is taken into consideration, the pace of increase of exports has more strictly determined limits.

The first draft programme will provide elements of a general picture of the economic development of a country for a period of twenty years or so. After the draft programme has been drawn up, more detailed planning will be needed, including individual projections consistent with each other. This will require use of all the available information. However, no general methodological framework can be provided for this stage of the programming procedure.

Appendix

MODEL ANALYSIS: THREE VARIANTS OF INVESTMENT POLICY

1. Let us assume that the annual rate of increase of gross national product P is $r=8.6$ per cent and that the share of gross productive investments (gross formation of fixed assets) in the social product amounts to an average of $s=\dfrac{I}{P}=25.5$ per cent. Starting from these two assumptions, we can find the instantaneous capital-output ratio

$$k_i = \frac{I_t}{\Delta P_t}.$$

By definition,

$$I_t = k_i \, \Delta P_t;$$

hence

$$tP_t = k_i \, rP_{t-1}. \tag{1}$$

Since, at a constant rate of growth,

$$P_{t-1} = \frac{P_t}{1+r},$$

it follows that:

$$s = k_i \frac{r}{1+r}. \tag{2}$$

By introducing the above assumed empirical values into equation (2) we arrive at the value of the instantaneous capital-output coefficient:

$$k_i = 0.255 \frac{1.086}{0.086} = 3.2. \tag{2a}$$

2. We further introduce the empirical assumption that the maturation period of investment will be $m=3$ years. In order to simplify the calculation, m is defined in such a way that the investment of each year, that is, the investment in the year t, matures at the end of the third year taken as an average, that is, at the beginning of the year $t+3$.

The relation between investment and the increase of production after m years will be called the lagged capital output coefficient k and will be defined as follows:

$$k = \frac{I_t}{\Delta P_{t+m}}. \tag{2b}$$

If an economy is growing at the rate of r per annum, then,

$$\Delta P_{t+m} = \Delta P_t (1+r)^m;$$

and, hence,

$$k_i = k(1+r)^m. \tag{3}$$

In other words, in a growing economy, the lagged gross capital-output coefficient is always smaller than the instantaneous coefficient, the difference being the larger, the higher the rate

Table 1

GROSS NATIONAL PRODUCT (GP), SHARE OF GROSS PRODUCTIVE INVESTMENTS IN GROSS NATIONAL PRODUCT (s), GROSS PRODUCTIVE INVESTMENTS (GI) AND TOTAL CONSUMPTION (TC) UNDER THREE DIFFERENT INVESTMENT POLICIES, 1960 TO 1980

(GP: INDEX, 1960=100; s: PERCENTAGE)

Year	Variant I				Variant II				Variant III			
	GP	s	GI	TC	GP	s	GI	TC	GP	s	GI	TC
1960	100.0	23	23.0	77.0	100.00	23.00	23.00	77.00	100.00	23	23.00	77.00
1961	107.9	23	24.8	83.1	107.90	23.25	25.09	82.81	107.90	24	25.90	82.00
1962	116.4	23	26.8	89.6	116.42	23.50	27.36	89.06	116.42	25	29.11	87.31
1963	125.6	23	28.9	96.7	125.62	23.75	29.83	95.79	125.62	26	32.66	92.96
1964	135.5	23	31.2	104.3	135.66	24.00	32.56	103.10	135.98	27	36.71	99.27
1965	146.2	23	33.7	112.5	146.60	24.25	35.55	111.05	147.62	28	41.33	106.29
1966	157.7	23	36.4	121.3	158.53	24.50	38.84	119.69	160.68	29	46.60	114.08
1967	170.1	23	39.3	130.8	171.55	24.75	42.46	129.09	175.36	30	52.61	122.75
1968	183.5	23	42.4	141.1	185.77	25.00	46.44	139.33	191.89	31	59.48	132.41
1969	198.0	23	45.7	152.3	201.31	25.25	50.83	150.48	210.53	32	67.37	143.16
1970	213.6	23	49.3	164.3	218.29	25.50	55.66	162.63	231.57	33	76.42	155.15
1971	230.5	23	53.2	177.3	236.87	25.75	60.99	175.88	255.36	34	86.82	168.54
1972	248.7	23	57.4	191.3	257.20	26.00	66.87	190.33	282.31	35	98.81	183.50
1973	268.3	23	61.9	206.4	279.46	26.25	73.36	206.10	312.88	36	112.64	200.24
1974	289.5	23	66.8	222.7	303.86	26.50	80.52	223.34	347.61	37	128.62	218.99
1975	312.4	23	72.1	240.3	330.61	26.75	88.44	242.17	387.13	38	147.11	240.02
1976	337.1	23	77.8	259.3	359.95	27.00	97.19	262.76	432.19	39	168.55	263.64
1977	363.7	23	83.9	279.8	392.16	27.25	106.86	285.30	483.64	40	193.46	290.18
1978	392.4	23	90.5	301.9	427.54	27.50	117.57	309.97	542.48	41	222.42	320.06
1979	423.4	23	97.6	325.8	466.42	27.75	129.43	336.99	609.90	42	256.16	353.74
1980	456.8	23	105.3	351.5	509.16	28.00	142.56	366.60	687.28	43	295.55	391.73
Levels in 1980 (Variant I= 100)	100		100	100	111		135	104	150		280	112
Average annual rate of growth over the period 1960 to 1980	7.9		7.9	7.9	8.5		9.5	8.1	10.1		13.5	8.5
Rate of growth 1979-1980	7.9		7.9	7.9	9.2		10.1	8.8	12.7		15.4	10.7
Instantaneous capital-output coefficient, k_i in 1980	3.14				3.33				5.06			

of growth. If $r=8.6$ per cent (as assumed before), the instantaneous coefficient 3.2 would overstate the technological coefficient, which can better be approximated by the lagged coefficient 2.5 (assuming that $m=3$ years).

The following consequence should be noted at this point: even if the technological capital-output coefficient, which in the case considered is approximated by the lagged gross capital-output coefficient k, remains unchanged at different investment policies, the instantaneous capital-output ratio k_i automatically changes because of the structural features of the process. As a result, k_i cannot be used for international comparisons and analytical purposes. If, for example, the change in investment policy means an increase in the rate of accumulation, we will have an increase in the rate of growth of production. As equation (5) indicates, this will be followed automatically by an increase in the instantaneous capital-output coefficient k_i (as soon as the gestation period of the first new investment is over), if the technological capital-output coefficient and the gestation period remain unchanged.

3. We now have all the elements needed for constructing a simple model with three investment variants. Variant I assumes that the share of the gross economic investment (inventories excluded) in the gross product, observed in the base year—that is, $s=23$ per cent—remains unchanged; s and k being given, we

can calculate the corresponding rate of increase of production r, which is necessary for calculating all the elements of Variant I. From equations (2) and (3) we obtain:

$$s = k r (1 + r)^{m-1}.$$ (4)

By introducing the empirical values we get:

$$\frac{s}{k} = r (1 + r)^{m-1}$$

$$r (1 + r)^3 = \frac{0.23}{2.5} = 0.092$$

$$r = 7.9 \text{ per cent}.$$ (4a)

As the relations in Variant I do not change, production, investment and consumption will increase at the same rate $r=7.9$ per cent, and the share of investment in production will remain constant.

In Variant II, the share of investment will increase from the present $s=23$ per cent to $s=28$ per cent (within twenty years), that is, by one-quarter of one per cent per year. In Variant III we will assume that the share of investment will increase by one per cent per year.

Due to the changes in the coefficient *s*, the rate of growth in Variants II and III is not constant but permanently increasing. For that reason, these Variants can be calculated only step by step. When doing this, it will appear that in the course of the first three years the gross product in these two Variants will be the same as in Variant I, because, due to the maturation lag, the effects of the change in investment policy are felt only in the fourth year.

4. When constructing the model, the following elements are of interest: gross national product (GP), gross productive investment (GI) and total consumption (TC). TC represents the balance of GP after deduction of GI and consists of personal consumption, collective consumption, non-economic investments and increase in stocks. Collective consumption expands significantly less than personal consumption, while the non-economic investments in the given conditions increase somewhat faster than personal consumption; thus, in order to simplify the procedure, we can assume that the movement of total consumption reflects the movement of personal consumption as well.

On the basis of the above assumptions we get the data shown in table I for three different investment policies.

5. If the empirical coefficients do reflect the real orders of magnitude—which seems very probable, although at the present state of knowledge we cannot say anything more precise about them—the three investment variants of the model represent inherent features of the development process of the economy under consideration. An analysis of table I and chart 2 leads to the following conclusions.

(*a*) In all three variants, the increase in investment will never bring about a decrease in consumption, owing to the pace of economic development achieved. In all cases, consumption will increase rapidly throughout the period considered.

(*b*) The effects of small short-term changes in investment policies can in the long run have a strong cumulative influence and bring about significant differences in the pace of economic development. Thus, at the end of the period considered, the rate of economic growth in Variant II is 9.2 per cent, and in Variant III 12.7 per cent, as compared to 7.9 per cent in Variant I.

(*c*) The greater the volume of investment, the greater the volume of consumption at the end of the period. In 1980, the annual consumption will be greater by 12 per cent in Variant III, and by 4 per cent in Variant II than the annual consumption in Variant I. The cumulative volume of consumption over the first fifteen years (1961 to 1975) amounts to 2,234 units in Variant I, 2,221 units in Variant II and 2,147 units in Variant III. During the following five years (1976 to 1980), however, the cumulative totals in Variant II and Variant III are as high as 1,562 and 1,619 units, respectively, as against only 1,518 units in Variant I. Thus, the radical gain in consumption during the later years is more than enough to offset the loss during the earlier years, the net gain over the whole twenty-year period

Chart 2

GROSS NATIONAL PRODUCT AND TOTAL CONSUMPTION UNDER
THREE DIFFERENT INVESTMENT POLICIES, 1960 TO 1980
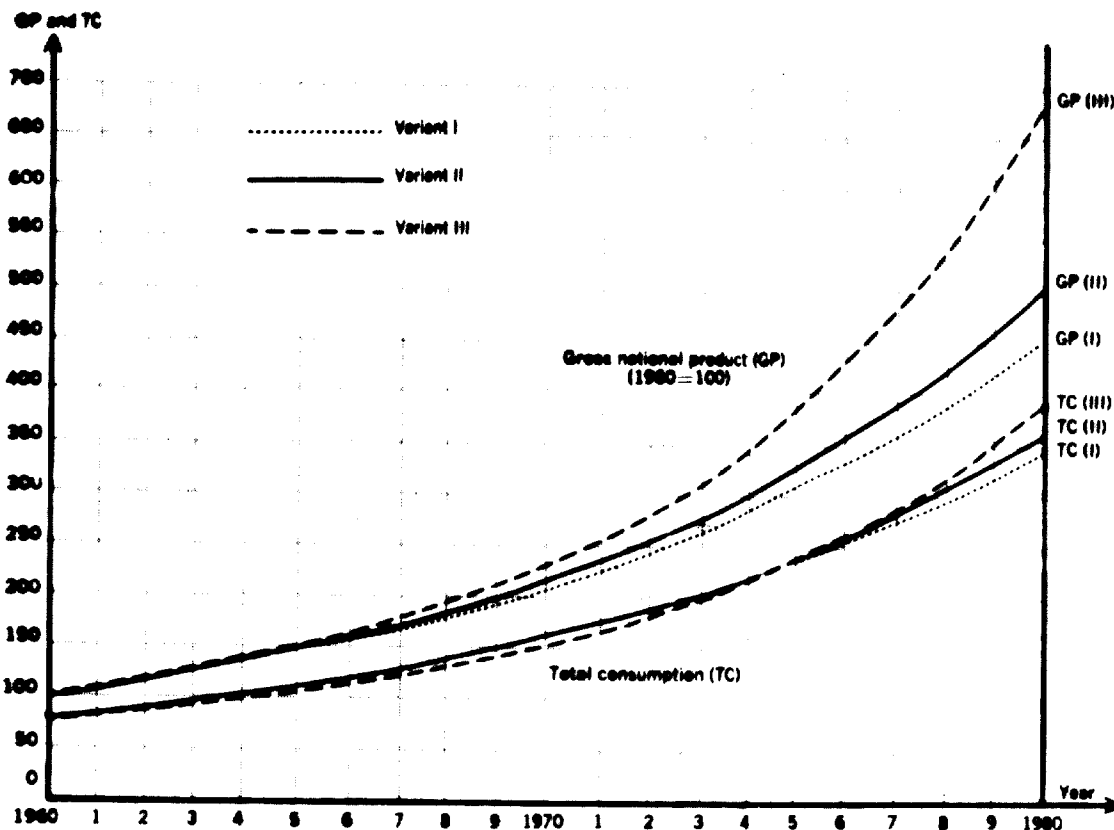
Yugoslav trainees (upper left) and Dutch workers welding the keel of a tanker in an Amsterdam shipyard

(1961 to 1980) being 30 units in the case of Variant II and 14 units in the case of Variant III.

(*d*) The chart shows that the lag of consumption in Variant II as compared to Variant I is relatively small so that the curves practically tally with each other. Even when the gap is largest (1969), consumption is only 1.2 per cent smaller in Variant II than in Variant I. There is a somewhat greater consumption lag in Variant III, where the greatest difference—5.6 per cent—is reached in 1970. But the table shows that this difference is equivalent only to less than the one-year increment in that year: already in 1971 the consumption in Variant III amounts to 168.5 units, which is more than the 164.3 units in Variant I in 1970.

(*e*) The discrepancies become substantial and increase rapidly after the level of annual consumption in Variants II and III catches up with that in Variant I. At the end of the period, the annual rate of increase in consumption amounts to 8.8 per cent in Variant II and 10.7 per cent in Variant III, as compared to only 7.9 in Variant I.

(*f*) Finally, as mentioned in paragraph 2 of this appendix, the varying rates of increase in production result in varying values

of the instantaneous capital-output coefficient, even though the lagged coefficient is assumed to be constant. In the example under consideration, the instantaneous coefficient remains at 3.14 in Variant I, while it reaches 3.33 in Variant II and is as high as 5.06 in Variant III.

6. In judging the appropriateness of the model to the conditions in Yugoslavia, the following points should be borne in mind.

(*a*) The capital-output coefficient applied in the model is less favourable than the one which Yugoslavia has achieved in recent years, which, in turn, is still higher than that achieved in some other economies. However, this coefficient cannot be determined in a more precise way. The most one can say in the present state of knowledge is that the lagged gross capital-output coefficient $k = 2.5$ (and the corresponding initial coefficient $k_i = 3.14$) is very probable. If there exists a possibility of achieving a smaller capital-output coefficient (for example, for the maintenance of the already achieved k), the favourable effects of the variants with a fast pace of investment can be significantly improved.

(*b*) Reducing the gestation period achieves the same effect as

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reducing the capital-output coefficient. Yet so little attention has so far been paid to the problem of the gestation period that nothing can be said about the possibility of reducing it to less than $m=3$ years.

(*c*) The constant lagged gross capital-output coefficient, coupled with an increase of *s*, implies a change for the worse of the technological capital-output coefficient. However, for a small increase of *s*—an increase of the order of magnitude in Variant II—we can assume that the technological coefficient k does not change. This assumption is based on an analogy with the economic and technological features of the enterprise. Specifically, empirical econometric research on cost functions shows that the typical curve of the marginal costs is horizontal (that is, the marginal cost is constant) as long as full capacity is not achieved. Similarly, we can assume that the efficiency of the economy remains approximately constant as long as the volume of investment moves within the boundaries of the accumulative capacity of the economy. Variant II corresponds almost certainly to the accumulative capacity of an economy of the Yugoslav type. Consequently, under the assumption of a constant technological capital-output coefficient, it may be anticipated that the "gross" capital-output coefficient will tend to decrease.

(*d*) When the enterprise achieves full output, its marginal costs increase rapidly. We can assume that near the limit of the accumulative capacity of the economy, the (net) marginal investment productivity decreases rapidly and soon arrives at the value $mpi=0$. It is impossible to determine this limit theoretically; it should be estimated on the basis of experience and empirical analysis. The experience in Yugoslavia and the Soviet Union suggests that a long term expansion of investment at a rate higher than 12 per cent can bring the economy to that limit. It can be seen from table I that, at the end of the period, investment in Variant III expands at a rate of over 15 per cent. Furthermore, no economy exists as yet in which the gross formation of economic fixed assets exceeds 40 per cent of the social product. It can also be seen that Variant III ends with *s*=43 per cent. Consequently, it is almost certain that Variant III is not realistic. The pace of investment which it assumes is not economically justified because greater effects can be achieved with a smaller investment.

7. If the maximization of the increase of consumption within the period of twenty years is set as a goal of the economic policy, it is evident that Variant II or III and not Variant I has to be chosen. For the reason just given, Variant III is not likely to be considered. This does not mean that Variant II should always be chosen. Between Variants II and III there may exist a range of investment variants more appropriate than Variant II. On this point, however, nothing more definite can be said as yet.

Establishment of Industrial Estates
in Under-developed Countries

Industrial estates are tracts of land assembled, improved and subdivided according to a comprehensive plan, in advance of, or upon, demand, either for sale or lease to prospective industrial occupants; standard factory buildings erected in advance of demand are frequently featured.

The publication deals principally with the role of industrial estates in policies of industrialization with special reference to promotion of small-scale industries. It gives first a general picture of industrial estates projects—planned and completed—in various countries. It then describes and analyses in detail the objectives and policies bearing on the establishment of industrial estates in three industrial countries where the device has been extensively applied: the United States, the United Kingdom and Italy. This is followed by a review of objectives and policies in two under-developed countries where important industrial estates programmes are being carried out: India and Puerto Rico. Detailed information is also provided on policies and achievements in Jamaica, Mexico, Brazil, Nigeria and Pakistan.

The experience of these countries is assessed in the next chapter. Four main types of policies in which industrial estates play a role are distinguished: location and development policies based, respectively, on indirect and direct control; industrialization policies based on inducements to investors from abroad; and industrialization policies based on provision of integrated measures of assistance, a type which is particularly suitable for the promotion of small industries. The chapter also contains a discussion of the types of estates suitable for under-developed countries at different levels of industrial development, and of policies of location and admission. It concludes with an examination of certain secondary effects of industrial estates, and of the role of the latter in development schemes of broader scope.

In the last chapter, industrial estates are discussed as a means of promoting small-scale industry, with special attention to problems of technical and financial assistance. Problems of planning industrial estates are examined in two appendices to this chapter: the first deals with exploratory surveys; the second contains a case study concerning the establishment of an industrial estate in an under-developed country.

Seminar on Industrial Estates in the ECAFE Region

A SEMINAR ON INDUSTRIAL ESTATES in the region of the Economic Commission for Asia and the Far East (ECAFE) was held in Madras, India, from 1 to 11 November 1961. The meeting was sponsored jointly by the United Nations and the Government of India and was organized by ECAFE and the Division of Industrial Development and the Bureau of Technical Assistance Operations of the United Nations Department of Economic and Social Affairs. The Seminar was attended by fifty-seven participants and observers from twenty-three countries and sixteen representatives of the United Nations, the specialized agencies and non-governmental organizations.

The main subjects discussed at the Seminar were objectives and policies in establishing industrial estates, planning of industrial estates, organization, management and financial arrangements, integration of industrial projects with programmes of urban or regional development and the role of international and regional co-operation in the development of industrial estates. The following are some of the important conclusions and recommendations of the Seminar.

OBJECTIVES AND POLICIES IN ESTABLISHING INDUSTRIAL ESTATES

The Seminar observed that in most countries of the ECAFE region the objectives of industrial estate programmes were to promote the development of small-scale industry and to influence industrial location in accordance with policies of decentralization. It was felt that industrial estates were also suitable for developing large-scale industrial centres and complexes, promoting industrialization projects connected with the development of ports, airports, large power plants, petroleum refineries and the like, and encouraging subsidiary manufacturing activities around such projects. The Seminar was of the view that in order to promote large industries it would not be necessary for public authorities to provide the services and assistance usually extended to small-scale industries in industrial estates. In such cases the public authorities might acquire land, develop it and give it on a sale or lease basis for development as industrial estates. Such projects might be called "industrial areas" to distinguish them from "industrial estates".

The Seminar agreed that the role of publicly sponsored industrial estates was mainly to promote further private initiatives and efforts. After the desired development had been achieved in an area, the government programme might be reduced in terms of numbers of estates or scope of facilities and services offered, and eventually discontinued altogether.

PLANNING OF INDUSTRIAL ESTATES

Feasibility studies and location policies

It was considered that an essential prerequisite for planning industrial estates was that there should be a formulation of government policy regarding the purpose, type and geographical distribution of the estates proposed to be set up. Within the framework of such a policy, certain surveys should be undertaken for ascertaining the feasibility prerequisites and industrial growth prospects for each proposed estate. The importance of location for the successful establishment and operation of industrial estates was emphasized. It should be ensured as a part of advance planning that conditions favourable for the success of an estate exist or could be created. Among these conditions the more important were availability of basic facilities, such as power, water supply and transport, proximity to markets and sources of supply of labour and, where possible, of raw materials.

The Seminar recognized the difficulties of pre-project planning of estates in rural areas, and the fact that feasibility studies in such areas might not always yield conclusive results. It recommended that the establishment of industrial estates in such areas be undertaken as a pioneering effort; a cautious and selective approach in this field would be advisable.

It considered that, as a rule, suitable locations for estates would be in or near small towns and in the vicinity of large industrial projects.

Types of estates

The Seminar recommended that the facilities offered in industrial estates should vary with the level of industrial development of the localities in which they were to be established. It might not be necessary for the Government to provide ready-built industrial accommodation or

certain common services in industrially advanced urban areas where there were spontaneous tendencies towards industrial concentration. In less developed localities—smaller towns or rural areas—publicly sponsored industrial estates should provide general-purpose factories and the necessary common services, since these were essential for stimulating industrial entrepreneurship and improving industrial operations.

In certain countries of the region, it was observed, specialized types of industrial estates were being established, such as estates for joint production programmes among small industries—for instance, production of parts and components for an assembly unit—and estates for small industries manufacturing parts and components or processing or finishing certain products for large industries, on a subcontracting basis.

The Seminar recommended that estates of the first type be set up on a limited experimental basis and that studies be undertaken of the organization and financial arrangements involved in joint production programmes and of the types of production for which location on a common site was required. It recommended that the establishment of estates of the second type be preceded by studies of measures to prevent abuse and exploitation of the small units by the large concerns.

Engineering and economic aspects

The Seminar noted that the costs of development and servicing per unit in a smaller industrial estate were usually higher than those in a large estate. It felt that, except for special considerations, an estate should be large enough to achieve practical economies of scale in the provision of services, special buildings and public utilities. It emphasized the importance of economic and efficient utilization of land in the planning and layout of industrial estates. Design should be such as would facilitate physical expansion as well as modifications in layout. The Seminar took note of the practices, in different countries of the region, as regards zoning, land use, size of plots, size, design and construction of factory buildings, roads, drainage, provision of utilities and common services, and of the costs of construction and services. It stressed the need for a continuing exchange of information among the countries of the region on the results of research and norms adopted for layout and building designs.[1]

Related social overhead investments

The Seminar observed that the question of social overhead investments was closely related to that of location of industrial estates. In selecting the location, account had to be taken of the availability of housing, public transportation, schools, hospitals and other community and social services, and of the prospective increased demand for such facilities resulting from the occupation of the estate. It was considered that the availability of a minimum of social as well as economic overhead facilities

was in most cases a prerequisite to the establishment of an estate in a given location.

ORGANIZATION, MANAGEMENT AND FINANCING OF INDUSTRIAL ESTATES

Sponsorship of industrial estates

It was noted that in the countries of the ECAFE region, the initiative and responsibility for starting industrial estates had been generally taken by the Government. The Seminar recognized the need for such initiative in the early stages, but recommended that the Governments should progressively encourage the entrepreneurs to assume such responsibility by joint action through the formation of companies or co-operatives.

Admission policies

The Seminar noted that policies of admission to industrial estates varied considerably from country to country and sometimes from one estate to another. It considered that both existing and new industries should be eligible for admission to industrial estates since both could contribute to raising productivity, productive capacity and employment. This would be achieved if all industries were required to install up-to-date machinery and to adhere to modern standards in respect of processing operations, quality control, working conditions, management operations, management-labour relations, and so on. Admission policies could also serve other industrial development objectives, such as diversifying or strengthening the industrial structure of the area, for instance, by giving preference to new types of industrial productions as against the traditional ones, industries permitting savings or increased receipts of foreign exchange, industries providing support to agriculture, and the like. The Seminar emphasized that big concerns should not be permitted to gain a foothold in estates for small-scale industries, whether by direct or indirect investment or control.
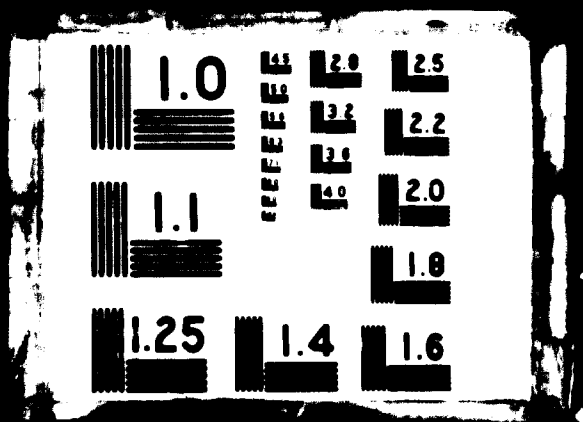
Sales and lease policies

The Seminar observed that in most countries of the region improved sites or factory buildings were offered on a rental basis rather than for sale or hire-purchase. It recognized the need for rent subsidies in most cases, but recommended that these should be for as short a period as possible and on a reducing scale. Many participants felt that leasing was generally preferable to selling, even though it involved expenditures which would be recoverable over a longer period and thus frequently limited the possibility of setting up a larger number of estates. The main consideration in discouraging individual ownership was the desirability of maintaining the corporate character of the estate.

Financing

Note was taken that in the countries of the ECAFE region, financing for industrial estates was almost entirely done by government agencies. The Seminar considered that, in view of the slow rate of return on investment in industrial estates and of the financial uncertainties

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[1] A report entitled *Physical Planning of Industrial Estates*, prepared by the Bureau of Social Affairs of the United Nations Department of Economic and Social Affairs, will be published in 1962.

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inherent in a new programme, government assistance was essential at the inception of the programme. It recommended that as the programme advanced, banking institutions as well as insurance companies should be induced to take up the financing of industrial estates. If necessary, Governments might stand guarantee for such institutional loans.

Special inducements to units in the estates

The Seminar felt that while the industrial estate had a developmental object, the intention was not to create a privileged section of entrepreneurs. Provision of ready-made factory accommodation, and availability of utilities, services and technical assistance should be regarded as sufficient inducement to make the programme attractive. It would not be desirable to provide special concessions and facilities, such as tax exemptions or abatements, reductions on customs duties, and so on, which were not available to units outside the estate.

INTEGRATION OF INDUSTRIAL ESTATE PROJECTS WITH PROGRAMMES OF URBAN OR REGIONAL DEVELOPMENT

The Seminar emphasized the need for co-ordinating or integrating industrial estate projects with programmes of broader scope. It considered that industrial estates should be planned as part of the economic and social development programmes at the local, regional or national levels.

It recommended inclusion of industrial estates projects in urban master plans and, in this connexion, drew attention to "resettlement" industrial estates as a means of rehousing industries displaced by slum clearance programmes. In certain cases, the establishment of "new towns" with one or more industrial estates might serve effectively to check demographic and industrial congestion in metropolitan areas.

The Seminar also recommended that programmes for the industrialization of large areas be integrated with regional master plans. In certain cases, it would be appropriate to set up a special agency or co-ordinating body having jurisdiction over the area, whose functions would include, besides construction of industrial estates, provision of individual or group sites for enterprises which do not require the estates' facilities and services. The agency might also be empowered to provide or co-ordinate provi-

sion of infrastructure facilities to support industry, such as power, water supply, roads, housing, community and social services.

INTERNATIONAL AND REGIONAL CO-OPERATION IN THE DEVELOPMENT OF INDUSTRIAL ESTATES

The Seminar was of the view that there was considerable scope for international and regional co-operation in the field of industrial estates and that the countries which have gained experience in this programme should assist others in accelerating their development. It made the following specific recommendations in this regard.

(a) Study tours and observation teams should be organized for the benefit of the countries which were new in this field.

(b) Research centres and institutions should be requested to help developing countries in drawing up norms for layouts, factory designs, specifications for building materials, and the like.

(c) The United Nations and other international agencies might be requested to undertake studies of the financial aspects of the establishment and operation of ·industrial estates for small-scale industries; subcontracting arrangements between small and large industries with special reference to "ancillary" industrial estates; problems of industrialization of rural areas, with special reference to rural industrial estates; problems of management and administration of industrial estates.

(d) Regional panels of experts might be constituted by the United Nations and ECAFE to examine specific aspects of the development of industrial estates in the region.

(e) Countries of the region should set up a roster of expert personnel, consultants and institutions which might be drawn upon by the United Nations and other organizations extending technical assistance for assignments in the field of industrial estates in the developing countries.[2]

2   The report of the Seminar and excerpts from some of the discussion and information papers prepared for the meeting will be published by the United Nations in the course of 1962. The report entitled *Establishment of Industrial Estates in Underdeveloped Countries* (United Nations publication, Sales No.: 60.II.B.4), published in February 1961, was one of the discussion papers submitted to the Seminar.

Three views of the Guindy Industrial Estate, Madras

The United Nations
Work Programme on Industrialization

MOST OF THE MATERIAL published in the *Bulletin on Industrialization and Productivity*, which originates from studies prepared by the United Nations Secretariat or is contributed from the outside at its request, relates to a work programme on industrialization carried out under appropriate resolutions of the Economic and Social Council. Since its inception the programme has undergone a number of substantial changes in its orientation and emphasis; information on the development of the programme has been published from time to time in the *Bulletin* (1).[1]

The purpose of the present note is to depict the programme of work at its current stage of development. It presents the rationale of the programme and gives an outline of the projects undertaken or scheduled to be undertaken in the three-year period 1961 to 1963. It is considered that such information would be of general interest since the United Nations programme in industrialization covers an area which is fairly representative of the problems confronting newly industrializing countries. Information on the work programme should be of particular use to research workers and institutions engaged in studies on industrialization. Furthermore, it is hoped that it might be instrumental in bringing about a better co-ordination of efforts made in various quarters by way of interchange of information on such efforts.

An appendix contains a brief account of the action taken at its first session by the Committee for Industrial Development, recently established by the Economic and Social Council, which was held in connexion with the thirty-first session of the Council in the spring of 1961.

ORIENTATION OF THE WORK PROGRAMME

The work programme of the Secretariat consists of (i) research projects in the form of reports and studies,

working parties, seminars and other meetings, and (ii) substantive support of United Nations technical assistance operations in the field of industry and economic development, the scope of which ranges from assistance in the formulation of the terms of reference of a project and selection of experts or fellows, to advice on the follow-up of a project upon its completion. The operations of the United Nations in industry give rise to a continuous flow of information from the field, which is a unique and valuable source of material for the research work of the Secretariat. The results of the research work contribute in turn to strengthening the supporting activities. The formulation of the proposed research programme was made bearing in mind this two-way process of complementarity and mutual support. The present note is concerned principally with the research programme.

The problems of industrialization cover a wide field, ranging from formulation of general development policies, problems of planning and programming on a national and regional level, relationships between the industrial and other economic sectors and trade and balance of payments aspects, to specialized economic and engineering problems which arise in connexion with the planning, setting up and operating of individual industries, such as their location and size, supply of managerial and technical skills, including skilled labour, supply of raw materials and other inputs, maintenance and the like. In view of this extremely wide coverage, in order to formulate a realistic programme of work, the Secretariat has to tread a narrow path so as to avoid, on the one hand, the pitfall of concentrating its studies in over-specialized fields which would be of limited appeal to many governments of industrializing countries faced with an array of pressing problems in many fields, and, on the other hand, the danger of spreading too thinly its very limited research resources. The solution adopted under the circumstances has been to concentrate on a number of prototype studies in a few selected main areas. The objective of such prototype studies is to develop gradually a body of research experience and

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[1] Figures in parentheses relate to the references at the end of this note. These contain, in particular, a classified list of the studies, articles and reports prepared so far under the programme and published as monographs or articles in the *Bulletin*.

methods of approach which could be applied in analysing problems of a similar nature arising elsewhere.

Furthermore, the Advisory Committee on the Work Programme on Industrialization, convened by the Secretary-General early in 1959, stressed the need for studying the problem of industrialization within the context of general economic development in general. The Committee's statement was as follows:

"In selecting and formulating the specific research projects, a somewhat artificial separation of the various aspects of industrial development is often unavoidable. It is recognized, however, that such a fragmentation —which may be necessary from a methodological point of view—should not be carried too far. The studies would provide one of the elements on which action by authorities in charge of industrial development could be based. Any such action should be based upon an evaluation of the conclusions of the study, within the context of the wider aspects of the problem of industrialization and economic development in general in the country concerned. The Committee recognized that industrialization is not limited to setting up isolated industrial enterprises, but is a continuing process. This implies a need for integrated measures of wide scope applied with sufficient intensity. Among these measures are those aiming at accelerating and directing the process of capital formation, those resulting in capital-saving on the plant, industry and national levels and those tending to reduce balance of payment difficulties, thereby removing obstacles to the rate of economic growth" (2).

An adequate coverage of the problems involved in industrialization which would provide governments with effective tools to steer the process of industrial development in their countries thus involves an inter-disciplinary approach linking planning on the aggregate level, planning on sectoral and industry levels and, finally, physical planning of the industrial facilities themselves. The present work programme of the Secretariat attempts in many ways to develop such an approach. It aims at establishing a bridge between the macro-economist and the model builder, the industrial economist and the engineer.

Until such a bridge is established and a synthesis achieved, and as long as the problem of industrialization is dealt with in separate compartments at different levels, the effectiveness of policies and measures based on such uncoordinated findings and recommendations may be seriously questioned.

Such an approach is being attempted in the programme by supplementing the "macro-economic" projects in planning and programming with studies at the industry level which are designed to produce a body of input and investment data based on actual industry practice, which are essential for a realistic estimate of requirements in capital, labour and other factors, and to make possible pre-investment appraisals of prospective industries by planning authorities. As other users of these data, one might mention public and private financing institutions (for example, national industrial development agencies), which use them for the purpose of appraising industrial projects before such projects reach the stage of engineering blueprint. The reader is referred to the projects listed in section I of the present article under areas A and B of the programme, entitled, respectively, "Industrial development programming and policies" and "Industry studies: economic and technological aspects".

An important feature of the programme carried out by the United Nations Secretariat at Headquarters is its integration with those of the secretariats of the regional economic commissions. Many of the problems in industrial development faced by the secretariats of the regional commissions have elements in common; thus, problems in planning and programming industrial development are common to all countries at similar stages of development, and many elements of the studies of particular industries, such as fertilizers, iron and steel, pulp and paper and building materials, relate to general technical and economic characteristics of such industries and apply equally well to industries of various countries, regardless of their location.

The work programme of the Secretariat at Headquarters has been designed so as to complement the programmes of the regional secretariats in this respect. In such fields of common interest as are mentioned above, the Secretariat at Headquarters acts as a clearing house to promote interchange of information and experience among regions; in addition it is co-sponsoring projects on certain topics which, while being examined in the light of the conditions and needs prevailing in the region, lend themselves to conclusions of more general applicability. Thus, the programme of work includes a working party on industrial development programming in the region of the Economic Commission for Latin America (ECLA), a seminar on new steel making techniques and a seminar on industrial estates in the region of the Economic Commission for Asia and the Far East (ECAFE); an inter-regional working party on the establishment of petro-chemical industries based on natural gas and others. Close working contacts between Headquarters and the regions are being maintained in all phases of the programme.

The work programme also covers certain areas which are of interest to some of the United Nations specialized agencies concerned with problems of industrialization, such as the International Labour Organisation (ILO), the Food and Agriculture Organization (FAO), the World Health Organization (WHO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO), namely, problems in management, small-scale industries, forest-based industries, urbanization and housing, training of manpower, industrial health and sanitation problems and the like. Some of the projects under the programme have been proposed for joint implementation with the agencies concerned. In addition, there is close consultation with the specialized agencies by way of inter-agency meetings and contacts at the working level, in connexion with the formulation and implementation of the programme of work.

The areas covered by the research programme essentially follow the terms of reference of the Committee for Industrial Development (3). These areas are:

A. Industrial development programming and policies;
B. Industry studies: economic and technological aspects;
C. Training and management;
D. Problems of small-scale industry;
E. Fiscal and financial aspects.

Research is also carried out in the Secretariat on social and demographic aspects of industrialization. Although these aspects are not included in the terms of reference of the Committee, it is thought useful to present in this note a summary of the proposed work in these fields.

The programme presented below incorporates the recommendations made by the Committee for Industrial Development at its first session in March 1961.[2] A number of projects already completed are included in order to present a complete picture of the activities in the period under consideration.

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[2]   *See* appendix to the present article.

I. RESEARCH

Area A

INDUSTRIAL DEVELOPMENT PROGRAMMING AND POLICIES

A.1. General aspects

CONSIDERABLE RESEARCH in development programming, including its purposes and scope, has been undertaken within the United Nations, in particular in the regional economic commissions (4). It is apparent that this is one of the areas in which the Secretariat at Headquarters is in an advantageous position to stimulate exchange of information and experience among regions and to undertake research on topics of inter-regional interest.

It is proposed as a continuing project that the Secretariat at Headquarters undertake to promote exchange of information and experience and engage, in co-operation with the interested regional commissions, in research in the general area of development programming with emphasis on industrial development. This would take the form of regional and inter-regional seminars, and of joint research work, including a continuing review of relevant studies in this field. As a first step, a working party on industrial planning to be co-sponsored by the Economic Commission for Latin America and organized in co-operation with the Bureau of Technical Assistance Operations is scheduled to meet late in 1962. It is described below, under B.1.b.

A.1.a. Questionnaire on experience and progress in the field of industrial development

The Committee for Industrial Development considered that the experience gained by the various developing countries in the field of industrialization was of general interest. With a view to ascertaining and analysing the experience and progress in the field of industrial development, a questionnaire was prepared late in 1961 and distributed to the Member States of the United Nations early in 1962. The replies will be made available to the Member States and, in due course, placed before the Committee.

A.2. Techniques of industrial programming

Given the variation in political, institutional and economic environments among countries, the United Na-

tions can usefully contribute by encouraging studies on various techniques of programming and formulation of industrialization policies, and on the experience of countries in their use and implementation. The objective is to assist governments in selecting techniques and policies appropriate to their needs as well as to appraise and suggest improvements of the techniques currently in use.

A.2.a. Use of models in programming

The first study in this area entitled "Use of Models in Programming" has been published in the fourth issue of the *Bulletin on Industrialization and Productivity* (5).

A.2.b. Evaluation of projects in predominantly private enterprise economies

Another study in this area, published in the present issue of the *Bulletin*, deals with evaluation of industrial projects. A critical analysis is made of the procedures for selection of projects which have been proposed for use or actually applied in case studies relating to seven countries. The study contains recommendations on the methodology and use of evaluation techniques in industrial planning.

A.2.c. Evaluation of projects in centrally planned economies

A parallel study now under way deals with project evaluation in selected centrally planned economies. The study concentrates on three main areas: the criteria used by the planning agencies in the selection of projects; a description of the methods used in applying these criteria or those proposed for use, including the values of the relevant coefficients, and the practical experience in applying these methods.

A.2.d. A study of industrial growth

In this study an attempt is made to analyse the pattern of growth of the industrial sector in various countries with a view to assisting under-developed countries in the formulation of policies regarding the pattern of development of the industrial sector. Since there are important differences among countries in the factors accounting for the process of industrialization, historical experience alone may not always be an adequate guide in this field.

This study has been undertaken in collaboration with the Research Center in Economic Growth of Stanford University. The study assumes that a variety of factors affects the

course of industrial growth and tests the economic and statistical significance of the effect of a certain number of selected factors. An analysis is undertaken to determine the relationship of industrial output, both total and by principal branches, to the level of per capita income, the size of the country, the extent of government intervention in the development of the industrial sector and other factors which may be significant. The results obtained in the study may be used to interpret the experience of countries and to provide a basis for projecting industrial output.

A.2.e. Long-term planning in selected economies

Considerable experience has been gained in the mixed economies and the centrally planned economies in developing various approaches to industrial programming, particularly as regards planning and programming of individual industrial branches. The study will cover the techniques for elaboration of medium-term and long-term plans, that is, the so-called prospective planning which has many elements in common in these economies. (Short-term planning is influenced to a large extent by local conditions and institutional elements which vary from country to country.)

A.2.f. Organizational aspects of planning

In a number of countries governments are faced with the problem of establishing planning organizations, and in several countries reorganization schemes are being considered. For these reasons a study will be undertaken on organizational aspects of planning. The study will cover the location of the planning bodies in the government machinery; their relationships with other government agencies, and the internal organization of these bodies as regards the functions of both national and sectoral planning, in particular, programming and planning of industry. The study will also deal with the mechanisms which provide for participation of the private sector in the planning process in mixed economies.

A.2.g. Studies in implementation of planning in selected countries

Both in planned and mixed economies, considerable discrepancies sometimes develop between targets and achievements which may lead to serious difficulties (for example, to foreign exchange shortages) and result in substantial cutbacks in the original targets or goals. The study will focus on problems of implementation which arise in mixed economies where plans or programmes involve to a very large extent the co-operation of the private sector. It will analyse the methods used by governments in various countries to adjust for discrepancies that may develop in particular industrial sectors between planned targets and achievements. The problem is essentially how to develop an effective link or "feedback" mechanism to detect discrepancies and permit adjustments to be made on a continuous basis (for example, in the form of the so-called "open end" planning in the organizational arrangements or in the implementation itself).

A.2.h. Maturation period of investment

It is well known that there is usually a considerable time lag between the design and preparation of blue-prints for industrial plants and the achievement of full capacity in production. The study will aim at analysing the various factors involved in order to indicate what may be considered a normal timing pattern which can be taken into account in industrial programming.

A.3. Projections for individual industrial sectors

For purposes of industrial programming and formulation of industry policies, it is necessary to have information on future prospects in both domestic and international markets for given industrial sectors. Studies involving projections of various industrial products have been undertaken in several regional commissions. For example, the Economic Commission for Europe (ECE) has carried out a study on the long-term consumption prospects for steel and steel products, including forecasts of production and trade; while the focal point of interest was Europe, the study was carried out in a world setting (6). ECLA and ECAFE have carried out or are carrying out studies on steel (7). As other instances of such work, ECE is now engaged in a study of trends in production and trade in capital goods produced by the mechanical and electrical engineering industries, while ECAFE and ECLA have produced, in co-operation with FAO, studies of the pulp and paper industries in their respective regions (8).

Therefore, studies of projections for individual industrial sectors will be undertaken as a continuing project. As in other areas, the implementation of the project will proceed along two lines. On the one hand, reviews will be undertaken, in co-operation with the regional commissions, of projections for selected industrial sectors or products in order to ensure uniformity of approach; some of this work might be carried out by *ad hoc* inter-regional working parties. On the other hand, Headquarters will undertake studies of industrial sectors which are of common interest to the regions (9).

A.3.a. Projection of demand for industrial equipment

Work is under way on projections of the demand for industrial equipment in under-developed countries. This study parallels the project undertaken by ECE referred to above which analyses the trends in production and trade in capital goods produced by the mechanical and electrical engineering industries in Europe. The study undertaken at Headquarters complements the ECE study in that it would put its conclusions in the broader context of the world economy as a whole.

This study will be followed up by integrating its results with those obtained from the ECE project when they become available. As a first step it is intended to submit the results of the Headquarters study to the next meeting of the group of rapporteurs participating in the ECE project.

A.3.b. Projection of demand for machine tools

One of the main topics to be discussed at an inter-regional working party on machine tools, mentioned in the section on industry studies below (*see* project B.3.c.), will be the problem of projections of demand for these items of equipment. Owing to the complexity of the output of this industry and the fact that it is of interest to all regions, the work will be undertaken as a co-operative study between Headquarters and the regional economic commissions.

A.4. Regional economic planning

The application of techniques of economic planning at the regional level in under-developed countries presents

a number of problems which in many respects are different from those in the more advanced countries where the pattern of industry and its location have been largely stabilized. In many of the former countries, regional industrialization represents a first stage in their industrial development; it is at that time that basic decisions have to be taken as to the appropriate types and locations of industries.

A series of studies in regional economic planning will be undertaken as a continuing project.

A.4.a. Survey of the methods and experience in regional economic planning

This project is intended to survey selected aspects of regional economic planning in various countries: in particular, the integration of regional development into national development programmes and policies; distribution of industries among regions, and overhead investment in relation to local schemes of industrial development.

A.4.b. Industrial development aspects of urbanization in countries of Africa south of the Sahara

A programme for concerted international action in the field of urbanization was formulated at the Inter-agency Meeting on Social and Related Economic Questions held at Geneva in July 1960. The objective of this action was to ensure an integrated approach to the problems of urbanization, taking into account the complex of interacting economic and social factors, such as agricultural, industrial and urban development and changing social institutions and services. This programme aims at assisting governments in the planning and execution of programmes and projects in areas where the urbanization process is accompanied by special problems of social and economic adjustments. The United Nations participates in this programme together with several specialized agencies.

Under this programme, a number of studies in the economic field of particular relevance to the present programme of work are made in such fields as selection and location of industries in order to counteract urban unemployment, cost of social overheads, relation between urbanization and industrial growth and co-ordination of urban and national programmes of industrialization. As the first stage, a study of industrial development aspects of industrialization in selected countries in Africa south of the Sahara will be undertaken in co-operation with the secretariat of the Economic Commission for Africa (ECA), under the concerted action programme.

Area B

INDUSTRY STUDIES: ECONOMIC AND TECHNOLOGICAL ASPECTS

B.1. Pre-investment data

The use of the techniques mentioned presupposes a body of knowledge on input, cost and investment requirements and other pertinent data for various industries. A considerable store of scattered and unorganized information is available but not in an immediately usable form, particularly as regards the applicability of the data to the needs of the newly industrializing countries; the data are largely in the form of unrefined and uncorrelated cost of production and investment figures which are generally derived from industry practice in the developed countries.

The need for appropriate input and investment data has been acutely felt by the United Nations and outside groups working on problems of industrialization. In the regional commissions, the second group of ECAFE experts on programming techniques met in January 1961 to examine the use of industrial cost data for development programming. In ECLA, the need for these data has been felt in the work of advisory groups provided by this Commission under the United Nations technical assistance programme and of the newly revised economic development training programme which is to include industrial programming. In view of these requirements, the Secretariat at Headquarters has undertaken as a continuing project a co-operative research effort with the regional commissions to initiate collection and analysis of industrial data for programming and pre-investment studies.

B.1.a. Continuing project on pre-investment data

The objective of this project is to collect and analyse for a wide variety of industries detailed data on inputs and investments reflecting the influences of such factors as scale of output, variation in technology and performance of factors of production. In the first stage, a group of industries will be studied which have been selected on the basis of various criteria, such as availability of data, complexity of the industry and relative importance in programming.

Thus, the Secretariat at Headquarters is currently engaged in a study of the cement industry along the lines indicated above. Data for a number of countries are being collected and analysed in order to establish a schedule of "normal" inputs and bring out the influence of technology, scale of output and local conditions. Similar studies relating to aluminium and selected food canning industries are also to be undertaken in the near future.

The results of the work undertaken during the first stage were discussed by a joint Headquarters-ECLA working group, with the participation of a number of outside consultants, which met in late spring of 1961 at Headquarters. This group reviewed the results obtained in the first stage and made suggestions for further work. In the second stage of the project, it is proposed to revise and expand the first studies and widen the range of industries covered, bringing in, in particular, the metal working industries which are of special interest to the ECLA region.

B.1.b. Working party on industrial development programming

A working party on industrial development programming in the Latin American region is scheduled to meet late in 1962. This working party is being organized jointly with ECLA and in co-operation with the Bureau of Technical Assistance Operations (BTAO). Extra-regional participation of experts concerned with industrial development programming is expected.

The objectives of this meeting are, among others: (i) a review of methodological approaches to and scope of industrial development programming and (ii) an appraisal of the experience in that field, in particular of the experience gained in connexion with the work of the ECLA advisory

groups and other programming activities under the United Nations technical assistance operations.

B.1.c. Industrial programming data in the ECAFE region

In connexion with the ECAFE meeting on programming techniques mentioned under paragraph B.1 above, the Secretariat at Headquarters prepared a study on "Investment and Current Input Data in Industrial Programming: A Case Study of Some Industries in the ECAFE Region" which was submitted to the meeting. This paper discusses the problems set forth above which arise in elaborating data for programming and discusses some material available from the ECAFE region from that point of view. It concludes with suggestions for further work. Other joint projects in this area are under discussion.

B.1.d. A study of equipment-output ratios

A study already completed deals with estimates of equipment requirements per unit of output for a number of broadly aggregated industrial sectors to be used in connexion with the study on projections of demand for equipment (see A.3.a. above). For this purpose use was made of an extensive inquiry into the structure of the United States economy in the early post-war years which was undertaken by the Harvard Economic Research Project. A breakdown of equipment requirements by detailed output categories was provided in that inquiry. For the purpose of the project these data were recalculated for broader output sectors which have been aggregated to correspond to the categories adopted in the projections.

The equipment coefficients thus obtained reflect primarily the United States technology in the early post-war period and other conditions of industrial organization and productivity prevailing in the United States. Further research will be carried out in two directions: first, the undertaking of inquiries into equipment data in selected industries in certain under-developed countries to determine the extent of deviation from the United States practice and the adaptability to under-developed areas of the coefficients derived from United States practice; second, the collection of additional detail on the composition of equipment requirements for certain industrial processes so as to obtain meaningful data for analysing the equipment problem on the supply side. This will make it possible to evaluate required equipment production capacities in relation to given industrial output, which should be of particular interest for the more advanced newly industrializing countries which envisage the expansion of national machine building industries (see also A.3.b. above). Co-operation of the regional commissions, in particular of ECE, will be sought.

B.1.e. Collection of industry information

In response to the needs for documentation in developing countries and in connexion with technical assistance operations, particularly in countries with limited library facilities, a number of tasks relating to documentation will be undertaken, including material on experience gained under technical assistance programmes.

B.2. Operating characteristics of industries

A number of studies have already been carried out on operating characteristics of selected industries, in such fields as labour-capital substitution (10), size of plant

(11), and use of industrial equipment (12). The usefulness of these studies has been acknowledged and it is proposed to continue this type of work. Furthermore, it is clear from the description of the projects on pre-investment data (B.1.) that studies of operating characteristics of individual industries and processes are closely related to work in that area.

B.2.a. Capital intensity in materials handling

It has been noted on many occasions that an area which is particularly suitable for labour-capital substitution is materials handling, where unskilled labour could replace mechanized handling methods without any loss of efficiency or quality of the finished product. A case study of materials handling in selected industries will be undertaken along the lines of the previous studies in labour-capital substitution.

B.2.b. Adaptation of processes and equipment

The adaptation of processes and equipment to local conditions is constantly under review by industrial engineers and managers in every country. It is well known that technological change and innovation have primarily taken place under the stimulus of conditions obtaining in the developed countries where the main body of technological knowledge, skilled manpower and advanced equipment exists. The under-developed countries present, in most cases, a different environment in terms of endowment in factors of production, availability of managerial and supervisory skills, nature of raw material, fuel and power supply and climatic conditions, as well as general economic organization.

The study on adaptation of processes and equipment will examine the possibility of orienting technological change or innovation so as to facilitate the solution of several problems confronting under-developed countries, in particular, the shortage of capital and foreign exchange. Examples will be given of significant adjustments made by certain industries in some of these countries in the processes and equipment available to them so as to reduce capital inputs or foreign exchange expenditures, or both. Some major obstacles to these adjustments will be discussed in order to outline areas for further research.

B.2.c. Assembly industries

A study of industries where, in the early stages of development, a substantial share of the value added to the final product derives from imported parts. As the national industry reaches higher technical standards, domestic production would gradually supply the parts previously imported, providing further impetus to local industrial development.

B.3. Studies of individual industries

It has already been noted that there is need for study of processes and equipment particularly suited to the resource endowment of under-developed countries. A number of technological innovations have appeared in recent years in various industries, a more intensive study of which appears to be particularly indicated in this context (13). As a continuing project, it is proposed to convene regional and inter-regional meetings on the recent developments within selected industries of interest to under-developed countries so as to promote an interchange of information on the processes involved and examine the possible impact of these developments.

B.3.a. Working party on the establishment of petro-chemical industries based on natural gas

The major petroleum producing countries of the Middle East, Latin America, North Africa and the Far East dispose of vast quantities of unused natural gas which is a by-product of their crude petroleum output. This by-product represents an equivalent in heat value of about 50 million metric tons of crude petroleum a year, of which a major portion is released as waste. Many of these countries have been making efforts to utilize this gas in their industrialization programmes and have formulated projects for manufacturing petro-chemicals using the natural gas as a raw material. These projects however, absorb, only a small portion of the gases.

It is proposed to convene an inter-regional working party to study ways and means of developing industries based on natural gas waste. The meeting would undertake to study available experience and relevant economic and technological factors in establishing these industries.

B.3.b. New developments in iron and steel technology

Discussions have taken place with ECAFE, ECE and ECLA concerning joint sponsorship of a seminar in this field, to be held in the ECAFE region and co-sponsored by BTAO. The co-operation of ECE, which has done considerable work in the iron and steel industries, has been obtained. ECLA has indicated that it will actively co-operate in the seminar by preparing various papers and arranging for expert participation. Discussions are taking place with ECAFE concerning detailed arangements for the meeting.

B.3.c. Machine tool building

The machine tool industry is of considerable interest to the newly developing countries and some of the recent innovations, such as automated methods of production, extensive use of interchangeable parts and consequent lowering of the cost of production, are of considerable interest to the industrial countries which are the major suppliers of machine tools and to under-developed countries both as users and potential producers.

It is proposed to convene in 1963 an inter-regional working party on recent developments in the technology of machine tool building. Among the regional commissions, ECE, ECLA and ECAFE are interested in this problem. The purpose of the proposed meeting is to examine the implications of the recent technological changes in that industry (for example, the potential savings in skilled labour requirements). Another topic to be considered by this meeting is a projection of demand for these equipment items (see A.3.h. above).

B.3.d. Chemical and allied industries

At the invitation of the ECAFE secretariat, the Secretariat at Headquarters will participate in a Seminar on Basic Chemical and Allied Industries, sponsored by ECAFE in co-operation with BTAO, which will be held in October 1962 in Bangkok.

B.3.e. Preparatory work in connexion with an international conference on the application of science and technology to the needs of under-developed countries

At its thirty-second session, the Economic and Social Council adopted a proposal submitted by the Secretary-General, following a suggestion of his Scientific Advisory Committee, for an international conference on the application of science and technology to the needs of under-developed countries, to be convened in 1963 in co-operation with the interested specialized agencies. The Secretariat is engaged in preliminary work relating to the drafting of an agenda and other aspects of the organization of that meeting.

Area C

TRAINING AND MANAGEMENT

C.1. Training

In the field of training, the work of the Secretariat at Headquarters is at present centred around substantive support to the United Nations fellowship programme in industry. Discussions are under way for an inter-agency programme of concerted action in the field of training, in particular as regards the newly emerging states. In this connexion, the following projects are proposed.

C.1.a. Project on methodology and techniques for assessing requirements for trained personnel

Training of manpower designed to ensure the balance between demand for and supply of trained personnel is an integral part of general industrial programming, and is a project of inter-regional interest—as was revealed by the discussions at the 1960 inter-agency working party on skilled manpower in Latin America. A study on the assessment of requirements, such as methodology of the assessment of needs and classification of skills, will be initiated early in 1963.

C.1.b. Preparation of a list of qualified training institutions in selected fields of industrial development

A list of qualified institutions for training of personnel in the field of industrial development is to be prepared in co-operation with ILO, FAO, UNESCO and other interested specialized agencies.

C.1.c. Specialized libraries for industrialization

The Committee for Industrial Development recommended that the Secretariat, in co-operation with the International Labour Organisation (ILO), the International Bank for Reconstruction and Development (IBRD), UNESCO and other interested agencies, consider the possibility of rendering assistance to under-developed countries in the establishment or enlargement of specialized libraries for industrialization. Work on this project was begun in 1961.

C.1.d. Preparation of teaching materials

The Committee also recommended that the Secretariat should prepare teaching materials on economic development with emphasis on industrialization, in co-operation with UNESCO, IBRD and other interested agencies. Preliminary discussions took place in 1961, and a working party of experts will be convened in 1962.

C.2. Management

As noted in previous publications of the Secretariat (14), the generally inadequate level of efficiency in industry in most under-developed countries is due, among other

things, to such factors as lack of technical and managerial skills, including financial management (for example, budgeting and cost accounting), insufficient use of equipment and poor organization of production. The Secretariat's work in this area will take the form of convening regional and inter-regional working groups on selected topics.

C.2.a. Organization of working parties on industrial management

As a first project, it is proposed to convene in Latin America some time in 1964, in co-operation with BTAO, a joint Headquarters/ECLA working party on industrial management which will be particularly concerned with management of industrial enterprises in the public sector. A number of under-developed countries in which a substantial part of the industrial sector is operated under public management face problems relating to administration and the maintaining of proper operating efficiency in the publicly-run industries. In addition to participation by representatives of the public sector, participation of representatives of private industry will be sought.

Area D

PROBLEMS OF SMALL-SCALE INDUSTRY

Further research will be undertaken on ways and means to deal with the structural weaknesses of small-scale industry, including provision of servicing and other assistance. The projects will deal with such measures as locating small enterprises in industrial tracts and estates, promoting co-operative arrangements and establishing complementary relationships between them and large industries. Projects will also deal with measures aimed at servicing and providing assistance in the financial, management and technological fields.

D.1. Industrial tracts and estates

The Secretariat has published a report on *Establishment of Industrial Estates in Under-developed Countries* (15), which deals with the role of industrial estates in policies of industrialization, with special reference to promotion of small-scale industries. It is proposed to hold a number of regional meetings in order to examine the problems arising in the establishment of industrial estates in the light of regional conditions and needs. These problems are of an economic, financial and organizational nature, and it is intended to investigate them in depth.

D.1.a. Financing of industrial estates

The financial aspects of the establishment of non-specialized industrial estates for small industries in urban and rural locations will be studied in a report dealing with financial problems relating to acquisition and improvement of sites; construction of factories and other buildings, provision of utilities, roads and other basic facilities; sales, lease and hire-purchase policies applying to sites and premises, and investment in plant and equipment and working capital. The study will analyse the replies to a questionnaire on these problems.

D.1.b. Seminars on industrial estates

A joint Headquarters/ECAFE Seminar on Industrial Estates in the ECAFE Region was held in Madras, India, in November 1961 in co-operation with BTAO and with the participation of ILO and UNESCO. The items discussed at the seminar were (i) objectives and policies in establishing industrial estates; (ii) economic and physical planning of industrial estates; (iii) organization, management and financing of industrial estates; (iv) co-operation between, and assistance to, small industries established on industrial estates; (v) co-ordination or integration of industrial estates projects with programmes of urban or regional development; (vi) international and regional co-operation in the development of industrial estates. Other seminars on industrial estates in the regions of the Economic Commission for Africa and the Economic Commission for Latin America are in the planning stage.

D.2. Case studies on co-operative and complementary arrangements

Case studies will be undertaken to examine the nature and role of such arrangements in mitigating the major structural weaknesses of the individual small enterprises by providing economies of scale and strengthening the competitive position of small-scale industry. Attention will be paid to the experience gained in certain countries, in particular, Japan and India (16).

D.2.a. Co-operative forms of association for processing, procurement, financing, marketing and shipping

D.2.b. Complementary forms of organization

These involve joint production programmes among small firms established in common or in separate locations, such as processing of each other's products or manufacturing and assembling parts and components.

D.2.c. Subcontracting arrangements between small enterprises and large concerns

Under such arrangements small enterprises manufacture parts and components for, or convert or finish the production of, large industries (17).

D.3. Survey of existing institutions for assistance to small-scale industry

It is proposed to undertake a survey of the work performed by institutions which provide specialized or across-the-board assistance to small business and of legislative measures taken in different countries to promote the small industry sector.

D.4. Studies of selected aspects of assistance

D.4.a. Provision of finance

Studies on financing of small industrial establishments have already been published by the United Nations (18). The subject will be examined in greater depth by collecting and evaluating the experience in various countries. The project covers such subjects as the establishment and operation of specialized financing institutions for short-term and long-term credit to small-scale industry; government financing in

the form of loans or participation in equity capital; government credit guarantees and insurance and purchasing schemes; hire-purchase plans; supervised credit; fiscal and financial incentives.

D.4.b. Marketing and export promotion

The project consists of case studies in selected countries, including a description of methods used by national institutions established for that purpose and a review of the relevant experience under technical assistance operations. A study on export promotion of industrial products, with special reference to products of small-scale industries, is under way. It will be followed by a study of domestic marketing of these products.

Area E

FISCAL AND FINANCIAL PROBLEMS

There are two aspects to the problem of financing of industries in under-developed countries. The first is concerned with ensuring that there exist sufficient resources from the national output which can be used for investment; in the less developed countries domestic capital formation may be generally expected to fall short of the level required for economic growth and industrial development and will have to be supplemented by foreign financing. The second aspect is the process whereby resources are channelled to industry to permit its expansion. These two aspects merge when international assistance, whether private, bilateral or multilateral, is given directly to specific industries either in the form of finance or in the form of equipment.

The contribution of foreign, private and public capital to economic and industrial development will be studied in the reports on the subject to be prepared by the Secretariat in conformity with Council resolution 780 (XXX) (19). The annual report on the international flow of private capital and the further report on the promotion of this flow were submitted to the Council at its thirty-second session (20). The Secretariat's programme of work in this field is affected by General Assembly resolution 1521 (XV), which set up a committee to consider measures preparatory to the establishment of a United Nations capital development fund, and resolution 1516 (XV) on the economic consequences of disarmament (21). The proposals under the present programme of work on industrialization deal with the second aspect of this problem.

E.1.a. Measures to promote export of industrial equipment to under-developed countries

A study will be undertaken dealing with governmental assistance to facilitate export and delivery of industrial equipment to under-developed countries. This project will make a survey of various measures undertaken in equipment exporting countries and appraise the results of these measures.

In some cases, assistance has been given directly to specific industries while in other cases it has been channelled through domestic financial and development agencies. In the private enterprise economies, such measures have taken the form of subsidies, export guarantees and reinsurance facilities offered by governmental or semi-governmental agencies, as well as direct assistance through grants or credits for the purchase of specific equipment. In the centrally planned economies, these measures have included various arrangements facilitating exports of equipment accompanied by other measures of assistance, such as provision of experts. The study will deal with experience gained in both types of economies.

SOCIAL AND DEMOGRAPHIC ASPECTS

The following studies relating to social and demographic aspects of industrialization are to be undertaken by the Secretariat under various programmes other than that within the purview of the Committee for Industrial Development (22).

Urbanization

The concerted action programme on urbanization undertaken with the specialized agencies is described above under A.4.b. A study of the role of industrial social service and its place in an integrated national social service programme will be initiated with the co-operation of ILO.

Community development

A study of the contribution of community development and self-help measures to economic and industrial development in Africa is to be undertaken. This inquiry will draw upon the experience obtained in conducting a similar study in the ECAFE region.

Housing, building and planning

A discussion of the developments with regard to the long-range programme of international action in the field of low-cost housing and community facilities and proposals for future work will be before the Social Commission at its thirteenth session.

Demographic aspects

During the three-year period under review it is planned to undertake a general survey of rural-urban migration in relation to urban and rural population growth in under-developed countries and to study the effects of urbanization and industrialization on the growth and structure of the economically active population. These studies will draw upon the experience gained in conducting a number of pilot projects in this field.

II. ACTIVITIES RELATING TO SUPPORT OF UNITED NATIONS
FIELD OPERATIONS IN INDUSTRY

PROVISION of substantive support to the field operations of the United Nations in industry under its technical assistance programmes and the activities of the Special Fund has accounted and will account in the future for a very substantial part of the responsibilities of the United Nations Secretariat under the programme of work in industrialization. It has already been mentioned that close interrelationship between research and operations has been one of the guiding principles of the programme. In the following paragraphs an attempt is made to formulate a "forward look" as to the further development of the operational aspects of the programme.

The magnitude and scope of technical assistance rendered in the field by the United Nations in connexion with industrial development has grown appreciably in the course of time. At the same time, there has been an increase in the coverage in depth of the servicing of these operations at Headquarters. There has been, in particular, more emphasis on assistance to governments in the establishment of country programmes in industry; in a number of cases, this has resulted in a reorientation of country programmes towards more "concentrated" assistance in a few key areas (for example, industrial estates, substitute materials in industry, fertilizers) and assistance through integrated teams rather than individual experts.

As far as the range of coverage is concerned, it is expected that the area of support will continue to be concentrated on industry programming and planning, policies of industrialization and the development of a certain number of industries which are of particular interest to under-developed countries: iron and steel—including iron and steel making and the staple transforming industries; cement; petro-chemicals; pulp and paper; food processing; fertilizers and related heavy chemicals; small-scale industries and industrial estates for small industries.

In addition, the development of the servicing and support operations will cover in the future a certain number of functional fields cutting across individual industries. Some of these are mentioned in the following paragraphs.

Management

In industrial management, emphasis is likely to continue in areas where government requests have been concentrated in the past: cost accounting and budgetary control, quality control, market surveys and sales, maintenance and plant instrumentation. The importance of these management functions in the development of the newly industrializing countries has been highlighted in reports and articles prepared by the Secretariat, and in a number of research projects under the proposed programme. In addition to the provision of experts, United Nations assistance is likely to take the form of the establishment of management training institutes to be financed through the facilities of the Special Fund (23).

Technological research institutes

Another field which is likely to claim increasing attention from the United Nations relates to assistance in promoting industrial and scientific research and provision of services to industry through the establishment of technological research institutes (24). Industrial enterprises which because of their small size cannot afford to establish research and experimentation units of their own would benefit from the services of such institutes. The latter would also help in the establishment of new industries (for example, on the basis of indigenous raw materials), extension of existing industries, improvement of processes and economy in services through reduction of waste or recovery of waste products. The assistance of the United Nations in this area is likely to be sought along the following lines: (i) in the establishment of institutes in countries and regions that are deficient in this service; (ii) in extending the scope of services of existing institutes, and (iii) in making known as widely as possible the services to industry through government and trade organizations, publications and the like.

Training in industry

The responsibilities of the Secretariat in the field of training have in the past centred largely on substantive support to the United Nations fellowship programme in economic and industrial development. In this connexion the attention of governments, in the elaboration of their technical assistance programmes, has been drawn repeatedly to the desirability of co-ordinating their requests for expert assistance with appropriate fellowship programmes so as to provide for the development of local cadres.

Efforts are being made at the present time to define the areas in which training of industrial cadres is needed and to develop projects under the technical assistance programme which are responsive to those needs. This involves a review of the needs as regards the areas in which training is required and of the available placement facilities. In addition to placement in industrially advanced countries, the possibility of utilizing, wherever appropriate, host facilities within the more advanced under-developed countries themselves (India, for example) is being explored, particularly as regards in-plant training of engineers (25).

Discussions are under way for the formulation of an inter-agency programme of concerted action in the field of training, especially in newly emerging states, following recent decisions of both the Council and the General Assembly. The operational responsibilities of the United Nations as regards training of skilled personnel for industry, in particular of personnel on higher technical levels, represent another area of work which is likely to expand substantially in the future.

Appendix[a]

RECENT ACTION BY THE COMMITTEE FOR INDUSTRIAL DEVELOPMENT AND THE ECONOMIC AND SOCIAL COUNCIL

At its first session, the Committee for Industrial Development had before it a memorandum by the Secretary-General (26) which contained proposals for a longer-term and expanded programme of work in the field of industrialization, and a memorandum containing suggestions for concerted action in that field (27). In addition, the Secretariat submitted to the Committee, at its request, notes on the activities relating to industrialization in the work programmes of the regional economic commissions; statements on the relevant activities of their respective organizations were made by the representatives of ILO and UNESCO. Certain research studies undertaken by the Secretariat were also made available to the Committee for information purposes.

In its report (28), the Committee gave an account of its proceedings, presented suggestions for consideration by governments and related national institutions and made a number of recommendations for international action concerning, in particular, certain aspects of the Committee's work and the work programme on industrialization.

In the field of industrial programming and policies, the Committee noted that the experience and progress of the various countries was of general interest and recommended that measures be taken to collect and disseminate information on the institutional arrangements for, and the methods applied in, planning and programming industrial development in Member States of the United Nations. It drew the attention of governments of developing countries to facilities such as the advisory groups for programming economic development set up in certain countries under the technical assistance programme and recommended that expansion of such facilities be considered by the Secretariat at Headquarters and the regional economic commissions. The Committee also urged prompt implementation of Council resolution 740 C (XXVIII) on the collection, analysis and dissemination of experience obtained in multilateral, regional, bilateral and national technical assistance in the field of industrialization (29), and expressed the hope that governments would provide to the Secretariat, on a systematic basis, material on such experience.

In the field of financing of industrial development, the Committee noted that, in an increasingly large number of developing countries, economic development was being carried out by means of long-term development plans. It suggested that the financing of industrial development should be considered in the context of such plans, and, where these do not exist, in the context of the long-term over-all economic development requirements of the country. The Committee agreed that the formation and mobilization of domestic resources should constitute the primary source of financing for development, and that such mobilization required appropriate fiscal and monetary policies as well as measures of self-help and internal reform. The Committee recognized that export earnings were a decisive factor in financing imports of capital goods required for industrial development, and suggested that every effort be made to promote exports of both primary products and manufactured goods from developing countries; in particular, it urged the industrial countries to review protectionist and other restrictive practices with a view to increasing their purchases from the developing countries. It also suggested that governments of both developed and developing countries should make efforts to reduce excessive fluctuation of prices, and promote reasonable and stable terms of trade for developing countries. The Committee agreed that foreign financing of economic development, both public and private, should be treated as an additional source of raising capital to supplement domestic

resources and promote internal capital formation. In the field of training and management, the Committee stressed the need for integrating education and training with plans for the economic and industrial development of under-developed countries, and recommended that international assistance should wherever possible be directed towards achieving this purpose. The Committee urged governments of both industrial and developing countries to expand provision of in-plant training facilities, and of in-service training in planning institutions.

The Committee discussed the functional aspects of its work, and emphasized that it was the first central inter-governmental body to be established for the consideration of the activities of the United Nations in the field of industrial development; it expected that the Council would channel relevant activities in this field through the Committee. In its work, the Committee will promote liaison and co-ordination in regard to all activities relating to industrial development in the United Nations family. The Committee noted the terms of the third preambular paragraph of General Assembly resolution 1431 (XIV) which refers to the fact that "industrialization will promote the diversification of the economies of under-developed countries and assure a more balanced economic and social structure and a high rate of economic development". Consequently, while concentrating its activities on industrial development, the Committee recognized the need for appropriate consideration of other aspects of general economic policy relevant to such development, without, however, duplicating the work of other appropriate bodies of the United Nations.

As regards the organizational aspects of its work, the Committee recommended that an industrial development centre be established within the Secretariat. The centre would undertake the collection, analysis and dissemination of experience gained in technical assistance programmes in the field of industrialization; it would also provide a mechanism whereby the United Nations, the specialized agencies and the International Atomic Energy Agency (IAEA) could obtain full information about each other's activities in this field and could take steps to co-ordinate them.

The Committee also decided to set up an inter-sessional working group to help the Committee to carry out its tasks, including those related to the work of the industrial development centre.

The proposals submitted by the Secretary-General were approved by the Committee. The Committee made recommendations regarding the orientation and emphasis of the projects, proposed inclusion in the programme of a number of additional projects and activities and, in some cases, recommended changes in the time-table of the programme. The Committee endorsed the view of the Secretary-General that the work in industrialization to be undertaken by the Committee and the regional economic commissions under their respective work programmes would be carried out most effectively if these programmes were complementary and mutually supporting; in this connexion, it welcomed the Secretary-General's proposal to link the expanded work programme to the corresponding work of the regional commissions. The Committee took note of the Secretary-General's suggestions for concerted action with the specialized agencies.

The Committee stressed the need for ensuring that material on industrialization published by the United Nations, especially the *Bulletin on Industrialization and Productivity*, should have the widest dissemination and, in particular, should reach those directly concerned with industrial development in under-developed countries.

At its thirty-first session, the Economic and Social Council had before it, among others, the report of the Committee for Industrial Development.

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[a]   The appendix contains a summary of the report of the Committee for Industrial Development on its first session (*see* reference (28)).

In the discussion, all representatives expressed their satisfaction with this report. Many members mentioned that they were gratified by the spirit of co-operation which had prevailed during the session of the Committee, a body composed of representatives from thirty countries with wide differences in political and economic structure, and which had permitted the unanimous adoption of a constructive report.

At the conclusion of the debate, the Council unanimously adopted a resolution (30) in which it approved the report of

the Committee for Industrial Development, endorsed the programme of work and the priorities set out in the report, requested the Secretary-General to take steps to implement the programme and other recommendations for action by the United Nations contained therein and invited the executive heads of the specialized agencies and the IAEA to take note of the report and to undertake the proposals contained therein for action, separately, jointly, or in collaboration with the United Nations, by their respective organizations.

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Published September 1958. Reprinted March 1962, U.N. Publ. 58.II.B.5
35 pages
Price: $U.S. 0.50; 3/6 stg.; 2.00 Sw. frs. (or equivalent in other currencies)
Available in English, French and Spanish editions

Indexes to the International Standard Industrial Classification of All Economic Activities

This publication furnishes numeric and alphabetic indexes to the revised international Standard industrial Classification of All Economic Activities (ISiC). The indexes are designed to assist governments, international organizations and other groups in adapting ISIC to the classification requirements of individual countries, in comparing national classifications to the international classification or in classifying data according to it. The numeric index contains approximately 10,000 entries and the alphabetic index, about 17,000 entries. in order ta facilitate the use of the indexes, a part of the publication is devoted to a discussian of the underlying principles and application of the revised internatianai industrial classification.

English edition published August 1959, United Nations publication, Sales No: 59.XVII. 9
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Spanish edition published and distributed by the Inter-American Statistical Institute, Pan-American Union, Washington, D. C. Published 1961. 423 pages.
Price: $U.S. 2.00

Obtainable from Distributors for United Nations publications or from the United Nations, Sales Section, New York or Geneva

Preliminary Bibliography for Industrial Development Programming

In 1953 and 1955, the Economic and Social Council of the United Nations adopted two resolutions in which it invited the Secretary-General to prepare a bibliography on industrialization and to keep it up to date by issuing periodic supplements. In 1956, the United Nations published the *Bibliography on Industrialization in Under-developed Countries* (Bibliographical Series No. 6, Sales No.: 56.II.B.2) which incorporated bibliographical material compiled earlier pursuant to the Council's request, and data received from Governments, universities and scientific institutions in response to a request from the Secretary-General for information on the subject. In 1958, a "Selected List of Titles on Industrialization" was published in *Bulletin* No. 1.

A special supplement to the already published material has now been prepared. The purpose of this bibliography is to serve as an aid to research workers, government officials and other persons engaged in the relatively new but increasingly important discipline of industrial development programming. It consists of two parts—"Industries in General" and "Chemical and Related Industries"—the first of which is published in the present issue of the *Bulletin*; the second will be published in the next (sixth) issue. Preparation of further bibliographies on industrial development programming is under consideration. The material presented in this and the next issue has been compiled by Dr. Thomas Vietorisz, former regional expert in industrial development programming, United Nations Economic Commission for Latin America, and revised and edited by the United Nations Secretariat.

It is envisaged that other specialized bibliographies as well as general material on industrialization will be prepared as a co-operative effort of the various organizations of the United Nations family. Such material would be published in future issues of the *Bulletin*.

INTRODUCTION

The bibliography presented in the following pages has been prepared under the joint Industrial Development Programming Project of the Economic Commission for Latin America, the Division of Industrial Development and the Bureau of Technical Assistance Operations of the Department of Economic and Social Affairs of the United Nations. The objective of the joint project is to explore methods and collect empirical information for the programming of economic development in the field of industry. This bibliography is the first among several whose preparation is contemplated under the project. It is a preliminary work, the purpose of which is to provide some orientation with regard to the information readily available, the problems of organizing this information, and the gaps that are to be filled by future empirical investigations.

In preparing the bibliography, attention had been focused originally on the chemical and related industries. In compiling sources and references for these industries, however, such a large number of references pertaining to industries in general were obtained as a by-product that it was decided to devote the entire first part of the bibliography to the latter. While that part is far from being comprehensive and is in some ways unbalanced, it may serve as a convenient first selection of the source material pertaining to industries in general, as well as

as a useful complement to the second part covering the chemical and related industries, and to further bibliographies covering other industrial branches, which are to be prepared later.

The chemical and related industries which are covered in the second part include inorganic and organic chemicals; fertilizers; soaps and detergents; insecticides and pesticides; dyes and pharmaceuticals; plastic materials, synthetic fibres and rubber; glue and adhesives; oils, fats and waxes; essential oils, perfumes and cosmetics. Of the chemical metallurgical processes, only those pertaining to aluminium are included. Petroleum refining, pulp and paper and a number of other chemical-process industries have not been covered.

A decision had to be made with respect to inclusion of materials of a primarily technological nature. Technical assistance reports have been included in all cases. As regards other technological references, only the most important entries have been included. The omission of many others was dictated by the vastness of the literature, although it is recognized that technological references on individual processes are highly useful, in particular for input-output analysis.

The principal sources for the preparation of the present bibliography were the following: the United Nations Educational, Scientific and Cultural Organization's *International Bibliography on Economics*, vols. I to VII; the classified listings of books, articles and unpublished doctoral dissertations of the *American Economic Review*; the "Index of Final Reports" of the United Nations Technical Assistance Administration, and several bibliographies of the United States International Cooperation Administration. Many other sources were also consulted.

The list is presented alphabetically by author, or by title when no author is indicated. Comments, additions and emendations to the bibliography are invited.

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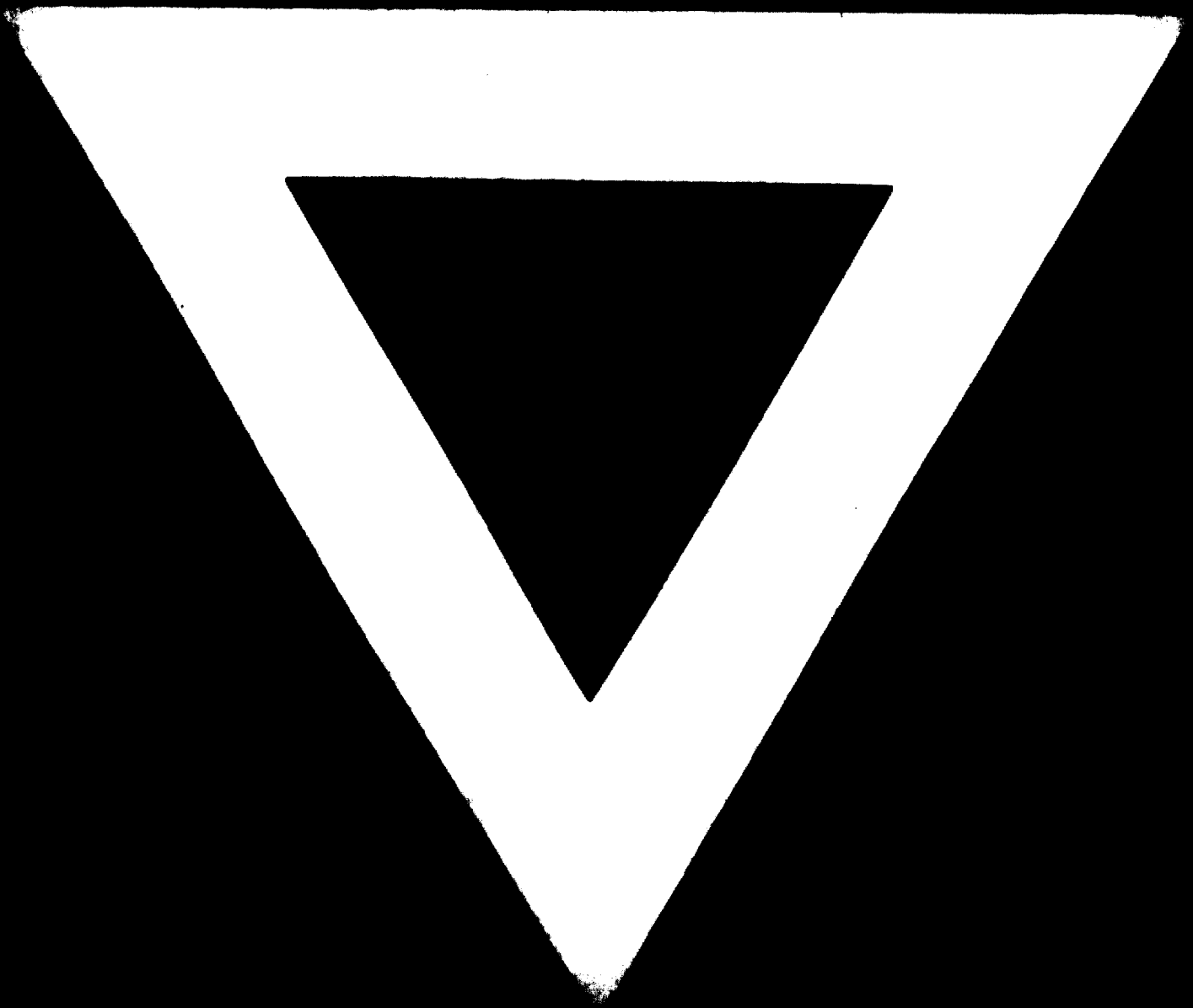OF NEW ZEALAND, C.P.O. 1011, Wellington.

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