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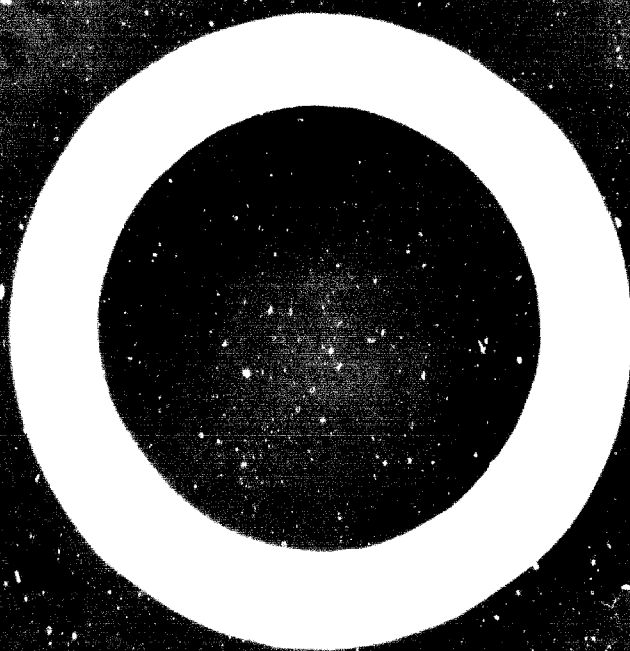
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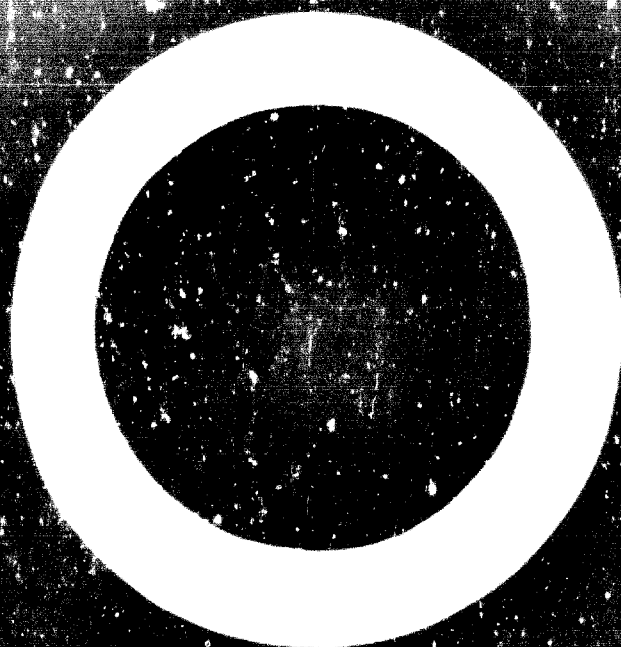
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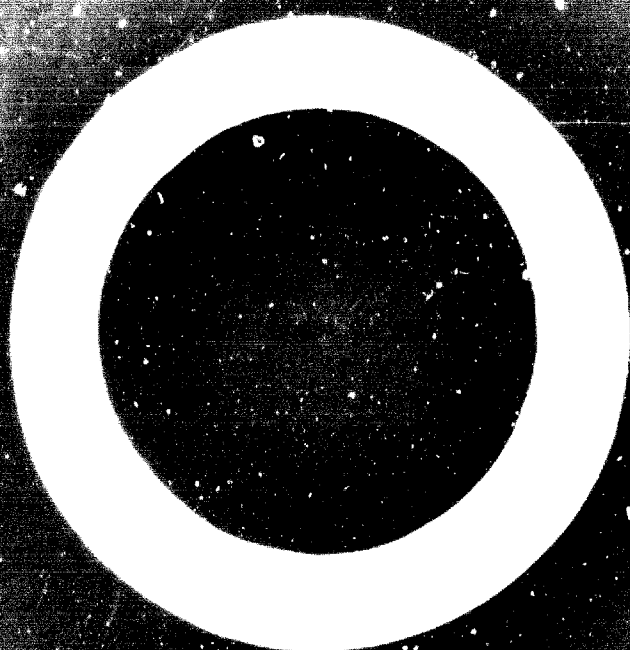


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INDUSTRIAL PLANNING



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
VIENNA

UNIDO MONOGRAPHS ON INDUSTRIAL DEVELOPMENT

*Industrialization of Developing Countries:
Problems and Prospects*

MONOGRAPH NO. 17

INDUSTRIAL PLANNING

Based on the Proceedings of the International
Symposium on Industrial Development
(Athens, November-December 1967)



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Foreword

The International Symposium on Industrial Development, convened by UNIDO in Athens in 1967, was the first major international meeting devoted exclusively to the problems of industrialization of the developing countries. It followed a series of regional symposia on problems of industrialization held in Cairo, Manila and Santiago in 1965—1966 under the sponsorship of UNIDO and the United Nations regional economic commissions, and a similar symposium held in Kuwait in 1966 under the sponsorship of UNIDO and the Government of Kuwait.

The Athens Symposium was attended by some 600 delegates from 78 countries and by representatives of various United Nations bodies, international organizations and other interested institutions in the public and private sectors. It provided a forum for discussion and exchange of views on the problems and prospects of the developing countries which are engaged in promoting accelerated industrial development.

The Symposium devoted special attention to possibilities for international action and for co-operative efforts among the developing countries themselves, and explored the scope, means and channels for such efforts.

Studies and papers on a wide range of problems relating to industrialization were presented to the Symposium—by the UNIDO secretariat and by participating Governments, international organizations and observers. An official report, adopted at the Symposium, has been published by UNIDO.¹ Based on this documentation and the discussions in the meeting, the present series of monographs is devoted to the 21 main issues which comprised the agenda of the Symposium. Each monograph includes a chapter on the issues presented, the discussion of the issues,

¹ *Report of the International Symposium on Industrial Development, Athens 1967 (ID/11)* (United Nations publication, Sales No.: 69.II.B.7).

and the recommendations approved by the Symposium. Some of the monographs deal with specific industrial sectors; some with matters of general industrial policy; and others with various aspects of international economic co-operation. An effort has been made to make the monographs comprehensive and self-contained, while the various economic, technological and institutional aspects of the subject matter are treated within the context of the conditions generally prevailing in the developing countries.

Since economic, technological and institutional aspects are described with particular reference to the needs of the developing countries, it is felt that the monographs will make a distinct contribution in their respective areas. They are intended as a source of general information and reference for persons and institutions in developing countries concerned with problems of industrialization, and particularly with problems and issues of international co-operation in the field of industrialization. With this in view it was considered that an unduly detailed technical presentation should be avoided while at the same time enough substantive material should be offered to be of value to the prospective reader. For a more elaborate treatment of the subject, the reader is referred to the selected list of documents and publications annexed to each monograph.

The annexes also contain information on the areas in which UNIDO can provide technical assistance to the developing countries on request; a selected list of major UNIDO projects in the respective fields; and a list of meetings recently organized by the United Nations.

It is hoped that the monographs will be particularly useful to Governments in connexion with the technical assistance activities of UNIDO and other United Nations bodies in the field of industrial development.

This monograph was prepared by Mr. Roy B. Helfgott, Chairman of the Department of Industrial Relations, Newark College of Engineering, and Mr. Salvatore Schiavo-Campo, Assistant Professor, University of Massachusetts, as consultants, in co-operation with the UNIDO secretariat.

CONTENTS

	Page
INTRODUCTION	1

Chapter 1

THE FORMULATION OF INDUSTRIAL PLANS	5
The price system and the allocation of resources	5
External effects and economic decisions	6
Requirements of a well-formulated industrial plan	7
Elements of plan formulation	8
Techniques of plan formulation	9
A dynamic approach to plan formulation	11

Chapter 2

THE IMPLEMENTATION OF INDUSTRIAL PLANS	13
Establishing a climate for industrial plan implementation	13
Elements of industrial plan implementation	13

Chapter 3

THE FORMULATION AND EVALUATION OF INDUSTRIAL PROJECTS	25
The connexion between formulation and evaluation	25
Ensuring consistency between the project and the programme	25
Conducting feasibility studies	26
Criteria for project evaluation	31
Measuring national profitability	34

Chapter 4

Page

THE IMPLEMENTATION OF INDUSTRIAL PROJECTS	40
Continuous re-evaluation as an implementation tool	40
Engineering requirements	41
Construction delays	41
Financial and organizational structure	41
The operational stage of the project	42
Managerial aspects of project implementation	43
The need for follow-up and information feedback	43

Chapter 5

REGIONAL AND LOCATIONAL ASPECTS OF INDUSTRIAL PLANNING AND PROGRAMMING	45
A general perspective	45
Factors of industrial location	47
General criteria for planning the location of industry	50
Techniques of industrial locational planning	52
A hypothetical example of locational planning by stages	53

Chapter 6

DATA REQUIREMENTS FOR INDUSTRIAL PLANNING AND PROGRAMMING .	55
Definition of the problem	55
Data requirements	58
Different approaches to data problems	62

Chapter 7

THE INTERNATIONAL SYMPOSIUM ON INDUSTRIAL DEVELOPMENT: ISSUES, DISCUSSION AND RECOMMENDATIONS	65
The issues	65
The discussion	70
Recommendations approved	72

Chapter 8

Page

UNITED NATIONS ACTION TO PROMOTE INDUSTRIAL PLANNING	74
Industrial programming	74
Technical assistance activities	77
Regional and locational aspects of industrial planning	79
Data requirements for industrial planning and programming	80
Industrial promotion activities	84
Regional co-operation in industrial development	84

Annexes

ANNEX 1 UNIDO ASSISTANCE IN INDUSTRIAL PLANNING	86
A. Areas in which UNIDO can provide assistance	86
B. Selected major technical assistance projects	87
ANNEX 2 MEETINGS, SYMPOSIA, WORKING GROUPS AND TRAINING SEMINARS ORGANIZED BY UNIDO, OR BY THE UNITED NATIONS PRIOR TO THE INCEPTION OF UNIDO	91
ANNEX 3 SELECTED LIST OF DOCUMENTS AND PUBLICATIONS ON INDUSTRIAL PLANNING	92

ABBREVIATIONS

ACC	Annual capital charge
ECAFE	Economic Commission for Asia and the Far East
ECLA	Economic Commission for Latin America
IBRD	International Bank for Reconstruction and Development
ICICI	Industrial Credit and Investment Corporation of India
NPV	Net present value
OCAM	Common Afro-Malagasy Organization
UNESOB	United Nations Economic and Social Office in Beirut
UNIDO	United Nations Industrial Development Organization



INTRODUCTION

To the hundreds of millions of people throughout the world whose condition of life is that of extreme poverty, each day is a struggle for survival. The urgent need to raise these masses to a minimum level of decent living standards has focused international concern on the achievement of economic development. Giving expression to this concern, the United Nations proclaimed the 1960s as the Development Decade. The aim of the Decade has been to unite all the Member States of the United Nations in a sustained effort to break through the cycle of poverty, hunger, ignorance and disease that still afflicts two thirds of mankind.

It is now evident, however, that the goals of the Development Decade have not been satisfactorily fulfilled, although the United Nations and its various agencies have been most active in expanding food production in developing countries, improving health conditions, raising educational levels, and in innumerable other related pursuits. Increasingly it is being recognized that without industrial progress a country cannot produce the goods and services needed to attain decent standards of living for its citizens. Awareness is increasing that there is a direct correlation between national *per capita* income and the level of industrialization. Studies carried out by UNIDO show that the most significant structural change accompanying an increase in the level of *per capita* income is a decline in the share of agriculture and a rise in the share of manufacturing in a country's output. Developing countries are seeking, therefore, to achieve more rapid industrialization and accelerated economic development.

The data presented to the International Symposium indicated that recent trends in industrialization have been far from satisfactory in most developing countries. While some have experienced annual growth rates in manufacturing of 7 to 9 per cent, the growth rates of most countries have been far lower. The total industrial production of the developing countries doubled during the past decade, but it started from an extremely low base, and the industrial sector of the economy of most of the countries is still relatively small. In fact, in most countries industry has not grown

rapidly enough to provide jobs for the rural workers who have been drifting into the urban areas. The manufacturing sector, moreover, has not been able to achieve the substantial export potential needed to offset the decline of import substitution opportunities.

Industrial development is determined by the economic, political and social conditions within a country. In the developing countries a variety of conditions deter the achievement of sustained growth. Despite general economic progress, a rapidly expanding population prevents increases in *per capita* income. Given extremely low standards of living, the ratio of consumption to income is very high, and little savings remain for investment in industry. Having little industrial experience, the developing countries lack technical know-how, and their labour forces have not had an opportunity to acquire the skills required by modern industrial technology. Low *per capita* income, combined with a relatively small total population in many countries, results in domestic markets too small to support efficient manufacturing enterprises, using modern technology, in many branches of manufacturing. The rigid, traditional ways of doing things in these countries often prevent the accommodations necessary for industrial growth.

In view of these tremendous barriers to economic development, it would be unrealistic to imagine that industrial expansion will occur spontaneously. The deep-rooted rigidities and other obstacles faced by many developing countries cannot be overcome by market forces alone; planning is an essential feature of industrial development in these countries. The extent of planning and the roles of the public and private sectors may differ in different countries, but no country can hope to achieve progress without some degree of planning.

Planning is based on two fundamental propositions: (1) that economic progress results in large part from human action based on analysis and reasoning and not as a consequence of chance; and (2) that by a systematic harmonization of both policies and investment projects into an integrated whole, the efficiency of the total economy can be improved.

In developed countries with market economies, the need for planning is less urgently felt than in the developing countries, since in the developed countries the machinery for co-ordination within the private sector and between the private and public sectors already operates reasonably well. Explicit planning is less feasible in the developed market economies owing to the greater complexity of the economy and to the decentralized manner in which most economic decisions are made. In developed market economies, decentralized decision-making has proved to have many

advantages. In most developing countries, however, some form of central planning is feasible, since there are fewer variables to be taken into consideration and desirable, since the mechanisms for co-ordination of individual action are much less sophisticated than in developed economies.

It can be misleading to point to the past experience of the advanced market-economy countries as negating the need for planning. These countries did not face the same types of problems, such as population pressure, that most developing countries encounter today. Second, most developing countries have an industrial sector that is partly government-owned. Third, developed countries in the past engaged in planning to a greater extent than is normally supposed. Notable examples include Colbert's royal manufactures to launch French industrial development; the modernization programme following the Meiji restoration in Japan; and the Government's canal-building and the tariff and land policies adopted to foster industrial growth in the United States.

Early definitions of economic planning stressed the centralized nature of the process as well as its quantitative aspects. Thus, in 1947, Landauer defined economic planning as:

"... guidance of economic activities by a communal organ through a scheme which describes, in quantitative as well as qualitative terms, the productive processes that ought to be undertaken during a designated future period. To achieve the main purpose of planning, these processes must be so chosen and designed that they secure the full use of available resources and avoid contradictory requirements, making a stable rate of progress possible."¹

It has now become clear that planning may be meaningful and feasible even though it is neither centralized nor strictly quantitative. A broader concept of planning seems to be necessary, one that encompasses various governmental economic activities that often cannot be either strictly centralized or quantified, especially in developing countries. In this sense, planning means advance co-ordination of ideas and economic efforts in order to achieve specified targets in the manner most effective within the constraints imposed by the over-all socio-economic environment. The details of planning—the degree of aggregation, of centralization, of quantification, of formality, of authority and responsibility etc.—reflect ideological and structural economic differences, but the essential task of planning is the same whatever the ideology or structure of the country.

¹ Landauer, p. 13; for full reference see annex 3 under "Other sources".

Given the propulsive role of manufacturing activities, the complex and dynamic nature of industrial investment, the relatively large financial and economic requirements of industrialization, and the necessity for inter-sectoral linkages, the need for planning industrial development is obviously great. Although it is difficult to elaborate planning machinery that effectively integrates all the various elements of plan formulation and implementation in a consistent manner, attempts must be made to do so. Without either adequate formulation and evaluation procedures or serious and realistic implementation, industrial development cannot proceed in the co-ordinated manner necessary to achieve optimum utilization of the economy's resources for growth. This monograph offers a brief survey of the techniques and issues involved in industrial programming and project formulation, evaluation and implementation.

Chapter 1 discusses the general criteria to be used in formulation of plans. An industrial plan should incorporate an explicit strategy of industrialization. Its targets should be consistent, and the resources necessary to achieve them should be identified. The plan should be based on a dynamic interpretation of comparative advantage.

Chapter 2 discusses the requirements for implementing plans. The Government can decisively influence implementation through its policies, through the supports of various types that it may offer, and through action to eliminate red tape.

Chapter 3 considers the criteria for evaluating industrial projects to determine whether they are consistent with the Government's policy and the over-all industrial programme and are economically feasible. *Chapter 4* discusses the requirements for the successful implementation of industrial projects. Follow-up should be considered as important as formulation and evaluation.

Chapter 5 analyses the principal factors influencing the location of industry and the techniques of regional planning. These techniques should be adapted to the specific requirements of the country or region and to the level of planning skills available in developing countries. *Chapter 6* examines the data required for industrial planning at the three main levels of programming—the economy-wide, the sectoral, and the project level.

Chapter 7 gives an account of the issues presented to the International Symposium, the discussions held and the recommendations approved relating to industrial planning. *Chapter 8* discusses the role of the United Nations in assisting developing countries to formulate better plans and to implement them.

THE FORMULATION OF INDUSTRIAL PLANS

THE PRICE SYSTEM AND THE ALLOCATION OF RESOURCES

Among other things, the inadequacies of the price system in developing countries as a mechanism to ensure that individual economic decisions will in the aggregate reflect society's preferences and its economic goals make planning necessary. As one leading economist has expressed it:

"...private enterprise in many underdeveloped areas seems a rather weak candidate for the assumption of heavy developmental responsibilities; and the free market as a central agency in the direction of resource use leaves much to be desired."²

Some of the inadequacies of the price system as a means of allocating economic resources in developing countries stem from government policy itself. Others arise when the actual economic situation (particularly in regard to the geographic and occupational mobility of the factors of production) diverges from theoretical assumptions. The following situations may be used to illustrate this point:³

A new project to extract mineral ores is not commercially profitable, owing to high royalties demanded by the owner of the land. If the land is unutilized at present and shows no prospects for future economic utilization, the royalties ought to be looked at merely as an accounting item, not as an item of economic cost; thus, the project may be profitable from the point of view of the national economy.

A new factory, designed to use heavily taxed fuel oil as a source of energy, does not appear competitive *vis-à-vis* an older factory, which functions by burning its own waste. To make a valid comparison of the efficiencies of both factories, the tax on fuel oil must be deducted from the projected costs of the new factory.

² Mason, p. 61; for full reference see annex 3 under "Other sources".

³ Lewis, pp. 29—30; for full reference see annex 3 under "Other sources".

A decision has to be made to set up either a hydroelectric plant or a thermal plant. If the hydroelectric plant is to last for a longer period of time, and if the prevailing rate of interest for borrowing money for the project underestimates the real scarcity of capital in the economy, the cost to the economy of the hydroelectric plant will be more underestimated than that of the thermal plant. Thus, the hydroelectric plant may be chosen even though a thermal plant might be economically preferable

EXTERNAL EFFECTS AND ECONOMIC DECISIONS

Another basic source of inadequacy of the price system in allocating investment in developing countries is the presence of external economies. External economies are reductions in unit costs of one economic unit arising from expansions of output in another economic unit. Externalities (either external economies or diseconomies) arise mainly from the provision of infrastructure, from the interdependence of different activities, and from the characteristics of the supply of domestic capital (savings). An expenditure on infrastructure benefits all economic units that are able to utilize the social overhead capital created and not only those firms for which the infrastructural investment is directly made. Once a road exists, everyone can use it at little or no extra cost to the economy. It follows, therefore, that the individual firm's estimate of infrastructural cost—which it necessarily attributes only to its own expected production—greatly overstates the cost to the economy, since that cost will in fact be borne by all those firms that benefit from the new facility. Similar external effects result from the interdependence of different industries. For example, economies of scale in one industry may lead to external economies accruing to a second industry that uses the products of the first as inputs into its own production process.

External effects cannot in most cases be reasonably taken into account by an individual production unit using market prices and, as a consequence, isolated investment decisions are not likely to result in the level and mix of industrial investment that would be best for the economy as a whole. This consideration applies not only to the normally quantifiable externalities mentioned above, but also to those non-quantifiable external effects that influence the social environment—traffic congestion, air and water pollution, inadequate housing etc. These "social" externalities are present in their most obvious and unpleasant form in

industrialized economies, but they also occur in developing economies, though less obviously, and cannot be properly taken into account without some form of economic planning.

REQUIREMENTS OF A WELL-FORMULATED INDUSTRIAL PLAN

A development plan should incorporate an explicit over-all strategy for industrialization. This provides the basis for planning sectoral programmes and specific projects. All too often, however, the over-all strategy is missing, and industrial plans are formulated as a conglomeration of plans for individual projects. The result is that investments are not correlated; even individual projects may fail because of the absence of complementary inputs, infrastructure, foreign-exchange allocations and finance, for all of which a plan could have provided.

A basic requirement of a well-formulated plan is the systematic consideration of the interdependence of economic activities, particularly inter-industry relationships. Another basic requirement is consistency. Contradictions between different targets and between different instruments of the plan, and contradictions over time must be avoided or adequately reconciled. For example, a plan might explicitly set as goals both the maximization of employment and the maximization of production; if over-all productivity were higher in capital-intensive projects than in labour-intensive undertakings, the plan would be inherently impossible to implement, for the two goals would conflict.

A plan ought to be formulated to achieve a reasonable balance between available resources and economic targets; this would encourage policy-makers and investors to think along similar lines. Although this direct confrontation of means and ends is sometimes evaded in actual plans, those who formulate plans should attempt to bring it about.

Finally, a well-formulated plan should decrease economic uncertainty. This is not a whimsical and economically irrelevant requirement. Indeed, it may be of crucial importance to the success of a plan in an economy where individual expectations have been shaped by a long history of stagnation and low-level economic equilibrium. Unless entrepreneurs know that other projects are also going forward, that purchasing power will be expanding, and that essential infrastructure will be provided, they may not undertake a promising project even though it would be commercially, as well as nationally, profitable. Thus, an effective information programme is needed so that those who make individual economic

decisions in the country will have a clear notion of the goals incorporated in the plan and have some assurance of complementary action should they in fact behave as the plan indicates they should.

ELEMENTS OF PLAN FORMULATION

The two major tasks confronting planners are to define the targets and to identify the resources necessary to attain them. Whether the definition of targets ought to precede or follow the identification of available resources depends in large measure upon the problem at hand and upon past procedure. Thus on the one hand, general objectives cannot be formulated without some ideal of available resources; and on the other hand, clear and specific uses of resources cannot be decided upon without reference to a set of general objectives. Target setting is merely wishful thinking if it is not realistically based on a minimum number of facts; and conversely, resource identification is an empty exercise without an explicit set of goals.

The duration of the plan also needs to be specified. Planning for a thirty- or forty-year time span is not practical because no meaningful forecast can be made for such an extended period. Planning for a period of two or three years or less has little value, for the inevitable time lags involved in plan and project formulation, evaluation and execution make it likely that some of the events to which the plan relates will have already taken place long before the plan has been completed. Most plans, therefore, cover a period of four to five years. Such medium-term plans must, however, be evolved with reference to a longer-term view of the country's development. At the same time, they must be translated into concrete short-term programmes. These programmes, usually elaborated on an annual basis, can be looked upon not as independent plans in a true sense but as the primary tools for implementing the medium-term plan.

After the general targets have been set, their implications for more specific targets and for the allocation of resources can be systematically explored, and the medium-term plan can be translated into sectoral programmes and specific projects. It is at this point that those who formulate plans should strive above all for consistency. It is at this stage also that the notion of input "constraints" on growth can be most meaningfully introduced. In most developing countries, neither the assumption of factor substitutability nor the opposite assumption of total complementarity is relevant. In manufacturing, in particular, the actual possibilities for

factor substitution are severely limited. This means that—given a set of growth targets—a projected surplus of one factor cannot be used to compensate fully for a projected shortage of another factor of production. Even after fully exploiting the possibilities for substitution that do exist, there must still be a minimum rate of increase in each factor—capital, labour and absorptive capacity—if target growth rates are to be achieved. For instance, should the remaining minimum increase in capital required not be attainable even after labour substitution, the country will be faced with a capital constraint on growth.

Substitutability between imports and domestic inputs is also often limited. If after full use has been made of available domestic inputs, the projected rate of increase of imported inputs is less than what is required by the target growth rates, the country will be faced with a balance-of-payments constraint on growth.

Hence, the various input constraints on growth must be identified so that the plan formulators can focus attention on the means of relieving the most severe constraints and on the adjustments required in policy. In addition to setting targets and identifying resources, a plan should identify substitution possibilities and contain a set of conditional statements on projected results under different conditions.

TECHNIQUES OF PLAN FORMULATION

In theory, the various elements of a plan ought to be elaborated simultaneously.⁴ For example, the macroeconomic plan theoretically should not be evolved prior to and separately from the plans for individual projects; nor should input constraints on growth be separately identified; nor should the choice of industries take precedence over the choice of location, or *vice versa*. In practice, however, as Tinbergen⁵ and others have pointed out, simultaneous solutions are most often neither necessary nor desirable, nor are the data for them usually available. On the other hand, if the coefficients used in the set of equations describing the structure and operation of the economy are such that causal ordering and identifiability are possible, or if the matrix of coefficients is close to a causally ordered structure, planning can proceed by stages quite effectively. Only when causal ordering is not possible, owing to the

⁴ This is the view, for example, of W. A. Lewis, *op. cit.*, Chapter III.

⁵ Tinbergen (1964) p. 94 and (1962); for full reference see annex 3 under "Other sources".

characteristics of the structural equations, are simultaneous solutions desirable. Unfortunately, however, simultaneous solutions require a wealth of data and an abundance of planning skills, which are normally not available in developing countries. When sufficient data and planning skills are lacking, simple iterative techniques of plan formulation are likely to yield at least as good results as highly sophisticated techniques like simultaneous equations and at much less cost. Thus, provided that every stage of planning is constantly reviewed with reference to the other stages and that effective mechanisms for feedback of information exist, planning in stages appears to be generally preferable to the simultaneous determination of all the basic relationships needed for planning. Moreover, owing to the lack of data and simultaneously quantifiable relationships in most developing countries, simultaneous determination is not possible.

Other technical questions relate to the various methods for making forecasts and projections and for estimating economic relationships. Chapter 6 discusses these questions in relation to the problem of improving industrial programming data.

A possible general list of planning stages can be outlined as follows:

(a) The macro-stage:

- Elaboration and transmission of instructions on basic development aims from the Government to the planning agency;
- Collection of statistics and forecasts on supply and demand;
- Macro-forecast;
- Confrontation of forecasts with development aims;
- Formulation of the macroeconomic plan.

(b) The sectoral stage:

- Collection of estimates on income elasticities of demand;
- Collection of sectoral data on resources and evaluation of overall technical possibilities;
- Translation of macroeconomic targets into sectoral targets;
- Confrontation of sectoral demand and supply estimates and forecast with the sectoral targets;
- Formulation of the sectoral programmes.

(c) The project stage (discussed in chapter 4);

(d) The finalization stage: revisions, adoption, publication of the plan and programmes;

- (e) The implementation stage: feasibility studies, promotion, investment, product erection and entry into production.*

A DYNAMIC APPROACH TO PLAN FORMULATION

Planning is essentially concerned with the future. Economic development is a dynamic process, which calls for, among other things, a modification of the existing conditions of production. Thus, plans formulated exclusively on the basis of current social and economic conditions may tend to perpetuate the very state of underdevelopment they are supposed to alter. This is especially true as it relates to the planning of economic activities subject to rapid change. These activities tend to be those most recently undertaken in the economy, i.e. usually industry. The development of industry, and particularly manufacturing industry, must be planned on a dynamic basis, not on the basis of past or present conditions. Economic concepts need to be reinterpreted and plans formulated on the basis of the best possible estimates of the future structure of production and demand.

In an international economic framework, this implies that the traditional economic principles governing the international division of labour do not necessarily provide correct guidelines for the formulation of industrial plans in developing countries. The principle of specializing in those activities in which a country is relatively more efficient is essentially static. Following the dictates of comparative advantage interpreted in a static sense may well result in plans that reinforce, rather than change, the current state of underdevelopment. When industrial plans are formulated, comparative advantage should be interpreted dynamically; this may not indicate further specialization in those activities in which the country is currently most efficient, but rather new investment in those in which the country can acquire a comparative advantage in the future. Thus, estimates of possible future changes in the country's factors of production are of paramount importance in formulating plans. Clearly, not only changes that are "autonomous" in nature should be taken into account, but also structural changes that can be induced by government policy.

Changes in the factors of production can be effected by implementing new policies. For example, a country's planners may conclude that a

* Adapted and expanded from Tinbergen (1964) pp. 88—89; for full reference see annex 3 under "Other sources".

large sector of the work force is potentially very skilled in tasks requiring unusual manual precision and that the projected structure of production of the watch industry is such that a skilled manual labour advantage will result in an over-all comparative advantage in the world market. The correct strategy may then be to plan for development of a watch-making industry, while at the same time workers are being trained to develop their potential (but currently non-existent) skills. The use of dynamic factors in planning thus becomes the basis for a concrete strategy of development. The best strategy may not always be apparent under different conditions. It is necessary, therefore, that the preferred development strategy be made explicit through planning so that its social and economic implications will become evident.

THE IMPLEMENTATION OF INDUSTRIAL PLANS

ESTABLISHING A CLIMATE FOR INDUSTRIAL PLAN IMPLEMENTATION

Well-formulated plans require for their effective implementation a favourable socio-economic climate. Government policy can play a crucial role in creating such a climate. This is most obvious with respect to ensuring domestic tranquillity, without which it is almost impossible to achieve effective implementation, but it also applies to other factors.

The tax structure a country adopts may determine the success or failure of the plan. This is particularly true in countries looking to private investment to play a major role. First of all, the tax structure must allow for the accumulation of savings and encourage the channelling of those savings into the specific capital investments required by the plan. Tax policy should also encourage the expansion of existing industry. This can be done by reducing the tax liability on company earnings that are ploughed back into plant and product expansion. Special treatment for export earnings may also be desirable.

The exploitation of inter-industry linkages may depend upon a country's tax policy. Petroleum refining, an industrial activity that almost all developing countries wish to promote, will serve as an example. Because of the limited size of domestic markets, refineries often are of necessity small and do not include catalytic cracking; this results in a large excess of heavy residual oil. The residual oil could be used for other industrial purposes, but in some countries a tax on residual oil discourages this and at the same time increases the operating costs of the petroleum refineries.

Government tariff policy may also contribute to the success or failure of the plan. A recent UNIDO industrial feasibility study disclosed that in a particular developing country, despite a government policy of encouraging domestic production, some businessmen reported that import duties on materials used in manufacturing were higher in some cases than the

duties on imported finished products. Government officials invariably indicated to the survey team that redress was possible in each legitimate case. It is quite clear, however, that to encourage domestic production of goods vital to further industrial growth, all developing countries need to establish more rational tariff schedules and to abandon the present method of deciding duties case by case. Indeed, a strong argument can be made for using protective tariffs as a tool of plan implementation until fledgling industries can compete effectively with imported products. Care must be exercised, however, lest tariff protection become a permanent crutch to industries; this would deter them from increasing their efficiency.

A major obstacle to achieving plan targets in many countries is the absence of a capital market and the consequent difficulty of obtaining long-term loans for industry. Not only do low *per capita* incomes make it difficult to accumulate savings, but the lack of credit institutions also prevents the channelling of what national savings there are into industrial projects.

Provision of long-term financing thus becomes a major means by which a Government can help to translate plans into industrial growth. It has several advantages. First, it reduces the amount that the Government would have to invest if it undertook the project entirely on its own. Second, it can reduce the cost of financing, because the Government has access to funds at lower rates of interest than private investors do. Third, it enables the Government to obtain the possible advantages of private management. Finally, and perhaps most importantly, it can ensure that industrial investment proceeds in accord with national planning objectives, because the Government can selectively promote those projects that offer the greatest national benefit.

The chief means of channelling government funds into the industrial projects to which the plan gives priority has become the industrial development bank. Some 75 development banks have been set up in individual countries throughout the world. International institutions include the International Bank for Reconstruction and Development (IBRD) and regional development banks for Asia, Africa and Latin America.

Development banks, enjoying a semi-independent position, can scrutinize and influence the implementation of industrial targets subject to less political pressure than a government agency encounters. These banks, most often completely government-owned but autonomously managed, provide loans of from five to fifteen years for new industrial projects

or for the planned expansion of existing ones. They can also provide a means of supervision as well as technical assistance. As one writer has stated: "There is perhaps no more useful single action which a government can take in the industrial development field than assisting in the establishment of an independently operated industrial development bank."⁷

In the past few years an increasing emphasis has been laid on the quality of human resources as a factor in economic development. Several recent empirical studies have pointed out the high correlation existing between a country's educational attainment and its *per capita* income. Developing countries, therefore, must make manpower planning an integral part of their over-all development planning. Thus, it is absolutely essential to construct an educational system that will produce the types of manpower necessary for fulfilment of the industrial plan targets in the correct sequence.

Attention must be focused on all levels of education. Illiteracy is a deterrent to industrial growth. An industrial worker, even if he performs unskilled tasks, must be able to read instructions. Elementary education must be provided for that portion of the population which, it is planned, will be absorbed into industry. Even more important is the need for secondary education to create the cadre of skilled workers and lower-level supervisors envisaged by the industrial plan. Finally, most developing countries need to expand their pools of high-talent manpower—engineers, scientists, managers—through education at the university level.

Phasing the time for implementing the educational requirements of the plan is particularly important, since there is a long gestation period for the production of professional and technical skills. The entire stress, however, need not be on formal education because there are other important ways by which people acquire skills—on-the-job training, for example. It should be noted, however, that the adaptability of labour and the ability to assimilate on-the-job training is enhanced through formal education and through inculcation of work attitudes suitable for industrial employment. Thus, a balance must be maintained between formal education and on-the-job training.

The Government can also influence plan implementation considerably by setting up industrial promotion institutes. The plan may create attractive industrial investment opportunities, but potential investors

⁷ Bryce (1960) pp. 88—89; for full reference see annex 3 "Other sources".

may not take advantage of them simply because they do not know about them. While this is particularly true of foreign investors, it is often equally applicable to citizens of developing countries. An industrial promotion institute can help to remedy this situation. Part of its function is to advertise existing investment opportunities and to give information on future projects envisaged by the industrial plan, but a good institute will go beyond this and will inform potential investors of the results of the feasibility studies on which the plan has been formulated.

Many developing countries today are effectively engaged in such industrial promotion. Yet foreign investors still are often unacquainted with investment possibilities, and it may be necessary to establish information offices abroad. India, for instance, has an industrial promotion office in the United States, which has been very successful in encouraging American companies to invest in projects in which the Indian Government is interested. Smaller developing countries unable to operate promotion offices abroad on their own could co-operate, possibly on a regional basis, to establish joint industrial promotion centres in one or two major foreign cities.

Countries assigning foreign investment an important role in the achievement of industrial targets must go beyond mere promotion and offer foreign investors concrete benefits. All the incentives mentioned above for domestic investors should be offered to foreign investors. In addition, foreign investors often wish to receive exchange conversion rights and freedom to use expatriates in key positions.

The correct timing of expenditures for raw materials exploration and for the development of infrastructure is also an important part of a government programme for effective implementation of industrial plans. Generally, the resource potential of the country is unknown, and infrastructure, particularly the transport network, is poorly developed. Since the costs of infrastructure are high and they cannot be charged to any particular user, the Government must provide these facilities. The availability of social overhead capital often decisively affects the profitability of industrial investment. Thus, the adherence to a publicized schedule for the construction of infrastructure may often help to bring about the desired sequence of investments.

At one time it was believed that if the Government built sufficient infrastructure, industrial development would follow almost automatically. This, however, has not been the case, and experience has shown that the scheduling of the construction of industrial projects must be co-ordinated with that of infrastructure. Thus, if a manufacturing plant is to be built

at a particular location, transport must be made available when it is needed for shipment of raw materials and finished products, as must power with which to operate the plant.

Planning for infrastructure must also take into account inter-industry linkages. For example, expenditures for infrastructure related to a new mineral deposit should be phased not only in relation to the demand generated by the extractive industry but also to the anticipated demand of future mineral-processing industries. Industrial estates can also be considered as a type of infrastructure necessary to industrial development. The concept of infrastructure, however, should include not only economic facilities, such as power and transportation, but also social facilities. Since an improvement in the quality of human resources is essential for industrial development, the provision of health and educational facilities contributes to the proper climate for general plan implementation.

The lack of an industrial tradition in developing countries means that the level of the technical knowledge of entrepreneurs and managers of industrial projects is low. Chances of operating plants successfully, therefore, are small unless the Government provides intensive support. The provision of industrial services, particularly to small firms, is essential, as they can improve a firm's efficiency immeasurably. A government-sponsored technical assistance bureau can engage in research, provide information and offer consulting services—engineering, accounting, manpower training—that would otherwise be unavailable. Since quality control is generally a grave problem in the early stages of industrialization, especially with respect to products intended for export, adherence to the quality and homogeneity standards called for in the industrial plan is necessary to render the plan meaningful in practice.

Finally, a climate conducive to effective implementation of industrial programmes may be fostered by cutting "red tape". For example, the Government of India has found it advisable to relax controls in pricing and distribution in certain key industries, such as fertilizers and cement. Cutting red tape is particularly important in countries seeking to achieve industrialization primarily through private business. When new industrial projects must receive government approval, very often many different agencies are involved, and the private investor has to make the rounds, hurdling one barrier after another. A reduction in the amount of red tape would make it simpler to set up new industrial enterprises and would reduce the time lag between the formulation and implementation of projects.

ELEMENTS OF INDUSTRIAL PLAN IMPLEMENTATION

Programming should take into account the inherent administrative, managerial, institutional, financial, political and social factors that stimulate or limit a country's growth potential. A typical shortcoming in the planning process is exclusive concentration on the largely macro-economic framework for the development plan, dealing with aggregates based on broad generalizations (such as over-all capital-output ratios) while not providing for the translation of sectoral plans into individual projects.

Even if the planners go beyond the simple formulation of the aggregate framework, results will be meagre unless planning is accompanied and followed by well-organized implementation. Establishment of an administrative structure capable of both planning and implementing the programmes is thus a first requisite. There is no single over-all organizational structure that can be recommended for all countries, but all should guard against either excessive centralization or decentralization. Since different branches and levels of government are involved in industrial programming and implementation, adequate provision must be made for inter-agency co-ordination. Officials of all agencies, including those at middle and lower levels, must be aware of the industrialization targets and the means for their achievement. A high government official, preferably a department head, must have ultimate responsibility for programming and its implementation because only such an official would have the power to enforce inter-agency co-ordination. In practice, he must delegate adequate powers and authority to subordinates and must be prepared to support them when they encounter resistance to co-ordination directives. The personnel engaged in programming and implementation should be competent and experienced.

Implementation of an industrial programme entails the development of an integrated, time-phased plan of action. This requires balancing of time and cost considerations; continuous programming in greater detail as the programme progresses; periodic reporting and evaluation at all organizational levels of progress as measured against schedules and cost estimates; identification of current and potential bottlenecks followed by corrective measures to overcome them; and continual updating. "Networking" procedures have been developed and are becoming an important tool for implementing industrial programmes and projects in developing countries.⁸

⁸ These procedures are discussed in "Procedures for Programming and Control of Implementation of Industrial Projects in Developing Countries", UNIDO/IPPD/3; to be published as ID/SER. L/1 in 1970.

One of the greatest difficulties in implementation is to achieve intersectoral co-ordination. Developing countries are becoming increasingly aware that the growth of the industrial sector and the growth of other major sectors, notably the service sector, are interdependent. The production of synthetic fertilizers illustrates the complementarity of agriculture and industry, and the production of cement illustrates the complementarity of the construction and manufacturing industries.

A major block to inter-sectoral co-ordination stems from the fact that different ministries and agencies of the Government are responsible for the development of different sectors. Without co-ordination, the isolated programmes of many sectors may not come to fruition. For example, the successful implementation of plans for expanding fertilizer production, which are under the charge of the Ministry of Industry, may depend on the timely construction of adequate warehouses, which may be within the jurisdiction of a separate department, and on the parallel undertaking of an educational campaign by the Ministry of Agriculture to acquaint farmers with the advantages of the new fertilizer. If one of these agencies fails to carry out its role, the entire programme may fail, no matter how well formulated.

Inter-sectoral co-ordination is of extreme urgency with respect to the joint implementation of industrial and infrastructural programmes. Many types of infrastructural projects are bulky and require large expenditures. Unless they are constructed in conjunction with a number of directly productive projects, their rate of utilization will be low and thus the cost per unit of final output high. Similarly, if the industrial phase of the programming is implemented before the infrastructural phase, the industrial projects will suffer from severe inefficiencies. Again, the problems of co-ordination are not easily solved, because different agencies are responsible for industry, roadbuilding, railroads, power, house construction and the like.

Interregional co-ordination is also very important, particularly in countries with federal types of Government in which individual states engage in their own programming. Regardless of the autonomy enjoyed by regional bodies, the Federal Government is ultimately responsible for achieving consistency between national and regional programmes. A UNIDO Seminar on Industrial Location and Regional Development concluded that planning is more successful when regional organizations are given responsibility for execution of the national plan and authority

to adapt it to local opportunities and conditions than when planning is rigidly centralized.⁹

Intra-sectoral co-ordination is equally important. Industrial programming entails a dovetailing of specific project proposals into a consistent sectoral programme. In addition, policy must be established in conformity with plan priorities. Co-ordination between the public and private projects within the industrial sector is essential. Since certain industries almost require that major suppliers of inputs or industrial purchasers of their output be located nearby, the possibilities of building industrial complexes rather than individual projects should be examined.

The financial aspects of plan implementation must also be considered. The first step is to determine the investment funds needed and the timing of needs over the period of the plan. It is equally important to forecast the finances that will be needed as the parts of the industrial programme become operative and to allow for alternative assumptions about their successful implementation and operation. Finally, planning for industrial development must clearly indicate how the financial needs of the programme will be met.

Since a certain degree of error in forecasting financial needs is inevitable, contingency funds should be set aside. The normal tendency is to underestimate needs and overestimate resources, and this normally proves more serious than errors in the opposite direction. Underestimation of needs in relation to resources can lead to the exhaustion of funds in the course of the programme, with the result that activities essential to those parts already completed cannot be undertaken. As a result, the entire industrial programme can collapse.

In this connexion, it is essential to ensure that foreign exchange will be available throughout the plan period in the amounts needed and at the proper time in order to procure the imported inputs necessary for implementation of the plan. A consensus has developed among economists that instability of export earnings may often have very damaging effects on development, and particularly on industrial growth. Thus, even though total foreign exchange earnings for the whole of the plan period may come close to the predictions made when the plan was formulated, the damage caused by shortfalls of exports in a given year is normally much greater than the gain generated by an export surplus of the same magnitude in a different year of the planning period.

⁹ For full reference of the report see annex 3 under "United Nations Industrial Development Organization".

Recent development literature has identified an "import constraint" on growth, operating separately from the domestic constraints. Such an import constraint arises from the low substitutability of domestic for foreign inputs; under these conditions, growth may be limited by lack of foreign exchange even though domestic factors of production might be growing at a rate sufficient to achieve the development plan targets. Hence, when export earnings, and thus the capacity to import capital and intermediate goods, fall short of expectations, increased production of domestic substitutes cannot make good the deficiency. If it is not compensated for by use of national reserves or international mechanisms of compensatory finance,¹⁰ the entire industrial project for which the imported inputs were necessary may have to be abandoned. In view of the interdependence of different industrial projects, a significant shortfall of foreign exchange might bring the successful implementation of an entire industrial plan into question. Conversely, surpluses of foreign exchange above the expected levels often cannot be translated into faster industrial growth, owing to the lack of the complementary domestic inputs without which a new industrial project cannot be undertaken. Paradoxically, the more correct and consistent the industrial plan formulation has been, the more serious is the difficulty.

Because the financial aspects of industrial programming are so important, the agencies involved in planning must include investment and operational fund needs and scheduling in their plans and indicate the sources of those funds. Furthermore, the Government must assist in raising equity capital. The ability to raise funds domestically depends in part upon the creation of a capital market and a network of credit institutions. This can be done directly by the Government through an industrial development bank, via the sale of bonds to the public, or indirectly through guarantees of loans obtained by private investors. Thus, a fully developed financial infrastructure is not necessarily a prerequisite for effective implementation.

Obtaining foreign financial participation offers a number of advantages, including access to larger sources of capital and foreign exchange, and possibly to lower rates of interest and longer maturities on loans. The scope of this monograph precludes the possibility of discussing to any extent the costs and benefits of using foreign private capital for industrial

¹⁰ The International Monetary Fund established in 1963 a compensatory finance mechanism, and a scheme for supplementary finance is at present being debated by UNCTAD.

development. Sources of aid from abroad should be thoroughly investigated when industrial development plans are being formulated.

Effective implementation of industrial programmes requires the establishment of clear channels of administrative authority and responsibility. Of necessity there will be some sort of hierarchy, with the Government at the head, the individual projects at the base and specialized institutions in between, each element being responsible to the one above it. To fulfil its functions, the framework of the implementation system must include:

A clear definition of goals, responsibilities and authority for each element in the system;

Qualified personnel at each level;

The formulation by each element in the system, for its own guidance, of an effective implementation plan, with its resources and the targets laid down for it taken into consideration;

The collection, processing and dissemination of information about the performance of each part of the system and flexibility in relation to objectives; when sufficient data are available, computer simulation techniques can be used.

Unless each element of the system knows the portion of the industrial programme for which it is responsible and has the authority to pursue its objectives, the programme will not be realized. As the report on "Problems of Industrial Planning and Plan Implementation in the ECAFE Region" disclosed,¹¹ better administrative machinery through which to conduct economic surveys, appraise periodically the implementation of programmes and review plans is urgently needed. Most importantly, it is necessary to break plans down into their component parts, identify critical points and maintain vigilance over interrelationships. In India, both the Committee on Plan Projects and the Programme Evaluation Organization perform these functions, but the other countries in the ECAFE region do not have such bodies.

Close co-operation between plan implementers and the outside sources of financial or technical assistance is likewise essential, but it is often not achieved. In most cases the provider of finance will assume prime authority and responsibility for follow-up. This is all right as long as an adequate balance is maintained between a consciousness of costs and a determination to achieve industrial development.

¹¹ For full reference see *Industrialization and Productivity Bulletin* No. 11 in annex 3 under "United Nations Industrial Development Organization".

“Follow-up has been neglected for at least five reasons: reluctance of borrowers to co-operate after they have received financial assistance; delay in the appearance of follow-up's full burden; newness of the concept; relative lack of glamour when compared to project evaluation; and the institution's tendency following the negotiating period to let the borrower get on with the job.”¹²

The lack of close co-operation between planners and outside organizations providing aid is unfortunate, since these organizations have experts on their staffs who can offer advice that may prevent serious shortcomings during the implementation phase. These organizations can increase their effectiveness to the plan implementers by including on their follow-up teams members of the team who were originally involved in the formulation and evaluation of the programme. Such persons are already familiar with the plan and its objectives and are thus in a good position to assist with implementation.

The implementers should also work closely with the outside sources of aid because in the process of implementation they may encounter unforeseen problems that will require them to seek further aid. If the outside organizations are kept apprised of current developments, they are likely to be more sympathetic to requests for further aid. If not, they are more likely to turn a deaf ear to such requests, preferring to stand on their original commitments. This is most unfortunate because plans always need to be reappraised and changes in them are often necessary.

Finally, implementation requires control and evaluation of the programme's execution. In this way progress can be measured, favourable and unfavourable trends recognized at an early stage, corrective actions taken when needed, and the effectiveness of the agencies and personnel executing the programme evaluated. Control and evaluation depend upon the receipt of whatever information is needed to determine whether the programme is progressing on schedule. Consequently, the programme must frequently be reviewed.

Since circumstances inevitably change during the execution of the plan, modifications in short-term programmes must be made accordingly. For example, the plan may require that before Activity A, a critical activity, can be completed, Activity B must begin. If for any reason Activity B cannot begin on schedule, the planning agency should be

¹² J. D. Nyhart, “Organization of Professional Cadres for Industrial Project Evaluation, Selection and Follow Up”, in *Project Formulation and Evaluation*. Vol. I. Evaluation of Industrial Projects, p. 46 (ID/SER. H/1) (United Nations publication, Sales No. : 67.II.B.23).

informed immediately so that it can take appropriate action. It may decide to modify the short-term plans involving Activity A or to draw resources from some other less essential part of the programme so that Activity B can begin on schedule. Similarly, those responsible for planning should inform the implementers of any changes in their programmes that will affect implementation.

To summarize: it is essential to emphasize that consistent formulation of the industrial plan and effective implementation and follow-up are complementary activities and cannot substitute for one another. Both are necessary if planning is to exert the crucial co-ordinating and catalytic influences on industrial development of which it is potentially capable. Indeed, the more consistent plan formulation is, the more essential effective implementation becomes. A well-formulated industrial plan by definition takes into account and utilizes to the greatest possible degree those economic interdependencies that generate desirable externalities. But these interdependencies can work negatively as well as positively. Thus, a failure to ensure the execution of a part of the plan will have a far more disruptive effect on industrial growth if the plan has been consistently formulated than if it is only a rough outline of policy objectives. And conversely, unless the underlying programme has been adequately and consistently formulated, thorough and effective follow-up will have little effect on industrial development.

THE FORMULATION AND EVALUATION OF INDUSTRIAL PROJECTS

THE CONNEXION BETWEEN FORMULATION AND EVALUATION

The formulation of sound projects and their careful and systematic scrutiny represent the foundation of industrial development under any economic system. Industrial projects can vary widely in size, character and complexity; they can involve the creation of entirely new industries, the construction of new plants or the expansion of the productive capacity of existing ones.

Because of the strong desire of developing countries to industrialize, it might appear that project formulation would be easy. Yet, the fact is that there are few well-formulated industrial projects in developing countries. This has been attributed not to mechanical problems of preparation but to other unfavourable conditions. The United Nations Economic Commission for Latin America (ECLA) attributes this situation to the absence of a properly qualified entrepreneurial class prepared to take initiatives and assume risks¹³ and to an inadequate economic policy on the part of Governments.

Planners in any developing country could conceive of literally thousands of projects that the country might undertake. However, the possibility of undertaking them successfully may not exist. Thus, it is essential to determine objectively whether a particular project is feasible under the conditions prevailing in the particular country.

ENSURING CONSISTENCY BETWEEN THE PROJECT AND THE PROGRAMME

The particular project must be not only feasible but also consistent with the country's over-all industrial programme. For example, it might be feasible for a particular country to build a plant to manufacture

¹³ Scarcity of entrepreneurs—or, limitations on the “ability to absorb investment”—is also the cornerstone of much theoretical thinking on economic development. See, for example, A. O. Hirschman (1958) *Strategy of Economic Development*, Yale University Press, New Haven.

plastic hula hoops, but this might contribute nothing to further development; on the contrary, the plant would consume scarce resources that might better have gone into some other activity more closely related to the country's general strategy of industrial development. To avoid this situation, industrial priorities must be established for a prescribed period of time. Programmes ought to have a logical and chronological priority over projects.

No project, therefore, can be examined in isolation; rather, it must be studied in relation to the economy and to other projects in the development programme. The importance of macroeconomic planning and of sectoral programming must be emphasized, but broad sectoral targets still have to be translated into specific projects. In turn, an analysis of project proposals can lead to the modification and adjustment of broad sectoral programmes and of the over-all plan.

CONDUCTING FEASIBILITY STUDIES

When a project that is consistent with the industrial programme has been formulated in its broad outline, the next step is to conduct a study of its feasibility. This study must determine first of all how closely the general requirements of the proposed project can be met. It must ascertain how well the country's resources and facilities in various locations fit the needs of the proposed project. It must concern itself with the availability, quality and accessibility of the input needs of the industry: raw materials, power, fuel, transportation, labour, intermediate products, and even suitable sites.

Next, the feasibility study must determine the proper scale of operations. Modern technology generates for many industries economies of scale, i.e. reductions of input requirements per unit of output. Empirical evidence shows that for most industries costs are lower and labour productivity higher in large plants. Thus, to maximize their efficiency, many industrial enterprises will find it necessary to operate large plants. However, a typical problem faced in developing countries is that the limited size of the domestic market alone does not permit the construction of plants large enough to lower unit production costs so that the goods produced can compete with imports. Attempts to overcome this problem by building somewhat larger plants and attempting to export the surplus production can sometimes lead to further difficulties. For example, a plywood factory recently built in a developing country is reported to be

too large for the local market, and therefore must export part of its production, but it is too small to achieve costs that are competitive on the world market. The theoretically correct solution, i.e. investment in large industries of potential comparative advantage in the world market, is unfortunately a very difficult one to determine in practice.

When the scale of operations is being considered, the proper input coefficients must be determined. In some industries, notably continuous-process industries such as chemicals, input coefficients are largely pre-determined by technical complementarity, but in other industries it may be possible to substitute labour for capital, or one material or service for another. In fact, one of the recurring debates in development economics concerns the level of sophistication at which technology should be when it is transferred from the highly developed countries to those which are less developed. One view is that technology emanating from the already industrialized countries is geared to economies in which capital is relatively cheap and labour relatively expensive; since just the opposite situation prevails in the developing countries, less advanced technology, requiring the use of more labour, is what is needed. A contrary view is that the use of the latest technology is required to maximize production and growth.¹⁴

Whatever merits these theoretical arguments may have, the fact is that the possible choices are limited. For one thing, more highly labour-intensive technologies are not being developed today. Second, at least when American companies establish new industrial plants in developing countries, they introduce virtually the same technology they employ in plants in industrialized countries. Thus, the latest technology is usually introduced—more specifically, the proved latest technology, for companies are not willing to experiment with new processes in developing countries.

This does not mean that the technology transferred may not be modified. One of the major modifications that may occur relates to the scale of operations. While some plants are exact duplicates of plants in the United States (or the Federal Republic of Germany, France, the United Kingdom etc.), others are smaller. Because of the more limited markets in developing countries, plants erected in them are frequently scaled-down versions of plants in industrialized countries.

For example, the establishment in a Middle Eastern country of a plant to produce rubber tires and tubes illustrates how technology may

¹⁴ Galenson and Leibenstein; for full reference see annex 3 under "Other sources".

be transferred and modified. In this case the manufacturer duplicated an American plant, using the same blueprints and machines. However, not all of the sophisticated automatic devices were introduced, since capital was more expensive and labour cheaper than in the United States. Fewer overhead conveyances were provided, and more reliance was placed on the manual handling of parts. To this extent technology was "restructured" to suit the existing factor proportions. At least some degree of technological adaptation thus appears desirable in the formulation of industrial projects in the developing countries.

Once the technical feasibility of a project has been determined, the next step is to analyse its economic feasibility. This requires a thorough analysis of the present and potential market for the product, including export possibilities. The current trends in demand for the product must be examined and projected into the future in order to determine what share of the market might be captured by the proposed project. For final products, this can be done by projecting current imports, present domestic production and trends in world trade. For intermediate products, the situation in the markets for the ultimate products would also have to be analysed. Since domestic markets are often too small to justify undertaking new lines of industrial production, the possibility of exporting some of the production should be carefully investigated. Export possibilities may exist where raw materials are cheap or transport costs advantageous, or where other factors appear favourable in a dynamic rather than a static sense. If this phase of the feasibility study indicates that there is no market potential, no further investigation is warranted, and the project should be dropped.

The second phase of the economic investigation concerns comparative production costs. When the scale of production and the input coefficients, as determined by the technical feasibility and market investigations, are known, the unit cost of production must be determined through an analysis of all cost items: raw materials, fuel and power, labour, plant and equipment, management, marketing, interest charges, depreciation and taxes. This analysis of costs will enable the planners to determine whether the product will be competitive.

The financial aspects of the proposed project must also be included in the study of its feasibility. Both financial capital cost and working capital requirements have to be estimated. These estimates should take into account that construction usually takes longer in developing countries than in industrialized ones, that duties will have to be paid on imported materials and machinery, that workers will have to be trained

and that consultants may have to be hired. Certain planning costs also ought to be charged against the project. The financial structure of the project—that is, the proportion of the costs that will be allocated to capital shares or to long-term and short-term loans—should be carefully formulated. The timing of financial needs is also important. Funds must be available at each stage of the project: construction, machinery purchase, work-force training etc.

Estimates of the earnings—and hence profitability of the project—can be determined by subtracting expected operating costs (including depreciation and interest costs) from anticipated sales revenues. Break-even points should be estimated in order to determine at what minimum capacity operation is economically feasible.

The feasibility of a project may depend upon the amount of foreign exchange it will require. Since most developing countries are usually very short of foreign exchange, requirements that are large in relation to prospective foreign exchange earnings may doom an otherwise feasible project.

There are a number of auxiliary factors to be considered in evaluating the feasibility of a project. It is important to determine whether the available or planned infrastructure can handle the extra requirements that will result from the new project. The feasibility study will have already dealt with some of these questions, but it is wise to doublecheck to make sure that no significant points have been overlooked. A number of examples will illustrate this. An industrial project that will use large amounts of power may be judged to be feasible because cheap hydroelectric power is available in the country, yet the specific location chosen for the plant may necessitate the construction of transmission lines that will significantly increase the cost of that power. Or, the feasibility of a plant that will use domestic raw materials may have been judged favourably because there is rail transportation between the mining region and the plant; however, it may be that the present rail bed cannot handle the bulky materials without costly structural improvement.

Other types of infrastructure, such as housing and availability of health services, must also be examined. Housing problems are acute when projects are located in rural areas. If housing is not available in the immediate vicinity of the plant, it may have to be built. Or, if a bus line can be run from a town some miles away to the plant site, workers could live in this town. The absence of health services can undermine the efficient operation of a plant. For example, a plant in a Latin American

country was set up eight miles from the nearest large town having a hospital. Whenever there was any accident at the plant (and minor accidents were frequent because of bad safety practices), the injured employee had to be sent to town for treatment. Although under normal conditions he should have been able to return to his job within an hour or two of treatment, because of erratic bus service the employee usually could not get back to the plant site the same day. To remedy this problem, the plant was forced to establish an industrial clinic to handle minor accidents.

Another factor to be considered is the availability of manpower. Too often it is assumed that because there is a surplus of manpower in developing countries, recruitment of an industrial workforce presents no special problems. In practice, however, finding workers with the requisite skills may prove to be a formidable task. The feasibility study, therefore, should determine whether it is possible to recruit and train a workforce.

The question of management is of particular importance. Many students of industrial development are of the opinion that the most common reason for the failure of industrial projects is poor management. There is a world-wide shortage of managerial and professional manpower; and in developing countries, where rapid industrial growth is taking place in an environment lacking industrial experience and adequate training facilities, the problem is extremely acute.¹⁵

The feasibility study, consequently, should evaluate the possibilities of recruiting and training a cadre of managerial and professional personnel. There is a need for people with technical ability who can efficiently supervise both production and maintenance. Managers able to handle accounting and financial matters are needed. Personnel relations, which include training and supervising workers and handling labour relations, must be in competent hands. Public relations—with customers, suppliers and government agencies—are also of key importance. Marketing is considered to be a very important field in industrialized countries with market economies, but its value is distinctly underrated in developing countries. This is a mistake, because marketing can be crucial to the success or failure of a project. Those responsible for marketing conduct studies of demand, which provide the signals for plant and product expansion or contraction. They direct the sales force, which converts the feasibility of industrial production into a profitable reality. Finally, good management

¹⁵ National Industrial Conference Board, pp. 21—48; for full reference see annex 3 under "Other sources".

has the capacity to respond to change. It keeps abreast of technological and product developments throughout the world and introduces change into its own operations when the time is propitious.

CRITERIA FOR PROJECT EVALUATION

That an industrial project is feasible does not mean it is desirable, and the next step is to evaluate it in terms of the country's over-all objectives. Unfortunately, no single criterion can be automatically adopted to determine how essential a project is. Different criteria apply in different situations, and, moreover, experts disagree on which criteria are the most applicable.

Several criteria relate to the factor proportions that will be used. The simplest of these concentrate on a single scarce factor and relate the expected rate of return to its use. Since capital is a very scarce factor of production in developing countries, a low capital requirement per unit of output is often considered to be a key criterion in evaluating a project. Thus, projects may be ranked inversely according to their capital-output ratios. There are, however, a number of objections to the exclusive use of this criterion, including the implicit assumption that other evaluation factors are insignificant, i.e. have zero shadow prices.

A related criterion is the maximization of savings. Use of this criterion would favour projects with high capital-labour ratios, on the assumption that they would earn the highest profits and so yield the most savings. However, a project having a high capital-labour ratio cannot automatically be presumed to be more commercially or socially profitable in relation to output than one with a lower ratio.

Developing countries sometimes turn the criterion of factor proportions around, that is, they seek to utilize those factors that are in surplus supply. Since less developed countries tend to be long on labour and short on capital, use of this criterion would favour labour-intensive projects. In fact, the criterion of maximization of employment opportunities is often used in evaluating industrial projects. This criterion, however, also has its limitations. Its exclusive use could result in the undertaking of uneconomic projects, and, as already indicated, there are technological constraints upon factor substitutability. In view of the small industrial base of most developing economies, even investment in the most labour-intensive projects would make only a minimal contribution towards reducing unemployment.

A variation of this criterion—maximizing the use of domestic natural resources—also may not always be applicable. For example, a UNIDO mission investigating industrial possibilities in the lower Mekong basin concluded that it would be a mistake to attempt to establish a large steel plant in northern Thailand even though iron ore deposits are located there because the finished product would have to bear high transportation costs to its major markets in Bangkok and other coastal areas. Instead, it advised that, when steel production becomes feasible on a large scale, it would be better to locate a plant on the coast, where it would use higher-grade imported ore.

In view of the lack of technical know-how and shortage of skilled manpower, particularly at the managerial level, a “stepping-stone” theory, based on a criterion relating to plant size and technological complexity, is sometimes put forward. According to this theory, developing countries would first undertake projects involving fairly simple operations and then move on to more complicated ones as experience is accumulated. This sounds logical, but following it exclusively could lead countries to overemphasize small-scale manufacturing and to ignore genuine opportunities in large-scale, technologically advanced industries. Besides, this theory relies on an assumption of gradualism in industrial development, an assumption not validated by either the characteristics of modern technology or by experience. Project evaluation should not be based on preconceived notions as to proper plant size and complexity, but on a specific analysis of the costs and benefits of various possible projects.

Another variation of the scarce-factor criterion relates to foreign exchange requirements and prospective earnings. The reasoning here is that foreign exchange is the scarcest resource in most developing countries and the official exchange rate is consistently undervalued. Relying on this criterion would entail giving preference to projects that require little foreign exchange or offer promise of net savings of foreign exchange by generating new exports or replacing goods formerly imported. As with other scarce-factor criteria, the foreign exchange criterion implies setting all other related costs to zero. The weight to be given this criterion depends largely on whether the shortage of foreign exchange is expected to be short- or long-term.

Although the foreign exchange criterion has many drawbacks, foreign exchange considerations cannot be dismissed when industrial projects are being evaluated. Many industrial plants have had to cease operations simply because countries have run out of foreign exchange with which to purchase needed imports of machinery or raw materials. As in the case

of all criteria, this one should be given appropriate weight, but not to the exclusion of other factors.

Commercial profitability, a different type of criterion, is the one used by private concerns undertaking industrial projects. The aim of the firm is to maximize financial profits, and thus it will engage in industrial projects that offer the expectation of greatest long run earnings. Even so, several different ways may be used to calculate commercial profitability.

A simple method that a company may use is to determine the pay-back period, that is, the length of time required for the stream of cash flows from the investment to equal the original cash outlay. The major disadvantages of this method, according to the Economist Intelligence Unit, a research and consultancy organization in London, is that it does not adequately measure the profitability of the project and takes no account of the time pattern of earnings within the pay-back period itself.

A more usual way of measuring profitability is through rate of return on investment.¹⁶ The two most common methods of calculating this rate are: the "book" method, whereby the expected or "normal" profit is taken as a percentage of the average capital employed over the life of the project; and the "engineer's" method, whereby the expected or "normal" profit is taken as a percentage of the initial capital employed. The main defects ascribed to the return-on-investment measure are the difficulty of defining "normal" profit where the profit may vary over the years, the difficulty of defining the amount and timing of capital outlay where investment allowances are given and where working capital forms a large proportion of the capital invested, and the lack of allowance for inflation.

In order to take account of the value of money over a period of time, discounted cash flow methods are often used to determine profitability. In other words, the cash flows generated by an investment should be at least sufficient to repay the initial outlay and to pay an acceptable rate of interest on the outstanding balance. The discounting methods, according to the Economist Intelligence Unit, are as follows:

The internal rate of return, which represents the highest rate of interest an investor could afford to pay without losing money on his investment if all the funds to finance the investment were borrowed and the loan, principal and accrued interest were repaid by application of the cash proceeds;

¹⁶ Terborgh; for full reference see annex 3 under "Other sources".

The net present value (NPV), which is found by discounting all future net cash flows arising from the project at an interest rate equal to the opportunity cost of capital;

The annual capital charge (ACC), which can be used when the net capital flow is fairly constant; it charges depreciation on a sinking-fund basis, so that in addition to desired profit, the entire capital invested in a project will be recovered at the end of the project's life.

The major advantage of the criterion of commercial profitability is that it is an objective criterion. Nevertheless, it is clearly not the best measure to use to evaluate industrial projects from the national point of view. Normally there are significant divergencies between commercial profitability and profitability in terms of national economic development. Such divergencies arise because the criterion of commercial profitability cannot take into account the external effects of projects and because social rates of discount, reflecting the community's preference for present or future consumption, may differ from private rates of discount, and especially from private foreign rates of discount. It has been advocated, therefore, that the proper criterion to use is that of national economic profitability. This is actually a ratio of the sums of a number of different criteria, i.e. the ratio between the appropriately weighted benefits of a project and its appropriately weighted costs in terms of the country's national development objectives.

MEASURING NATIONAL PROFITABILITY

As defined by A. K. Sen, "social benefit-cost analysis" is essentially a tool to formulate and evaluate projects in terms of the explicit national objectives that underlie development planning.

"The social benefit-cost analysis tackles tactical questions at a project level of the product mix, the size of the plant, its location, the choice of technological processes, the use of different raw materials, factor proportions, the degree of specialization, opportunities for future expansion, time phasing, etc., so that projects are formulated and evaluated in order to fulfil the objectives of the over-all plan, including the sectoral programmes."¹⁷

It must be borne in mind, however, that it is not the function of the project evaluator to determine what the national objectives are. This determination, as well as the relative weights attached to the various

¹⁷ For full reference see Sen, p. 25 in *Industrialization and Productivity Bulletin* No. 13 (listed in annex 3 under "United Nations Industrial Development Organization").

objectives, and the social rate of discount reflect the judgements of the community as made by its highest political and administrative leadership. When a technician evaluates a project strictly in terms of commercial profitability, he is in effect usurping the functions of the policy-makers. Policy-makers must, therefore, either clearly indicate to the technicians what weights are to be attached to different planning objectives or run the risk of abdicating their function and allowing whatever strategy of industrial development has been decided upon to be nullified.

Since a major shortcoming of the evaluation of projects in terms of commercial profitability is that it fails to take account of external effects, social benefit cost analysis must of necessity attempt to do so. The external effects of projects can include both costs and benefits. Among the principal external benefits resulting from industrial projects are the formation of a skilled labour force and the acquisition of technical know-how. Although there is no ready-made formula, the evaluators should attempt to incorporate these external effects into their calculations of the profitability of different projects. A scale of weights can be devised that will give some rough measure of the contribution of different projects to the future productivity of labour.

Other types of external effects that should be considered include those in the area of social and economic infrastructure—education, health services etc. An evaluation based on the criterion of commercial profitability would not include these real costs to the country, although in reality they should be allocated to the cost structures of the individual industrial projects responsible for them.

Among the most important external effects of industrial projects are those generated by inter-industry relations. The creation of a new industry may generate the growth of suppliers of inputs ("backward linkages", which tend to generate a "compulsive" sequence) and/or constitute the basis for investment in industries that utilize its products ("forward linkages", which tend to generate a "permissive" sequence).¹⁸ Any project will have indirect effects because it causes changes to take place in the rest of the economy. The effect on the demand and supply of goods produced in other industries should be taken into account in the evaluation of the project. According to Harberger,¹⁹ the task of measuring indirect benefits can be reduced to three steps:

¹⁸ The terminology and the theoretical reasoning are taken from A. O. Hirschman, *op. cit.*

¹⁹ Harberger in *Evaluation of Industrial Projects*, p. 239; for full reference see annex 3 under "United Nations Industrial Development Organization".

Ascertaining those industries or activities in the economy for which marginal social benefit is likely to differ from marginal social cost;

Estimating the magnitude of difference, for each industry, per unit change in its output;

Estimating the likely change in the output of such industries as a consequence of the project being evaluated.

Commercial profitability is calculated in terms of the market prices of inputs and outputs. In reality, however, the markets of developing countries are far from perfect, so that the equality of market prices with the actual social opportunity costs of inputs and outputs cannot be presumed.²⁰ National economic profitability, on the other hand, is calculated on the basis of "shadow" (or "accounting") prices, which are estimated prices, arbitrarily assigned to inputs and outputs to reflect their anticipated national economic scarcity, particularly in the light of the multiple targets of the national development plan.

The labour market provides an excellent example of the type of market imperfection that requires the use of shadow prices. Since in labour-surplus economies the market wage rate is far above the social opportunity cost of labour, using the market rate to evaluate the benefit or cost of projects to the society or country as a whole is plainly misleading. If sufficient qualified workers can be drawn from the ranks of the unemployed, no sacrifice of alternative output need be made, and some economists (Tinbergen, Kahn, Lewis) have suggested even setting the shadow price (social opportunity cost) of labour in developing countries at zero. Others have gone even further and advocated a negative shadow price, based on the argument that since unemployment is a social evil, extra employment is a direct benefit rather than a cost to the economy.

Another argument is that the shadow price of labour should be set equal to the wage rate for agricultural labour. Even this claim must be thoroughly probed, for in practice it is usually not possible to obtain even the most unskilled labour in urban areas at wage rates similar to those paid to agricultural workers. Harberger argues, therefore, that the shadow price of labour should be based on the wage that is required to

²⁰ Social opportunity costs are the estimated costs to the particular society (or economy as a whole) of using the required factors of production (such as labour, capital, foreign exchange and natural resources) in one project or undertaking compared with using them in all other existing or anticipated projects or undertakings.

attract labour from agricultural to industrial employment, plus an adjustment factor reflecting the higher cost of providing social overhead facilities (housing, transportation facilities, food distribution and other community services) for the workers and their families.²¹ Furthermore, the general scarcity of skilled workers means that the shadow prices (costs to the society) for the more highly skilled grades of labour will be close to their market prices. Indeed, using market wages for skilled labour may underestimate the opportunity costs of such labour in a developing economy. Finally, social benefit-cost analysis must make allowance for a reduction in the gap between market and shadow wages as economic development proceeds and the market price mechanism improves.

Setting shadow prices for a project's raw material inputs is also the subject of controversy. Many planners argue that this is necessary because the social cost of production of the input may be lower than its market price. The rejoinder is that although shadow prices may in some cases be justified for such inputs, equivalent results are achieved by generally valuing all material inputs at their market prices and considering separately, as indirect benefits of the project, any surplus of benefits over costs generated in the material-producing industry as a direct consequence of the project in question.

Since many countries establish rates of foreign exchange that tend to overvalue their currencies, there is a strong case for fixing a shadow price for foreign exchange higher than the official rate.

Use of a shadow price for capital can yield an evaluation of a project totally different from that obtained through the use of market rates of interest. This is to be expected, because the choice of the time period and rates of interest to be applied within it may be very different when considered from the individual and national points of view. The market rate of interest is supposed to represent the preference of the population as between current and future consumption, as well as the productivity of private capital investment, which represents the opportunity cost of public sector projects.

In the early stages of a country's development, when living standards are low, the population will prefer present rather than future consumption. Yet rapid industrialization may require the sacrifice of present consumption in favour of capital accumulation. The individual attitude may be described by Keynes' famous dictum: "In the long-run, we are all dead." The country, however, must also consider the welfare and preferences of

²¹ Harberger, *op. cit.*, p. 36.

future generations. The solution chosen by some highly industrialized countries has been to assign a low weight to growth—this favours present consumption over future consumption.

The authoritarian solution to this problem is to disregard the preferences of the present generation. Democratic solutions to the conflict between greater consumption today and greater consumption tomorrow are not easily achieved. Even if the population as a whole were willing to make sacrifices on behalf of future generations, this cannot be easily translated into individual behaviour. Each individual might be willing to forego current consumption if everyone else would do so, but since the market mechanism does not allow him to make such a contract with others, he behaves otherwise.²² All these considerations suggest that social rates of discount lower than the market rates of interest for the corresponding periods should be chosen. Harberger warns, however, that the use of low rates of discount in evaluating benefits and costs may lead to the acceptance of more projects than can be financed.²³ This in turn may lead to a selection of the wrong projects and to insufficient savings within public projects, savings which should be contributing to national capital formation.²⁴

Income distribution within the present population and between generations can be influenced by the weights assigned to various national objectives when the national profitability of projects is being evaluated. This is done in effect by many countries through policies designed to aid lagging regions. In these cases, Governments have decided that the output created in a poorer region is more valuable than the same output would be in a richer area because it helps to equalize the regional distribution of income. It must be recognized, however, that such policies could result in severe retardation of the country's over all rate of industrial growth, and, as a consequence, ultimately work to the disadvantage of the people in both the poorer and richer areas.

To sum up: social benefit-cost analysis is a method for measuring the national profitability of proposed projects. Its use enables Governments to decide which industrial projects deserve priority and which should be discouraged. It is extremely difficult to determine proper shadow prices to use in doing this. A simpler method is to use commercial profitability estimates as a base and then to make adjustments to reflect more nearly

²² Sen (1961 and 1965); for full references see annex 3 under "Other sources".

²³ Harberger, *op. cit.*

²⁴ Sen in *Industrialization and Productivity Bulletin* No. 13; for full reference see annex 3 under "United Nations Industrial Development Organization".

the true social costs and benefits, as determined by the objectives of the national plan. The use of linear programming models for the entire economy to obtain appropriate shadow prices is not suitable for developing countries. Technicians capable of applying these techniques are lacking, as are data; and the characteristics of the economy must be so oversimplified as to make the resulting shadow prices unreliable. More will be said on programming methodology and data requirements in later chapters.

THE IMPLEMENTATION OF INDUSTRIAL PROJECTS

Project planning is usually subdivided into formulation, evaluation and implementation. This classification seems to have arisen because the three phases of project planning are generally carried out by three separate agencies: formulation, by a firm of consultants or a project bureau; evaluation, by a financial corporation or bank and/or a planning agency; and implementation, by a private or public executing agency. There are inherent dangers in this three-tiered institutional set-up, and they show up most strongly in the implementation stage. Problems of implementation have already been discussed with respect to the formulation of industrial programmes, but most of them apply equally to projects, and there are some additional ones to consider as well. Probably the most important step is to ensure that "programming" does not cease at the pre-project phase, when provisions are made for investment, but is stretched to encompass the post-project phase, when the yield from the investment is to be realized. Proper techniques should be developed and specialized organs set up to deal with the execution and follow-up of projects in order to attain reasonable norms of efficiency with respect to the utilization of installed capacity, costs of production, productivity of labour, maintenance of equipment and quality control.

CONTINUOUS RE-EVALUATION AS AN IMPLEMENTATION TOOL

Since a number of years may elapse between the original formulation of a project and the time at which it is to be implemented, constant review of the original formulation is necessary. Although the project may have appeared to be desirable when it was first evaluated, in the interim many changes, endogenous or exogenous, may have occurred that will put the project in a new light. For example, the processing of a domestic raw material may have been expected to enhance export earnings, but a new synthetic may have subsequently been invented in an industrialized

country. Similarly, projects originally evaluated unfavourably may make more sense later. An example of this might be the initial rejection of a project to process a local raw material because of high costs of extraction or production, but an increase in foreign production cost or a decrease in transport costs may now make the local price internationally competitive.

ENGINEERING REQUIREMENTS

Once a project has been favourably evaluated from a national profitability point of view, the next step is the preparation of engineering designs, drawings, and specifications. The engineering requirements must be related to the site for the project: soil and foundation testing, water analysis, detailed plans of plant layout, transport linkages, water supply, drainage and waste disposal. This has to be followed with the design of process equipment and of structures.

CONSTRUCTION DELAYS

Construction delays are one of the most serious obstacles to implementation in developing countries. It is most important, therefore, that realistic schedules be developed showing the time required for the construction of each detailed item and the sequence in which items should be ordered, built and installed. Contracts with private firms should specify heavy penalties for failure to complete construction or deliver equipment on time. Sometimes unnecessary delays result from inefficiencies on the part of government administrative agencies. For example, permission to import essential equipment may not be granted until long after it is needed. In this case both the project management and the agency may be at fault. Project management should apply for all necessary licences and permits well in advance and should calculate the time required to receive them when drawing up schedules, and government agencies should streamline their procedures so that they do not become automatic obstacles to industrialization.

FINANCIAL AND ORGANIZATIONAL STRUCTURE

The financing of the project is another key aspect of implementation. The total costs of the project, including capital investment and working capital costs, should be determined. A common implementation problem is the failure to guarantee the continuity of financial assistance; funds

are provided for construction of the project, but not for operating it efficiently once it is built. Amounts already spent and estimates of future expenditures should be detailed to guard against omitting any category of costs. Then the sources of money—private or public—must be determined, and the amount that is to come from each. The form in which funds are to be sought—capital or loans at varying terms—must also be decided.

The organization of the management responsible for implementing a project is of paramount importance. Every stage of implementation must be carefully planned, and all aspects—engineering, recruitment and training of workers and financing—co-ordinated. Unnecessary delays and costs are often encountered because vital organizational aspects of implementation have been overlooked.

THE OPERATIONAL STAGE OF THE PROJECT

The second aspect of planning for implementation deals with the project in its operational stage, and experience indicates that this is a major area of weakness. Many industrial projects, although apparently well-conceived, turn out to be inefficient, high cost operations, typically suffering from excess capacity and poor equipment and technology. One reason for lowered industrial efficiency is the tendency in some cases to link external assistance exclusively with the development of new projects without giving sufficient attention to the need to provide working capital (raw materials, spare parts and other industrial components). Planning, therefore, should ensure that sufficient financing is available, and that the equipment and machinery as well as raw materials, fuel and power and other inputs are the proper ones and are ready on time.

With respect to manpower, the planners must forecast the total work force that will be needed to man all shifts, classify the employees needed by grade and skill, and determine at what stages of construction they will be recruited. Such planning must be done in advance because skilled workers may have to be recruited from other areas of the country. Since it is difficult to move substantial numbers of workers, it is often necessary to establish local training centres, and temporary buildings should be provided for this purpose. To capitalize the training costs, the early planning stage should include an estimate of training requirements, including the number and types of instructors, and all these costs should be built into the financial structure of the project so that funds will be available when they are needed.

MANAGERIAL ASPECTS OF PROJECT IMPLEMENTATION

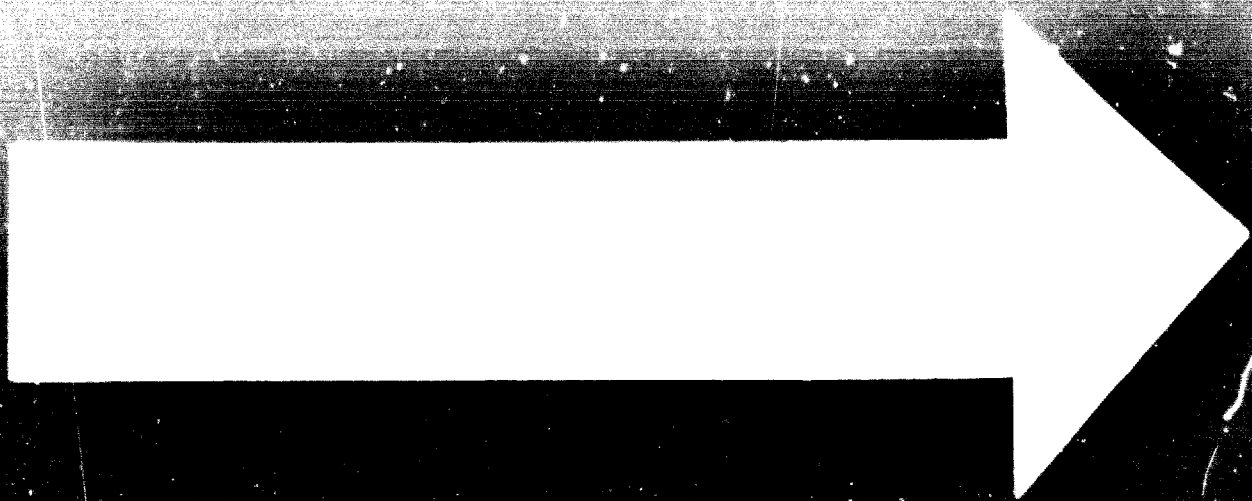
Although management is the key to the success of an industrial project, most developing countries are sorely deficient in this area. Among the common problems are an imperfect understanding of the functions of management, especially top management; an absence of clear lines of authority and responsibility; a lack of experience; reluctance to exercise the necessary leadership or, at the other extreme, to delegate authority to subordinates; insufficient cost-consciousness; inability to use proper accounting tools; disregard of personnel considerations; and, most importantly, underestimation of the value of marketing. A prime requisite in project implementation, therefore, must be the recruitment and training of the managerial cadres. This can be facilitated by the provision of consultants from a national productivity bureau, the hiring of foreign consultants and the use of technical assistance experts from UNIDO and other international agencies.

Local management can be strengthened in various ways. One way is to define the objectives of the project consistently, clearly and in quantitative terms and to hold management responsible for achieving them. Second, incentives can be offered to induce management to act in the most efficient manner. Managers, for example, may be paid bonuses when they meet time, cost and quality schedules. Even if the project is a purely governmental undertaking, attempts should be made to ensure its operational autonomy; the managers should be removed from the regular civil service structure and granted as large a degree of autonomy as is necessary for efficient operations, subject only to the requirements of the project and to periodic scrutiny by the public authorities generally responsible for implementing the industrial plan.

One advantage of securing foreign participation in industrial projects is that it provides the means of obtaining the managerial and technical manpower required, and in the implementation of projects this is even more important than foreign financing.

THE NEED FOR FOLLOW-UP AND INFORMATION FEEDBACK

All too often, great care is devoted to formulating and evaluating projects but their implementation is neglected. To avoid this situation, equal stress must be placed on follow-up. This can be done by setting up in the agency responsible for project formulation and evaluation a

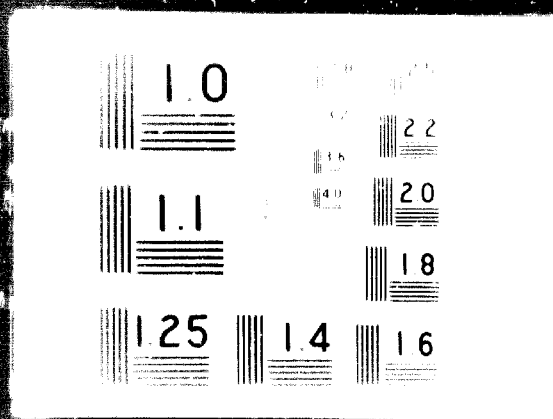


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separate department for follow-up. H. T. Parekh, General Manager of the Industrial Credit and Investment Corporation of India (ICICI), suggests that follow-up begin as soon as the funds for a project have been authorized. ICICI, for example, requires the submission of reports every quarter during the construction phase, every month in the initial stages of production, and every quarter thereafter. These reports cover both the physical and financial progress of the project. The information is then compared with estimates and scrutinized to anticipate problems that may require special attention. However, such periodic reporting is a waste of managerial time unless the information is systematically evaluated and specific action taken where needed.

Once potential trouble spots have been identified, through the examination of the periodic reports submitted, the supervising agency, whether development bank, central planning bureau or Ministry of Industry, may be able to help the project management overcome the problems. Thus, if additional funds are needed, financing may be arranged before work on the project grinds to a halt. If delays are being encountered in securing government permission for necessary activities, the supervising agency may be better able to expedite such permission. If technical weaknesses within the management of the project threaten delays, the agency may be able to secure outside consultants to fill the gap.

But follow-up consists of more than the periodic submission and examination of reports. Project managers may hesitate to report on their difficulties, or they may be so engrossed in their work that they are not aware of potential roadblocks. The supervising agency itself should periodically send its personnel to check on projects in preparation and operation. Since the implementation problems encountered are extremely diverse, the follow-up staff must include individuals with an adequate background in the professional disciplines of economics, accounting and engineering. They must be able to take an over-all view of the problems facing the project and suggest remedies for solving them. The ability to do this will grow in time because the follow-up staff, by being exposed to a myriad of projects, will gain a breadth of understanding and experience that is seldom obtained by managers of individual projects.

REGIONAL AND LOCATIONAL ASPECTS OF INDUSTRIAL PLANNING AND PROGRAMMING

A GENERAL PERSPECTIVE

Regional industrialization planning is intimately connected with the national distribution of industry, and it is related to the broader question of regional development. Decisions as to the location of industry are instrumental in most cases in determining the pattern of growth of the various regions of a country. Often the decision on where to locate a new project can be as crucial to industrial development as the decision on when to undertake it or the decision on whether to undertake the project at all.

The question of simultaneous planning versus planning by stages arises once again. And again the answer is the same: the actual conditions prevailing in developing economies make it both possible and desirable, as a rule, to proceed by stages. Thus, either country-wide sectoral production planning or territorial production planning may have priority, provided that the national sectoral programme is revised in the light of the results of regional studies, or that the regional plan is revised in the light of the results of the national sectoral studies. The sequence chosen is usually the one that more closely suits the perspective of the planners. If planning targets relate mainly to the industrial development of the country as a whole, sectoral planning, on a national basis, will precede regional planning; and those areas will be selected that are economically most suitable for the industries chosen. If the development of a specific area in the country is given priority, territorial planning will have precedence, and those industries will be selected that are especially suited to the regions chosen for development. Both sectoral and locational planning are necessary elements of national planning: a failure to "regionalize" a national sectoral plan will damage the prospects of success of the sectoral programme itself, and conversely, a failure to determine which industries are most suitable for the regions chosen will damage the effectiveness of regional plans. Again, the key lies in consistency in the

formulation of the plan. Plans at one geographic level must be consistent with plans at any other geographic level (whether regional or urban) and with the concrete locational decisions for individual projects. In addition, adequate implementation and follow-up of the locational plans are necessary.

Central to a consideration of the regional and locational aspects of industrial planning is the conflict between national growth and the industrialization of less developed regions within a country. Debate on this subject has crystallized into two opposing viewpoints. On the one hand, it is argued that a concentration of industry in certain regions is a natural tendency for most developing countries; that a number of factors make location in one region much more profitable (on the basis of both commercial and national profitability criteria) than dispersal of industry throughout a number of regions; and that, therefore, attempts to counteract this tendency are either futile or harmful, or both. On the other hand, it is argued (usually without proof) that the external effects of the regional concentration of industry are negative, that private locational decisions favouring further industrial concentration in one or two regions are correct only from the point of view of commercial profitability, and hence, that planning directed towards preventing the regional concentration of industry is both fair to the less developed regions of a country and better for national industrial development. The conclusion of a group of experts convened by UNIDO to examine problems of regional industrial planning supports the first point of view.²⁵

As a general rule, the development of a region ought to be viewed as a part of the national welfare. The broad objective of national planning is to increase national welfare, all components of which are interdependent. The general problem thus consists of harmonizing the regional development objectives of the plan with the other objectives of the plan, and particularly with that of national economic growth.

Thus, in principle, the inclusion of regional goals in industrial programmes is subject to a simple rule: if raising the level of development of a specific region of a country is a national objective, and if choices as to industry and location are based on the criterion of national profitability, the benefits and costs of a sectoral programme or of a project can be weighted accordingly. In other words, if planning goals are clearly specified, if the economic consequences of planning choices are quantifiable in some manner, and if the various levels of planning are consistent

²⁵ *Report of the Interregional Seminar on Industrial Location and Regional Development* (ID/19) (United Nations publication, Sales No.: 69.II.B.22).

with one another and realistically formulated, social benefit-cost analysis can be readily used to evaluate the (weighted) desirability of a new industry or project. Such a state of affairs does not, however, always exist. It is well, therefore, to emphasize that from the point of view of national industrial development (admittedly only one of the objectives of planning), for most developing economies concentration of industry in one or two regions can be considered necessary for successful industrialization. Often the choice is not between locating a new industry in region A or locating it in region B, but between having an efficient new industry in region A or not having an efficient new industry at all.

FACTORS OF INDUSTRIAL LOCATION

As noted earlier, the profitability of industrial investment is partly determined by the location of the productive facilities. Various factors influence the choice of location of a new industry or project, and they should all be taken into account when the geographic distribution of industry is being planned. The principal locational factors are discussed below.

Land

In the strict sense, land provides the actual site of industrial plants, and siting characteristics must be carefully considered in relation to the technical requirements of the project. In the broader and more relevant sense, "land" includes the availability of natural resources and natural energy, and is a primary factor of location. Clearly, natural resources are not evenly distributed throughout the territory of a country. When raw materials or hydroelectric or natural gas energy account for a high proportion of total production cost, when substitutability with other factors of production is low, and when transport costs for the raw materials are high, the locational pull of the availability of raw materials may decide the choice of location.

Labour

The location of industry is also influenced by the geographic distribution of labour. In turn, different industries are affected to varying degrees by the local availability of skilled labour. If labour accounts for a high

proportion of total cost, if other factors of production cannot be substituted for it to any great extent, and if its geographic mobility is low, it may be the dominant locational factor. In general, industries that depend largely upon unskilled labour are significantly influenced by wage differentials in alternative locations. However, in developing countries, where unskilled labour is normally available throughout the national territory, the locational influence of unskilled labour is relatively minor. Since skilled labour is scarce and tends to be concentrated in particular places, it is often a primary determinant of the location of industries that depend largely upon skilled labour, particularly in the areas of technology and management. The UNIDO expert group concluded that it is extremely difficult in developing countries to persuade skilled labour to move to underdeveloped regions. When rational location of an industrial project requires that labour be induced to make such a move, thorough preparation is necessary, and the costs of the move must be weighed carefully.²⁶

Capital

In market-economy countries the third major production factor also plays a role in the location of industry because, contrary to traditional assumptions, capital is not perfectly mobile geographically. When industries with high financial capital requirements do not enjoy equal access to capital markets in all localities, they will take the differing costs of financing into account in deciding on location. That the mobility of capital is often limited is shown by the fact that the commercial banks appear to favour regions with industrial traditions, and new projects in an existing industry may tend on this account to locate near existing productive facilities.

Transport

Locational planning is basically concerned with the movement of goods and services, and hence transport costs are a crucial element in this area of planning. The choice of a means of transport depends on numerous factors related to the structure of the industry and of the country as a whole. In general, for any given medium of transport, the transport

²⁶ *Ibid.*

costs per mile decrease with each increase in the distance covered, particularly in transport media which require heavy investment in terminal facilities and for which pick-up and delivery costs are high.²⁷ There is a consensus that a developing country should not try in the early stages of development to create a comprehensive transport network and that transport investment should precede by as little as possible investment in other activities. The UNIDO expert group concluded that the appropriate objective in transport investment, and in investment in infrastructure in general, is "to ensure a level of infrastructural capacity which is in line with projected needs without freezing an excessive amount of resources".²⁸ Other writers on the subject of regional planning hold similar views. Chenery, for example, argues that the heavy concentration of public investment in infrastructure in southern Italy has not resulted in substantial improvement of the economy of that region;²⁹ and Owen concludes that transport projects "built on the chance that development would follow have led to costly disappointments...".³⁰ A generalization to be drawn is that pushing any single planning instrument too far may cause excess capacity and waste without substantially benefiting either national industrial development or the region itself.

Inter-industry economies

External economies deriving from inter-industry linkages have become one of the most important factors of location. Correct plan and project formulation requires a systematic examination of the inter-industry effects of investment. A number of recent studies have concluded that inter-industry relations are probably even more important as a factor of industrial location in developing countries than in developed countries, and that the existence of such linkages is a powerful stimulus to the geographic concentration of industry. The location of a new industry in a region may generate the growth in that region of suppliers of inputs or facilitate the rise of industries that use its products. Inter-industry economies can lead ultimately to the formation of a vertically integrated industrial complex. It has been found that industries exhibiting

²⁷ Hoover; for full reference see annex 3 under "Other sources".

²⁸ *Report of the Interregional Seminar on Industrial Location and Regional Development* (ID/19) (United Nations publication, Sales No.: 69.II.B.22).

²⁹ Chenery; for full reference see annex 3 under "Other sources".

³⁰ Owen, p. 191; for full reference see annex 3 under "Other sources".

high "forward linkages", i.e. those producing to supply intermediate demand, are highly concentrated geographically, and that the regions in which they concentrate tend to have a faster rate of industrial development.

Urbanization economies

The term refers both to the reduction in production costs arising from an increase in the size of urban areas and to the advantages of locating industries near cities. There are several reasons why urbanization economies occur. Plants located in or near cities are able to utilize the services of laboratories and training facilities; they benefit from the availability of infrastructure and have ready access to commercial and financial institutions. Moreover, it has been stressed that in developing countries such a centralized location has enormous importance because it permits entrepreneurs to meet in person and to be close to the planning and policy organs of the Government. When communications are inadequate, minimizing the distance between persons assumes fundamental importance, and this leads to geographic concentration of those who do business together.

But urban concentration also causes diseconomies. For example, increases in living costs and wages, delays in transportation, diminishing returns in housing construction and many unfavourable social effects of urbanization do occur. The negative external effects of the urban concentration of industry should neither be ignored nor overemphasized; rather, they should be compared with the advantages of urban concentration. Such a comparison is in practice extremely difficult to make, owing to the lack of empirical evidence on the exact relationship between city size and economies or diseconomies. It is known, however, that "up to a certain city size" industrial concentration and urbanization are beneficial, and, indeed, necessary for industrial development and the efficiency of resource allocation.

GENERAL CRITERIA FOR PLANNING THE LOCATION OF INDUSTRY

The optimum geographic pattern of distribution of industry depends on the level of development and on the characteristics of the country in question. It may be noted that "as long as ... regions have differing

advantages and disadvantages for production, differences in regional growth must be seen as part of the total system, just as are economic specialization and division of labour".³¹ No rigid criteria can be applied to the choice of distribution pattern, but three general principles should be borne in mind.

There should be consistency between national programmes for the over-all distribution of industry and the location of individual projects, since locational and regional factors are an inseparable part of national planning and programming. Locational plans and decisions should give the greatest possible consideration to the changes in regional factor endowments that are expected to take place in the economy in the future.

Locational planning should seek to minimize aggregate transport costs because the economic efficiency of location is partly determined by minimizing the total transport costs between the project, its input sources and its markets. Briefly, the locational "pull" of any factor of production is directly proportional to the relative use of the factor in the production process and to the cost of procuring and transporting it, and inversely proportional to the net cost of substituting other factors for it. The locational pull of the market can be roughly measured by the share of transport costs from factory to market in the total costs of the product. Clearly, the relevant transport costs are the ones projected for the entire planning period and thus include estimates of the effects of all foreseeable changes. Minimization of the sum total of transport costs does not, however, automatically determine the optimal location for an industry; the effects of the industry's interaction with other economic activities also play an important role.

Locational planning should seek to maximize external economies. Proximity to other industries is a locational factor to the extent that these other industries constitute a market for the output of the industry or are a source of the inputs it needs. This aspect is already covered by the principle of transport cost minimization and can be dealt with in the same manner. However, proximity to related industries is a significant factor in its own right because of the possibility of reaping external economies from the joint use of infrastructure and from urbanization.

To summarize: industries should be located in such a way as to exploit external economies to the fullest extent to which they are

³¹ Perloff and Dodds, p. 137; for full reference see annex 3 under "Other sources".

compatible with the two other principles (minimization of transport costs and consistency), preferably through joint locational programming of these related activities. If one assumes that the requirement of consistency has been satisfied first, there remains only the need to balance transport costs against the utilization of externalities.

TECHNIQUES OF INDUSTRIAL LOCATIONAL PLANNING

To determine whether the choice of location for a project is practical, both detailed regional and detailed project feasibility studies must be carried out. Since it is impractical for the planner to do a detailed locational study for every region in the country and a feasibility study for every industry that might be feasible, a general classification of industries by locational orientation can be employed to narrow down the industrial sectors within which specific locational studies are to be conducted.

Beyond a certain level of national income, industrialization, and particularly the improvements it brings in transport and communications, may lead to greater freedom in locational choices for each individual industry. Industrialization also tends to reduce the locational pull of raw materials and to increase that of markets. As a result, preferences of individual industries for a certain location become less strong and the range of choice of location increases, since reductions in the cost of transport and the growth of local markets bring into the feasible range a number of areas that earlier would not have been considered. However, most industries are becoming increasingly oriented towards markets and central locations, owing to the factors discussed earlier. Thus, while locational "freedom" becomes greater for individual industries as industrial development proceeds, the manufacturing industry as a whole will tend to be even more strongly oriented towards urban areas than it is at early stages of development.

There is a remarkable similarity of locational orientation between industries in different countries. Highly concentrated industries in one country also tend to be highly concentrated in another, and industries widely dispersed in one country tend to be dispersed in other countries also. Hence, measures aimed at influencing industrial location are likely to be more successful if applied to the industries generally characterized by wider dispersal.

While locational analysis of industry can show the relative influence of various factors on the locational orientation of an industry, regional analysis assesses the availability of these factors in a given geographic area. Regional analysis is thus the reverse side of the same process: matching the needs of the industry with the characteristics of the region.

Several locational and regional planning techniques have been elaborated and in some cases applied. These include: industrial-complex analysis, which aims at determining the optimum combination of plants of different industries and the optimum degree of technical and economic integration; the regional multiplier, a tool to assess the impact of a new industry on a region; and interregional linear programming and regional input-output analysis. All these planning techniques can be highly useful under certain conditions, but caution in the use of sophisticated techniques in developing economies is highly advisable.²²

A HYPOTHETICAL EXAMPLE OF LOCATIONAL PLANNING BY STAGES

Suppose that a developing country has or will have a comparative advantage in the production of ammonia fertilizers, and that the industry has a high potential for growth and for inducing the development of other industries. On this basis, the planning authority decides to include an ammonia fertilizer project in the national industrial programme. It must then be decided in which of the areas offering an actual or potential comparative advantage from the national point of view to locate the new facility, the objective being to produce the maximum impact on national growth.

Consistency demands that the project fit within the over-all programme, that it be located in accordance with the over-all geographic pattern planned, and that its establishment be consistent within the time dimension of the programme. The minimization of transport costs requires that a number of locations be eliminated from further consideration owing to excessively high projected transport costs. By combining a cost study of ammonia fertilizer production with regional analysis and a study of freight costs, the number of feasible locations can be narrowed considerably. The process is far from over, however, since the planning authority is interested not only in minimizing transport costs, but also

²² *Report of the Interregional Seminar on Industrial Location and Regional Development (ID/19)* (United Nations publication, Sales No.: 69.II.B.22).

in choosing the optimal location for the project from the national profitability point of view. The third principle—maximization of external economies—must now come into play. The efficiency and growth of the fertilizer project depend in large measure on its proximity to refineries and other related industries (on the supply side); industrial-complex analysis and regional input-output analysis may then be of assistance (if warranted by data and availability of planning skills) in determining which of the low-transport-cost locations offer the highest degree of inter-industry economies. But the planning authority is interested not just in efficiently locating the fertilizer plant or in minimizing its transport costs: the final objective is to maximize the total impact of the locational decision upon the growth of the national economy. The final choice can be made only after the interactions of the proposed project with other activities outside the industrial field have been evaluated and after the advantages and disadvantages of urban agglomeration have been assessed and weighed against the results of applying the previous criteria. Social cost-benefit analysis may be useful in quantifying those externalities that do not derive strictly from inter-industry relations. Finally, the results of the earlier stages (including the *a priori* evaluation of the technical and economic characteristics of the fertilizer project itself) should be reviewed and if necessary revised in accordance with the results of the later stages of locational planning.

DATA REQUIREMENTS FOR INDUSTRIAL PLANNING AND PROGRAMMING

DEFINITION OF THE PROBLEM

One of the characteristics of economic underdevelopment is the insufficiency of the data on which development planning needs to be grounded. Planning, at the very least, means co-ordination of efforts; and this is impossible without a minimum of information on the technical and economic environment in which it takes place, on the costs and possible benefits of alternative courses of action and on specific investment opportunities. In very simple terms: it is not possible to decide what is yet to be done if one does not know what has been done already.

Some data always exist, even in the least developed of countries; also, adequate programming can take place without a completely detailed picture. Thus, in developing countries it is necessary to determine the extent of the gap between the set of data required under the appropriate methodology and the set of data actually available in the economy. The practical definition of the "data gap" for any country depends, therefore, essentially on the planning methodology used and the planning targets set. If, for example, a simple methodology were considered adequate, existing data might also be considered sufficient, whereas a "data gap" would arise should more complex and sophisticated planning methods be contemplated.

A first important generalization, therefore, is that the data requirements depend on the planning methodology. An immediate consequence of this principle is that benefit-cost analysis can be applied to the gathering of new data as appropriately as it can to the evaluation of a concrete project. The additional cost of collecting economic and technical information previously not available, so that more advanced planning methodology may be used, must be compared with the additional benefits expected from applying the more advanced methods. In many cases such a calculation may result in a decision to postpone the task of gathering additional information, or to forego it altogether, because the increase in prediction

and in the programming accuracy of the methodology requiring such information does not seem sufficiently great to justify the costs.

Still, as pointed out earlier, planning is impossible without a minimum of information. The data necessary for planning and programming can be categorized in a manner similar to that in which planning levels are distinguished, i.e. data requirements for the formulation, evaluation and implementation stages of planning. In general, since the term "planning and programming" covers a very broad range of issues and possibilities, data requirements should be defined in a similarly broad fashion. Thus, not only engineering and economic data are relevant, but also information on policy instruments, on the social environment, on financial and commercial affairs and so on. When a narrower concept of planning is used, the data necessary will include both engineering and economic-statistical information. There are significant differences in approach between the disciplines of engineering, economics and statistics; correspondingly, the data generated and needed by each of these disciplines will usually be somewhat specialized in nature.

A second generalization, therefore, is that planners must take account of the specialized nature of data originating from different sources and often attempt to reconcile or synthesize them. For example, the concept of "efficiency" is quite different in economics from what it is in engineering: yet economic efficiency cannot be determined without data on technical efficiency. Also, statistical information must be interpreted from both an economic and a technical point of view; for example, data on domestic production plus imports of an individual commodity are insufficient for a determination of the domestic market demand for the output of a planned project without explicit consideration of the selling price, which in turn is meaningless unless it is supported by an assessment of the technical efficiency with which the commodity can be produced.

A third generalization is that data requirements will change as dynamic changes occur in the technical, economic and social structure of the country. As noted earlier, development means economic growth plus change, and this is particularly true of industrial development. To increase production within the same economic, technological and social context is not the principal objective: rather it is to effect those changes in the techno-economic and social structure of the economy that are most likely to lead to sustained growth in the future. It is therefore particularly difficult to assume that the existing data pertaining to the economy as it is or was are fully relevant when it comes to planning for the future; past patterns are at best only partially indicative of the future.

Much of the information that truly effective development planning (and particularly industrial planning and programming) requires is non-existent—not so much because it has not been collected but because it relates to events that have not yet taken place and that differ qualitatively from events in the past.

This is especially true in the field of industry. The industrial sector in most developing economies is small, and it is very difficult to plan industry for the future on the basis of such limited industrial experience. In large measure, therefore, the “data problem” is not an autonomous problem but rather a symptom of underdevelopment. While efforts to improve the “indigenous” statistical and informational bases for planning must be continued, the inherent limitations of these efforts must also be kept clearly in mind.

Complementary action must also be taken: the type of information needed can be drawn from the actual industrial experience of other countries. However, to a large extent the path of industrial development is specific to each country; to presume that information derived from the industrial experience of another country is fully applicable is unwarranted. It is therefore necessary not only to collect international data, but also to provide developing countries with a range of sets of data on the same industrial phenomenon, and to establish criteria and procedures that will increase the transferability of industrial information from one country to another with different characteristics and targets. These are tasks that unquestionably require international action. It has become clear that the “conventional” approaches to reference programming data—the “industry census” approach, for example—suffer from serious limitations. The other conventional approach—i.e. reliance on information from a few advanced countries—provides no criterion for assessing the applicability of this information to the conditions prevailing in a developing country.

The data necessary for industrial planning and programming range from the very broad informational background necessary for macro-economic allocation problems to the very specific data needed for implementation of a particular project. The following sets of data are generally required:

Background data on the over-all economic and social environment in the geographic area under consideration;

Data on current conditions and potentials of industrial sectors;

Technological data on alternative production processes;

Detailed data on the specific productive facility most suited to local conditions.

The weight to be given to each set of data will vary according to the outlook and objectives of the institution concerned with a particular stage of planning. In general, institutions entrusted with planning at the national or regional level will be more concerned with the first two sets of data mentioned above, while individual investors will look more closely at the data necessary for designing individual projects.

From a practical policy point of view, the term "industrial programming data" should include information that can be:

Used for a wide variety of planning and programming purposes;
Collected efficiently and distributed effectively by a central (or poly-centric) source;

Justified in terms of the benefits and possible costs of disseminating the information more efficiently.

DATA REQUIREMENTS

The formulation and evaluation of industrial plans and projects require information at each of the three main levels of programming: the economy-wide, the sectoral and the project level. Programmes on each of these levels can be formulated—and evaluated—according to different approaches, each reflecting a programming methodology. In turn, each approach can be applied in a simple form or in increasingly sophisticated formulations. Since the actual choice of method will depend on the availability of planning skills and of data in each country, the following is only a general overview of the broad kind of data required under different programming approaches at various levels.

Economy-wide plans

These can be formulated in four principal ways:

(a) *Planning by major components of national income.* Data required under this approach include the principal national income aggregates (consumption, saving, investment, "autonomous" government spending, export and import series) and information on the capital account side of the foreign sector (i.e. remittances on foreign investment, foreign debt service payment).

(b) *Planning by sectoral breakdowns.* In addition to the information necessary under point (a) above, data on separate sectors and on inter-sectoral relations are required, (since programming models of the input-output type are essentially static, and coefficients of production fixed, normally planning by sectoral breakdowns will not necessitate information on alternative technological possibilities for the production of given outputs).

(c) *Planning by major resources of economy-wide importance.* The technique of commodity balances, used under this approach, requires information on technical norms, complemented by more qualitative information relating to production and consumption targets and capacities, and to the degree to which the technical norms can be "bent" in case of need.

(d) *Planning by mathematical programming models.* Mathematical programming models, whether of the linear or the non-linear kind, combine the best features of the input-output and of the commodity-balances approaches, and produce solutions which are, on strictly programming terms, far more efficient than either of the other two methods. Unfortunately, however, mathematical programming models require a multitude of data. In addition to the information necessary for technologically static input-output planning and for commodity balances, mathematical models, owing to their dynamic nature, need information on different production processes. In general, the more variables a planning approach takes into consideration the more reliable are the results it produces, but also the greater the amount and detail of information required. If this information is not available or if it is unreliable, the results of a sophisticated programming method may be even less reliable than those obtained through relatively simple techniques.

Project plans

At the project level no attempt is made to derive those comprehensive relationships that permit an overview of the whole economy, an industrial sector or even a single industry as a whole. Instead, the technical characteristics and the institutional setting of the individual project are explored in depth to provide information on which a specific investment decision can be made. Projects may be defined and specified on the basis of:

(a) *Market, cost and institutional studies.* These studies require data on existing and projected demand, the engineering design of the project,

its size and location, the financial and organizational aspects, and a set of data relating to the environment. All these data are necessary for correct project evaluation.

(b) *Studies of social impact.* The results of these studies are used to modify the commercial profitability evaluation of the project. Thus, from the various alternative projects that satisfy the minimum profitability criteria, the project yielding the greatest direct and indirect social benefits may be the one chosen. Data necessary for social impact studies will vary according to the type of social effect thought to be of predominant importance. In general, the social effect of the project can only be assessed correctly in an economy-wide context, and this creates a link between project planning and macroeconomic planning. To some extent, therefore, the data required for the study of the social impact of the project will be collected and evaluated according to the same criteria used to gather and elaborate the data necessary for macroeconomic analyses.

(c) *Techno-economic studies aimed at translating sectoral plans into a specific project plan.* Data requirements are quite similar to those pertaining to cost studies undertaken to determine selling prices and market demand. The main difference is that in this case the study of market demand potential as a function of price is replaced by the fixed objective of meeting plan targets that are usually specified in physical units.

Sectoral plans

Sectoral plans lie between economy-wide and project-level programmes. They are therefore less precisely definable and less homogeneous as a category than either of the other two levels of planning, for they cover an entire range of possible applications. A "sectoral" plan may apply to the entire manufacturing sector, to a whole industry, to an industry more narrowly defined, to a complex of technologically similar activities or to a very large individual project. The actual definition of the scope of sectoral planning will depend on the industrial development targets, on the over-all economic development targets, and on the resources, programming skills and data available. The general objective of sectoral planning is to achieve a broader perspective than that obtained through project programming, but no attempt is made to adopt an economy-wide viewpoint. The data requirements are to be defined according to the level of sectoral planning being considered:

(a) *Planning by process analysis.* A very considerable depth of technological detail is required. Process analysis requires a complete picture of the entire range of technical options and details in the sector considered. The broader the sector the more strict the informational requirements become.

(b) *Planning by feasibility or by locational studies.* These two approaches also require a significant amount of technical information, but the main emphasis is shifted from engineering detail to costs and market potential. These approaches are closer to the economist's than to the engineer's viewpoint. A feasibility study begins by assessing the technical and economic characteristics of the sector and then sets out to determine which geographic locations in the country offer the resources, market and general environmental conditions that can make investment in that sector profitable from a national viewpoint. A locational study on a sectoral basis, on the other hand, begins by assessing the resources and markets of a specific region, and only then sets out to try to identify a sector that would suit them. The data required are in principle the same under both approaches, although the chronological and logical order of gathering and elaborating the data is reversed. In general, the feasibility study approach is convenient when the sector under consideration is essential for national economic development; in this case the national economic profitability of investment in that sector takes precedence. The locational—or regional study—approach is appropriate when the industrial needs of a specific region loom large in the set of national economic goals; the choice of the sector depends on the needs of the region and the resources available there. Data on regional needs and resources thus take precedence over industrial data.

(c) *Planning by industrial-complex analysis.* The objective is to identify and explore the linkages among various components of the complex. These interrelationships are the source of inter-industry external economies, and the desire to take advantage of these economies often necessitates an industrial-complex approach. Data required on each component project should then be sufficient for the analysis of interactivity linkages. The same consideration applies to the planning of very large individual projects, within which interrelations are often just as essential as in an industrial complex.

DIFFERENT APPROACHES TO DATA PROBLEMS

Data necessary for industrial planning and programming may be gathered and published on a national or international basis. As mentioned earlier, for purposes of industrial planning in one country, data derived from the experience of other countries can be used only to a limited extent. Yet the absence of large industrial sectors in many developing countries forces reliance on the experience of other countries for necessary information. If "generalized" data are carefully evaluated to determine their suitability for local planning, data difficulties can largely be overcome. National and international activities in this area are to a great extent complementary rather than competitive. The advantage of international action in the field of industrial planning and programming data lies in the broad perspective and expertise that planners can gain by dealing with large masses of data and an entire range of data problems in a vast number of countries. Data collection is only a first step because inadequately classified data are almost useless. International data services permit a framework of systematic classification to be built up. This could be done on a national level only at enormous cost, whereas internationally the expense of classification is divided among a large number of countries.

The same complementarity of action is found between *ad hoc* studies and expert services, on the one side, and continuing programmes, on the other. The greater portion of industrial planning information should be systematically collected and elaborated. It is usually necessary to conduct special surveys to obtain complementary information for each case in order to make the continuous flow of systematic information fully relevant to specific industrial programmes. Complete systematization of all technical, economic and social information that might be needed would obviously be extremely wasteful. Exclusive reliance on *ad hoc* surveys, however, would generate damaging delays between the stages of formulation and implementation and also deprive the long-run process of industrial planning of that vital perspective provided by continuous contact with the unfolding of economic and technical events. An efficient balance must be found between those aspects of the work that are to be handled internationally and/or on a continuous basis and those that are to be handled nationally and/or in an *ad hoc* manner. This balance will clearly vary from country to country and from planning problem to planning problem, but such a balance can be approximated by the benefit-cost type of approach. Although quantitative estimates of the "benefits" and "costs" of international versus national programmes and of continuing

versus *ad hoc* programmes are obviously out of the question, a clear understanding of the trade-offs involved can assist those working in this field to avoid a wasteful apportionment of data collection and elaboration tasks.

In practice, an efficient balance between continuing programmes and *ad hoc* surveys has been conspicuous by its absence. Indeed, there has been very little co-ordination even between different *ad hoc* surveys conducted by different institutions. Provision is seldom made for systematically utilizing the information obtained through special surveys. The same type of information may be requested time and time again from the same economic units. Weighted down by piles of questionnaires, individual economic units often return carelessly compiled information, or even completely imaginary data. Avoidance of duplication of requests for information may greatly help to increase the reliability of the replies.

Data problems may also be considered in terms of the cataloguing approach and the pre-digest approach. The former limits the task to indexing the data collected for easy reference, leaving to the user the task of extracting from the catalogue the information desired. The latter screens the collected material according to criteria and methods of classification elaborated on the basis of past data needs. A considerable amount of detail is preserved through the cataloguing approach, but the proliferation of technical and economic information in recent years makes it extremely difficult and time-consuming for the user to extract from the "catalogue" the information he actually needs. In this context, "primary" information—information based on a direct observation of a factual event—should be distinguished from secondary information. Primary information may be processed and interpreted in different ways as circumstances require. Normal cataloguing activity should be complemented by the identification of the relatively primary information that can be useful for various phases of industrial programming. The selection of primary information can be made only on a pragmatic basis. Once again, a benefit-cost approach is indispensable.

To a certain extent, a two-way relationship exists between data availability and project design. Project or plan formulation depends, for the level of aggregation and specification, on the amount and nature of information available; thus, information ought to be collected and classified with the nature of the plan or project formulation in mind. However, the reverse is also partly true: the design of a project (and to some extent the mode of formulation of a programme) should be

elaborated in part to simplify the task of collecting the information necessary for it. Among other things, a well-designed project should:

Permit a routinized procedure for the co-operative accumulation of relatively primary (or multipurpose) information, as opposed to *ad hoc* searches for once-only users;

Be based on a clearly defined spectrum of users;

Motivate individual users to participate in the sustained, co-operative execution of the project by contributing relevant data from their own sources to the central disseminating agent;

Establish a standard format for the questionnaire, flexible enough to allow the answers to be as complete as the respondents wish to make them;

Provide for periodic re-assessment and needed change.

THE INTERNATIONAL SYMPOSIUM ON INDUSTRIAL DEVELOPMENT: ISSUES, DISCUSSION AND RECOMMENDATIONS

The issues, the discussion, and the recommendations approved by the Symposium are presented in this chapter.

THE ISSUES²²

Many questions have to be solved in developing countries as a result of their particular natural resources, size of population and markets, foreign exchange limitations, levels of skill and technical know-how, institutional limitations etc.

Preconditions for industrial planning

The process of economic development is dynamic and subject to adjustments to changing situations; the process of planning is similarly dynamic. It is not an easy task to perfect the planning machinery in which all elements of plan formulation and implementation—economic potential, administrative organization and political goals—are effectively integrated. This imposes on public administration new and often unfamiliar tasks which combine entrepreneurial and managerial functions.

Economic planning requires a wide range of technical skills not generally found in the traditional administrations. This calls for introduction of specialized economic and technical services in the administrative apparatus. Under this heading, attention may be concentrated in this particular context on matters relating to planning data. The following points are suggested for discussion:

- (a) Development of a coherent stock of planning data;
- (b) International "data-bank" services.

²² From UNIDO, *Issues for Discussion: Formulation and Implementation of Industrial Programmes, 1967* (ID/CONF. 1/A. 16) (mimeo.).

Planning involves extensive stocktaking in order to determine where economy stands, not only with respect to the structure and performance of existing industries but also with respect to its alternative possibilities for future development. It is a recognized fact that existing statistical and other information systems for industrial programming purposes are far from being adequate in most developing countries. Indeed, improvement of the basic statistical apparatus is a slow and costly process in which progress depends on the development of underlying industrial activities. Immediate needs have to be met mainly by means of *ad hoc* surveys and studies limited to case-by-case problems. However, industry enquiries of a more or less similar scope are repeatedly undertaken on different occasions by different organs, often programmed in an unco-ordinated way and executed for limited purposes, thus missing the opportunity to develop a coherent stock of planning data. Attention should be paid to technical assistance co-operation in this specific area.

In addition to the need for strengthening the statistical apparatus within each country, there is a problem relating to the gaps in information in less developed countries, which calls for concerted action at both the national and the international level. For advance planning purposes, recourse has to be made frequently to the experience gained in other countries, including not only qualitative observations but also a wide range of quantitative technical data required for economic calculations. Proposals for internationally comparable statistics derive from this need. In this connexion, comparability of data at a highly aggregative level, many steps removed from the underlying details of individual productive units, is not sufficient. What is needed is the type of information and the data-processing techniques which would provide an operationally meaningful linkage between aggregative sectoral data and project-level programming data. It goes without saying that an "over-all plan" constructed on highly tentative macroeconomic estimates and coefficients leads, more often than not, to deficiencies in the actual process of resource allocations. In conjunction with the traditional form of "data-bank" services in the United Nations and other international organs, a scheme should be developed in this area.

Industrial planning priorities

Governments of developing countries have taken strong interest and play a major role in promoting industrial development. This, together with the mobilization of resources and the structural changes necessary for the development of a modern industrial sector, has led to widespread use of industrial planning and programming.

While there are many problems in planning industrialization, the following three areas have been selected where difficulties exist and where there are possibilities for action by UNIDO:

- (a) Choice of industries, technologies and skills;
- (b) Bridging the gap between the central plan and the project level;
- (c) Planning techniques and skills.

CHOICE OF INDUSTRIES, TECHNOLOGIES AND SKILLS

Industrialization is considered by developing countries not only as a way to create the means for local production of goods hitherto imported but as a means of bringing about modernization and structural change.

The problem of choice of technology is related to the strategy of economic development of a country. There is a relationship between the target formulation in the development plan and formulation of the industrial development strategy. It is important for developing countries to select a strategy of industrial development that will optimize their use of present and future resources. This involves the need for dynamic planning, since the process of development itself involves changes in the availability of factors such as capital and skills. Adoption of modern technologies which are largely developed by the advanced countries and are thus geared to the factor endowments and size of markets prevailing there, presents a major problem; on the other hand, there is little capacity in developing countries for developing alternative technologies or introducing changes to existing ones. The situation is further complicated by technological competition in the field of research and innovation in which the developed countries are engaged. Owing to the large amount of capital and the skills necessary for promotion of technological advances in the industrial field, there is increased concentration of technological research and innovation in a few large firms and State-owned enterprises in industrialized countries. This has a restrictive effect on the availability of alternative technologies for industries in the developing countries.

In the field of research and development, international co-operation in the form of regional projects, as well as efforts at sharing information on alternative technologies, should be envisaged.

BRIDGING THE GAP BETWEEN THE CENTRAL PLAN AND THE PROJECT LEVEL

Targets for the central plan are set either from the top or from the bottom by summation of projects and requests from different government agencies. In either case, these targets must find expression in an industrial

plan or programme, as well as activities in related sectors, such as energy and construction. To assure consistency between the targets and the projects, it is necessary to have sectoral studies and programmes for individual branches of industry. This process of sectoral programming and even that of detailed industrial planning is seldom carried out in developing countries because of lack of information, methodologies and trained personnel.

In order to fill this void, sectoral programming studies should be undertaken to provide planning agencies, as well as experts in the field, with useful background material of direct applicability in the formulation of sectoral industrial programmes. This will not only help in attaining consistency in planning but also in identifying new projects by pointing to potential imbalances and investment opportunities.

PLANNING TECHNIQUES AND SKILLS

Examination of the experience of most developing countries reveals that, while there is a widespread tendency to engage in planning, the techniques vary within a wide range. There seems to be a need for a survey based on field studies of the actual experience of developing countries in industrial planning. Such a survey would be instrumental in pinpointing areas in which assistance is required. The proposed survey would also serve to obtain information on organizational arrangements, as well as the assistance provided through international multilateral and bilateral co-operation and would suggest areas where training in appropriate skills is required. There exist different forms of international assistance in the training activities in this field of the regional planning institutes for economic development located in Santiago, Bangkok and Dakar, and it is suggested that these be further expanded.

Techniques of project planning: formulation, evaluation, implementation and follow-up

Industrial programmes have to be translated into specific industrial projects, for only through sound formulation, evaluation and implementation of these projects can the targets of investment, output, employment etc. be realized. It is in this area that practically all developing countries appear to run into problems.

Poor formulation, evaluation, implementation and follow-up of industrial projects are reflected in: (a) an unduly long time taken in identifying investment opportunities and formulating projects; (b) unduly long gestation periods in execution; (c) excessive construction costs;

(d) poor quality and high costs of products; (e) low commercial profitability; and (f) shortfalls in realizing the planned goals such as employment and income, capital formation, improvement in the balance of payments, regional disparities etc.

One of the problems in formulation and evaluation of projects arises from the fact that even when industrial projects are formulated and evaluated in terms of commercial profitability, they are not evaluated in terms of social profitability, representing the sum of net weighted benefits accruing to different social objectives embodied in the policies and plans of the Government. Thus, commercial profitability analysis needs to be supplemented by the social profitability. The social benefit-cost accounting has been developed to that end.

Another problem arises from the inadequacy of programming and follow-up of the execution of approved industrial projects. Several techniques for programming, execution and the follow-up by supervising agencies could be applied more usefully as a matter of routine in developing countries that would help to reduce significantly the cost of construction in terms of money and time. Moreover, project planning in developing countries, as a rule, does not contain norms of efficiency to be attained in the operation of the enterprise in respect of the utilization of installed capacity and inputs, productivity of labour, costs of production, maintenance of equipment, quality control etc. In other words, project planning generally provides for investment but not for realization of the maximum yield from the investment.

One of the weaknesses is the absence in most developing countries of machinery for formulating and evaluating industrial projects. This machinery comprises project bureaux or consulting firms, which carry out the tasks of identifying investment opportunities, preparing feasibility studies and bankable projects, as well as final project reports, including engineering blueprints and programming for the implementation of projects. This lack is associated with the lack of skilled personnel and promotion in this field of activity. Consequently, there are many cases where the shortage of good projects is even more serious than the shortage of capital or foreign exchange.

The foregoing problems in the field of project planning suggest several areas of activity that could be recommended to be undertaken by national, bilateral and multilateral agencies. The first is the establishment of project bureaux or consultant firms in developing countries, which may be supported by United Nations technical co-operation programmes. The second would be to clarify and develop techniques and methodology for identification of investment opportunities, feasibility studies and evaluation of projects, programming of implementation and follow-up systems and programming of norms of efficiency in the operation of industrial

enterprises. A third area of activity would involve sending technical assistance experts to help developing countries in project planning, which requires a large number of persons on a permanent basis in each developing country. The demand for such personnel cannot be adequately met by hiring foreign experts. The fourth and most important area of activity in the long run is the organization of training workshops in project formulation and evaluation, programming for implementation and follow-up systems, and in the determination of the norms of efficiency. The workshop would use the case-study method to train a nucleus of local personnel, who would in turn train others.

THE DISCUSSION³⁴

Underlying the deliberations on the problem of industrial planning was the thought that in most of the developing countries industrial plans were simply an aggregation of projects. In many cases there was a lack of correlation, which was essential from the operational point of view, between the expenditure plans envisaged for the over-all development of an economy and their industrial components, as well as among the industrial components themselves. Mention was made of the role of macro-economic plans which, in their nature, should be complementary to the detailed sectoral studies by product and by project. It was suggested that it was necessary to work out a system of "feedback" by means of appropriate control procedures or *ex post facto* analysis at all relevant levels. Because of the immensity of the tasks and the changes that inevitably took place during the working out of plans, some participants insisted on the necessity of working out flexible programmes that could be constantly adjusted to accord with current conditions, which were continually changing.

The planning organ must be adapted to the special conditions of the country. It was stressed that it was important for these organs to seek the participation of both public and private services in the elaboration of industrial plans and programmes. At the same time it was recognized that decision-making at the project level placed a very heavy burden on the local industrialists, who were lacking in experience, and that it was necessary to increase the technical services provided by the national and international financial institutions in order to facilitate their task.

³⁴ From *Report of the International Symposium on Industrial Development, Athens 1967* (ID/11) (United Nations publication, Sales No.: 69.II.B.7).

The view was expressed that it would be desirable if an international organization such as UNIDO had a special service responsible for keeping under constant review the policies and programmes of industrial development being implemented by the developing countries. The dissemination of this information would enable the countries providing assistance and the financial institutions to understand the situation better and would also help the countries to work out better plans and to do so more confidently. The fear was expressed, however, that these studies might tend to be too general and thus be of little value for the solution of specific problems.

Many participants were in agreement that it was necessary to include in project programming all the considerations and actions relating to the phase following the implementation of the projects. It was necessary to review and re-evaluate such projects continually to be sure that they were adjusted to the fluctuations in the economic situation and to take measures to ensure the participation of private and public institutions able to carry out such projects. The organization of training courses on project programming and follow-up would be most useful in order to develop specialized personnel. At the same time, the need was recognized for setting up project bureaux specialized in the creation and elaboration of realistic industrial projects and in their follow-up and implementation.

One of the major problems for developing countries is the lack of essential planning data, that is, a synthesis of statistical, economic and technical data required for the elaboration of an industrial programme. In this context the establishing of "data banks" could be of primary importance. This would facilitate an interchange of the large volume of potentially useful information which existed in the files of the various organizations, both national and international, but which was at present almost completely unknown to those who need it.

Suggestions were made as to the type of information that could be serviced through the proposed "data bank". Mention was made in particular of data relevant to quantities and prices, which would make it possible to evaluate the market potential of the new industries of the developing countries. The possibility of using in an adapted form certain essential parameters, such as income elasticity of demand as derived from the experience of developed or developing countries, for the purpose of projections of less developed countries was discussed. The "data bank" might serve as a clearing-house for information relating to export industries, so as to assist developing countries to avoid installation of excessive production facilities in ignorance of each other's intentions.

It appeared to be more and more necessary to initiate common action at the multinational level with respect to research, pre-investment studies and planning. The efforts that the countries themselves were making to improve data and techniques of industrial programming should take into account the problem of inter-country comparability. UNIDO should participate actively in the development of international co-ordination in this field.

Stress was laid on the importance of having entrepreneurs who were well qualified to envisage, initiate and implement industrial projects. The developing countries should encourage foreign companies to participate in the management of the new industries in order to accelerate the training of local cadres. A good way of economizing in the use of scarce talent would be for a group of local industrial enterprises engaged in similar activities to share the services of a team of specialists who would undertake management functions in various fields (e.g. finance, production, purchasing, maintenance and personnel).

Several participants felt that "shadow" prices should be used for working out projects, but it was noted that few countries were equipped to use this method satisfactorily. The view was expressed that the benefit-cost method, which took social factors into account, might give a distorted result if it was applied without taking the linkage effects into account, that is, the effects that a given project might have on the profitability of other sectors. It was suggested that it would be useful and even necessary in the developing countries to make an inventory of the various studies that have been made of the pattern of growth of industries that offer a very considerable degree of interdependence with other industries.

RECOMMENDATIONS APPROVED²⁵

Having regard to the complexity of the problems of programming data which calls for concerted action at both the national and international levels, UNIDO should immediately explore, in consultation with the United Nations Department of Economic and Social Affairs and the UNDP, the possibility of putting into effect a "data bank" service, in order to create a permanent effective machinery for systematic centralization and exchange of information to be available at the national, regional and international levels; to this end, UNIDO should take all necessary

²⁵ From *Report of the International Symposium on Industrial Development, Athens 1967*, (ID/11) (United Nations publication, Sales No.: 69.II.B.7).

measures and steps to ensure the best possible co-ordination between its activities and those of regional economic commissions, UNESOB and other regional and international organizations concerned with development.

In co-operation with these organizations, UNIDO should assist in improving and rationalizing methods and means for compiling and evaluating industrial programming data for developing countries.

UNIDO should continue and expand its technical assistance activities consisting of the dispatch of special experts with the task of helping the developing countries in project planning and in working out programmes for their implementation.

UNIDO, in co-operation with the regional institutes for economic development and planning, should develop a sustained programme of training courses for personnel in the developing countries in the fields of industrial plans, preparation and evaluation of identified projects and in programming of the implementation of such projects and their follow-up.

In the formulation of national industrial programmes, Governments should, in the widest possible measure, consult with private industry able to participate in such programmes.

UNITED NATIONS ACTION TO PROMOTE INDUSTRIAL PLANNING

The programme of UNIDO for assistance in industrial planning is financed under various United Nations operational programmes in which UNIDO participates. These programmes are: the Regular Programme of technical assistance devoted to industry and financed from the United Nations budget; the Special Fund component of the United Nations Development Programme (UNDP/SF); and the Technical Assistance component of the United Nations Development Programme (UNDP/TA). UNIDO receives, in addition, voluntary contributions from Governments for the financing of the Special Industrial Services programme (SIS), a programme limited largely to urgent short-term missions. Some projects may also be financed from funds in trust, deposited by Governments for specific projects, or other direct voluntary contributions. In all these programmes assistance is given only at the request of the Government concerned.

INDUSTRIAL PROGRAMMING

Training personnel in industrial programming

The International Symposium and other international meetings have emphasized that a major focus of UNIDO activities should be in the area of training in order to develop a cadre of skilled industrial programme and project planners, evaluators and implementers. To this end, UNIDO should develop and organize a sustained scheme of training workshops for the local personnel in developing countries in the field of industrial planning, project formulation and evaluation, programming for implementation and follow-up systems, and the determination of norms of efficiency.

Such workshops would use the case-study method to train a nucleus of local personnel, who would in turn train others. UNIDO should also explore the possibilities of creating multinational centres for research

and training in industrial programming. These centres should be established and operated in close co-ordination with activities of other international organizations in this field.

International symposia and seminars should be organized to supplement these training activities. Such periodic seminars would provide an opportunity for advanced training of persons engaged in industrial programming and, at the same time, enable them to exchange information with their counterparts from other developing countries. In this way, many of the trainees would be able to anticipate the types of problems that might lie ahead and thus be better prepared to deal with them. The documentation prepared for such seminars and their proceedings would, moreover, become a useful source of knowledge and information for all who are involved in industrial programming. UNIDO should disseminate such documentation and recommendations as widely as possible.

On the action front, UNIDO and other international agencies should intensify their efforts to train personnel in needed industrial skills. This is particularly important with respect to managerial, technical and supervisory personnel. Efforts should be made to discover means of speeding the training process, and, in this respect, new techniques of training, such as programmed learning and the use of simulation models, should be thoroughly explored.

Research with respect to industrial programming

There is broad consensus that further research efforts are needed.³⁶ UNIDO should try to clarify and develop techniques and methodology for identification of investment opportunities, feasibility studies and evaluation of projects, programming of implementation and follow-up systems, and programming of norms of efficiency in the operation of industrial enterprises. As was pointed out at the Interregional Symposium on Industrial Project Evaluation (Prague, 1965), the follow-up of approved projects in developing countries has been impeded by difficulties in the construction of projects in the form of delays in the schedule and over-runs in costs.³⁷ It was recommended that one of the most effective means of overcoming these difficulties and reducing costs and time in the construction of projects lay in the use of the network theory, including

³⁶ For further discussion of this subject, see Monograph 10 "Industrial Research" in this series.

³⁷ For full reference see annex 3 under "United Nations Industrial Development Organization".

the critical-path method in planning and implementing construction of projects. Further research was needed in this field, preferably with the help of pilot studies of the actual use of such methods with a view to discovering their operational feasibility in developing countries.

The 1965 Prague Symposium set out the following issues in industrial project evaluation on which further research and investigation would be highly desirable:

Factors underlying the formulation of the general strategy of industrial development for developing economies at different stages of development and with different sizes of domestic markets;

Methodologies of sectoral industrial planning, evaluation criteria for sectoral programmes, evaluation techniques for individual projects within the setting of the sectoral targets, and elaboration of capital and other input coefficients for the principal branches of industries as a tool of sectoral programming;

Functions and organization of work of evaluating agencies with special reference to their responsibility regarding project development and implementation;

Comparative evaluation of the period of recoupment or pay-back period and discounted cash flow methods in estimating commercial profitability;

Pilot studies in co-operation with developing countries in the application of the criterion of national economic profitability, as well as a study clarifying the role of value judgements in the calculus of national economic profitability and relationship between these judgements and the possibilities for fulfilling different objectives;

Treatment of uncertainty in the evaluation of industrial projects and possible solutions;

Methods of evaluating management, requirements and standards for the proposed projects;

Required skill patterns for sectoral development programmes or projects;

Pilot studies designed to test the suitability of alternative techniques of using accounting prices in developing countries;

The use of international prices for inputs and outputs and other methods for evaluation of export industry projects with a view to integrating them in international specialization;

Studies on follow-up practices in countries with different economic systems.

UNIDO should conduct research on changes in technology, market structure, world demand for industrial products and the like, in order to provide guides to developing countries in their formulation of industrial programmes. Given the increasing recognition of the importance of the human input to the industrial output, UNIDO should expand research on the skill requirements in manufacturing industries, as well as additional research on the transfer of skills and technology from the advanced to the developing countries. Such research would provide information necessary for the formulation of educational and training plans by developing countries.

TECHNICAL ASSISTANCE ACTIVITIES

UNIDO should continue to enlarge its technical assistance activities, particularly the sending of *ad hoc* experts to help developing countries in project planning, including programming of implementation and follow-up systems. Such technical assistance should be geared to the specific needs of each individual country and should utilize only the most competent experts, including those from developing as well as advanced countries. One means of increasing the number of experts coming from developing countries would be to send younger men as trainees with the experts on assignments. In this way, men with good educational backgrounds could also acquire the first-hand experience necessary to becoming first-rate industrial advisers.

Special attention should be paid to the length of time that an expert will be available to a country, for experience indicates that in many instances, just as the expert becomes familiar with the country's problems and is in a position to offer the advice needed, his assignment is concluded. Project planning, however, requires a large number of persons on a permanent basis in each developing country. Technical assistance should cover the entire gamut of problems associated with industrial programming: from over-all industrial development strategy to assistance in the establishment of quality control and standardization services and to advice with respect to improving the efficiency of a specific manufacturing establishment.

UNIDO's aid to developing countries can also take the form of providing back-up support to activities in which they are engaged. It can, for instance, help them to design and conduct industrial feasibility studies. Indeed, as recommended by the International Symposium on Industrial Development, UNIDO should participate actively in the

industry survey missions, action groups, feasibility studies etc., as may be recommended by the regional economic commissions of the United Nations and the United Nations Economic and Social Office in Beirut (UNESOB), or as may be requested by intergovernmental organizations. Even where UNIDO is not directly engaged in these activities, it can help by reviewing the feasibility studies that countries have undertaken themselves.

Since planning is so vital to industrial development, UNIDO, in co-operation with other relevant international and regional organs, should actively assist the developing countries in establishing and strengthening appropriate project bureaux or similar agencies, which may be supported by United Nations technical co operation programmes. UNIDO should also keep under continuous study the planning policies and programmes pursued by developing countries, along with the economic, social and political factors influencing such plans. This could lead to the dissemination of information that would result in better understanding among the aid-giving countries and financial institutions, and that would help individual countries to formulate better plans and programmes.

Manuals and operational guides

UNIDO can help the developing countries to help themselves by providing manuals and operational guides. The Interregional Symposium on Industrial Project Evaluation, held in Prague in 1965, suggested that the gap in the literature on industrial project evaluation pointed to the need for a manual on industrial project evaluation that could be used by evaluating agencies and educational and training institutions in developing countries. Similarly, the Seminar on Industrial Location and Regional Development, held in Minsk in 1968, recommended that preparation of an operational guide on regional industrial planning should have top priority in UNIDO's future work in that area. Such a guide would be centred on the explanation of different techniques and their presentation in simplified form, which could be of immediate usefulness to persons concerned with industrial location and regional development. Similar guides and reference documentation could be prepared with respect to other aspects of industrial programming. UNIDO should also become a clearing-house of information on methods of industrial planning, that is, such information should be collected and exchanged internationally through UNIDO. In the process, UNIDO should attempt to standardize such information and the corresponding terminology.

REGIONAL AND LOCATIONAL ASPECTS OF INDUSTRIAL PLANNING

With respect to the proper location of industry, the *Ad Hoc* Expert Meeting on Regional Industrial Planning, held in Geneva in 1967, recommended that UNIDO should strongly promote an improved understanding of the spatial dimension of industrial development and a wider use of efficient techniques of industrial location and regional planning. This complex task should be carried out through a well-balanced combination of research, promotional activities and operational activities. A list of topics of priority importance that UNIDO should research in the future, as time and budget permit, in addition to whatever research is necessary for direct support of specific operational activities, was promulgated, as follows:

- Labour mobility, labour skills, cost of training and other aspects of labour as a factor of industrial location in developing countries;
- Impact of multinational integration or co-operation undertakings on national location and regional planning criteria and programmes;
- Review of the experience of developed countries in industrial location and regional development, with particular reference to its applicability to developing countries;
- Organizational and institutional aspects of regional planning in developing countries.

The experts also recommended that UNIDO explore the possibilities of creating permanent multinational centres for research and training in regional development and planning. As a first step, regional planning centres should be formed within existing industrial development centres. Furthermore, categories of "regional industrial planner" and "industrial location expert" should be introduced into UNIDO's roster of technical assistance experts, and efforts should be made to include as many competent experts from developing countries as possible.

The Interregional Seminar on Industrial Location and Regional Development, in addition to supporting the recommendations of the *Ad Hoc* Meeting of Experts, emphasized the need for promoting a wider knowledge and use of efficient techniques and for adapting them to the technical and informational conditions prevailing in developing countries in order to render these techniques practicable and directly usable. It also added to the list of priority areas of research the reconciliation of sectoral and regional approaches to planning, and the role of natural resources in industrial location. It would also be helpful if UNIDO could

undertake a study, or provide assistance to the developing countries, to analyse the implications of city size for industrial productivity and costs. UNIDO should initiate a study of the possibilities of creating growth poles outside the developed regions, in conformity with the general criterion of "selective dispersal", and of the characteristics of a policy to create growth poles. This study should survey the present geographic distribution of industry, examine the possibilities of creating new industries in less developed regions, and illustrate the findings reached by means of country examples.

DATA REQUIREMENTS FOR INDUSTRIAL PLANNING AND PROGRAMMING

The discussion at the International Symposium on Industrial Development centred on two basic considerations:

Planning entails an initial establishment of a basic inventory of potentialities, since there has been no prior satisfactory collection of essential data;

The selection of industrial sectors for development might be facilitated by better information on the short-term and long-term supply and demand influences, both domestic and international, affecting each industrial sector.

These and other considerations led to recommendations ranging from the pooling of country data for industrial manpower planning to improving the statistical basis of information for the planning of specific industries. Several of these recommendations have been followed up by UNIDO in a series of pilot studies, as discussed below. All of the recommendations stressed the importance of "improving and rationalizing methods and means for compiling and evaluating industrial programming data for developing countries". The leading role UNIDO could play in this area and the overriding need for close co-operation between UNIDO, the Department of Economic and Social Affairs and the regional economic commissions were also stressed. UNIDO, in co-operation with these agencies and other relevant regional and international organs, should promote, and be prepared to participate in, technical assistance activities to improve and systematize the methods and facilities for compilation and elaboration of a wide range of industrial programming data. Job specifications for such activities may be provided either as an integral part of the activities concerning specific industrial development programmes or projects or under such specialized posts.

The UNIDO secretariat has intensified its efforts to develop "profiles of manufacturing establishments" and has begun to explore possibilities of following up the other principal recommendations of the Symposium concerning programming data by assembling an international working party on industrial programming data, which held its first session late in 1968. The "profiles" seek to "provide a zoo of live specimens of industrial establishments" which may be studied by various users for various purposes. The project is based on the consideration that industrial planning requires information not only on existing industries, but also on alternative possibilities for future industrial development, and that, in the absence of a complete national statistical apparatus, reference has to be made to the experience gained by the industrial development of other countries. The primary purpose of the work is not to construct rigid theoretical norms, but rather to examine a variety of technological and organizational possibilities, in order to assist in preparing economic feasibility studies for industrial development programmes, and profitability and other diagnostic studies on important industrial programming parameters.

Two volumes of the "Profiles", containing technical and economic information relating to 460 establishments in five countries (France, India, Israel, Japan and Yugoslavia), have been published.³⁸ Two more volumes, surveying selected establishments in Austria, Ethiopia, the Federal Republic of Germany, Mexico, Uganda and the United Republic of Tanzania, are in preparation, and further extensions are contemplated.

Deepening of the content of the profiles and broadening of their industrial and geographical scope seems to be in order, and extension of the programming data collection activity to establishments in other industries and in other countries could greatly increase the significance of the results. More information should be provided on the economic aspects affecting an industry, such as the general trend of its development, data on supply sources, description of historical performance, and economic appraisal of each establishment in terms of markets, management and the like. However, since it would be costly to "deepen" the contents in this way, a choice may have to be made between two alternatives: (a) expansion of geographic and industrial coverage; or (b) deepening the analytical content by the addition of more economic information. At any rate, greater emphasis on specific needs of potential users is certainly

³⁸ For full reference see annex 3 under "United Nations Industrial Development Organization".

called for, and for this purpose the co-operation of all agencies interested in the project (either as producers or users of the data compiled) should be actively sought.

The International Working Party on Industrial Programming Data recommended that UNIDO also compile "extracts of industrial feasibility studies". Such a proposal, to collect and classify data relating to relevant pre-investment studies, on the important consideration that the wealth of data collected with reference to such studies was rarely utilized to improve the informational basis of future industrial programming, was advanced in 1967 by ECLA and the Inter-American Development Bank. According to the working party, the main objectives of an informational mechanism to retrieve data from pre-investment studies would be:

To provide an analytically digested summary of pre-investment industrial studies with a view to developing common guidelines for the preparation and evaluation of such studies;

To develop sample terms of reference for industrial projects;

To demonstrate sound criteria for economic and financial analysis for project formulation;

To serve as a checklist of criteria for evaluation of consultants' project studies;

Through co-ordination with the "Profiles of Manufacturing Establishments", to provide insight into the linkages between the characteristics of industrial projects as envisaged at the preparation stage and those of similar projects in actual operation.

The retrieval of economic and engineering information from pre-investment studies could be a very rewarding activity in terms of meeting the needs of both the users and the producers of industrial pre-investment studies, and a very proper activity for UNIDO. UNIDO should take the initiative by calling together a small group of experts to elaborate the general guidelines for the project and a tentative plan of operations. An important first step would be the evolution of a standard of evaluation to restructure the contents of project reports to fit a common framework for the collection and dissemination of programming data.

In view of the complexity of the problem of programming data, which calls for concerted action at both national and international levels, it is recommended that a broader and more active scheme be developed for "data bank" services than has been traditionally available in UNIDO, the regional economic commissions or other international organs. The proposal refers to collection of information of a factory-directory type,

including the number of plants in existence, their output-mix, their productive capacity, their plans for capacity expansion, and other general information. Alternatively called an "industry file", the system would collect and classify in a uniform directory the basic data relative to each of the industrial plants in existence in a country. Such a data bank could help to ensure effective execution of technical assistance activities for specific individual countries or groups of countries, as well as creating an effective sustained mechanism for exchanging information on both regional and international levels.

Data banks are now used in the United States for several purposes, including forecasts of industry sales, market analysis, investment analysis and plant location. The concept is at an experimental stage even in industrialized economies and is relevant only to those developing countries that are in a good position to co-operate with others in evolving a data bank in some form. Objections to the proposal are that the type of information which could be included in industry files in developing countries could be obtained speedily on an *ad hoc* basis and need not be systematically collected in expensive industry directories, and further that such a system would be wasteful if the file were to include all possibly useful data relating to every industrial plant in a country. Besides, the identification of factories and the disclosure of a vast amount of information about them would encounter resistance from the firms in question. On balance, however, it appears that working towards the evolution of a data bank system for developing countries could be of use in alleviating the informational difficulties facing industrial planning, but this work should not have priority over other proposals for improving the informational basis of programming.

Data for industrial project implementation are vitally needed. As discussed earlier, the time aspects of industrial programming are essential to effective implementation. It would not be advisable to give exclusive attention to the collection and elaboration of data necessary for the formulation and evaluation of industrial plans and projects and neglect the information needed for effective implementation and follow-up. The problem of plan and project implementation is an extremely complex and multifaceted one, and there is disagreement on the means to improve the informational basis of the implementation process. One such difference of opinion concerns the question of whether the basic design of a study should be of a generalized and strategic nature or should be centred on the provision of *ad hoc* tactical solutions through a case study approach. There is, however, a broad consensus that the data gathered should as

far as possible permit the identification of "critical points" in the process of implementation, and also that such data should emphasize the problem of time-phasing of investment expenditures.

INDUSTRIAL PROMOTION ACTIVITIES

A major type of activity that would be most helpful in advancing industrial development would be industrial promotion. This is of particular significance to those countries looking towards private business to expand manufacturing, for foreign capital is receptive to industrial opportunities when it becomes aware of them. The provision of more information, therefore, would be most helpful. UNIDO has been very active in this and should expand its role in co-ordinating the efforts of developing countries to establish industrial promotion centres in the advanced countries.

REGIONAL CO-OPERATION IN INDUSTRIAL DEVELOPMENT

Finally, UNIDO should attempt to play the role of catalyst in the promotion of regional co-operation in industrial development. In order to do so, it should strengthen its relationships with the regional economic commissions, UNESOB and intergovernmental organizations, which are recognized as the most suitable bodies for promoting regional co-operation among developing countries. In accordance with the recommendations of the International Symposium, in order to develop projects jointly with these bodies and to avoid duplication of efforts, UNIDO should appoint regional liaison officers in the headquarters of the regional commissions, UNESOB and intergovernmental organizations.

In co-operation with the regional economic commissions, UNIDO should attempt to ensure that the industrial development plans of individual countries take account of developments in other countries in their region. This would be a first step towards the achievement of regional co-operation in industrial development, an enunciated goal of all the regional economic commissions. Such exchanges of information, possibly through periodic regional seminars on industrial planning, could permit developing countries to avoid costly duplication of efforts and achieve savings in investments. Regional facilities, such as research institutes, statistical centres and promotion services, would also be most helpful.

At the same time, UNIDO should continue to advance the concept of regional industrial integration. Many advantages would accrue from such integration—expansion of the size of the market, greater efficiency in exploration and exploitation of natural resources, and mobilization of larger amounts of capital. Although the notion of industrial integration is intriguing, it is not easily achieved, particularly at the present time. UNIDO should nevertheless continue to engage in research on the benefits and efficacy of such integration and should play an increasing role in the exchange of information so that its advantages will become more evident.

Annex 1

UNIDO ASSISTANCE IN INDUSTRIAL PLANNING

A. AREAS OF ASSISTANCE IN THE FIELD OF FORMULATION AND IMPLEMENTATION OF INDUSTRIAL PROGRAMMES AND PROJECTS

Formulation of general objectives and quantitative targets, the framing of strategies and the setting of priorities for industrial development;

Improvement of the quantity and quality of programming data in individual developing countries as a prerequisite for successful planning, and stimulating and organizing an increase of the exchange of technical and economic data between developing countries;

Various issues and techniques of industrial programming and project planning, including problems of regional development and industrial location, as well as organizational aspects of industrial planning;

Formulation and evaluation of industrial projects, including preparation of feasibility studies and preparation of bankable project reports;

Compilation and dissemination of profiles of manufacturing establishments and pre-investment projects in support of the activities related to industrial programme and project preparation;

Procedures for programming and control of implementation of industrial programmes and projects, including systems of project implementation and follow-up.

Particular emphasis is given to advisory missions which will assist requesting countries in solving problems encountered in industrial planning, project programming and implementation. These missions will focus on the evaluation of key industrial sectors, identifying priority investment projects, preparation of feasibility studies, programming and controlling project implementation, and establishing strategies and targets to ensure optimal utilization of resources for accelerating industrial development.

B. SELECTED MAJOR TECHNICAL ASSISTANCE PROJECTS

The projects listed below relate to the activities of the United Nations Industrial Development Organization since its establishment in 1967. The list excludes projects carried out under the predecessor organizations of UNIDO (the former Division of Industrial Development up to 1962 and the Centre for Industrial Development up to 1967). Since the projects are listed for illustrative purposes, the names of countries have been omitted.

The respective programmes under which the projects are implemented are shown as:

SIS	Special Industrial Services of UNIDO
UNDP/TA	United Nations Development Programme, Technical Assistance Component
UNDP/SF	United Nations Development Programme, Special Fund Component
RP	Regular Programme

(1) *Projects implemented or under implementation in areas related to the formulation and implementation of industrial programmes*

AFRICA

- National Centre for Industrial Studies (UNDP/SF)
- Industrial Studies and Development Centre (UNDP/SF)
- Centre of Industrial Studies for the Maghreb (UNDP/SF)
- Advice on problems of industrial development (UNDP/TA)
- Evaluation of proposed specific industrial projects (UNDP/TA)
- Evaluation of feasibility studies for manufacturing industries and project implementation (UNDP/TA)
- Industrial programmer and industrial cost accountant (UNDP/TA)
- Industrial project formulation, evaluation and implementation (UNDP/TA)
- Preparation of programme for the industrial sector (UNDP/TA)
- Industrial development programming (UNDP/TA)
- Organizing a project evaluation team to deal with industrial and capital investment projects (SIS)
- Survey of industrial development potentialities (SIS)
- Survey of the manufacturing industry (SIS)
- Survey of state-financed industrial enterprises (SIS)
- Project evaluation in connexion with an economic development plan (RP)
- Feasibility studies on projects for a development plan (RP)

- Industrial policy, project evaluation (RP)**
- Industrial planning and project evaluation (RP)**
- Evaluation of industrial projects (RP)**
- Industrial programming and project evaluation (RP)**
- Project formulation, evaluation and implementation (RP)**

THE AMERICAS

- Resources survey of a region (UNDP/SF)**
- Study of resource potentials for industrial development (UNDP/TA)**
- Evaluation, selection and execution of industrial projects (UNDP/TA)**
- Project evaluation and implementation (UNDP/TA)**
- Preparation of an industrial development plan (UNDP/TA)**
- Industrial planning and project evaluation (UNDP/TA)**
- Industrial planning (UNDP/TA)**
- Evaluation of feasibility studies for manufacturing industries and project implementation (UNDP/TA)**
- Industrial policies and programmes related to the economic integration of Central America (UNDP/TA)**
- Formulation of industrial policies and programmes (RP)**
- Corporate financial planning (SIS)**
- Industrial programming and project planning (SIS)**
- Evaluation of manufacturing projects (SIS)**
- Funds-in-trust evaluation of industrial projects (funds in trust)**

ASIA AND THE FAR EAST

- Research Centre for Industrial and Trade Development (UNDP/SF)**
- Feasibility studies on the establishment of industries (UNDP/TA)**
- Feasibility studies for specific industries (UNDP/TA)**
- Inventories of available natural resources and utilization of production facilities (UNDP/TA)**
- Preparation of pre-investment studies for state enterprises (UNDP/TA)**
- Industrial classification survey and programming data (UNDP/TA)**
- Evaluating programmes of industrial sector (UNDP/TA)**
- Feasibility studies of industrial projects (UNDP/TA)**
- Adviser to the Economic Development Board (UNDP/TA)**
- Economic research and project evaluation (UNDP/TA)**
- Evaluation of surveys in various industrial fields (UNDP/TA)**
- Review of industrial policy, and appraisal of industrial development programmes (UNDP/TA)**
- Technical and financial aspects of proposed projects (UNDP/TA)**
- Review of methodology for evaluation of new industrial projects (UNDP/TA)**

Industrial sector programming (SIS)
 Economic evaluation of an aluminium reduction plant (SIS)
 Project identification, formulation and development (SIS)
 Industrial marketing and feasibility studies (SIS)
 Establishing a working system for market studies (SIS)
 Preparation of investments priorities plans (SIS)
 Fellowship in industrial development (RP)
 Regional industrial adviser attached to the economic regional commission (RP)

EUROPE AND THE MIDDLE EAST

Centre for Industrial Development (UNDP/SF)
 Industrial Studies and Development Centre (UNDP/SF)
 Programme evaluation (UNDP/TA)
 Preparing feasibility studies for various industries (UNDP/TA)
 Fellowship in industrial development (RP)
 Regional industrial adviser attached to the economic regional commission (RP)
 Industrial planning and development (SIS)
 Promotion of certain projects under the SIS programme (SIS)

- (2) *Projects in preparation or under discussion with Governments in areas related to the formulation and implementation of industrial programmes*

AFRICA

Industrial studies for the development of the Senegal river basin (UNDP/SF)
 General survey for industrial harmonization in OCAM membership states (UNDP/SF)
 Industrial programming (UNDP/TA)
 Project preparation and evaluation (SIS)
 Project implementation (SIS)
 Industrial regional planning (SIS)
 Regional industrial adviser (UNDP/TA)

THE AMERICAS

Industrial programming (UNDP/TA)
 Project formulation and evaluation (SIS)

ASIA AND THE FAR EAST

Industrial programming (UNDP/TA)
Project preparation and evaluation (UNDP/TA)
Industrial regional planning (SIS)
Programming data analysis (SIS)

EUROPE AND THE MIDDLE EAST

Industrial programming (UNDP/TA)
Project preparation and evaluation (SIS)

Annex 2

**MEETINGS, SYMPOSIA, WORKING GROUPS AND TRAINING
SEMINARS ORGANIZED BY UNIDO, OR BY THE UNITED NATIONS
PRIOR TO THE INCEPTION OF UNIDO**

	<i>Location</i>	<i>Date</i>
Interregional Symposium on Industrial Project Evaluation	Prague	October 1965
<i>Ad Hoc</i> Working Group on Industrial Programming Data	New York	November 1965
Training Workshops on Industrial Project Formulation and Evaluation	Mexico City	June-July 1966
	Colombo, Ceylon	December 1966
	New Delhi	December 1966- January 1967
<i>Ad Hoc</i> Experts Meeting on the Role of Advanced Skills and Technologies in Industrial Development	New York	May 1967
<i>Ad Hoc</i> Experts Meeting on Regional Industrial Planning	Geneva	May-June 1967
Interregional Seminar on Industrial Location and Regional Development	Minsk, USSR	August 1968
International Working Party on Industrial Programming Data	Vienna	November 1968
Interregional Training Workshop on Industrial Project Implementation	Amsterdam	September- October 1969
Subregional Working Sessions of the International Working Party on Industrial Programming Data	East Africa	November-
	South East Asia	December 1969
	Central America	
Subregional Expert Group Meeting on Industrial Programming Data	Beirut	<i>Proposed date</i> November 1970
	Teheran	Late 1970

Annex 3

SELECTED LIST OF DOCUMENTS AND PUBLICATIONS ON INDUSTRIAL PLANNING¹

UNITED NATIONS

CENTRE FOR INDUSTRIAL DEVELOPMENT (PREDECESSOR OF UNIDO)

- A Study of Industrial Growth* (ST/ECA/74) (Sales No.: 63.II.B.2).
- Studies in Economies of Industry. 1. Cement/Nitrogenous Fertilizers Based on Natural Gas* (ST/ECA/75) (Sales No.: 63.II.B.3).
- Report of the United Nations Seminar on Industrial Programming*, held in São Paulo from 14 to 15 March 1963 (E/C.5/27, E/CN.12/663) (Sales No.: 64.II.B.8).
- Basic Principles and Experience of Industrial Development Planning in the Soviet Union* (ST/CID/3) (Sales No.: 66.II.B.1).
- Economic Integration and Industrial Specialization among the Member Countries of the Council for Mutual Economic Assistance* (ST/CID/7) (Sales No.: 66.II.B.4).
- Studies in Economies of Industry. 2. Pre-Investment Data for the Aluminium Industry* (ST/CID/9) (Sales No.: 66.II.B.10).
- Report of the Interregional Symposium on Industrial Project Evaluation*, held in Prague from 11 to 29 October 1965 (ST/TAO/SER.C/82) (Sales No.: 66.II.B.11).
- Industrial Planning and Programming. Criteria for the development of manufacturing industries in developing countries 1966* (E/C.5/111 and Add.1) (mimeo.).

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

- Profiles of Manufacturing Establishments*, 2 vols. (ID/SER. E/4 and 5) (Sales No.: 67.II.B.17 and 68.II.B.13).
- Project Formulation and Evaluation. Vol. I. Evaluation of Industrial Projects* (ID/SER. H/1) (Sales No.: 67.II.B.23).

¹ Symbols and Sales Numbers of United Nations documents and publications are given in parentheses after the titles.

Report of the Interregional Seminar on Industrial Location and Regional Development, held in Minsk from 14 to 26 August 1968 (ID/19) (Sales No.: 69.II.B.22).

Industrialization and Productivity Bulletin No. 11 (ID/SER. A/11) (Sales No.: 67.II.B.10) see the following articles:

"The Metal-Transforming Industry in Venezuela: An Import Substitution Development Programme", by ECLA.

"Industrial Finance in Five African Countries", by R. F. Meagher.

"Problems of Industrial Planning and Plan Implementation in the ECAFE Region", by ECAFE.

"Financing of Manufacturing Industry in Selected Countries of the Middle East."

Industrialization and Productivity Bulletin No. 12 (ID/SER. A/12) (Sales No.: 68.II.B.3) see the following articles:

"Decentralization and Project Evaluation under Economies of Scale and Indivisibilities", by T. Vietorisz.

"Skill Requirements in Manufacturing Industries", by M. Zymelman.

"UNIDO *Ad Hoc* Meeting of Experts on the Role of Advanced Skills and Technologies in Industrial Development".

Industrialization and Productivity Bulletin No. 13 (ID/SER. A/13) (Sales No.: 69.II.B.3) see the following articles:

"The Role of Policy-Makers in Project Formulation and Evaluation" by A. K. Sen.

"Recent Over-all Progress in Industrialization Achieved by Developing Countries".

"Industrial Development Strategy in Latin America", by the Latin American Institute for Economic and Social Planning.

Industrialization and Productivity Bulletin No. 14 (ID/SER. A/14) (Sales No.: 69.II.B.12) see the following articles:

"The Role of the Industrial Sector in Economic Development".

"The Need for an Export-Oriented Pattern of Industrialization".

"The Role of National Development Finance Companies in Industrial Development", prepared by the World Bank Group.

"Skill Requirements for Industrialization", prepared by I.L.O.

"Export Marketing Organizations".

Implementation of Industrial Projects, 1967 (ID/CONF. 1/3) (mimeo.).

The Role of Policy-Makers in Project Formulation and Evaluation, 1967 (ID/CONF. 1/4) (mimeo.).

Industrial Location Planning, 1967 (ID/CONF. 1/12) (mimeo.).

Requisites of Production, Processing and Utilization to Develop Agriculture, Forestry and Fisheries, prepared by FAO, 1967 (ID/CONF. 1/15) (mimeo.).

Industrial Location Policies and Policy Measures in Developing Countries, 1967 (ID/CONF. 1/27) (mimeo.).

Criteria for the Location of Industrial Plants (changes and problems), prepared by ECE, 1967 (ID/CONF. 1/B. 3) (mimeo.).

ECONOMIC COMMISSION FOR ASIA AND THE FAR EAST

Formulating Industrial Development Programmes (Sales No.: 61.II.F.7).

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Bryce, M. D., *Industrial Development*, McGraw-Hill, New York, 1960.

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Chenery, H. B., "Development Policies for Southern Italy", *Quarterly Journal of Economics*, November 1962.

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Mason, E. S., *Economic Planning in Underdeveloped Areas*, Fordham University Press, New York, 1958.

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Owen, W., *Strategy for Mobility*, Brookings Institution, Washington, D.C., 1964.

Perloff, H. S. and V. W. Dodds, *How a Region Grows*, New York, 1963.

Sen, A. K., "On Optimizing the Rate of Saving", *Economic Journal (Cambridge, England)* September 1961.

Sen, A. K., A Possibility Theorem on Majority Decision, Working Paper No. 61, Committee on Econometrics and Mathematical Economics, University of California, Berkeley, Calif., 1965.

Terborgh, G., *Business Investment Policy*, Machine and Allied Products Institute, Washington D.C., 1958.

Tinbergen, J., *Central Planning*, Yale University Press, New Haven, Conn., 1964.

Tinbergen, J., "Planning in Stages", *Statsoekonomisk Tidskrift* 1962, No. 1.

Tinbergen, J., *The Design of Development*, Johns Hopkins Press, Baltimore, Md., 1958.



**UNIDO MONOGRAPHS ON INDUSTRIALIZATION OF DEVELOPING COUNTRIES:
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