

**REPORT OF
THE UNITED NATIONS
SEMINAR ON
INDUSTRIAL PROGRAMMING**

São Paulo, Brazil, 4-15 March 1963



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Department of Economic and Social Affairs

REPORT
OF THE
UNITED NATIONS SEMINAR
ON INDUSTRIAL PROGRAMMING
held in São Paulo, Brazil, 4-15 March 1963



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CONTENTS

	<i>Page</i>		<i>Page</i>
INTRODUCTION			
A. PROGRAMMING OF INDUSTRIAL DEVELOPMENT AT THE COUNTRY LEVEL		II. <i>Evaluation of industrial projects: selection of individual projects and preparation of feasibility or pre-investment studies</i>	
I. 1. General economic programming and the formulation of industrial development programmes..	5	1. Evaluation of projects in predominantly private enterprise economies	34
2. Structural changes in production and demand; import substitution and promotion of export trade	8	2. Evaluation of projects in centrally planned economies	38
3. Selection of techniques and labour utilization; economies of scale.....	9	III. <i>Formulation of sectoral industrial programmes: problems of dynamic and of traditional sectors</i>	
II. <i>Latin American experience in industrial programming</i>	14	1. Sectoral programming of dynamic industries..	40
III. <i>Experience in industrial programming in Asia and the Far East</i>		2. Sectoral programming in traditional industries	44
1. Japan's experience in industrial programming.	17	IV. <i>Industrial programming and policies with particular reference to participation of the private sector</i>	49
2. India's experience in industrial programming.	20		
B. PROGRAMMING AT THE SECTOR AND PROJECT LEVELS		<i>ANNEXES</i>	
I. <i>Basic data and criteria for industry programming</i>		I. Attendance list	52
1. Basic data and criteria for programming in the steel-transforming industries.....	23	II. Agenda and list of documents.....	53
2. Basic data and criteria for programming in the chemical industries.....	26	III. Opening statement by Admiral Lucio Meira, President of the Executive Groups of the Brazilian Industry..	56
3. Basic data and criteria for programming in the pulp and paper industry.....	28	IV. Address delivered by Mr. Nuño F. de Figueiredo, Director of the Industrial Development Division of the ECLA secretariat and Director of the Seminar, at the inaugural meeting held on 4 March 1963....	59
4. Basic data and criteria for programming other industries	31	V. Address delivered by Mr. S. Lurié, Director, Research and Evaluation Division, Centre for Industrial Development of the United Nations, and Director of the Seminar, at the inaugural meeting held on 4 March 1963	66

INTRODUCTION

A seminar on Industrial Development Programming in the Latin American region was held in São Paulo, Brazil, from 4 to 15 March 1963.¹ It was organized jointly by the United Nations Economic Commission for Latin America (ECLA) and the Centre for Industrial Development in co-operation with the Bureau of Technical Assistance Operations (BTAO) of the Department of Economic and Social Affairs of the United Nations Secretariat and was sponsored locally by the Executive Groups of the Brazilian Industry (GEIA, GEIN, GEIMAPE, GEIMAR and GEIMET), the National Confederation of Industries of Brazil and the Federation of Industries of the State of São Paulo. The Seminar was attended by sixty-nine participants and observers from eleven countries of the region, four countries outside the region, and the United Nations and other international organizations.

There has been increasing recognition in Latin America of the need for economic planning and, in particular, for planning of industrial development, as evidenced by the fact that most of the Governments in the region have by now organized planning agencies to deal with these problems. It is considered that industrialization is a key element in the process of rapid economic growth of the under-developed countries. However, only in exceptional cases can the required tempo of industrial development be achieved through the autonomous operations of the market mechanism, particularly if industrialization is to be compatible with the social and political objectives of economic development currently sought by Governments. Planning and programming of industrial development have of late been increasingly recognized as basic prerequisites for a consistent policy of industrialization and the optimal use of national resources. These call not only for the development of effective planning techniques taking into account the particular conditions of under-developed countries, but also for the establishment of additional machinery for the formulation and the implementation of industrial plans and programmes.

The purpose of the Seminar was to stimulate an exchange of views on the experiences in industrial planning among a group of specialists in this field, representing the various aspects involved in the planning process. The participants were selected from among general economists, industrial economists, engineers and industrialists within and outside the Latin American region, in an endeavour to promote a mutual understanding of the problems faced in the planning process. An attempt was thus made to build a bridge between planning and policy making and the actual establishment and operation of industry. Moreover, some of the participants from countries outside the Latin American region, namely, France, India,

Japan, Poland and the United States, represented areas at different stages of economic development and with different economic systems. The confrontation of the experience of these countries with that of Latin America proved to be extremely fruitful in stimulating the thinking of the Latin American participants on problems in their own areas.

Extensive documentation in the form of research studies was presented to the Seminar by the two organizing bodies, the Research and Evaluation Division of the Centre for Industrial Development at United Nations Headquarters and the Industrial Development Division of the secretariat of the Economic Commission for Latin America. A wide range of problems relating to planning and programming of industrial development, economic characteristics of industries and evaluation of industrial projects was reviewed in the Seminar. A consistent effort was made to orient the discussions towards a search for practical solutions which would be of immediate use to Governments faced with the problem of developing realistic policies and measures to promote industrial development in their countries. Among other results of the meeting, a number of areas were mapped out for further investigation.

The Seminar divided the discussion items into two main areas: programming of industrial development at the country level, and programming at the sector and project levels. The first was subdivided into the following topics: methodology of industrial programming within the general economic programming; structural changes in production and demand; selection of techniques and economies of scale; and experiences of Latin American countries and a few others in industrial programming. The main topics of discussion in the second area were: basic data and criteria for programming of a number of industries (steel transforming, chemicals, pulp and paper, textiles, cement, aluminium and industrial construction); evaluation of industrial projects and preparation of feasibility studies; formulation of sectoral industrial programmes for both dynamic and traditional industries, and implementation and other aspects of industry programming with particular reference to the private sector.

In discussing over-all planning and its relation to sectoral planning of industry in general and planning of individual industrial branches, the need for formulating a general national plan was explicitly recognized. It was realized that countries were facing considerable difficulties in this respect, particularly as regards statistical data and availability of programming personnel, but these difficulties were not considered to be insurmountable. However, at the present time many countries in the region were lagging in the area of over-all planning and the question arose as to what extent limited planning on a sectoral basis, which was being carried out in some of the countries of the region

¹Project B.1.b of the Programme of Work on Industrialization of the United Nations, approved by the Economic and Social Council (document E/3600/Rev.1, paragraph 130).

(Mexico and Brazil, for example), could be effective in the absence of a comprehensive over-all plan. The consensus was that countries were well advised to proceed with partial planning of their strategic or bottleneck sectors, even before they were in a position to produce an adequate over-all plan. As an example, it was mentioned that even in the case of a centrally planned economy such as Poland, in the early stages of planning a major effort had been concentrated on the bottleneck sectors, namely, those which had suffered a major dislocation as a result of war.

The Seminar gave its attention to the absorption of unemployment a major factor in planning in the developing countries of the region, in view of the existing high level of structural unemployment which is being aggravated by the rapid growth of the labour force. In this connexion, the possibilities of capital-labour substitution in industry were discussed, but these were generally found to be of limited scope because of the technological characteristics of modern industry. It was considered that a serious effort should be made to promote systematic technological research to explore the possibilities of increasing the flexibility of industrial processes in regard to the substitution of capital by labour. It was envisaged, however, that the manufacturing sector as a whole could be expected to have a relatively limited absorptive capacity for manpower, and that significant progress in absorbing unemployment could be made only by an over-all development effort.

The factor of economies of scale in industrial planning gave rise to a thorough discussion, since most countries in Latin America offered limited markets for manufactured goods. This limitation results either in an inability to establish industries whose minimum economic scale is above the capacity of the national markets, or, if such industries are established, in chronic underutilization of capacity. In this connexion, the Seminar drew attention to the possibilities offered by regional integration whereby national markets would be pooled so as to permit the establishment of large-size plants which would benefit from economies of scale.

In this connexion, the question was raised of export markets for goods manufactured in the region. There were two reasons why under-developed countries should seek to expand their exports of manufactured goods. In the first place, foreign demand would in many cases be a welcome supplement to the limited domestic demand and would enable countries to engage in industries where the cost-scale factor is a leading consideration. In the second place, promotion of exports of manufactured goods would result in diversifying the structure of exports of countries whose foreign trade is at the present time concentrated on exports of primary commodities; such diversification would contribute towards reducing the impact on the economies of the developing countries of the fluctuations in demand and prices of primary commodities. A number of factors were reviewed by the Seminar, which at the present time were handicapping the expansion of exports of manufactured goods. These were, in particular, inertia on the part of the entrepreneurs in the traditional industries, ignorance of export practices and markets, and, as one of the major factors, lack of credit facilities to finance export operations.

Following the discussion of the general aspects of planning, the Seminar went on to examine the experience of individual countries in general in industrial planning. A review was made in particular of the experience in a number of Latin American countries of the ECLA/BTAO Advisory Groups, which have been an effective instrument developed by ECLA for assistance to Governments in this field. A presentation was also made of the experience of certain countries of the region in sectoral programming of specific industrial sectors. This applies, in particular, to the work on programming of mechanical industries in Peru which had been carried out by an ECLA team, and to the experience of Brazil in certain industrial sectors (for example, the establishment of an integrated automobile industry and the development of heavy mechanical construction and naval construction industries) through the device of the so-called Executive Groups. Under the latter, special *ad hoc* authorities in charge of programming and the execution of the programmes of the respective sectors were established, in co-operation with the private industrial groups concerned.

In this context, the Seminar also benefited from the contribution made by the participants from outside the region who presented and analysed the experience in industry planning of certain countries, namely, France, India and Japan. These three countries shared the common feature of active participation of the private sector in the elaboration and implementation of industrial planning, under the leadership of the public authorities which provided the basic framework of objectives, goals and targets, although the "intensity" of the planning process itself varied from country to country. Thus, broadly speaking, in Japan and France only the general objectives and over-all targets were spelled out by the Government, while implementation was largely left to the operation of the market and price mechanism; in India, government intervention in planning and implementation was of a much wider scope.

The discussion proceeded to the problem of evaluation of individual projects in connexion with the process of screening and selection. Selection of projects for implementation—or approval, in the case of projects implemented by the private sector—is a problem which the public authorities of most under-developed countries have to face in their day-to-day operations, even in the absence of any formal planning schemes, as a matter of allocation of scarce resources among competing uses. The practices of both predominantly private enterprise economies and centrally planned economies as regards their methods of evaluation of projects were discussed; the criteria and methods used in the latter were also of direct interest to economists dealing with this problem in mixed economies. In this connexion, the Seminar also examined the concept of shadow prices and its role in evaluation of projects. As is well known, this concept is applied because, under the conditions of factor endowment and factor pricing in under-developed countries, market prices provide a very imperfect indication of the social cost of inputs. It was stressed by the participants that, while the theoretical value of shadow prices is generally recognized, they could be useful as a tool of practical policy making only in so far as they could be properly quantified, and that a serious effort should be made to study

the experience in actual use of this concept. It was mentioned in this connexion that in the centrally planned economies, the device of shadow prices is being widely used in the evaluation of projects.

The experience of the international financial institutions, the International Bank of Reconstruction and Development and the Inter-American Bank for Economic Development, in evaluating industrial projects was presented to the meeting, particularly as regards the criteria used. The latter were primarily of the conventional banking type, although some consideration was given to broader aspects of a social and economic nature. It was stressed in this context that there was need for impressing under-developed countries with the importance of having properly prepared projects; it had been the experience of banking institutions that many projects submitted for financing failed to meet normal banking standards as regards technical and financial requirements.

The problem of preparation of pre-investment studies, with a view to their being used in both screening and evaluation procedures and the preparation of "bankable" projects, led to consideration of the need for the so-called preinvestment or planning data. These data are the basic technological and economic characteristics of industries used in the preparation of preinvestment studies; the participants were careful to point out that the latter should not be confused with the more detailed and much more costly engineering studies which are undertaken at a later stage for projects whose implementation has already been decided upon. The documentation on preinvestment data presented by ECLA and the Centre for Industrial Development for a certain number of industries (steel transforming, chemicals, pulp and paper, cement, fertilizers based on natural gas, aluminium, textiles, etc.) were considered to be a highly valuable pioneering effort, and it was suggested that a comprehensive and co-ordinated effort be made by countries and international organizations to collect and analyse in a systematic way economic and technical data derived from actual operation of industries in under-developed countries.

Also presented to the Seminar by the ECLA secretariat were studies dealing with the development in Latin America of specific industrial branches, in both the traditional and the dynamic sectors, the former covering largely consumer goods, industries such as

textiles, the latter, industries whose establishment could be expected to result in a more general radiating effect on the economy beyond their own sphere, for example, steel, machine building, heavy chemicals. In the case of the traditional industries, the discussion turned around the problem of the degree of modernization of their equipment which would be appropriate in the light of the conditions in the region. It was considered by some participants that a too far-reaching modernization of them and the consequent increase in productivity might lead to an aggravation of the unemployment problem by releasing manpower at present employed and that the purely technological criteria of engineering efficiency should be weighed against the heavy social cost involved.

Finally, the problem of implementation of planning was discussed, in particular as regards the integration of the private sector in planning. It is clear that, in the mixed economies, a predominant part of investment and production in industry was necessarily carried out by the private sector; realistic planning should take into account the fact that the implementation of the targets provided in the plan could be carried out effectively only if appropriate incentives were provided to private enterprise in terms of normal entrepreneurial motivation to induce it to engage in these activities. It was necessary on the other hand to reconcile private entrepreneurial motivation with the general social and economic objectives of the government development policies; the two did not necessarily coincide in all cases. This meant that planning in a mixed economy implied the necessity of developing a consistent and integrated network of measures and policies destined to guide the industrialization process in the private sector in accordance with the stated objectives and targets of the plan. It was mentioned earlier that the experience of France, India and Japan presented to the Seminar offered certain lessons in this respect; in particular, the experience of France was considered relevant in view of the fact that in that country a particularly effective machinery has been developed for the collaboration of the private sector with the public planning authorities in the formulation and implementation of planning. It was considered that additional case studies by the United Nations are indicated in this field. It was also suggested that as a follow-up of the discussion, a seminar especially devoted to this problem should be convened.

A. PROGRAMMING OF INDUSTRIAL DEVELOPMENT AT THE COUNTRY LEVEL

A.I.1. GENERAL ECONOMIC PROGRAMMING AND THE FORMULATION OF INDUSTRIAL DEVELOPMENT PROGRAMMES

METHODOLOGY OF INDUSTRIAL PROGRAMMING IN THE CONTEXT OF GENERAL ECONOMIC PROGRAMMING

(a) *Definition of the problem*

1. The importance of the problem of the relationship between over-all and industrial programming derives from certain essential considerations. One of these is the structural inter-relationship of the processes of production and demand arising from inter-sectoral technological and economic relationship. These relationships are sometimes expressed in the form of static or dynamic input-output tables according to whether or not the relationships referring to changes in productive capacity over time are included. These inter-relationships imply that the development of any one sector (for example, the manufacturing sector as a whole or any of its branches or any specific industry) is not independent of what happens in the remaining sectors which make up the economic complex. Thus, for instance, the development of the steelmaking industry is dependent on the production of iron ore, coke, energy, etc., on the one hand, and on the demand for rolled products as an input in other activities, such as construction and metal transforming industries, on the other.

2. There is a greater need to take into account these structural interrelationships in the general programming of the more highly diversified economies, where alternative possibilities for the allocation of resources are more numerous. On the other hand, less weight might be attached in such economies to problems of compatibility of targets, since the market regulatory mechanism that operates automatically is more effective. In less diversified—not so highly industrialized—economies and with fewer inter-relationships among manufacturing sectors and branches of industry, the use of inter-sectoral and inter-industrial relations may be considered to be of lesser importance but more emphasis would be placed on specific industries and individual projects. As the industrialization process advances, the production of intermediate and capital goods assumes greater significance, and the interdependence of economic activities increases, especially within the manufacturing sector itself. Thus, although it is possible to rely, up to a point, on the automatic regulatory price and market mechanism which operate at higher levels of diversification (such as the existence of under-utilized capacity, flexibility of plant and equipment in regard to production of various goods and availability of entrepreneurial talent), it is equally true that an explicit analysis of inter-industrial relationships, in formal terms, or at least by means of partial balances, is indicated.

3. The second element is the functional interdependence between demand and income levels. For consumer goods, this interdependence is usually expressed in terms of income demand elasticity coefficients. Obviously the demand for consumer goods is affected not only by the income level but also by the distribution of income among the population, which has a direct effect on the pattern of demand for various products. Again the distribution of income between consumption and investment affects the pattern of demand in an economy. This interdependence means that the development of the various sectors of the economy, to the extent that they are affected by domestic demand, will depend on the over-all development of the economy—that is to say, of all income-generating activities—and on the distribution of the benefits of such development.

4. The third element is the desire to correct some of the structural weaknesses which characterize most under-developed countries. These are in the first place the slow rate and uneven pace of economic growth and the inequitable distribution of the benefits arising from it. These problems require urgent solution and it is obvious that these structural deficiencies cannot be dealt with on a purely sectoral level.

5. It is on the basis of the general objectives of programming that the development strategy will be formulated. This strategy relates to such policies as creation of employment; reduction of vulnerability to external fluctuations; integration in respect to regional markets; geographical distribution of industries; development of the more backward areas; etc.

6. In all these matters the role of the manufacturing sector in the process of over-all economic growth is of utmost importance. As an example, vulnerability to external fluctuations may be reduced through the greater diversification of exports—in which exports of manufactured goods could play an important part. It implies in most cases a major effort of import substitution first as regards consumer goods and, as the process of industrialization develops, of intermediate and capital goods. As was mentioned earlier certain income redistribution objectives directly affect the pattern of demand for consumer manufacturers, the influence of which on the structure of the industrial sector is evident. It has further repercussions on employment and on capital requirements since the so-called “light” industries producing current consumer goods generally make more intensive use of labour than of capital.

7. A particularly important problem arising in programming economic and social growth is that of employment. In many Latin American countries there is a high level of unemployment at the same time as

the labour force increases at a much more rapid rate than employment opportunities. The fact has to be recognized however that manufacturing industry can play only a minor role in direct absorption of labour. This is due not only to the inadequate rate of expansion of manufacturing production, but also to the nature of modern technology which is highly capital intensive and offers in most cases few possibilities of substitution of capital by labour.

8. Finally, there is the need for optimum utilization of resources generally in scarce supply in under-developed countries, such as capital and foreign exchange. This calls for decisions as to technological and resource allocation alternatives among the various sectors of the economy and with respect to specific activities.

(b) *Problems relating to coverage and levels of industrial programming*

9. The term "coverage" is understood to mean the fields to be included in economic programming. The maximum coverage corresponds to over-all programmes which, to a lesser or greater extent, include all the activities of an economy. Minimum coverage relates to a specific investment project. The problem of programme *coverage* differs from that of programming *levels*. The latter term relates to greater or lesser degree of detail in a programme, that is to say, degree of aggregation of the activities. A high programming level would imply the formulation of over-all targets and of the general measures designed to attain them. A lower level of programming would imply the formulation of specific investment projects and specific measures and actions required to implement them.

10. In the discussion the question was raised as to the extent to which, in the absence of an over-all economic development programme, it is reasonable to apply sectoral programming; for instance, on the basis of forecasts of relevant variables and of structural links between the activities to be programmed. In particular, the question arises as to how far programming of the manufacturing sector alone is to be considered as a reasonable alternative to a system of integrated planning on the national and sectoral levels which in many Latin American countries is not available.

11. In this connexion the desirability and even the need of over-all economic development programming efforts was explicitly recognized. This consensus of opinion was based both on considerations of the need for consistency among multiple objectives and specific targets and rational allocation of resources among the different sectors of the economy.

12. Two different viewpoints were observed, however, with respect to the timing — or priority — of over-all programming in relation to partial programming of certain manufacturing sectors and branches. According to one viewpoint, under-developed countries would do well to programme certain strategic activities even without the benefit of an over-all or general plan, in order not to delay the promotion of such activities. It was considered that many countries would experience considerable difficulties in formulating an over-all programme while there were activities or projects which had to be developed. The main obstacles in the way of formulating a realistic

over-all plan mentioned by the participants were lack of adequate statistical data, of trained programming personnel and of an adequate organization for the preparation and implementation of the programmes.

13. However, although the above factors seemed to justify giving priority to sectoral programming, it was agreed that certain minimum extra sectoral planning (e.g., in the form of projections) going beyond the specific activities was necessary. As an example, reference was made to the problem which would arise in the case of the programming of the steel industry since the demand for steel depends on the levels of activity and investment in many other sectors, such as building, metal transforming (wire, tools, machines), transport and agriculture and is more generally diffused over the entire economy. The problem clearly cannot be solved by partial programming; and if the direct and indirect technological and economic relations affecting such demand were not fully considered, the quality of the sectoral steel programme would very much suffer. It was argued that projections of demand for such widely used commodities as steel could be made in the first approximation by using correlations with aggregates such as gross domestic product, the future development of which it was necessary and possible to estimate. These first projections could then be counterchecked and supplemented by more detailed studies based on end-use, where use would be made of a general input-output table.

14. In the course of the discussion it was further pointed out that Brazil and Mexico have emphasized partial programming of certain specific activities, such as steelmaking, metal transforming (e.g., manufacture of trucks and passenger cars), electric power generation, petro-chemicals, etc. More recently, however, both countries were attempting to approach their development problems from an over-all perspective and have prepared national development plans. It was also mentioned that in the case of Poland, although at present general programming is carried out in parallel with sectoral planning, in the very early period of planning the programming efforts were concentrated in certain strategic sectors with the emphasis on bottleneck sectors (e.g., coal).

15. A consensus was reached that over-all programming was necessary and that it should be possible to make parallel efforts on the over-all and sectoral and project levels. General programming was not only complementary to partial programming of the strategic or obvious "bottleneck" sectors but also made it possible to check the consistency, efficiency and feasibility of sectoral programmes. An effort should be made to eliminate the technical difficulties involved. The lack of information was cited as one of the technical difficulties that would be relatively easy to solve. For instance, it was possible to study the manufacturing sector effectively by means of *ad hoc* surveys on the absence of elaborate industrial censuses. In Chile and Venezuela such surveys were made in connexion with the preparation of economic development programmes, using conventional statistical tools for the purpose.

16. It was mentioned that several countries of the region, among them Chile, Colombia, Bolivia and Venezuela, have prepared over-all economic and social development programmes without, at the same time,

neglecting the programming of certain sectors of strategic importance. It is true that the experience of Brazil and Mexico has shown that it was possible to achieve a successful rate of development of individual industrial sectors by means of partial programming, but even the latter countries are at the present time in the process of shifting their attention to over-all development planning. In this connexion it was mentioned that the region should take advantage of the progress in programming techniques and benefit from the accumulated experience of other countries.

17. Those who felt that over-all programming and even an over-all programme must precede sectoral programming were not unaware of the difficulties involved. It was considered particularly important to ascertain and analyse the major problems relating to the inadequacy of the rate of economic growth and other structural deficiencies referred to earlier. It is necessary to formulate the general objectives and the strategy of development in order to set up the basic criteria of the sectoral and more specific programmes. This involves a certain number of basic studies and the use of programming models.²

(c) *The employment problem*

18. In the discussions the problem was raised of the relatively minor role played by the manufacturing industry in the absorption of manpower in relation to the high level of structural unemployment and rapid growth of the labour force typical of many underdeveloped countries.

19. The case of Venezuela was given as an illustration. Economic development in that country has been growing rapidly in the fifties, the gross domestic product rising, in real terms, at a rate of about 8 per cent annually and manufacturing production — in terms of gross product at constant prices was expanding at a rate of 11.6 per cent annually. Nevertheless, the ratio of unemployment in total labour force rose from 6 per cent in 1950 to 13 per cent in 1960. Problems such as these raised the issue of maximization of employment opportunities as one of the objectives of economic development. It was mentioned that the implementation of this objective would involve substantial investment in complementary resources in labour-intensive industries and lead to an increase in national production in the short run; in the longer run, however, it might be inconsistent with the achievement of accelerated economic growth which requires above all a high rate of capital formation.

20. It was mentioned that the present programmes in Venezuela and Bolivia tend to emphasize employment since these countries face serious social problems of unemployment. However, it was recognized that the full responsibility for creating job opportunities could not rest with the manufacturing sector alone. The employment problem had to be approached within the wider perspective of an over-all development effort. Thus it was mentioned that while Venezuela's development plan included substantial employment targets for the manufacturing sector under which about 90,000 workers were to be absorbed annually, it was foreseen

that the major proportion of unemployed would be absorbed in other activities such as, for example, housing construction. Mention was made of the fact that in the particular case of Venezuela, the relatively low price of capital in relation to that of labour — apart from the fact that the cost of manpower could be expected to rise substantially in the future owing to the upward pressure of wages — resulted in lesser employment opportunities, since entrepreneurs tend to make use of more capital-intensive methods of production.

21. Concerning the experience of other countries, it was mentioned that Japan had chosen to maximize output in preference to employment in the hope that the dynamics of development in the course of the next ten years will by itself solve the employment problem. India, which gave special emphasis to heavy industry in its second and third five-year plans, paid at the same time considerable attention to employment by promoting small-scale and cottage industries. One-seventh of the planned investment in industry was allocated under the third plan to increasing opportunities in these sectors.

22. In connexion with employment opportunities in industry, in addition to those arising from the pattern and rate of growth of the sector itself, the question was raised of labour-capital substitution through choice of adequate techniques.³ As regards the latter, the varying degree of technological flexibility in various branches of industry was mentioned. Thus, engineering and process industries (e.g., chemicals) required precise specifications which imposed the use of standard equipment of given capital intensity. On the other hand, there were possibilities of greater input of labour per unit of output in the light and handicraft industries.

23. The existence of extensive margins of idle capacity in some industries in many Latin American countries were mentioned as providing for greater occupational opportunities. The reasons for the existence of idle capacity could often be found in the limitation of the market for industrial goods, particularly in industries requiring a minimum installed capacity because of indivisibilities and the nature of the equipment available in the market. Cost factors are also sometimes involved; for example, the use of night shifts is frequently more expensive.⁴ The existence of idle capacity of such type may be illustrated by the Venezuelan experience, where more than 50 per cent of all industries operate only one shift daily.

24. The question was raised as to how to promote better utilization of installed capacity and on appropriate selection of technology and processes with a view to providing for more employment opportunities in industry. One suggestion advanced in the course of the discussion was to raise the price of capital and capital goods, particularly in the case of imported goods; however, the general opinion was that such measures

³ See, in this connexion, section A.1.3 for a more detailed discussion of the problem.

⁴ In connexion with the use of night shifts mention was made of a number of other factors preventing its introduction. Because of high tariff protection entrepreneurs had in many cases no incentive to use their equipment more intensively or to delegate supervisory functions which would be required in working more than one shift per day. Multiple shift operation also required the introduction of preventive maintenance and the setting up of a more complex administrative organization.

² See "Use of models in programming", *Bulletin on Industrialization and Productivity*, No. 4, United Nations publication, Sales No.: 60.II.B.2.

which are essentially inimical to investment in industry should be used with extreme caution.

25. In relation to the employment possibilities in handicraft industries, India's experience under the third five-year plan was mentioned. This related in many cases to seasonal unemployment in Indian agriculture. Provision was made for utilization of hand-weaving and spinning skills which are available in many rural areas; raw materials and markets are also available locally. As a measure of promotion credit was granted for the purchase of cotton, spinning wheels and hand looms. Similar methods were applied for processing of sugar cane, manufacture of soap from non-edible vegetable oils, etc.

26. In this connexion the possibilities of co-existence of high and low productivity industries in a so-called dual technology system was discussed. It was mentioned by one participant that such a system had been considered in Bolivia, whereby the benefits of high

productivity in the more modern industries would be transferred in part to sectors which employ a higher proportion of labour.

27. The case of Japan was mentioned as a good illustration of deliberate technical and economic dualism, in which large industries obtained their intermediate goods from a multitude of small workshops. It was pointed out, however, that such a situation should be distinguished from what might be called a "false" dualism, such as occurs today in many Latin American industries. The latter situation is being favoured by the existence of a non-competitive régime in industry because of excessive protection, which does not induce entrepreneurs to be overly concerned over efficiency and costs. As a result there exists, side by side with the larger enterprises, a number of marginal high-cost, small producers whose survival is due to their being sheltered by high monopoly prices prevailing in the industry.

A.I.2. STRUCTURAL CHANGES IN PRODUCTION AND DEMAND: IMPORT SUBSTITUTION AND PROMOTION OF EXPORT TRADE

28. Economic development implies both an increase and structural changes in production. One of such changes is the process of industrialization itself, that is to say, the greater expansion of industrial activities in relation to others. But industrialization also implies qualitative changes in the structure of the industrial sector as a whole. In the industrialization process, substitution of imports plays a major role, together with the changes in the demand for manufactures, both domestic and foreign. Exports of manufactures have until now been a rather negligible factor in this respect, but they deserve, however, increasing consideration as the industrial development of the Latin American region progresses.

29. Programming implies to a large extent anticipating the magnitude and direction of these structural changes and designing a policy aimed at removing the obstacles standing in the way of such changes and creating the necessary incentives to promote them. In this sense industrial programming involves problems of supply, demand, import substitution and exports of manufactures.

30. As far as supply is concerned, aside from the technological interrelationships mentioned earlier, its response to the growth of demand may be distorted under the influence of certain institutional factors, which should be taken into account.

31. On the side of demand, taking first domestic demand, the role of income levels and distribution and of the development of other activities was mentioned before. The importance of domestic demand is reflected in the development programmes of Latin American countries, in which from 70 to 80 per cent of the increase in manufacturing production is related to this factor.⁵ As regards foreign demand it was recalled that export diversification would reduce the vulnerability of under-developed economies to external disturbances, a major objective of most development programmes. Reference was made in this connexion to the difficulties which were encountered by the developing countries in

exports of manufactures and policy measures aimed at removing such obstacles were mentioned.

32. As regards the more general problem of existing obstacles and resistances to structural changes, which are involved in the process of industrialization the following were mentioned: the difficulty of channelling private capital from traditional to new activities because of the inertia of the entrepreneurs; lack of development projects, in particular because of the lack of facilities and skills to prepare such projects; lack of qualified labour at all levels; lack of consistency in the protection policies; imperfect operation and limited size of the capital markets, etc. Because of these factors there was danger of monopolistic concentration in certain sectors since incentive measures taken by the Government and meant to stimulate new lines of production sometimes result merely in favouring self-financing in the traditional sectors. A case in point was Chile, where policy measures were being designed to implement the programme of development; the shortage of projects referred to above was an additional factor, although Chile was not a striking illustration in this respect. The reasons for the lack of qualified projects were ignorance of new possibilities and shortage of competence in technical and financial matters.

33. As to the protection policies, they often lacked flexibility, were generally excessive and were often imposed as a result of intervention of pressure groups. Lack of flexibility in the formulation and application of protectionist policies prevented or hampered the establishment of new industries and tended to perpetuate high levels of protection which did not encourage efficiency. Because of indiscriminate protection, industrial investment was not always channelled into the most appropriate productive branches, cost considerations not always being a deciding factor.

34. In relation to exports, the factors mentioned were: lack of incentives for entrepreneurs to enter international markets because of keener competition and unfamiliarity with these markets; the general structural weakness of industry in the form of inefficiencies and high costs; lack of export credits; etc.

⁵ See Instituto Latinoamericano de Planificación Económica y Social, *Análisis y programación industrial*.

35. Although it was recognized that many countries do not have consistent policies of stimulating exports of manufactures, the question of financing was considered to be of considerable importance, since even when industries of developing countries were able to compete in external markets on the cost basis such competition was hampered by lack of credit facilities which other suppliers were in a position to extend. A case in point cited in the discussions was that of railway equipment which, it was mentioned, could be effectively produced in Latin America, had not export possibilities been seriously hampered by the absence of credit facilities.

36. Some participants maintained that most industrial entrepreneurs in underdeveloped countries who were sheltered by a comfortable margin of protection in a generally non-competitive domestic market were reluctant to face the risks and highly competitive conditions in the export markets; this situation would not

A.I.3. SELECTION OF TECHNIQUES AND LABOUR UTILIZATION; ECONOMIES OF SCALE

(a) SELECTION OF TECHNIQUES AND LABOUR UTILIZATION

38. Concern over this problem derives from the fact that, on the one hand, most under-developed countries, including those in Latin America, have a chronic backlog of under-employment or unemployment, which is generally increasing owing to the growth of the population, and that, on the other hand, capital is relatively scarce. This would imply that the marginal productivity of labour is very low or almost zero, while that of capital is high, corresponding to the opportunity costs of both factors of production.

39. Thus, one school of thought argues that as a matter of general policy under-developed countries should, in their industrial planning, favour labour-intensive methods of production, since this would result in the most efficient use of all resources and maximise social marginal productivity and output. Another school of thought takes a different view, however, and expresses a preference for capital-intensive techniques contending that under-developed countries could overcome their chronic economic stagnation only by using the most efficient methods of production, which as a rule are highly capital-intensive. It is further argued that capital intensive techniques, because of their higher productivity, yield a high economic surplus. Since this surplus is less likely to be distributed in the form of wages and thus spent on consumption, it contributes to a greater rate of capital formation and hence to accelerated economic growth. This is not the case of labour-intensive techniques of low productivity where a large part of the product is being absorbed by wages paid to workers, who have a relatively high propensity to consume. Advocates of this policy are aware of the problem of unemployment and under-employment but take the position that the high economic surplus available for reinvestment and the resulting higher rate of economic growth will in the longer run absorb an increasing share of the active population.

40. It is well known that modern industrial processes are for the most part technologically "rigid" in regard to the possibilities of capital-labour substitution. There are, however, some activities where the acceptable "factor mix" varies within certain limits. Such is

necessarily be corrected by export incentives. It was mentioned as an illustration that in Colombia a policy of incentives for exports of manufactured goods, in the form of favourable fiscal and foreign exchange measures, failed to achieve any significant success.

37. Finally, it was mentioned that there was no well defined and consistent policy on the part of Latin American Governments in regard to promoting export trade in manufactures within the framework of an integrated Latin American market. For such a policy to emerge it was necessary that the principle of self-sufficiency and concentration on import substitution which has been underlying the industrial policies of the countries of the region be revised. Among industries particularly suitable for regional export promotion were mentioned industrial machinery (machine tools and textiles equipment), passenger cars and transport equipment, chemicals and pulp and paper.

the case in construction, earth-moving operations and in certain industries such as food processing, cloth weaving, some metal transforming, etc.

41. Even where it is possible to choose among different alternatives of "factor mix" other aspects of the problem have to be considered. The case of the cement industry is an illustration. By adopting a more labour-intensive vertical kiln as against a rotary kiln it is possible to save on capital. But there are limitations to the use of this technology, such as the upper capacity limit of the vertical-kiln and the need for a higher skilled labour to operate it; furthermore, the quality of the cement may not be as high; in other cases the use of an alternative technology may require the use of raw materials which are not easily available.

42. The flexibility in technology may sometimes take the form of adopting less specialized equipment. Thus, for instance, in machining operations modular-constructed machine tools, etc., may be more adapted to conditions of developing countries where the smallness of the markets does not favour highly-specialized, high-capacity machine tools.

43. The techniques available at the present time to less developed countries are generally of high capital intensity, and new processes are constantly being developed in the more advanced industrial countries which generally tend to raise rather than lower the proportion of capital to labour. This is due to a historical situation. The factor mix of a given industrial process was developed in accordance with the resource endowment and corresponding pricing of factors of production. The newly developing countries need not retrace the same path of technological development. In the immediate future these countries have no alternative but to import existing equipment and thus accept equipment which corresponds to the conditions of resource endowment in capital and labour of the highly industrialized countries. In the longer run, the less developed countries will have to find their own technological solutions taking of course into account, the limitations on capital-labour substitution alternatives.

44. The meeting was of the opinion that this situation is applicable also to countries with relatively abundant capital resources, such as Venezuela, owing

to the serious unemployment problem in that country, reference to which was made earlier. It was agreed that all industrial programmes should pay attention to problems of alternative industrial processes. As an example of studies in this field was mentioned that of the Brazilian textile industry, produced by ECLA and presented to this meeting under items B.I.4 and B.III.2 of the agenda.⁶ It was further felt that a research effort should be made by the developing countries through their technological research institutes with a view to developing technological variants particularly adapted to their conditions. Too close a dependence on the technology and "know-how" of the older industrial countries through imports of technical personnel and acquisition of manufacturing rights would not always correspond to real needs and might be even in the long run detrimental to the process of industrialization. In this connexion it was felt that considerable emphasis should be given to the need for training scientific, technical and managerial cadres.

45. Another aspect discussed was the decision making level relating to selection of techniques. Decisions have been so far left to entrepreneurs who were not always in a position or had the competence to deal with the problem. Moreover, the prevailing market prices of capital and labour which were not always an accurate reflexion of their relative shortage or abundance, generally led to a systematic bias in favour of more liberal use of capital than was justified. The latter tendency was being, moreover, reinforced by a desire among entrepreneurs to reduce their labour problems.

46. It was felt that Governments have at their disposal various means to influence the choice of techniques by private enterprise. It was recalled, however, that in the past governments, on the contrary, had in many cases favoured the use of more capital-intensive techniques through certain forms of taxation (e.g., payroll taxes) and other discriminatory measures in foreign exchange, trade and credit policies. As an example of the latter was mentioned the fact that it was exceedingly difficult for an enterprise to obtain financing for purposes other than investment in capital goods, since physical installations and machinery were considered standard security for industrial loans.

47. As regards the flexibility of factor substitution a distinction was made between the "core" and ancillary operations. The former are generally technologically "inflexible". In contrast, ancillary operations (e.g., inplant transport, material handling and maintenance) usually offer a greater degree of flexibility.

48. As another element in the capital saving policy there is the use of second-hand machinery; in particular, of machinery that has become "surplus" in advanced countries, not necessarily because of technological obsolescence but on account of such factors as the increase in wage rates, shifts in demand and other considerations. Caution was expressed by some participants that in many cases the use of second-hand machinery may require a higher input of skilled labour because of the additional maintenance and repairs involved. The scarcity of skilled labour in the developing countries would thus impose definite limitations in this respect. On the other hand, it was considered that some "surplus" equipment might be appropriate — with

⁶ *A industria têxtil do Brasil* (E/CN.12/623).

some adaptation to local conditions — as a prototype for domestic production. As an example, textile machinery produced locally could have a lower level of mechanization, and domestically produced machine tools engine lathes could be used instead of automatic or semi-automatic lathes.

49. In the evaluation of the choice between alternative technologies it was suggested that shadow prices be used instead of market prices, and moreover, as regards the former, these should be considered in a dynamic sense, taking into account in particular the fact that because of the secular pressure upon wage rates of certain institutional factors, the relative cost of labour may be expected to rise in the longer run. This should be taken specially into account in programming industries with longer time horizons.

(b) ECONOMIES OF SCALE

50. The analysis of economies of scale may be limited for descriptive purposes to the use of one factor, such as changes in cost per unit of a product, as a function of alternative values of installed capacity, the assumption being that in each alternative the capacity would be fully used. This should be distinguished from the case when the economies or diseconomies of scale are due to changes in the degree of utilization of a *given* installed capacity. The latter case arises when the minimum capacity of the production unit is, for reasons of technological indivisibility, greater than the available market.

51. In order to deal with this problem in a consistent way it is necessary to define more clearly the concepts involved. Thus, by "product" will be understood the result of one or more operations that will produce materials with well-defined characteristics, specifications or a change in identity and specifications.

52. By an "industrial process" will be understood all transformations induced in a given material to obtain a specific result, by using certain agents and means. Thus, the process may be a chemical reaction, a physical transformation, etc.; the agents may be heat, electricity, chemical affinities, and the means, production equipment. Acetylene may be given as an example of a product that could be obtained by two different processes, namely, the petrochemical and the carbide processes. By an operation technique is understood a technique characterized by the nature or organization of the equipment. An example of two operation techniques for the same process is the reduction of iron ore in a classical blast furnace or in a modern high pressure blast furnace, in which the same agents are used although some characteristics are different and the equipment is modified. The term "technology" is used as an abbreviated expression to designate the whole constituted by a process and operation technique.

53. The technical limitations on capacity are clearly a function of the technology used. An example can be given of the shaping of steel ingots by means of hydraulic presses and by rolling mills. Another example is production of steel either in classical blast furnaces, which do not exceed a maximum of 600,000 tons of pig iron annually or in pressure blast furnaces which reach an annual capacity of about 1,500,000 tons.

54. Taking into account the above definitions, a cost curve corresponding to a given factor, which

represents the economies of scale as a function of that particular factor, will be understood as covering the technology allowing for the least production capacity possible.

55. When instead of a simplified scheme in which the process or processes produce a single product, consideration is given to joint production, where one product is associated with another in more or less fixed proportions, as for example, caustic soda and chlorine in electrolysis of salt, the problem of economies of scale does not present any particular difficulty once it has been decided which among the final products is relevant for the analysis.

56. The question is more complex when different products are produced in varying proportions, such as a commercial rolling mill for bars and profiles, the production capacity of which varies according to the type of finished product. In such a case, it will be necessary to relate inputs to some standard capacity which will be defined as corresponding to a certain product mix; the latter being adjusted to some normal demand pattern if the criterion is economy in the use of factors or to a least price combination if emphasis is placed on the economic feasibility of investment in view of possible changes in the structure of demand.

57. If a product is obtained through assembly of other products, the analysis will have to be done by stages corresponding to the partial operations which make up the final product and taking into account the integration in one plant of two or more of the partial processes.

58. In the context of conditions prevailing in under-developed countries, the effect of external economies should also be taken into account in the analysis, since the size of plant is frequently determined by factors relating to conditions outside the plant itself. Thus, the lack of external economies typical of under-developed countries, makes plants tend towards integrated operations. To this should be added, as was pointed out above, the factor of indivisibility of certain industrial equipment, which makes it impossible fully or even adequately to use certain pieces of specialized equipment.

59. This leads in the case of Latin America to considering the problem of economies of scale for certain industries in the light of the prospects of schemes of regionally integrated markets, such as the Central American Industrial Integration Agreement and the Montevideo Treaty, the latter being a scheme intended to widen the size of the market for given industries and facilitate their access to it. Taking into account these longer run perspectives, the alternatives appear to be either:⁷ (i) to install sub-optimal size equipment; or (ii) to install optimal size equipment but with partial utilization of capacity; or (iii) to postpone the installation of optimal equipment for a period long enough to permit a sufficient expansion of demand to provide for fuller utilization of capacity.

60. Thus, if the production capacity corresponding to the programmed targets is less than that in which cost is minimized, it should be possible to evaluate the loss involved in the underutilization of the minimum capacity consistent with the technical implementation

⁷ See Tither Scitovsky, *Economic Theory and Western European Integration*, George Allen and Unwin, London, 1958.

of the programme during the transitional period required for the market to reach a level at which excess capacity and higher costs will be eliminated.⁸ The magnitude of this loss to be borne during the transitional period is an additional factor to be considered in programming.

61. On the other hand, if the capacity consistent with the programmed targets is considerably above that in which costs are minimized, it should be possible to introduce additional objectives of decentralization and regional development. Such objectives clearly could not be satisfied if they involved a fractioning of total output among individual plants, each of uneconomic scale.

62. The design of investment programme which is optimal with respect to use of capital and other economies of scale necessitates technical and economic information covering the entire range of possible major industrial activities. This information would also serve for the preparation of estimates of total resource requirements and of intersectoral flows; it should be of a more detailed nature than the so-called input coefficients which are currently derived from standard inter-industry input-output analysis.

63. Clearly, only in exceptional cases will any single factor — such as economies of scale — be the decisive element in programming. As mentioned earlier, another element entering into consideration would be the possibility of varying the factor mix in the form of technological alternatives. However, the introduction of economies of scale into programming provides for a criterion which will make it possible to appraise with more precision the implications of certain industrial development objectives. Thus for a given international price level, it will help to define the required level of protection or subsidies — according to the promotion measures considered during the transitional period involved.

64. The attached table constitutes a simplified presentation of some of the findings of studies on economies of scale in a sample of industrial activities.

65. The transition from an over-all methodological approach to specific studies gives a rise to innumerable difficulties which entail special treatment for each industrial activity, as in the case of the problem of the divisibility of equipment. Among the special features worth mentioning are sizes of plants in which the scale of variation was not always uniform. For instance, in the case of kraft paper manufactured in an integrated mill, the production indices ranged from 100 to 200 to 400, but in that of the manufacture of raw cotton textiles in an integrated mill processing its own yarn (yarn count Ne 10, carded), production indices ranged from 100 to 199 to 274.

66. In the chemical industry considerable variety was observed in the case of eighteen cases which were studied. The data presented in the table relate to two cases: production of sulphuric acid, and that of butadiene, which provides some idea, however general, of the pattern of economies of scale in relation to investment in that industry.

⁸ See "Problems of Size of Plant in Industry in Under-developed Countries", *Bulletin on Industrialization and Productivity*, No. 2, United Nations publication, Sales No.: 59.II.B.1.

	<i>Textiles</i>	<i>Boiler-making</i>	<i>Steel tubes</i>	<i>Pulp and paper</i>	<i>Chemicals</i>
1. Divisibility of principal equipment	Three hypotheses are adopted for the cleaning section in the spinning mill and the sizing section in the weaving mill, the third assuming that all items of equipment are balanced	Owing to the discontinuity of the process some equipment does not work to full capacity	Production with balanced processes in terms of speed of operation of welding equipment	Balanced continuous processes	Continuous processes. Elements designed for the capacity utilized
2. Number of work shifts	According to hypotheses 1 to 3	1 and 2 shifts	According to technologies 1 to 3	3 shifts	3 shifts
3. Homogeneity of product	3 types of raw fabric of different qualities of cotton and different sizes	According to orders received	Only size and weight vary	Qualities and final product (pulp or paper) vary according to level of integration of treatment	Completely homogeneous in each sample process
4. Levels of productivity (especially productivity of labour)	Higher than the Brazilian standard, and considered attainable	In accordance with conventional European and United States standards	In accordance with conventional European and United States standards	In accordance with conventional European and United States standards	European and United States standards, slightly modified to allow for the real situation in the region (± 20 per cent labour force in relation to United States standards). Low incidence of labour productivity
5. Technology utilized	The same degree of mechanization, with emphasis alternatively on labour or on capital	In accordance with standards in the most highly mechanized Latin American countries	Same degree of mechanization, with emphasis alternatively on labour or on capital	Labour-intensive; all equipment items balanced	Conventional (modern). Capital-intensive
6. Percentage of amortization	10 per cent	10 per cent	10 per cent	15 per cent	Varying between 7 and 10 per cent
Production indices	100—199—274	100—200	100—178—447	100—200—400	{ 100—276—830 (A) 100—200—400 (B)
Unit indices	100— 88— 85 (a)	100— 77	100— 72— 44	100— 59— 46	{ 100— 83— 66 (A) 100— 75— 56 (B)
Unit investment indices	100— 88— 86	100— 76.2	100— 76— 44	100— 67— 52	{ 100— 83— 67 (A) 100— 75— 56 (B)
Unit operational cost indices	100— 95— 93	100—100.9	100— 95.8-91.2	100— 73— 59	{ 100— 86— 77 (A) 100— 89— 84 (B)
Average total cost indices	100— 90— 88	100— 88.9	100— 85.8-67.8	100— 71— 57	{ 100— 84— 71 (A) 100— 79— 65 (B)
	Case A (cotton, yarn count Ne 10c) (a) Unit = 100 metres of textile (see ST/ECLA/CONF.11/L.20)	Case A 1-A 2 (see ST/ECLA/CONF.11/L.13)	Manufacturing programme IV (see ST/ECLA/CONF.11/L.14)	Kraft (integrated) (see ST/ECLA/CONF.11/L.19)	(A) Sulphuric acid (B) Butadiene (see ST/ECLA/CONF.11/L.17)

67. In the manufacture of welded steel tubes, a determining factor in the volume of production is the capacity of the welding equipment, which in turn allows for some degree of flexibility in the manufacturing programme (tubes with different diameters). In the sample chosen the scale increases relate to larger sizes of welding equipment, always assuring a single line of production and a single work shift.

68. Indices of production, investment and costs are presented at the foot of each industrial activity column. Thus, under the head of "Pulp and paper", production scales vary in strict proportion, and the corresponding average total cost indices show fairly considerable economies of scale. In other activities, (e.g., textiles), the variations in the scale of production are not strictly proportional and average total cost indices do not reveal any very significant economies of scale.

69. To sum up, even if complete uniformity is not to be found in each industrial activity, a comparison of indices sheds light on the phenomenon of the relation between production and average total cost, in which the problem of economies of scale is synthesized.

70. The ensuing debate emphasized the need for close attention to economies of scale in industrial programming and to its relation to the other factors of technological alternatives. It was felt that this applies not only to programming at the national level, but also at the level of regional economic integration. Thus, several countries are envisaging or implementing projects in fields such as petro-chemicals, steel-making, aluminium, and pulp and paper without giving proper consideration to the possible benefits from economies of scale through integration. On the other hand, it was pointed out that the discussion on economies of scale generally centred on individual plants, which was an appropriate procedure for certain types of industries, such as processing of agricultural or mineral raw materials. There were, however, industries where the factor of economies of scale should be considered and chemical industries in which the benefits of economies of scale emerged not only with the increase in size of individual plants but also in the context of complexes including both large and small units. Mexico has adopted such a wider approach in the programming of its automobile industry.

71. Attention was also drawn to the fact that the factor of economies of scale should be considered in the context of the degree of protection which it is intended to give to the industry and it should also be considered in some cases in a dynamic perspective. Thus, if the Government pursues a policy of favouring maximum import substitution (e.g., by means of protection and subsidies), the factor of economies or diseconomies of scale may not be a decisive element, since given adequate protection an enterprise would operate profitably at any scale, however uneconomic. The establishment of a plant with excess capacity in relation to the present market is also justified if the market is expected to grow and reach at some later time a level consistent with the installed capacity; or if there exist possibilities of regional integration or exports. Thus, dynamic industrial sectors such as petro-chemicals would have to be planned on a scale larger than the domestic markets with an orientation towards exports; on the other hand, industries working essentially for

the domestic market might be small and medium scale; some of them would be complementary to other industries. It was considered, however, that the solution of the size problem through exports or integration should not be overestimated; in fact a simultaneous development of intermediate industries could be observed in several countries of the region, with little regard to integration.

72. In regard to the other factors related to scale, it was noted that in certain cases the establishment of industries was subject to limitations or lack of external economies. The required complementary investment in facilities tended to make the entire operation uneconomic (e.g., the case of a factory obliged to build access roads, its own power plant, water treatment and recovery installations, etc.).

73. The cost and availability of organized transport facilities was one of such factors. Where transport costs were high in relation to the factory cost of the product due to distance and transport rates — which is particularly the case for bulky low price commodities — smaller decentralized plants may be more economical to install, and could successfully compete with larger scale low-cost units. A deficient and ineffective transport organization acts in a similar way; thus, in the case of fertilizers, efficient and prompt delivery during a limited season is essential. Should the industry have to provide its own transport services, this would imply a heavy additional investment which would affect the delivered cost.

74. As was mentioned above, economies of scale are subject to certain technological limitations, such as indivisibility of certain equipment, which results in an unbalance between the capacities of the different processes within the same plant,⁹ aggravating the problem of excess capacity. A solution might be provided in some cases by the use of multi-purpose as against specialized equipment and more intensive use of equipment through multiple shifts; the latter solution implies the availability of skilled management for the organization of production and poses a number of problems of social overhead, educating labour to new work habits etc.

75. Finally, in regard to the factor of alternative technologies as related to economies of scale, it was considered that a serious research effort should be made in this field. Economies of scale can be favourably affected by technological change, if a higher rate of output could be produced by a given investment. It is realized that under-developed countries are not in a position to devote resources to such research comparable to those that are being provided in the industrially more advanced countries. It was pointed out nevertheless that successful industrial innovations have already been developed in some Latin American countries (e.g., direct reduction of iron ore such as the HYL process in Mexico: production of pulp based on

⁹ An illustration is provided by the bale opening and cotton cleaning process in a spinning mill, which requires a larger capacity than the rest of the equipment. Another illustration is provided in the manufacture of welded steel tubes, where the capacity of the welding machinery controls the rate of output. This is in contrast with the situation in process industries (e.g., most chemical industries, pulp and paper) whose equipment is designed to operate in a balanced way throughout the process.

indigenous tropical wood in Colombia). There was also need to adopt a new approach to the problem of transfer of technology. The import of foreign expertise did not provide a permanent solution. Foreign technical experts were trained in the industrialized countries and thus familiar with techniques and processes adjusted to scales of output and other conditions prevailing in those countries. There was need for developing know-how appropriate to conditions in Latin America; there was also need for developing trained managerial cadres, since rates of output could be raised by measures of managerial nature such as preventive maintenance, improvement of internal transport and handling, production incentives, etc. More generally

it was essential that management in the developing countries develop a dynamic and aggressive outlook receptive to new ideas and fully conscious of local problems and conditions.

76. Lastly, it was pointed out that the success of integration programmes such as those of Central America or the ALALC would largely depend on the rapid and efficient sectoral adaptation and co-ordination at the country level as part of the economic complex of the area as a whole. The dynamism of the industrial sector, which is playing a decisive part in the development of Latin America, will benefit from the effect which rational planning can have on the use of human and material resources in the region.

A.II. LATIN AMERICAN EXPERIENCE IN INDUSTRIAL PROGRAMMING

77. For some years now most Latin American countries have been making rather intensive efforts to fit their economic and social policy into a programme framework which can reconcile the manifold objectives implicit in raising standards of living, ensure that available resources are efficiently utilized and that the targets set are practicable and consistent. The countries of the area have, in one way or another, made progress in setting up more or less complete programming operations and in formulating over-all, general or sectoral programmes.

78. ECLA's activities with respect to analysis of the economic development of these countries and dissemination of the concept and techniques of programming have been highly influential in such programming activities. Many countries have recently intensified their programming efforts, as a result of the Charter of Punta del Este which set in motion the Alliance for Progress and suggested the need for country programming of economic and social development. Industrial programming evidently plays a major role in these efforts, since the general consensus is that industrialization is a key element in economic development.

79. In analysing the Latin American experience of industrial programming, the experience of the Advisory Groups¹⁰ as set forth in a working paper prepared by ECLA for the Seminar,¹¹ was taken into account.

80. The analysis was divided into two parts. First, experts from different countries of the region¹² described the experience of their own countries; secondly, the salient aspects of such experience were discussed. Both the analyses and discussions centred around five main points considered initially to be of major interest: (1) the institutional background of industrial programming; (2) characteristics (time period, coverage, levels of programming etc.); (3) data required for the

formulation of programmes; (4) specific projects; (5) industrial policies.

81. The first conclusion to be drawn from the analysis of the industrial programming experience of Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico, Venezuela, and the remaining Central American countries, is that while all of them are making progress in the formulation of programming procedures, such progress has been uneven. While some (Bolivia, Chile, Colombia and Venezuela) have completed detailed and comprehensive over-all programmes for economic and social development, others (Brazil and Mexico) have prepared only general programmes in an initial attempt to co-ordinate economic and social objectives and policies. The Central American countries have made some economic development studies and prepared aggregate and sectoral projections while making progress in programming at the regional level. Ecuador has emphasized development projects and is now making an effort of programming along broader lines. Finally, while Argentina is seriously concerned with the programming problem it has only recently begun to take the necessary action.

82. The countries which have specific achievements to show with respect to general programming (Bolivia, Chile, Colombia and Venezuela) are at different stages with respect to the institutional arrangements for programming. Bolivia, Colombia and Venezuela have made great strides in the installation of programming machinery. They have included in the programming activity the institutions concerned with programming, the information media, the budget, the machinery linking economic and social policies with programming, the machinery for maintaining the necessary contacts with private enterprise, etc.¹³ While the range and degree of progress vary widely among these countries, they have in common the fact that they have prepared general programmes and established programming procedures and arrangements for their implementation.

83. Although the first formal programme of economic and social development was completed in Chile in 1958, institutional arrangements have somewhat

¹⁰ The Advisory Groups were created by ECLA in the beginning of 1959. Colombia and Bolivia were the first countries to request their co-operation in the formulation of programming procedures and preparation of economic and social programmes. By mid-1962, when the Latin American Institute for Economic and Social Planning was established, the responsibility for this type of assistance was taken over by the newly created organization.

¹¹ *La experiencia de los Grupos Asesores en la formulación de programas de desarrollo de la industria manufacturera* (ST/ECLA/CONF.11/L.7).

¹² The countries represented at the meeting were Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Mexico and Venezuela.

¹³ The installation of programming procedures in some countries was described in the following working and reference documents presented by ECLA: *La experiencia de los Grupos Asesores en la formulación de desarrollo de la industria manufacturera* (ST/ECLA/CONF.11/7); *La experiencia de los Grupos Asesores y los problemas prácticos del desarrollo económico* (E/CN.12/584).

lagged. This was due, to a large extent, to the position of the planning office, which is located in a parastatal institution, the Chilean Development Corporation (CORFO) and thus lacks the authority that it might have had it been placed at a higher government level, as is the case in Bolivia, Colombia and Venezuela.

84. The industrial sector, naturally enough, occupies a key position in such programming, particularly in Chile, Colombia and Venezuela, where manufacturing development programmes have been formulated in considerable detail, so much so that in Chile and Colombia, for example, about 50 per cent of net investment is allocated to specific projects.

85. Mexico and Brazil have recently formulated over-all economic and social development programmes, which are not as detailed as those mentioned above. The characteristic feature of the programming efforts of both countries is planning and promotion of specific activities.

86. In Brazil efforts were made recently to provide general programming with an institutional basis. Thus, a Minister Extraordinary for Programming was named, which will give greater authority to the National Programming Commission (COPLAN) which has been in existence since 1961. Mexico is progressing, although more slowly along the same road. Nevertheless, as in Brazil, programming of specific activities has been given a certain institutional basis, particularly with respect to the industrial sector (e.g., the *Ad Hoc* Committees in Mexico and the "Executive Groups" in Brazil).

87. The Central American countries have carried out economic development studies and, in some cases (Costa Rica), prepared over-all and sectoral projections. Detailed although partial studies of public investment have been made in Honduras, and in other countries, including Panama, some industry studies have been carried out.

88. The Central American countries have related their programming efforts to the economic integration of the area; in this respect, the programming process has received an institutional basis and most countries have also made progress on the national level inasmuch as nearly all of them have established over-all programming offices.

89. At the level of the region as a whole programming is in the hands of the Economic Council and the Permanent Secretariat of the General Treaty on Central American Economic Integration, as well as the Central American Bank for Economic Integration, the Central American Research Institute for Industry, (ICAITI), the Council for Central American Higher Studies and the Clearing House.

90. These countries have recently requested assistance from the Latin American Institute for Economic and Social Planning, ECLA, the Organization of American States and the Inter-American Development Bank for the preparation of their over-all development programmes. Such assistance will be provided by a joint advisory group.

91. Ecuador has for some time had two programming agencies: the Secretaría General de Planeación and the Junta de Planificación y Coordinación Económica. The Junta has engaged in economic diagnoses

and the formulation of over-all targets, on the basis of which it produced a development plan; at present an over-all development plan is being prepared. As regards the manufacturing sector emphasis has been placed on selection of possible development projects and a sizable list of specific initiatives is now available.

92. Finally, in Argentina over-all programming has not made much progress in the manufacturing sector, efforts have concentrated on promotion measures, particularly with respect to basic industrial activities. Several programming activities at the level of specific projects have been initiated. In 1960 the National Development Council (Consejo Nacional de Desarrollo) and the Federal Investment Council (Consejo Federal de Inversiones) were established, the latter having so far been the more active of the two. Since Argentina has adequate studies on national accounts and basic statistical information, work on over-all programming can be undertaken.

93. The second important question which was brought out in the statements on Latin American experience was that of the administrative level of the planning agencies. In all countries whose experience was described, except for Chile, either there are central programming agencies at the presidential or ministerial level, or the establishment of an agency at such a level is planned. These agencies are as follows:

Argentina: Consejo Federal de Inversiones

Brazil: Comisión Nacional de Planeamiento

Bolivia: Junta Nacional de Planeamiento

Colombia: Consejo Nacional de Política Económica y Planeación en el Departamento Administrativo de Planeación y Servicios Técnicos

Ecuador: Secretaría General de Planeación y Junta de Planificación y Coordinación Económica

Mexico: Secretaría de la Presidencia. Oficina de Planificación

Venezuela: Oficina Central de Coordinación y Planificación (CORDIPLAN).

94. In the Central American countries and Panama the following programming agencies have been set up:

Costa Rica: Oficina Nacional de Planificación

El Salvador: Consejo Nacional de Planeamiento

Honduras: Consejo Nacional de Economía

Nicaragua: Junta Nacional de Planeamiento

Panama: Consejo Nacional de Economía

95. In Chile, as mentioned earlier, the programming office is part of the Development Corporation, an autonomous government entity. However, an economic co-ordination mechanism at the sectional and provincial level — COOPERE — is being tried out.

96. With reference more specifically to industrial programming, the central offices usually have special sections to deal with this sector. Moreover, some related activities are decentralized. A case in point is that of the Instituto de Fomento Industrial of Colombia, an autonomous state agency which works directly on industrial programming, particularly with respect to the more specialized field of project preparation. It is also in charge of direct promotion, investment and production for certain items. A similar case is that of Nacional Financiera in Mexico. In Brazil the programming of specific industrial branches is under the re-

sponsibility of the so-called "Executive Groups": for the automobile industry (GEIA), for heavy machine building (GEIMAPE), for naval construction (GEIN), for road building machinery (GEIMAR), and for the metallurgical industry (GEIMET). In Mexico such programming is under the responsibility of *ad hoc* committees: para la Programación de la Industria Siderúrgica (iron and steel); para la Programación de las Industrias Químicas (chemical industries); para la Modernización de la Industria Textil (textiles), respectively.

97. The most common arrangement is to have a central office responsible for over-all programming, which entrusts certain specific tasks to specific entities and establishes contacts with other state and private co-operating agencies. In Brazil and Mexico, the executive groups and *ad hoc* committees are more independent agencies.

98. It was pointed out during the discussion that in most countries the idea of creating a favourable climate for industrial programming has been gaining ground rapidly both in public and private circles. This has very often been one of the objectives of the programming agency. In the public sector attention has concentrated on the establishment of administrative links, negotiations with the various agencies responsible for industrial policy and provision of services and information, particularly with respect to market conditions and other trends. The participation of the private sector is sought by associating entrepreneurial groups in the programming process, by providing them with technical and information services and by defining a clear-cut industrial policy, including the areas of public and private action in investment and production.

99. It was noted during the debate that a climate which is generally favourable to programming frequently vanishes when the time comes for action and taking executive decisions with respect to industrial policies or government intervention in specific activities. This situation was mentioned in relation to programming on the national level in Central America in spite of the significant progress achieved in regional integration of industry.

100. Some countries such as Chile, Colombia, Ecuador and Venezuela, have encompassed the entire area of industrial programming in their programmes and programming procedures. In others, like Brazil and Mexico, greater stress has been laid on programming and promotion of specific activities. This, however, does not imply that in the first case promotion of specific industries has been neglected or that in the second case no attempt has been made to provide a more general framework for the programming of specific activities.

101. With respect to geographical coverage, most countries focus their programming on the country level without disregarding however, specific regional problems. In the case of Venezuela (Corporación de Guayanas), Brazil (Superintendência de Desenvolvimento do Nordeste (SUDENE)), Argentina (Consejo Federal de Inversiones) regional programming agencies have been created.

102. In all the countries concerned industrial programming is hampered by lack of development projects.

Although ideas of different stages of maturity abound, there is a dearth of projects which could be submitted to an economic and financial evaluation. This has urged some countries to make an effort to correct the situation, as is being done in Ecuador and Venezuela. In Ecuador, a complete list of possible projects has been prepared, and these are being submitted to feasibility tests for purposes of subsequent implementation. The work is in the hands of the over-all Planning Office and the Economic Planning and Co-ordination Board.

103. In Venezuela, intensive efforts have been made to promote project preparation and a project register has been established in the Ministry of Development. Registration is not mandatory for entrepreneurs, but if their projects are registered they can obtain numerous promotional benefits granted by the State. Moreover, the Venezuelan Development Corporation, the Central Co-ordination and Planning Office, and the Ministry of Development join forces by pooling their technical and economic staff for the preparation of draft industrial projects. These projects are offered to private enterprise, giving it financial facilities for the completion of the relevant studies. This system has been described as true "project factory".

104. The case of Colombia, in which about 80 per cent of net industrial investment during the first stage of the ten-year programme was allocated to specific projects, has already been mentioned. In addition, the Industrial Development Institute of that country is making a considerable effort to prepare projects in co-operation with the Institute of Technological Research.

105. In Chile, a large number of specific projects has also been made available. Their preparation and evaluation took place during the formulation stage of the programme.

106. In general, all the countries are placing great emphasis upon project preparation, since, as has already been mentioned, the lack of properly prepared specific industrial initiatives has been a major obstacle. The various promotion agencies, including development institutes and banks, participate in such activities.

107. The lack of basic information of projects, of experience and tradition in economic development programming has usually meant that countries which have formulated over-all and industrial programmes have had to resort to rule-of-thumb programming techniques adapted to specific local conditions. Such conditions have been considered in terms of raw material balances, inter-industrial relationships and partial *ad hoc* evaluation criteria. The feasibility of these projects has been considered in terms of possible measures and actions to be taken for their implementation in the necessary financial and economic resources.

108. During the discussion emphasis was placed on the need for formalizing programming techniques as programming procedures are being established, particularly as regards collection and channelling of data and preparation of projects, and as experience which is already abundant in some countries is being accumulated.

A.III. EXPERIENCE IN INDUSTRIAL PROGRAMMING IN ASIA AND THE FAR EAST¹⁴

I. Japan's experience in industrial programming

109. In spite of its limited natural resource endowment in relation to its population and heavy war damage, Japan is one of the few countries which has succeeded in expanding its economy at a very high rate. Economic planning has contributed a great deal towards this development.

(a) SOME FEATURES OF THE JAPANESE ECONOMY

110. It has often been noted that the Japanese economy has been characterized by three unfavourable factors from the point of view of economic growth, namely, over-population, limited land area and poor natural resource endowment. In appraising the post-war development in Japan, it is clear, however, that in spite of these factors her rate of growth has been exceedingly high judged by both international and historical standards. The average annual rate of growth in the past ten years was some ten per cent which is twice the pre-war figure. The question arises as to how Japan was able to achieve and maintain this rate of growth in the face of the basic unfavourable conditions mentioned above.

111. Concerning the factor of population, it should be noted that, in highly developed countries, existence of abundant labour resources may be a positive factor in growth, since there are generally available complementary productive factors. In Japan the *rate* of population increase was on the whole moderate; it was 1.2 per cent during the period 1880-1935, 1.4 per cent in the post-war years of 1950-1955, and declined to less than 1 per cent in the more recent years. On the other hand, there has been a high rate of capital formation. The rate of gross capital formation was about 20 per cent of gross national product in the pre-war period and above 30 per cent in the post-war years. These high rates of capital formation were accompanied by the availability of highly skilled manpower and aggressive use of borrowed technology through introduction of modern techniques in many sectors of industry, which enabled the Japanese industry to achieve a high level of productivity. The combination of high productivity with high rates of savings led further to accelerated capital formation and economic growth.

112. A further contribution to this high growth rate was the particular economic and institutional structure of the Japanese economy which has characterized it since the eighteenth seventies, namely, its dualistic nature under which labour-intensive agriculture and small-scale industries coexisted side by side with highly capital-intensive industries.¹⁵ Thus, the existence of an abundant labour supply, well educated and trained in industrial skills, far from being a retarding factor has

¹⁴ See "Industrial programming in the ECAFE region" (ST/ECLA/CONF.11/L.8); "India's experience in industrial planning" (ST/ECLA/CONF.11/L.9); "Japan's experience in industrial planning" (ST/ECLA/CONF.11/L.10); and also reference documents: "Proposals for an industrialization programme in Singapore, excerpts from the report prepared by a BTAO team of experts"; "Manpower requirements in industrial planning, the Japanese experience", by S. Okita; and "Economic roles of the dualistic natures in the industrial development of Japan", by T. Watanabe.

¹⁵ See T. Watanabe, op. cit.

on the contrary contributed in a substantial way to the rate of economic growth.

113. The second unfavourable factor is the small size of the cultivable land area. Although it is true that in absolute size the cultivable area of Japan has not been sufficient for her population, the use of improved agricultural techniques, (e.g., chemical fertilizers and selected seeds) combined with the improvement in the balance of payments because of an intensive effort of export promotion made it possible for Japan to solve the food problem. According to the present economic plan, it is estimated that the additional land needed for the future use of industry, housing and public facilities is only a little more than 3 per cent of total area under cultivation. Therefore, when the shift of labour from low productivity agriculture to high productivity industries is considered, scarcity of land will not be a serious problem. There is, moreover, little justification at the present time to aim at self-sufficiency in agricultural production since there is a tendency for significant agricultural surpluses to develop in a number of countries.

114. The third factor is poor endowment in natural resources. It is a known fact that Japanese industries are largely dependent upon imports of raw materials. Eighty per cent of iron ore, 98 per cent of petroleum, almost 100 per cent of cotton and wool and two-thirds of salt and soya beans are now being supplied from foreign sources. These imports, as in the case of agricultural products, depend on the maintenance of adequate exports and, in the last analysis, on the competitive strength of Japanese industrial products in the international market. The cost of shipping has been historically a limiting factor in imports, particularly as regards distant sources of supply. However, advances in the techniques of transportation, particularly of maritime transportation, has contributed to reducing greatly the cost of long sea hauls. For instance, the emergence of super-oil tankers and large bulk ore carriers made the Japanese islands, because of their geographical position and the many suitable port sites most favourably suited for location of industries, consumers of these raw materials.

115. In other industrial fields the paucity of natural resources has been gradually overcome by the advancement of technology. For instance, in textiles, the proportion of cotton and wool has declined in favour of domestically produced rayon and synthetic fibres. Because of these and other counteracting factors the ratio of imports to gross national product and the dependency on imports does not necessarily increase with the expansion of industry and may even decrease. It is true that the dependency on imports of raw materials and energy is likely to increase as the output of the economy expands, but, at the same time, the increase in the value added by domestic labour, particularly as processing industries develop, has had an offsetting effect. In fact, the ratio of dependency on imports which was 18 per cent in Japan in the years 1934-1936 had declined to 13.5 per cent for the period 1953-1958.

116. On balance in spite of three unfavourable structural features of the Japanese economy mentioned above, it is not likely that its future growth will be

impeded; it is probable that the Japanese economy will gradually reach the level of the present advanced countries.

(b) HISTORICAL CHANGES IN THE INDUSTRIAL STRUCTURE OF JAPAN

117. Until 1868 Japan was completely isolated from the rest of the world, due to a national isolation policy. After the opening up of the country in that year, the Japanese Government embarked upon two lines of policy: first, to become a modern military power, and second, to bring the country to the stage of self-sustained economic growth. It was soon recognized by the policy makers that the natural resource endowment of Japan including the cultivable land area was extremely poor. Therefore, until the early part of the twentieth century, the major efforts of the government economic policy were concentrated on building up an adequate basis for industrialization. This consisted in raising the productivity of agriculture, expansion of production of raw silk, the latter being the only commodity that Japan could export without serious competition, establishment of basic industries such as iron and steel, development of the textile industry which was considered as most suitable because of the existence of an abundant labour force, and establishment of a national education system. During the period 1880-1910 the annual rate of economic growth was about 4.2 per cent. The per capita national income around 1910 was about 110 dollars in 1951 prices.

118. With a few exceptions, the structure of output of industry by sectors, presented a pattern fairly close to the "normal" statistical pattern derived in a recent United Nations study.¹⁶ Only two sectors, machinery and transport equipment—mainly shipbuilding and railroad cars—which were particularly favoured by government investment and subsidies present substantial positive deviations from the "normal" pattern for countries of similar basic characteristics.

119. During the next period 1910-1935, which is the first period of industrialization proper, domestic incomes were rising steadily at the rate of about 4.5 per cent per year, and exports were increasing even more rapidly. In the third period 1935-1955, further structural changes took place. These reflected the adjustment of the economy to a substantial fall in exports, the loss of supplies of raw materials from the former territories, and, in the later phase of this period, the change from a military to a peacetime economy. By 1955 the national income was only about 20 per cent above its 1935 level and the per capita income was even lower.

120. The structural changes during these two periods, i.e., 1910-1935 and 1935-1955, may be summarized as follows: in the first period the changes in the production structure were due almost entirely to the growth of domestic and foreign demand. Favourable conditions in export markets, resulting from the European war of 1914-1918 and the devaluation of Japanese currency in 1931, led to an annual rate of growth of seven per cent in exports; there were no shortages of imported goods despite the rapid growth of incomes.

¹⁶ See *A Study of Industrial Growth*, United Nations publication, Sales No.: 63.II.B.2.

During this period import substitution was relatively unimportant.

121. During the second period, covering the war and the post-war recovery years, the relative importance of the factors which were responsible for the structural shifts underwent substantial changes. Supply limitations became dominant. This period witnessed the loss of export markets which in turn reversed most of the trends of the earlier period. In the economy as a whole import substitution and technological change played an increasing role as a motivating form of expansion.

(c) THE ECONOMIC DEVELOPMENTS IN THE RECENT YEARS

122. The average annual rate of growth has been in the past ten years some ten per cent, twice as high as in pre-war. The factors which have contributed to this rapid rate of growth can be summarized as follows:

- (1) The low level from which recovery started. Suppressed demand during the war was released and this was satisfied by a rapid rise in supply made possible through redeployment in industry of the demobilized labour force and conversion to peaceful uses of industrial equipment, which had been previously devoted to military use;
- (2) An abundant supply of skilled labour, use of technological innovations and adaptation of industrial technology and organization to Japanese conditions. The already mentioned dualistic nature of the Japanese economy, under which labour-intensive agriculture and small-scale industry have co-existed and developed side by side with highly capital-intensive industries was an important contributing factor;
- (3) A consistent spread between the growth of productivity and real wages. The high rate of industrial growth has been made possible by a high rate of capital accumulation in the manufacturing enterprises, which resulted in part from the fact that real wages lagged consistently behind productivity;
- (4) A high rate of savings due to traditional patterns of consumption;
- (5) A vigorous government policy of promotion of industry, including the establishment of an effective planning mechanism. Under the Japanese system of planning the Government is not engaged in direct measures of implementation of the targets of industrial activity, this being largely left to the private sector and the operation of the price and market mechanism. However, indirect measures were taken in the fiscal and monetary fields to provide for a favourable environment for the development of the private sector; appropriate action was also taken in the traditional public sector to provide the necessary economic and social infrastructure.

123. In the last decade development of the industrial sector was accompanied by significant structural changes. In 1955 the share of heavy manufacturing industries—metal products, machinery and equipment and chemicals—exceeded 50 per cent of the total industrial output. Domestic consumption expenditure for

durable goods rose 2.5 times compared with 1.3 times for the over-all consumption index (1955-1961). This tendency was particularly strong in electrical equipment such as television, the ownership of which was increased from four sets per 10,000 persons in 1955 to 480 in 1961. In order to maintain a reasonable equilibrium in the balance of payments it was considered necessary to change the export structure, with greater emphasis on exports of heavy machinery. In 1950, about 55 per cent of Japan's exports consisted of light industrial goods, of which three-fourths were textiles; by 1960, the ratio changed to 37 per cent for light industry and 41 per cent for heavy industry. This shift corresponded to the changing pattern in the world export market, where the demand for exports of light industrial products has been gradually declining. As a result of these drastic changes in foreign and domestic demand the industrial structure of Japan is expected to accentuate its present trend. In the new long-range economic plan, the share of heavy industrial products is estimated to reach 73 per cent of total industrial output by 1970.

(d) TECHNIQUES OF PLANNING

124. The early plans were formulated by using extrapolations of trends and application of a trial and error method. At a later stage, with the accumulation of statistical data and the development of planning techniques, more complicated plan frameworks were formulated using growth models and input-output techniques.

125. The 1955 plan was "employment centred". A projection was made of the active labour force and multiplied by a projected value of productivity per worker to arrive at gross national product. The 1957 plan was a "trial model of rates of growth". The rate of growth was assumed as a function of employment, saving and investment, and foreign exchange. Estimates were made for capital-output ratio, labour-capital ratio and marginal propensity to import. Using different time series data and applying three hypothetical rates of growth, high, medium and low, several projections were obtained, out of which were selected the alternatives which appeared to be most realistic in terms of attainment of the targets within the limitations imposed by available resources.

126. The most recent plan frame includes four sets of equations relating respectively to demand, supply, employment and income distribution. Each of these sets comprises equations of definition, balance, technology and behaviour. It also includes commodity balances for supply and demand, the number of such commodities increasing with time; these include basic raw materials (steel, cement, sulphuric acid, etc.), energy (coal, power, petroleum, etc.) and the major export commodities.

127. The two earliest plans were aimed at reconstruction and rehabilitation of the war-damaged economy and combating inflation. In the next phase of planning, the objectives were the achievement of a self-supporting economy and reduction of under-employment and unemployment; as regards the former objective the emphasis being on promotion and modernization of industries with high export potential and of those with lesser reliance on imports. The two recent plans

emphasize economic development with the objectives of a substantial increase in the standards of living of the population and attainment of full employment. Particular emphasis is given in the last plan to the development of infrastructure and of labour abilities and skills; promotion of science and technology and modernization of small and cottage industries.

128. The planned targets have, by and large, been attained or exceeded. This points towards both the strength and weakness of the planning techniques. It demonstrates on the one hand that a mixed economy which combines private initiative largely based upon the operation of market mechanism with some assistance and guidance of the public authorities can achieve a high rate of industrial growth. Planning succeeded in mobilizing domestic savings and channelling them into the dynamic sectors, in selecting the techniques most suitable to the prevailing conditions and in protecting promising industries at the "infant" stage of their development. The fact that targets have been exceeded shows, on the other hand, the weakness of the planning methods since it means that private enterprises in competing among themselves for a greater share of the target output have been investing in productive capacities, the total of which exceeds the actual demand. This excess investment resulted in unexpected increases in imports.

(e) DISCUSSION

129. In discussing industrial programming in Japan, reference was made to the over-all programming techniques as well as techniques of sectoral and regional planning. It was recalled that the techniques used were relatively simple, ranging from simple extrapolations to labour-centred and capital-centred models. In addition to macro-economic projections sectoral planning for manufacturing industry is being carried out by the Ministry of International Trade and Industry (MITI). In this task MITI co-operates closely with the associations of the respective industries; information provided by the latter is included in the input-output tables and tested for consistency. Discrepancies sometimes occurred between the plan targets and their realization; most of these were found to arise because of differences in the evaluation of technological changes. As regards geographical distribution of industry, there was no deliberate regional planning up to 1960. With the introduction of the new plan in 1961, the Japanese Planning Agency established a unit in charge of inter-regional planning, in order to reduce the imbalance in the development among various regions.

130. Great interest was shown in the high rate of economic and industrial growth of Japan; the rate of industrial growth averaged in recent years 18 per cent per annum. This rate was made possible by a high rate of capital formation in the manufacturing enterprises, which resulted in part from a substantial spread between the growth of productivity and real wages. Productivity in manufacturing industry increased between 1955 and 1960 by 52 per cent, while real wages rose by 33.5 per cent. Although this gap between productivity and real wages appears to have narrowed down somewhat in the recent years, it still remains. It was mentioned that industrial and economic planning was also to some extent responsible for the high rate

of growth because it makes possible a more rational allocation of resources. In the earlier stages of planning, there were some doubts by private industrialists as to its usefulness; however, in the course of time the advantages of industrial programming were acknowledged by private enterprise and full co-operation of the private sector with the planning authorities is now current practice.

131. Looking ahead, Japanese economists are anticipating a decline in the rate of industrial growth. There will be a growing shortage of labour that may reach a critical stage by 1970, accompanied by sharp increases in wages. A slow-down in the expansion plans of private enterprise is also considered desirable from the point of view of the balance of payments; tight monetary policies have been introduced lately designed to slow down the rate of industrial growth. The present high rate of capital formation is expected to decline in the future as changes in consumption habits among the new generation take place with consequent fall in savings. Moreover, the rate of technological innovations, which contributed towards about one-half of the annual rate of growth during 1955-1960, is expected to slow down.

132. It was mentioned that until 1950, i.e., the completion of the rehabilitation phase, the Japanese economy had witnessed inflationary tendencies; since then there has been only a 27 per cent rise in consumers' prices and between 1955 and 1960 a 3 per cent decline in the average price index took place. Most of the price changes had taken place through the automatic working of the market mechanism. Prices were controlled for only a few key items such as rice, transport, etc., in order to protect consumers and reduce the rises in money wages. The decline in prices of primary products in the world markets during the past decade had a highly favourable effect upon the cost structure of Japanese industry, and prices of manufactured goods based on these raw materials showed a substantial decline in recent years.

2. India's experience in industrial planning

(a) ECONOMIC CONDITIONS IN INDIA

133. The Indian economy is characterized by over-population, abundance of natural resources and a low level of per capita income. India is one of the largest and most densely populated countries of the world and accounts for one-seventh of world population. The rate of growth of its population has increased from 1.4 per cent per annum between 1941 and 1951 to over 2 per cent between 1951 and 1961, the population having risen during that period from 362 million to 438 million. On the basis of the present tentative estimates the total increase in population over the period 1961-1976 may be of the order of 187 million. These figures bring home two significant points. First, a large proportion of India's resources will have to be devoted merely to provide a livelihood for the increased population. Second, given even a modest rise in per capita income, India has a sufficiently large domestic market to produce industrial goods or services taking advantage of economies of scale.

134. As is the case in many other under-developed countries, the resource endowment of India is not fully known, but it can be stated that India is rich in

resources. There are considerable iron ore and coal deposits; the country is a leading world producer of mica, ilmenite and manganese ore; it is also rich in many other minerals. India's hydroelectric potential is among the highest in the world, and recent surveys and explorations have shown the possibility of the existence of oil reserves. It should also be possible to increase substantially the agricultural yields through irrigation and expansion of fertilizer input. A large domestic market and substantial endowment of natural resources thus provide a solid base for rapid industrialization of the country.

135. The economy of pre-Plan India was characterized by secular stagnation. The comparable data available for 1931/32 and 1950/51 indicate that the level of real per capita national income did not register any increase in the two-decade interval between these years. The raising of the levels of living and of employment opportunities in India thus entailed the problem of transforming a static economy with low levels of consumption, saving, productivity and employment into a dynamic economy based on modern technology with high rates of saving and capable of a rate of self-sustained growth that should significantly exceed the growth of population. The planning process in India includes institutional changes, measures for development of human resources, an allocation of resources between investment and consumption and among different sectors of the economy.

(b) INDUSTRIAL SECTOR IN THE DEVELOPMENT PLAN

136. The industrial sector has been assigned a crucial place in India's development programme. It is expected to meet the demand for industrial consumer goods which, as is well known, increases normally more than proportionately to per capita real income. It is called upon to assist the development of agriculture, transport, power, and housing by providing fertilizers, steel, cement, bricks, locomotives, wagons, trucks, electrical equipment, agricultural machinery, etc. It is envisaged to develop a national machine-building industry to provide nationally produced plant and equipment for the consumer and producer goods industries. Finally, the industry programme envisages sizable exports of industrial manufactures in the not too distant future, since the traditional exports have a fairly limited scope for expansion.

137. Beginning with 1951, India has completed two Five-Year Plans, and is at the present time engaged in implementing the Third Five-Year Plan (April 1961-March 1966). The First Five-Year Plan was essentially a very modest programme for rehabilitating the economy following the damage suffered during World War II and the partition, with emphasis on agriculture, irrigation, power and transport. The Plan contributed to India's development in many ways. It focused the nation's attention on the vital need for development, having been designed not only to provide the objectives but also the means to attain them. It laid down basic policies and initiated certain institutional changes which were indispensable for development of the economy. Measures of land reform, of revitalization of the co-operative movement—especially as regards rural credit—the setting up of agricultural extension services, the initiation of a number of institutions for

providing credit to agriculture and industry; in particular, for developing small-scale industries, etc., are examples of achievement in this area. Finally, the Plan created the basis for future development by expanding irrigation, transport and power facilities and strengthening the administrative structure.

138. The Second Five-Year Plan placed emphasis on basic and heavy industries while continuing the institutional reforms initiated during the First Plan. From a technical point of view it was superior to the First Plan. In 1955/56 the Planning Commission worked out for the first time a perspective plan covering the 15-year period 1956-1971 (and in some versions the 20-year period 1956-1976). It was in the light of this perspective plan that the Second Five-Year Plan, 1956-1961, was formulated.

139. Against a projected increase of 47 per cent provided in the Second Plan the national income at constant prices rose in the decade 1950-1960 by 42 per cent, while per capita income rose by 16 per cent during the same period. The rate of investment in the economy has more than doubled during the decade. It rose from five per cent in 1950-1951 to 11 per cent in 1960-1961.

140. Over the period of the two Plans, agricultural production has expanded by 41 per cent and output of food grains by 46 per cent. The consumption of nitrogenous fertilizers increased nearly six-fold from 55,000 tons to 318,000 tons of nitrogen. Installed capacity of power generation expanded from 2.3 million kW to 5.7 million kW. Freight carried by railways increased from 91.5 million tons to 154 million tons. The number of commercial vehicles increased by 81 per cent to 210,000, while mileage of surfaced roads rose by 48 per cent to 144,000 miles.

141. In the industrial sector, total output increased during the last decade by about 50 per cent. This sector is divided into two broad categories: the so-called "organized" industries and the village and small-scale industries. Up to 1955-1956 the contribution of the latter to the national income exceeded that of the "organized" factory enterprises. The position has changed during the Second Five-Year Plan with its emphasis on organized industries; in 1960-1961 factory enterprises contributed 9.4 per cent of national income compared with 8 per cent by the unorganized industries. However, in spite of the emphasis on industrialization, the proportion of the net output of the industrial sector in the national income has risen by only 1.6 per cent, from 15.9 per cent in 1951-1952 to 17.5 per cent in 1960-1961.

142. The growing importance of the industrial sector (including minerals) in the economy is indicated by the growth in its share of the total investment programme under the three Plans. This share accounted for 13 per cent of the total investment in the First Plan; for 27 per cent in the Second Plan where it equalled the combined share of housing, other construction and inventories, and for 29 per cent in the Third Plan, representing the largest investment allocation among the major sectors of the economy.

143. Expansion in employment opportunities was stated to be one of the major objectives of development planning in India. The first Plan which took general cognizance of the employment situation, had to be

expanded in December, 1953 in an attempt to cope with growing unemployment in the country. Since then, the employment situation has continued to receive attention of the planning authorities. The long-term objectives of planning in this area have been, however, relatively modest and consisted in providing for additional employment opportunities commensurate with the increase in the labour force over the plan period; in other words, in preventing further increases in the numbers of under-employed and unemployed labour.

144. Estimates indicate that the net addition to the labour force between 1951 and 1961 was about 28 million. The first two Plans are estimated to have created 12 million new jobs outside agriculture, and about 3 million within the agricultural sector, thus leaving a balance of 13 million unemployed. It is anticipated that the labour force will increase by 17 million during the third Plan period as compared with the creation of 14 million new employment opportunities during the same period. The contribution of the industrial sector to the solution of the employment problem has been mainly through the expansion of the cottage and small-scale industries. The Planning Commission has adopted a policy of protection and promotion of the latter industries, having allocated 14 per cent of total investment assigned for manufacturing to the cottage and small-scale industry sector. Despite their relatively low share in investment, expansion of cottage and small-scale industries is anticipated to provide 55 per cent of the new jobs in the total manufacturing sector under the third Plan.

(c) CONCLUDING REMARKS

145. Governments can adopt different attitudes to economic planning under a predominantly private enterprise economic system. The Government may take the responsibility for direct formulation and implementation of the plan including the plan for the private sector; or it may adhere to the principle of intervening as little as possible in the operation of the economy, confining itself to indirect measures of steering or managing the economy along the main tendencies set down in the general objectives of the Plan. In the latter case it is recognized that as far as the private sector is concerned, the ultimate responsibility for investment and production lies with the enterprises themselves and that the role of the Government is not one to decide upon production targets or specific investments in the privately owned industries but to provide the basic conditions for their implementation.

146. In spite of the differences in their stages of industrial development, resource endowment and socio-cultural background, both India and Japan have been aiming essentially at similar objectives in their economic planning, that is, a rapid industrialization as a means of achieving a high rate of economic growth. There is, however, a difference between these two countries in the policies adopted and their implementation. The policies adopted in India have relied to a large extent on direct government intervention; hence, the large share of public sector in industrial production, wide use of licensing procedures, import quotas, subsidies, etc. On the other hand, the policies in Japan were largely based on reliance on the market mechanism, using indirect measures of fiscal and monetary nature to achieve the realization of the planned targets.

B. PROGRAMMING AT THE SECTOR AND PROJECT LEVELS

B.I. BASIC DATA AND CRITERIA FOR INDUSTRY PROGRAMMING

I. Basic data and criteria for programming in the steel-transforming industries

147. It is difficult to determine the technical coefficients of production and investment needed for programming the machine-tool and industrial equipment industries, because of the broad range of products of very different types which are included under this heading; the differences in techniques and means of production used and the inter-industry relationships which characterize the manufacture of these goods. There is a need for analytical tools to select those activities which could or should be introduced or encouraged in a given country; to evaluate specific projects for establishing a given industry; to determine the inputs needed for the establishment of the relevant branches of the metal-transforming industry; and to see what other requirements must be fulfilled in order to develop such industries. A number of studies has been carried out with this aim in view, but to date no satisfactory answer appears to have been found to the problems involved in programming this sector.

148. In May 1961, a group of experts met at United Nations Headquarters in New York in order to examine and evaluate the results achieved to date in industrial programming and, at the same time, suggest the guiding principles to be followed in any future work on the subject. With respect to the metal-transforming industries, the conclusions of this group¹⁷ showed the merits of the methodologies examined when viewed as a first approximation but recognized the difficulties which would arise in putting them into practice. Some of the reasons given were that the methods were not yet sufficiently advanced to permit an analysis of the different technical alternatives, of economies of scale, etc.; moreover, doubts were raised as to the applicability, in under-developed countries, of the coefficients, which were based on conditions in industrially more advanced countries. Particular attention was paid to the latter problem since much of the information needed for programming in this sector has to be obtained from the more developed countries where the metal-transforming industries have reached a high degree of development. There is very little experience of this activity in countries where industrialization is just beginning.

149. It was recommended at that meeting that, with a view to improving analytical methods and obtaining a better knowledge of the nature of the problems involved in programming the metal-transforming sector, a series of studies would have to be carried out in specific industries.

¹⁷ See "Report of the Meeting of the Expert Working Group on Industrial Development Programming Data", held at United Nations Headquarters 17-19 May 1961.

(a) THE MACHINE-TOOL INDUSTRY

150. Within the machine-building industry, machine-tools are perhaps the most difficult to study. The great variety of types and models produced, the possibilities of interchanging them in carrying out a given job, the constant technical improvements which are being introduced and the varying levels of automation that can be obtained all combine to introduce great analytical complexities in the programming of this sector. The importance of the machine-tool industry need not be emphasized, since the strategic role which it plays in expanding the supply of manufactured goods is well known.

151. Two papers¹⁸ were presented at the Seminar on Industrial Programming which aimed at providing the basic data and criteria for programming the manufacture of machine-tools and for quantifying the different variables and the way in which these are mutually dependent upon each other. These papers took into account the complexity of the machines, their weight and the quality of their manufacture; the analysis was directed towards determining inputs and size of plant which would be most appropriate given the magnitude of these factors and the type and model of the machine in question.

152. The factor of complexity was introduced in the study because of the need for comparing the difficulties of manufacturing one machine or another. The great variety of types and models¹⁹ of a particular machine makes comparison difficult; thus a statement to the effect that the manufacture of an engine lathe is easier than that of a turret lathe of the same capacity is meaningless unless the degree of complexity of each machine is specified. With this aim in view, the study establishes a complexity index which reflects the most significant amount of machining difficulties. As a first attempt, this index is defined as the sum of several categories of simple or compound parts of the machines, such as the number of gears and pulleys; transmission shafts, lead screws and motors; couplings and frictions, brakes, levers; bed frames and guides, auxiliary apparatus such as pumps and filters, and so forth. This leads to the determination of a series of numerical values which indicate the level of complexity of the machines as follows:

¹⁸ *Algunos problemas metodológicos planteados por la programación de la industria de máquinas-herramientas y otros equipos* (ST/ECLA/CONF.11/L.11) and *Criterios y antecedentes para la programación de la industria de máquinas-herramientas* (ST/ECLA/CONF.11/L.12).

¹⁹ The term "machine" is used in this paper to cover a lathe, a milling machine or an eccentric press. The type determines the possible differences in the manufacture of one particular machine while the model indicates mainly the size within each type.

(i) Kinematically simple machines would have an index of between 10 and 50;

(ii) Machines of average complexity, an index of from 50 to 100;

(iii) Kinematically complicated machines, 100 to 200;

(iv) Machines with complicated kinematic, hydraulic, pneumatic and lubrication circuits, from 200 to 400. For some machines an indication is also given of the probable range of variation of these indices.

153. As for the weight, the studies suggest a need to consider a coefficient of correction to allow for the greater difficulties that may be encountered in building heavy machines as against lighter machines having the same index of complexity. There were however insufficient data to quantify these differences, and the studies recommended further detailed research which would have to be undertaken in conjunction with the manufacturers. The quality factor was classified by reference to international construction standards, although it was observed that this would be insufficient since it would not allow for the difficulties faced by the manufacturer if he produces above, below or within the limits set in the standards. However, as a first approximation three kinds of quality were accepted: one, for machines where the test results are below the minimum standards recommended; another, for machines which meet only part of the tests or where, because of the defects in the materials used, the initial precision is maintained for only a short period of the machine's working life, and a third for machines which consistently meet the standards. Assuming a relationship between the level of quality and the working tolerances, it was concluded that machine-tools in the first group are three times easier to machine than those in the second and five times simpler than those in the third.

154. There is a close relationship between size of plant and technical ability at the executive level. Five sizes were therefore established, beginning with artisan shops and extending to factory size establishments having sufficient technical resources to undertake the building of any type of machine, and covering a range of from 20 to 200 persons employed.

155. After selecting the criteria for defining qualities, indices of complexity and sizes of plant, the most desirable area of work is determined, along with production capacity, taking into account the number of direct man-hours available in the enterprise and the number of man-hours needed to manufacture 100 kg of end product; an appreciation is then made of the investments and manufacturing costs for 100 kg of end product. By comparing these costs according to the different size of plant, the levels of productivity which could be expected in each of them and the selling price of the product, a link is established between the operational possibilities of the enterprises from the technical and economic standpoints.

156. Although investments and operating costs were determined for five sizes of plant, no conclusions could be drawn from these concerning the influence of scale; indeed the products corresponding to each size were not strictly comparable because the technical possibilities for their production and their operational characteristics were themselves closely related to size.

For example, machines with a high degree of complexity cannot be manufactured in small establishments, while those which are very simple are not economically attractive to the larger plants.

157. As a result of the discussions on these two papers, it may be concluded that as a general rule this methodological approach could be considered adequate for dealing with the problems involved in machine-tool manufacture. Nevertheless, it was recommended that some elements should be reviewed in greater depth; for that purpose more intensive field work would be required in order to collect the basic information needed and, if the opportunity should arise, to undertake a practical application of the results of the study based on the methodology used.

158. Among the comments made in the meeting, the following are of particular interest and should be taken into account when the study is revised:

(i) The study is directed more towards metal-cutting machine tools than towards metal-forming machines and the latter should be considered separately;

(ii) The size of plant is not only a function of the complexity, quality and weight of the machines produced, but may also be affected by the degree of subcontracting involved and the bringing in of know-how from abroad. Nevertheless, it was recognized that the methodology under discussion had the necessary flexibility for adaptation to these new variables;

(iii) It would be desirable to look into the possibilities of replacing capital by labour for this type of manufacturing activity; although it was pointed out that this aspect was implicit, to a greater or lesser degree, in the sizes of plant selected. It was also suggested that the different capital intensities involved in the various sizes of plant would be worth stressing;

(iv) Investments in the various sizes of plant selected should be treated on a homogeneous basis with respect to ownership of the land and buildings;

(v) In order to establish the relationship between the weight of a machine and its degree of complexity, a large amount of information would have to be collected in order to be able to observe the behaviour of these variables; it will have to be borne in mind that no simple direct relationship could be expected since the quality and type of the material used in manufacture is of particular importance; thus machines of equal complexity may vary in weight according to the material used;

(vi) An effort should be made to bring together in a single numerical coefficient the variables of quality, complexity and weight for a large number of machine-tools, in order to simplify the practical application of the methodology.

(b) OTHER INDUSTRIES

159. There are analytical complications in determining the technical coefficients of production and investments, as well as the various factors to be considered in programming the manufacture of other types of machinery and equipment, but perhaps these are not as serious as in the case of machine-tools. The more homogeneous nature of the end product, the rather standardized means of production, the fewer technological alternatives, and the use of specific types of

machinery are elements which, according to their greater or lesser influence in the manufacture of a given product, simplify the analysis considerably.

160. This is the case, for example, with the manufacture of welded pipe²⁰ and boiler-shop products²¹ although in the latter case there are certain problems arising out of the fact that the same machinery can be used for the production of a large variety of items. The work done in these sectors and presented at the Seminar, which relates particularly to the determination of investments and unit costs for different volumes of output, show rather conclusive results. For the study on manufacture of welded pipe, three sizes of plant were selected, each having a single production line and differing in the capacity, on one-shift basis of the basic welding equipment. A further study considered the alternatives of each of the three basic plants working two and three shifts each; finally cases were studied involving the doubling and tripling of the production line under a single shift operation. Investments and operating costs were determined for each of these alternatives, based on information obtained directly from specialized sources and within the limitations imposed by the sizes of pipe up to four inches of nominal diameter. Production of welded steel pipe was defined in terms of four variables, that is: the number of lines of manufacture, the speed of welding, the manufacturing programme and the number of days worked per year. The conclusions from the analysis of the over-all variations and combinations of these variables were as follows:

(i) It is most economical to move from a size of plant with less capacity working with a single line of manufacture to alternatives in which the increased production is due to greater capacity of the welding equipment (one production line and one shift), since it gives the lowest figure for the size-investment ratio;

(ii) With regard to operating costs, the greatest advantages are to be obtained from increasing the number of shifts, which indicates that the replacement of capital by labour inputs is advantageous under the conditions of the study, reflecting the characteristics observed in Latin American countries.

161. The document on economies of scale in boiler shops is based, from the methodological point of view, on the fact that the development of boiler shops towards larger sizes is more closely linked with the quality and value of the end products than with the physical increase in production. This trend is so marked in this particular metal-transforming branch that it would be hard to find a boiler shop which had increased its output by continuing strictly in its initial production line. Because of the need to use manpower and investments to greater advantage, industrialists tend to manufacture equipment with a greater value added, that is, where the end product is of a more complex type. This characteristic of boiler shops undoubtedly presents some analytical difficulties; this has been, however, overcome by examining the behaviour of investments, the cost of manufacture and the selling price of the end product for two hypothetical types of

²⁰ See *Economías de escala en la fabricación de tubos de acero con costura* (ST/ECLA/CONF.11/L.14).

²¹ See *Economías de escala en caldererías* (ST/ECLA/CONF.11/L.13).

shops, the first of which makes basic products and the second a more elaborate product. The more favourable operating conditions have been studied for these two cases following the criterion of profitability, according to whether the manufacturing process is more or less capital intensive. The conclusion from this analysis is that in the operation of boiler shops there is a complementary type of behaviour between capital and labour and that capital-intensive processes are less economic than the labour-intensive processes.

(c) THE INFLUENCE OF SCALE IN THE MOTOR VEHICLE INDUSTRY

162. Those responsible for planning the development of metal-transforming industries in under-developed countries are continually faced with the problem of establishing the influences of the scales of production—compatible with the small markets available to them—in the production costs of the end product. This is particularly the case of mass production industries in the industrialized countries, among which one of the most outstanding examples is the motor vehicle industry.

163. Taking advantage of the opportunity provided by the establishment of the motor vehicle industry in Brazil, the study²² presented on this subject examined the possibilities for establishing a method of analysis for costs, with reference to the scales of output already achieved in Brazil. An attempt was made to determine the scale of ratios for similar vehicles made in Brazil and in the various countries of origin, which would correspond to equal production costs in both locations. It should be mentioned that these ratios would be established by using final values of costs and scales, without being concerned with the production patterns adopted in the two areas or with the prices of unit inputs.

164. It was accepted that for each given type of vehicle produced in different factories there is a hyperbolic function of the unit cost in relation to scale in the two areas considered and that at equal cost levels it would be possible to determine the desired equivalence of scale.

165. In order to apply this method, somewhat heterogeneous values had to be used, but it was assumed that this should not greatly affect the conclusions since the objective was to gain orders of magnitude rather than exact values of the ratios, which could lead to further detailed studies.

166. An interesting finding was that in order to achieve cost equality the scale for the United States would have to be twenty times greater than in Brazil for oil trucks and that for small passenger vehicles, the European scale would have to be two to seven times greater than in Brazil.

167. In these comparisons, the costs for Brazilian manufactures correspond to the value including profits at the factory, knocked down, while for foreign vehicles, the costs corresponded to the crated knocked-down (end) value at a Brazilian port.

168. It was agreed in the discussion that this method of evaluating economies of scale, as presented in the

²² See *Considerações preliminares sobre as economias de escala na indústria automobilística Brasileira* (ST/ECLA/CONF.11/L.16).

paper, was very interesting and deserved further research and a more thorough checking of the values used; several types of information which could be collected for that purpose were indicated.

2. Basic data and criteria for programming in the chemical industries

169. Considerable attention has been paid to the problems related to the programming of the chemical industry because of the importance which this industry has acquired in recent years and the dynamic influence exerted by it.

170. The programming of the chemical industries is hampered by such factors as the heterogeneous nature of the uses for chemical products; the fact that they may sometimes be consumer and sometimes intermediate goods; the difficulties which arise in establishing preliminary estimates of investments and operating costs because the processes involved are of a relatively complex technological nature which are continually changing and therefore subject to heavy technical obsolescence; finally, the fact that most chemical activities involve important economies of scale which affect the selection of projects and the decisions concerning location and timeliness of new installations. The fact that increases in demand are often unpredictably rapid, constitutes another aspect which has been given attention in the studies.

171. The documents presented in connexion with this subject refer to nitrogenous fertilizers based on natural gas and to the general problem of economies of scale in the chemical industries.

172. The first of these documents²³ analyses the differences which may arise in under-developed countries with respect to the structure of production costs and the magnitude of the capital required in the nitrogenous fertilizer industry. After referring to the products (ammonia, urea, nitrate and ammonium sulphate), their uses, methods of production and the world situation with regard to production, consumption and trade during the period 1954-1960, an examination is made of the capital requirements and the structure of production costs, starting with North American experience. The differences which may arise in developing countries are analysed, in terms of the cost of equipment, installation and operating costs, costs of catalysts and other auxiliary materials, and differences in labour productivity. It appears that the differences in these items are not necessarily offset by the economies that could be achieved by locating the industry near the sources of natural gas, or cheap supplies of fuel, energy and labour, at prices lower than those observed in the heavily industrialized areas.

173. In the opinion of German and American specialized firms, larger investments per unit of end product may be expected in plants built in countries which are not greatly industrialized. The cost of these investments have been estimated for some plants as being 15 per cent higher than in the United States and Europe. If one adds the unfavourable scale situation due to the small size of the markets, there is room for doubt as to the competitive position of this industry in developing countries.

²³ See *Nitrogenous fertilizers based on natural gas* (ST/ECLA/CONF.11/L.18).

174. It is moreover recognized that it is not possible to establish quantitatively the effect of such factors as the difference in labour productivity, the cost of certain auxiliary products and the possible need for greater amounts of working capital. It is also stressed that there are only very slight possibilities for substituting labour for capital in these industries, characterized as they are by relative technical complexity and a high degree of mechanization.

175. The analysis of the cost structure confirms the high incidence of costs relating to capital, which amount to over 40 per cent of the production cost, representing depreciation and interest. The greater investments, together with the high interest rates often found in developing countries, would lead to an increase in the total cost of production—in the neighbourhood of 25 to 40 per cent. Adding this cost differential to the effect of the smaller scale of production to be expected in these countries, it is not likely that this would be offset by the low cost of raw materials even in the extreme case of attributing zero cost to natural gas.

176. This unfavourable situation would be improved if, in addition to the existence of natural gas in exceptionally favourable conditions, economies of scale could be obtained through integration of regional markets and particularly if there were to be a dynamic growth of demand over a short period. Once satisfactory experience had been acquired in production and management techniques, adequate conditions would arise for competitive production of nitrogenous fertilizers in those countries where there are considerable surpluses of natural gas.

177. The influence of economies of scale on investments and production costs in the chemical industry²⁴ can be measured quite apart from local factors, through an idealized general pattern of production costs. It should be pointed out that the basic information used in relation to capital inputs and technological coefficients, had been collected for about ninety chemical activities in earlier studies carried out by the Economic Commission for Latin America.²⁵ In these studies an attempt was made to evaluate the regional prospects for developing the chemical industries so as to meet the demand forecast for 1970, and its conclusions confirm in general the favourable position of the region, despite the dispersion of cost according to location, which ranges from 10 to 12 per cent over the general average. The incidence of economies of scale was examined in the case of three specific industrial complexes: nitrogenous fertilizers, soda-chlorine-bicalcium phosphate, and sulphuric acid-phosphoric acid-triple superphosphate.

178. In the course of the survey made on the effect of scale, in the case of eighteen important chemical products, it was found that economies of scale could reach values between 17 and 43 per cent of unit investments, by tripling the capacity of the installation adopted as the point of reference. Given the high incidence of the capital factor on production costs in the chemical industry, these economies would have a significant

²⁴ See *Economías de escala en la industria química* (ST/ECLA/CONF.11/L.17).

²⁵ See *La industria química en América Latina* (E/CN.12/628/Add.1, 2 and 3).

effect on production costs on account of depreciation, interest and other elements associated with size.

179. In the course of the discussion some of the difficulties were pointed out with reference to estimates of investments and costs and the quantification of economies of scale; stress was laid on the desirability of having comparable information on intermediate capacities that could usually be achieved.

180. Reference was made to the differences between chemicals for end use and basic intermediates. These differences affect the criteria for programming purposes. For example, in the latter case there must be an integration of the various end uses in order to provide a suitable scale of manufacture of intermediate products. An example is provided by the production of styrene which could meet not only the demand in the field of plastic materials (polystyrene) but also to make synthetic rubber.

181. In other sectors of the chemical industry, such as the manufacture of nitrogenous phosphatic and potassic fertilizers, stress was laid on the need for adequate planning designed to balance the supply of each one of these elements. In fact, while in some countries there is an accelerated development of nitrogenous fertilizers and a lagging behind of others, in other countries the opposite is the case, namely, a relative backwardness in the development of nitrogenous fertilizers as compared with the superphosphates industry (Brazil). The origins of the fertilizer industry differ from country to country, since in some cases private enterprise introduced these industries (phosphated fertilizers), whereas in others production of synthetic nitrogenous fertilizers is concentrated in state enterprises. This often results in maladjustments in the supply of both elements and consequently in their consumption.

182. A combination of factors points to the need for programming the development of a regional chemical industry directed towards satisfying the needs of an integrated market. One of the aspects requiring special attention in the immediate future relates to standardization of specifications and qualities of the chemicals made in different countries; in this respect, notable efforts have been made in Brazil and Mexico.

183. With respect to the data provided on economies of scale, concern has been expressed by the Inter-American Development Bank as regards to the development of Latin America's chemical industry, particularly the establishment in the smaller countries of new industries at levels well below the minimum economic size. It was suggested in this connexion that it was desirable to programme the installation of chemical activities associated with other industrial outputs in order to reach larger volumes in the consumption of raw materials common to both, with the resulting economies in supply; at the same time, such integration would result in economies in joint utilization of general and auxiliary services required simultaneously by these manufactures. Some examples were given of such integration, among them the combination of cellulose, electrolytic soda and chlorine, in Argentina.

184. On the other hand, programming of chemical industries requires an over-all knowledge of the technological alternatives and of the evolution of inter-

mediate products, which poses problems of technical obsolescence which are not always given due attention. Thus the programmes for manufacturing synthetic rubber of the butadiene-styrene type, a product requiring separate manufacture of butadiene and styrene, can be redirected towards production of new types of rubber—polybutadiene—which requires only one of the two intermediate products—butadiene; this technical change in the end product would facilitate the problem of economic scale of production.

185. Reference was made to the assistance that an institution such as the Inter-American Development Bank could give at the programming stages through financing by deferred credits, that is, granting a "period of grace" of three to four years—applicable in countries where the market may, during this period, reach the capacity needed to absorb the output of new plants. This would facilitate installation of manufactures with initial production capacities in excess of the immediate market demand, since the financing charges would be postponed until the "maturation" of the demand. In this respect, mention was made of the forthcoming putting in operation in Argentina of a complex of petrochemical plants in which as many as six different products are to be made, with relatively high capacities.

186. The programming of a fertilizer industry intended to supply the regional Central American market was described, stressing those factors which led to the choice of the location of the two planned complexes in countries whose demand account for more than 60 per cent of the total consumption in that region. For instance, the manufacture of sulphuric and phosphoric acids of superphosphates and complex fertilizers intended for the whole region was established in El Salvador (Acajutla), whereas manufacture of nitrogenous fertilizers derived from ammonia was established in Costa Rica (Punta Arenas), based initially on imported ammonia. Practically 85 per cent of this second plant has already been built, and it will deliver ammonium nitrate and complex fertilizers manufactured by the PEC processes. Among the special problems found in programming this industry were the preferences of the farmers for given types of fertilizers, a result of the promotion efforts of the importers.

187. It was considered that the fragmentation of products as fertilizers in Central America in two distant plants was not completely justified but was due to some extraneous factors which had influenced the choice of location.

188. The development of a large fertilizer industry in Brazil (superphosphates in São Paulo) poses another example of adaptation of the size of the installations to the future evolution of demand. In the case of Brazil an effort is required to achieve a balanced supply of nitrogen and potassium as fertilizers. As far as the latter element is concerned the importance was stressed of technological research in order to develop new sources of supply through the use of saline residues resulting from the separation of salt for industrial purposes.

189. The need for programming directed towards the use of local resources, was also emphasized in connexion with the use for the manufacture of sulphuric acid of pyrites found in association with coal in Santa Catarina, instead of sulphur which has to be imported.

190. The imbalance which exists in most Latin American countries between the demand for caustic soda and chlorine requires special attention in programming the industry for sodium alkalis, in order to adapt the choice of alternative processes to the foreseeable evolution of the demand for chlorine. The latter is an intermediate product in great demand for numerous chemical manufactures—pesticides, solvents and plastics—which have not yet developed satisfactorily in some countries. The fact that it is produced automatically in a proportion of 0.85 tons per ton of electrolytic caustic soda produced, is a factor limiting the installation of new soda plants and, in some cases, the utilization at full capacity of the existing ones. In this respect, reference was made to the development plans of the Instituto Venezolano de Petroquímica (Venezuelan Petrochemical Institute) in relation to vinyl plastics and some chlorinated pesticides, which would solve this imbalance by creating new markets for chlorine; in fact, there may arise eventually the reverse problem, with the demand for chlorine expanding more rapidly than that for caustic soda—a phenomenon which has been known for some time in the chemical industry of the highly industrialized countries. In countries having an alternative source of caustic soda, such as the causticizing of sodium carbonate (Mexico, Brazil and Colombia) there could be a more balanced production pattern for electrolytic soda and chlorine, and this would solve the problem of chlorine surplus. Such a balance has already been achieved in the case of Brazil, as a result of the development of the manufacture of chlorinated pesticides and solvents. Nevertheless, even in these cases, considerable imports are required of caustic soda, as high as 60 per cent of consumption. The situation described in relation to the industry of chlorine and alkalis shows the drawbacks of an unprogrammed development of intermediate chemical products, with the resultant difficulties, and the need to consider industrial complexes rather than isolated manufactures in programming this industrial sector.

191. It was emphasized that the spreading of information concerning the experience in different regions with the techniques of programming the chemical sector, both by regional planning institutions and by international organizations, would be most useful.

3. Basic data and criteria for programming in the pulp and paper industry²⁶

192. Consumption of paper and paper board in Latin America increased from 1.8 to approximately 2.5 million tons between 1955 and 1962, and it is estimated that consumption will continue to grow in the next few years at the accelerated rate recorded in previous years. Demand is expected to reach some 3.5 million tons by 1965, and 6.5 million tons by 1975.

193. Although these increases, both past and future, may be considered spectacular, a comparison of Latin American per capita levels of consumption with those prevailing in the more developed regions puts the situation in a more correct perspective: the 12 kg of per capita consumption in Latin America are very far

²⁶ See ECLA/FAO/BTAO, "Programme data and criteria for the pulp and paper industry" (ST/ECLA/CONF.11/L.19).

from 50 kg in Europe, 180 kg in North America and even from the world per capita consumption of 30 kg.

194. The region produces about two-thirds of its own requirements of paper and board as well as cellulose pulps; most of its imports consist of newsprint and long-fibre pulp, since it is particularly well endowed with fibrous resources for making short fibres. In fact, Latin America is relatively poor in coniferous woods, which constitute the traditional sources of long-fibred cellulose resources, whereas it has virtually unlimited resources of short fibre. This situation, together with the fact that unceasing technological research has reduced the difference in the possible uses of both types of fibre, has promoted an increasing use of the abundant resources (short-fibre) to an extent that it is estimated that by 1965 approximately half of the pulp used will be of the short-fibre type.

195. The pattern in the region varies both with regard to production and consumption of cellulose products. There is a considerable degree of concentration by both: Argentina, Brazil and Mexico represent together almost 80 per cent of regional consumption of paper and board. Per capita consumption ranges from 0.5 kg to 25 kg, corresponding, respectively, to Haiti and Argentina. Adding Chile to the group of the first three countries, their share in the manufacture of finished products amount to 85 per cent and in the case of pulp to nearly 95 per cent.

196. All countries in the region import cellulose products; nevertheless, Chile is a net exporter, because of its exports of newsprint and kraft pulp which are almost all sent to other Latin American countries.

197. In the area, production started in the vicinity of the large urban centres, mainly on the basis of waste paper and imported pulp. Originally, the scale of production was small and the factories have in many cases continued to be small, with a daily output of around ten tons.

198. Nevertheless, there are already plants having a capacity ranging from 100 to 150 tons a day. In this connexion, it should be stressed that once the expansion of the pulp plant at Laja (Chile) has been completed, together with that of the newsprint factory at Montelegre (Brazil), their respective daily capacities will rise to 625 and 425 tons. Hence, in both cases, operations will be at the levels corresponding to the international market. These are, however, unique cases in the Latin American paper industry.

199. It has been estimated that projects resulting in expansion of productive capacity by 1965 represent an investment in plant of some 700 million dollars spread over the period 1959-1965; if it is assumed, somewhat ambitiously, that by 1975 production will satisfy the entire demand for pulp and paper products, except for the amounts currently imported, the investment in plant should amount to 1,600 million dollars in the ten years from 1966 to 1975.

200. The magnitude of a capital resource involved in a region which is characterized by acute shortages of capital leads to a recognition of the need for most efficient use of the resources set aside for expanding the sector's productive capacity. The Seminar considered that the discussion paper (ST/ECLA/CONF. 11/L.19) provided the industrial programmer with a

useful tool for determining the policy to be applied to the sector.

201. It is considered that the seven pulp products selected for the study provide a representative cross-section of the industry: the similarity of the curves shown in the annex indicates that other products follow a similar pattern. The products selected were: unbleached and bleached kraft pulp, unbleached and bleached kraft pulp and paper, newsprint, and unbleached and bleached semi-chemical pulp and paper. The economies of manufacturing these products were studied for plants with a daily capacity of 50, 100 and 200 metric tons, with twenty-one cases being presented. The range of capacity was intended to be suited to the national markets in most Latin American countries. Although it could be argued that smaller plants might be economic in some countries, it is considered that with the potential wider markets resulting from LAFTA (Latin American Free-Trade Area), the economic life of such plants could be short. In that respect, even the selected plant sizes might be insufficient, if LAFTA achieves within a reasonable period of time its target of freeing the Latin American markets of the existing barriers. In fact, the largest of the three sizes which were studied was selected not so much because it represents the limit at which economies of scale disappear but because it corresponds to the sizes which would predominate in the foreseeable future and, in some cases, even at the present time. In this connexion, it should be recalled that the small plants now operating under apparently economic conditions in several countries are able to do so only because of the powerful protection they receive through customs tariffs.

202. Estimates of manpower requirements, capital requirements, direct manufacturing costs, total production costs and gross earnings on investment are presented for each case. United States experience was used as far as labour, chemical, energy and other inputs were concerned. Obviously such data cannot be applied directly to programming in Latin American countries since the number of workers, for example, may be two or three times as high, as in the United States. The principal raw material for the first four cases is coniferous wood and in the last three cases, low density broad-leaved wood. Wood density and yield were based on combined Latin American and North American experience.

203. The selected design corresponds to a modern but not highly automated plant; for each product, the design of each of the three sizes of plant is identical, which leads to identical estimates of unit raw material and energy requirements. On the other hand, estimated unit labour requirements and unit administration and overhead costs decline markedly with increasing plant size. While labour, administration and overhead costs in the plants with a daily output of 50 tons represented between 30 and 40 per cent of the total unit cost, the share drops to less than 20 per cent in most plants with a daily output of 200 tons.

204. This also applies to unit capital requirements which, taking the two limit sizes, decline by about 50 per cent. The capital cost requirements include plant capital and related interest during construction as well as working capital, but make no provision for possible investment in plant infrastructure which may

be required for specific projects. Consequently, as unit investment requirements decline, unit capital costs also drop, although not to the same extent as labour, administration and overhead costs. The latter reduction in operating costs is far more important from the standpoint of economies of scale than the reduction caused by the non-proportional growth of the investment required.

205. A comparison of total unit costs shows that an increase in daily capacity from 50 tons to 200 tons permits reductions in such costs of between 40 and 50 per cent of the total cost in respect of the lower capacity.

206. The estimates of unit total production costs, when compared with mill net price estimates based upon meeting world competition without tariff protection, indicate that only the largest of the plant sizes studied would have any prospect of meeting such competition. Similar estimates from the point of view of gross earnings on investment indicate that, when facing world competition, the 50-ton mills would operate at a loss, the 100-ton mills would make a minimal profit, and the 200-ton mills would only be marginally profitable. It follows therefore that pulp and paper mills in most countries of Latin America need tariff protection while serving their limited national markets. The corollary is that broader markets are required in order to enjoy the full benefits of economies of scale.

207. It is concluded that there are indeed important economies of scale in the pulp and paper industry, particularly at capacities suited to new development in most Latin American countries. The source of the economies of scale lies in the continuous process nature of the industry. With increasing size of a specific design of plant, labour requirements and administration and overhead costs increase only slightly, so that unit manufacturing costs decline markedly. Labour requirements vary little with size of plant for a given design because most workers are overseers of one or more steps in the process, and because a worker can operate a large piece of process equipment as readily as a small one. Similarly, it takes about as many managerial, supervisory, and other administrative employees to administer a large plant as a small one of the same design.

208. Similarly, plant investment requirements do not rise in proportion to plant size, so that unit investment requirements decrease with increasing plant size of a specific design. Neither does the cost of supporting facilities, such as plant railways and roads, workshops, warehouses, laboratories and offices, rise as rapidly as plant capacity.

209. In planning for the future development of pulp and paper industry, when the objective is production at the lowest possible cost, it appears that every effort should be made to build the largest single-line plant possible consistent with anticipated demand during the ensuing few years within a given size of the domestic market.

210. The analysis of the criteria of selection of products provided an opportunity for the formulation of suggestions to the effect that the selection should include the manufacture of paper based on bagasse pulp. In this connexion, the prevailing trends in the

region were examined, with particular reference to the replacement of long fibre by short fibre as a raw material for pulp-making. The shortage of conifers—both in physical and economic terms—has led to the utilization of short-fibre resources which, as in the case of bagasse, present extremely favourable conditions for their utilization, particularly because of the concentrated supply, and, in many cases, proximity to replacement fuels.

211. The utilization of bagasse is particularly important also as regards the possibility of its replacing mechanical pulp for which, in most cases, the scarce coniferous resources are used. In this connexion it was mentioned that research is being conducted in Mexico on whether as much as 75 per cent of bagasse mechanical pulp could be used in combination with 25 per cent of coniferous pulp for newsprint.

212. The Seminar emphasized the need to investigate and experiment with the prospects offered by combinations or mixtures of pulps made from different fibres, in order to make use of the favourable properties of each kind of fibre. The case of Brazil was given as an example where utilization of bagasse had been delayed because of the insistent attempts of using it without addition of long-fibred pulp.

213. Potential pulp resources of the tropical forests were also the subject of discussion at the Seminar. Concern was expressed at the lag in incorporating this resource in the exploitable sources of fibrous raw materials in view of the fact that many of the technological problems have already been solved. Several alternatives were put forward; one of these, which seemed to rally a great deal of expert opinion, consists in the utilization of existing species, followed by planting of other known species, such as fast-growing pine or eucalyptus. The other tends towards the policy of encouraging the natural regrowth of the forest.

214. With respect to the second alternative, the Seminar was apprised of the background of the first project in the region for manufacturing of pulp on an industrial scale based on tropical woods, in Cali, Colombia. It was found there that once the first thinning had taken place, the natural regrowth took place with a considerable reduction in the variety of species—a dominant characteristic of tropical forests—and an increase in the already high percentage of species suitable for conversion into pulp.

215. In connexion with research and experiments related to tropical woods viewed as a resource for pulp-making, and taking into account their considerable potential importance in this respect, it was mentioned that it would be very useful to have in Latin America an institution which would be devoted to such activities. As an important antecedent was cited the work being undertaken in the Mexican Institute for Technological Research (IMIT), in particular, the studies carried out on the application of one of the new sulphite processes on the basis of magnesium; it was thought up to now that only the sulphate process could be used for converting Mexican tropical woods into pulp. The new process is to be used by an enterprise to be established in the State of Chiapas, Mexico; it offers considerable advantages, in particular, the reduction of the cooking time, which leads to a reduction in investment costs.

216. In spite of the importance of short fibre in the region at the present time and of its prospects in the future which are even greater, it was considered appropriate to introduce an element of caution, in the sense that the excellent properties of long fibre should not be underestimated and that advantage should be taken of existing favourable conditions for developing this resource by means of plantations which, in the case of *Pinus Radiata* in Chile and *Pinus Caribea* in Brazil, had given very satisfactory results. It should also be remembered that although the prospects of utilization of short fibres are being gradually expanded, there are technological factors which, for the time being and in the near future, impose certain limitations on the use of this resource.

217. From the programming point of view it is interesting to note what has taken place in Brazil in recent years, namely, that the appearance on the market of considerable quantities of short-fibred eucalyptus pulp led at a given moment to the assumption that there was a considerable export surplus of fairly stable nature. In turn, it was thought that investments for production of long-fibred pulp were unjustified and these were temporarily set aside. It appeared very soon, however, that domestic demand has absorbed the exportable surpluses and began to exert pressure on the supply of long-fibred pulp, thus stimulating new investments.

218. A situation of this kind shows clearly the need for accurate projections, both for finished products and for cellulose. In this connexion, it was pointed out that the projections for finished products (paper and board) had been confirmed by the figures of actual consumption, whereas the differences between projected and actual demand for pulp had been considerably out of line in some cases. There was general agreement to the effect that, among other factors, the possibility of resorting to almost innumerable combinations of the different fibrous raw materials made any accurate forecast difficult. At the same time, the lack of up-to-date information on installed capacity and additions to capacity introduces another factor of uncertainty which was felt particularly in the case of pulp.

219. The abundant supply of eucalyptus wood for pulping purposes in Brazil and in some other countries was mentioned during the Seminar, and it was pointed out that its increasing use was due to the fact that the techniques for converting it into pulp were well known.

220. Sisal and jute were also mentioned as sources of long-fibre pulping resources, although at present the greater value of these fibres for manufacturing textiles makes it difficult to use them in other applications.

221. With regard to the case of newsprint produced on the basis of mechanical pulp made from salicaceous species (poplar and poplar-willow), presented in the study, mention was made to the effect that only in Argentina did any immediate possibility exist of having this species available in the Parana Delta. The properties of newsprint made from these species were not always satisfactory. It was also mentioned that the low profitability of newsprint manufacture meant that in most cases it has to be produced in an integrated plant, that is, including production of kraft pulp which in turn may be followed by the production of kraft paper.

222. The Seminar recommended, with regard to the size of plant studies, that the research should continue at levels higher than the maximum daily capacity of 200 tons, since although the sizes studied might be considered excessive for the present situation from a dynamic point of view, a widening of Latin American markets may be envisaged as a result of economic integration schemes. Although it is difficult to generalize on this subject, this would have to be supplemented by a study covering transport costs and their relationship to economies of scale.

223. Two examples were mentioned which show the importance of economies of scale in this industry. In one case, that of the Laja plant (Chile), these advantages are one of the determining factors of the financial support provided by the Inter-American Development Bank, since by trebling its output very considerable reductions in costs will be obtained. In the other case already mentioned, that of the Cali plant which also obtained financial support from the IDB, it was found that it was possible to double its output (from 50 to 100 tons of pulp daily) by increasing the investment by 25 per cent.

224. Studies of the manufacture of semi-chemical pulp in Argentina were considered important, since a good part of Argentina's forest resources are particularly suitable for this type of pulp. In this connexion, it was thought that it would be most useful for that country to undertake a study on economies of scale in the manufacture of semi-chemical pulp and the role of this type of pulp in the paper industry.

4. Basic data and criteria for programming other industries²⁷

(a) SUMMARY OF THE DISCUSSION PAPERS PRESENTED TO THE MEETING

(i) *Cement*

225. The study examined investment and production costs as related to the size of plant, the principal components of cost of production and investment, the different technologies, the raw materials and other aspects of the problem.

226. The relevant data were based on the experience of the United States, the Federal Republic of Germany, the USSR, Japan and some under-developed countries. A comparative analysis of the data has been made as regards inter-country variations in costs and inputs, taking into account variations in physical inputs, prices of factors and differences in performance. As a rule, costs in the less developed countries were found to be higher than those in the industrial countries.

227. The study points out the importance of raw materials in selecting the location of the plant. Technological alternatives, namely, rotary kiln versus vertical kiln plants and in the case of the former, the "dry" versus the "wet" process have been examined.

228. As regards the vertical kiln the report points out that this presents the advantage of lower capital cost, easier installation and also relocation if the plant has been designed with the latter purpose in mind. On the other hand, it presents certain limitations,

since (i) it has an upper capacity limit of 200,000 tons per year; (ii) it is adapted only to the dry process; (iii) it requires more rigid specifications in terms of raw material and fuel, and (iv) it may result in a product of an inferior quality.

229. The cement industry is characterized by significant economies of scale. Thus, according to data from the Federal Republic of Germany the unit cost of production declines from US \$16 to US \$12 per ton with the increase in plant capacity from 100,000 to 400,000 tons a year. This variation in cost as a function of size arises mainly in respect to inputs of fixed capital and labour. No economies of scale appear in regard to fuel, energy, and raw material. The data for several countries examined in this study indicate a constant investment-size elasticity in the range of 0.64 to 0.77. As an example, data from the Federal Republic of Germany indicate that fixed investment per ton of capacity declines from US \$48 for a 33,000 ton capacity plant to US \$19 per ton for a 400,000 ton capacity.

230. An important element in the selection of economic size are transport costs. The transport factor is obviously related to the size of the installations, since size will determine the concentration or dispersion of production in relation to the cement consuming markets. Since cement is a bulky material of low-priced product the effect of the transport factor may be of comparable magnitude to that of size.

(ii) *Aluminium industry*²⁸

231. The various stages of the aluminium production were discussed in the paper: mining and extraction of bauxite, production of alumina; reduction of alumina to aluminium metal and aluminium products.

232. As regards raw materials, the paper discussed extraction of bauxite, its quality, types, geology and geographic concentration, mining operations and their economic aspects. Emphasis was laid on transportation cost since bauxite is a low-priced commodity; accessibility of bauxite deposits is a prime factor and the alumina plants are generally located in the immediate neighbourhood of the bauxite mines.

233. Various production processes were discussed with respect to production of alumina. Data on fixed investment for various capacities are given for plants treating monohydrate and trihydrate bauxite and it was found that the former type of bauxite requires about a ten per cent higher investment; fixed investment per metric ton for a 100,000 ton plant is about US \$170-210 for trihydrate and US \$190-230 for monohydrate plants. Operating cost data were given in terms of money costs and physical inputs for the two main alumina processes. It was found that minimum capacity plants for under-developed countries were in the range of 100,000 to 165,000 tons for alumina plants working for the export market and combined with bauxite mining, and in the range of 30,000 to 40,000 tons when integrated with a reduction plant to produce aluminium metal for local market.

234. The data for aluminium reduction covered mainly the Pre-bake and Soderberg electrolytic processes. In terms of fixed investment at various capa-

²⁷ See B.III.2 for programming data and criteria in traditional industries (textile industry).

²⁸ "Programming data and criteria for the aluminium industry" (ST/ECLA/CONF.11/L.24).

cities, it was found that Pre-bake plants cost more than Soderberg at capacities below 100,000 and less so at higher capacities. Fixed investment for a 50,000 ton plant ranges between US \$750 and \$1,050 per ton of metal for Pre-bake and between US \$700 and \$1,000 for Soderberg plants. Consumption of electric power is 17,000 kWh per ton in Pre-bake plants and 17,500 kWh in Soderberg. The different factors affecting capital cost and input requirements, including differences in the anode system, size of cells, power cost, climate and location were discussed.

235. The report further presented in general terms, the various aluminium fabricating processes, e.g., rolling mills; rod, wire and cable plants; extrusion plants, and production of kitchen utensils and hollow ware, with emphasis on those that are believed to be appropriate to conditions in developing countries. Because of the large variety of processes and products, it was not possible to give detailed capital cost estimates; instead of that a review was made of the capital cost factor for the most important types of fabricating plants. In the way of illustration, it was mentioned that a continuous hot rolling mill for widths up to 100-200 inches of capacity and ranging from 100,000 to 200,000 tons per year requires an investment of between US \$30-\$50 million. For the same reasons no attempt was made to give detailed operating data.

236. In addition to the currently used processes the report mentioned the existence of several new processes which are at various stages of commercial development. One is direct reduction of bauxite into aluminium metal without going through the alumina stage thus resulting in substantial capital savings; however, the commercial value of this process is at the present stage still subject to caution.

237. A section of the report was devoted to discussing the input requirements for plants located in isolated areas which are devoid of normal industrial facilities. This locational aspect is of great importance in an industry which requires large investments on its own account and where additional investment in infrastructure would add greatly to the cost of its establishment.

(iii) *Studies on construction in the Soviet Union*²⁹

238. These two studies represented a first attempt at exploring the wealth of information in the form of economic and technical industry data available in the centrally planned economies. Construction has been selected in view of its importance as a major component of investment; it usually accounts for a high share of fixed investment in industry. Thus, for cement, construction costs may range between 30 and 35 per cent, and for aluminium, between 25 and 30 per cent of total fixed investment.

239. The two studies are complementary. The first dealt with inputs by structural elements, while the other attempted to establish a classification of structures in terms of standard structural elements.

²⁹ "Materials, labour, capital and flow inputs in construction in the Soviet Union" (ST/ECLA/CONF.11/L.25) and "Classification of industrial structures in the Soviet Union" (ST/ECLA/CONF.11/L.26).

(b) DISCUSSION

(i) *The cement industry*

240. The discussion in the Seminar revolved around the following points: economies of scale versus transport cost, location of cement plants, location of demand, concentration *versus* decentralization of production, and further research.

241. The practical usefulness of studies of the type presented in the discussion papers was unanimously recognized. It was mentioned in particular that on the basis of the experience of financing institutions, e.g., the Inter-American Development Bank and the International Bank for Reconstruction and Development, availability of such data should be extremely useful. Much information is available on specific plants but no effort has been made so far to analyse it. A systematic analysis of data for various industries would provide a basis for examining various alternatives at the preliminary stage of selection of industry projects. Engineering studies at the blueprint stage are both too advanced and too costly for that purpose. The availability of a set of reference studies for various industries would greatly facilitate the decision-making process and avoid costly mistakes.

242. With respect to the relationship between the factors of transportation, plant location and economies of scale, it was felt by the participants that the studies did not sufficiently elaborate on this problem and that further work was necessary. Thus, the considerable economies of scale obtained in concentrating production in a single large plant may be offset by high costs of transport to the consuming centres; this was particularly true in the case of cement which is a bulky low-price product. The problem was complicated by the fact that transport cost itself was subject to economies of scale, which involves the finding of an optimum solution combining location, size of plant and transport cost. It was suggested that this problem could be dealt with by using mathematical techniques of linear programming. It was pointed out, however, that in cases where the demand was evenly distributed around a transport system of, say, a railway line more simple methods could be used.

243. It was pointed out by one participant that in Poland, where the raw material for cement was available in several locations, the determining factor in location was transport and the cement plants were located in regions where there was excess capacity in transportation facilities. It was further pointed out that the location and the nature of the market for cement (temporary or permanent demand) would also be an important factor. Thus, an investigation should be made of the location of key construction projects, of expected construction activities in the future, and the duration of these operations. The transport rates—which in some cases were set at artificially high levels—were another factor.

244. With respect to decentralization of production, it was mentioned that economies could be obtained by bulk shipments, and also by transporting clinker to the points of use where it would be ground. Clinker required less care in handling than cement and involved lower transport and handling costs. There were also economies in grinding and packing. Several instances

of decentralizing clinker grinding operations were mentioned in the cases of Argentina and El Salvador; in the latter country clinker was being imported from Guatemala. In both cases this procedure was found to be more economic.

245. In regard to the cost data given in this study it was mentioned that these seemed to correspond to actual conditions in industry. An opinion was expressed that it would be useful to have a more detailed breakdown of the capital cost element.

246. Several suggestions were made with regard to further research. It was suggested that further work be made on products based on cement such as asbestocement, concrete pipes and other construction materials. These were the type of industries that were likely to develop at an early stage of industrial development since by their nature they are essentially local industries. Further work should also be undertaken in exploring the relative merits of the wet process. Finally, as suggested above, the inter-relation of location, size, and transportation required further detailed investigation.

(ii) *Aluminium*

247. The discussion may be grouped under four headings: (a) new technological developments; (b) minimum size plants; (c) investment requirements, and (d) policies to be pursued with regard to alternatives of either exporting bauxite as raw material or domestic production of alumina and further processing of the alumina into aluminium metal.

248. With respect to new technological developments, it was mentioned that an alumina plant was in operation in Poland using clay as raw material; the technological problems of the process have been solved but the economic feasibility is still under study. Experiments on the use of clay as raw material were also carried out in the United States, but the work is still in the early experimental stage. Research was under way in Argentina and Mexico to explore the possibility of utilizing alunite as raw material and it was suggested that these two countries exchange their experience in this field. Another raw material was mentioned—laterite (a combined oxide of iron and aluminium)—which was being tested in Japan.

249. As regards aluminium reduction, new processes of direct reduction bypassing the alumina stage were mentioned, which were expected to yield a decrease by about one-third in capital costs. It was mentioned in this connexion that Venezuela was considering the installation of a direct reduction process.

250. With regard to the problem of minimum size, it was mentioned that in the case of two projects proposed for Argentina and Venezuela, the order of magnitude of the envisaged scale of operations was close to the figure mentioned in the report, namely, about 20,000 tons per year. Possibilities of establishing even smaller-size plants were mentioned, and reference was made to the reduction plant in China (Taiwan),

which has a capacity below the minimum suggested in the report and has proved to operate economically. In the case of the latter plant some of the equipment was produced locally, which may have resulted in lower investment cost.

251. As against these statements which suggest that small economic plants may be possible, other statements were made in support of the conclusions of the report, namely, that substantial economies of scale were obtainable up to a capacity of about 200,000 tons per year for alumina plants and 100,000 tons per year for aluminium plants. These data were said to be in general agreement with references made in the trade regarding economic size plants. It could be expected, therefore, that smaller plants would be able to compete only if given more or less substantial tariff protection. Emphasis was laid in this connexion on the large capital investment required per ton of aluminium metal—that may amount to US \$1,500—for an integrated operation of production of alumina and aluminium metal, including the installation of the required power facilities. These investment costs may further increase by additional investment in infrastructure when plants are to be installed in isolated areas. It was mentioned that because of such heavy investments countries should consider very carefully investment in this industry in the light of other alternatives which may have equal or higher priority.

252. With respect to the last point of the discussion mentioned above regarding the policy alternative of either exporting bauxite or processing the latter into alumina with further conversion into aluminium metal, a specific case of one country was mentioned. The development of commercial deposits of bauxite in that country has been delayed because of the disagreement between the Government and interested private concerns on this particular issue, the former insisting on exports in the form of alumina and aluminium metal. It was considered that a general economic study of this problem by the United Nations Secretariat would be indicated.

253. It was felt that the report might have given more complete data on transportation costs for bauxite, alumina and aluminium. Further study was also recommended regarding the economics of aluminium fabricating. The investment costs for fabricating plants shown in the report are very high, and it would be desirable to explore alternative production methods in this area and to indicate what types of aluminium products may be fabricated on an economic scale in small and medium-sized enterprises.

254. It was mentioned by the Secretariat that additional work was being carried out in this area. An attempt is being made to incorporate in the study additional data at its disposal that relate to the industrial experience of several other countries developed and under-developed; also, that the recommendations made in the meeting on various points requiring further research will be taken into account in its future work.

B.II. EVALUATION OF INDUSTRIAL PROJECTS: SELECTION OF INDIVIDUAL PROJECTS AND PREPARATION OF FEASIBILITY OR PRE-INVESTMENT STUDIES

I. Evaluation of projects in predominantly private enterprise economies

(a) SUMMARY OF THE DISCUSSION PAPERS

255. Planning involves the projecting and setting up of aggregate targets, both on the national and sectoral levels. The primary objective which is expressed explicitly or assumed implicitly is the maximization of national income. Other objectives include increasing employment opportunities, strengthening the balance of payments, equitable redistribution of income, development of the more backward regions, etc. These objectives are quantified in the form of targets set within the limitations of available resources including factors of production during the planning period.

256. Project evaluation involves screening and selection of projects that would fulfil the set targets within the framework of the available resources. Within the planning mechanism it deals with the selection of the "building blocks" which make up the aggregates of the global and sectoral plans. Aggregate targets are cross-checked against the sum total of individual projects and *vice-versa* by an iterative process until a reconciliation is obtained.

257. It appears necessary to state at the outset that the question of evaluation of projects relating to economic and social infrastructure has been left aside in the discussion paper presented to the Seminar. The problem of evaluation is much more complex in the case of such projects the complexity arising from the fact that infrastructure projects do not result in a clearly identifiable or marketable product so that quantitative comparisons of infrastructure projects both among themselves and with directly productive investment projects are extremely difficult to make. Allocation of resources for this type of project is done usually on a "rule of thumb" basis. In general practice, an upper limit is being imposed on expenditures pertaining to projects in the social sector. Thus, for instance, in the Pakistan plan, expenditures for education, health, housing and social welfare were set at 20 per cent of total public expenditures; a figure which is of the order of magnitude of similar expenditures in the development plans of India and elsewhere.³⁰

258. The selection of a set of projects involves several stages. The first is the preparation of a set of candidate projects. This is done within the limits of known or conceivable resource and factor endowment of a country. The second stage is a preliminary screening procedure to select the most promising projects from the point of view of economic feasibility. The screening is done through rough estimates of cost and yields. The case studies for Burma, Peru and the West Indies illustrate procedures that have been used in this stage.³¹ Inadequacy of available data may, of course, impose limitations on the extent of coverage and accuracy of the evaluation of the eligible projects; for instance,

when the selection of projects designed to supply the local market would be based, because of lack of other information, on import statistics only.

259. As to evaluation criteria the existence of multiple planning objectives combined with the fact that some of these objectives may be conflicting is one of the many problems to be faced. In private enterprise economies the problem of criteria and, more generally, that of evaluation itself is resolved by the operation of the price and market mechanism. In the developing countries the market mechanism, because of a variety of reasons of an economic, institutional and social nature, and in particular because of the structural weaknesses of their economies, cannot in all cases be relied upon; hence, the need for project evaluation and of appropriate criteria for selection.

260. In dealing with this problem two broad approaches have been identified: in one approach the multiplicity of objectives is resolved by attaching priority rating to specific objectives; partial ratings emerge which are combined using a system of weights into a single rating. Clearly, this brings in an element of subjectivity. In the second approach, based on more objective criteria, emphasis is placed on a quantitative definition of the various elements of costs and expected yields which are combined in a mathematical expression, costs and yields being sometimes adjusted to take account of the imperfections in the price and market mechanism.

261. In this connexion, a paper submitted by the Inter-American Development Bank to the Seminar³² contains a description of the criteria used by it; a detailed list of such criteria appears in an annex to that document.³³ In another paper presented by the International Bank for Reconstruction and Development³⁴ it is stated that the World Bank loans are extended to borrowers on conventional banking terms. The Bank does not, however, take the relatively narrow viewpoint of a conventional bank creditor. It is also interested in the general benefits that the prospective investment will bring to the economy. Therefore, it does not confine its scrutiny to the project itself, but investigates the whole economic complex of which the project will form a part. This involves an investigation of the various aspects of the proposed investment, namely: economic, managerial, organizational, commercial and financial. In some cases considerations of legal, political and institutional nature are also taken into account.

262. Reference was made earlier to adjustments for imperfections of the market mechanism. Scattered attempts have been made to use accounting prices. For example, in some of the case studies referred to in the paper of the secretariat, adjustments were made for certain cost elements, namely, the price of capital in Israel; the foreign exchange rate in Turkey and the Philippines, and, also in Turkey, the price of home-produced goods destined for domestic use.

³² "The Inter-American Development Bank and Industrial Development in Latin America" (ST/ECLA/CONF.11/28).

³³ Another annex gives an informal guide to the type of information desired for specific applications.

³⁴ "Project Appraisal by International Bank for Reconstruction and Development", (ST/ECLA/CONF.11/29).

³⁰ See "Investment in infrastructure versus direct production facilities", presented as a background paper to this Seminar.

³¹ See "Evaluation of projects in predominantly private enterprise economies: selected procedures based on case studies", *Bulletin on Industrialization and Productivity*, No. 5, United Nations publication. Sales No.: 62.II.B.1.

263. In principle, it is conceivable that a complete model could be constructed for a given economy, with a set of equations describing the functional relationships of the economic system and providing for a general equilibrium solution that would include the "accounting prices" and the optimum allocations of resources. Such a method is, however, of theoretical interest only and of little practical value because of lack of data and the lack of accuracy of available data.

264. Instead it has been suggested that a plausible approximation of the "accounting prices" could be provided by a trial and error method. This would involve selection of a certain set of factor prices on the basis of which the profitability of the candidate projects would be calculated. On the basis of these calculations the projects would be ranked in declining order of profitability and by comparing the resource requirements of these projects against the resources available, a maximum set of projects would be determined corresponding to the limit of the available resources. It would be, of course, a sheer and unlikely coincidence if the first set of selected prices would lead to simultaneous exhaustion of all resources by the set of projects determined under this procedure. It is more likely that the supply of only one resource would be exhausted, with an excess of others still being available, which implies that the price of the exhausted resource has been set too low. Through successive adjustment of prices and iteration of the described procedure, a set of projects would be found that satisfied the optimum solution since it would absorb all the available resources.

265. While the choice of the sets of prices is more or less arbitrary it is nevertheless confined within certain limits. Thus, for the interest rate, the range would lie between the interest on government bonds and securities on the one extreme and the "parallel" market rate on the other; a lower range limit is also provided by the interest rate prevailing in the international capital markets or the domestic "organized" local capital market. Similarly, in the case of foreign exchange, the range of selection of the accounting rate of exchange would be between the official and "parallel" market rates. For unskilled labour, the upper limit would be the prevailing market wage rate, since in countries suffering from over-population and heavy structural unemployment the accounting price of labour is by definition lower than the prevailing market rate, although it is presumably higher than a zero rate which some economists would consider as the opportunity cost of labour in such countries.

(b) DISCUSSION

(i) *Relationship of global planning and project evaluation*

266. The framework for the discussion was set as follows. Macro-economic studies are intended to define over-all targets and resource limitations while sectoral studies intend to allocate resources between various sectors (economic and social infrastructure, directly productive projects in industry, agriculture, etc.), so as to provide for optimum productivity of the several resources. Sub-sectoral studies within each major sector aim at identifying bottlenecks, defining the investment and growth needs of each sub-sector and establishing priorities. Project evaluation involves the process of

selecting projects in such a way as to optimize the global and sectoral objectives within the limitations of available resources.

267. The discussion brought out a variety of opinions with respect to the problem of project evaluation and its link to global and sectoral planning. An opinion was expressed that there is no need for complex methods of project evaluation. It was pointed out that once an appropriate and adequate policy framework has been set up to develop a given industry, evaluation of individual projects should not pose any serious problems. The case study of Peru was given as an illustration. In this study national goals have been set under certain assumptions. Sectoral projections were then made and cross checked against the global goals. Further projections of sub-sectors and products were made within each sector. An iterative procedure has been used at each stage and revisions were made accordingly. Simple, although subjective, criteria have been used to identify industries and products that show a good potential of growth.

268. The linking of project evaluation to macro-economic planning was illustrated by a theoretical example in the Secretariat discussion paper referred to earlier.³⁵ This dealt with a case of two factors of production, labour and capital, and a number of projects that could be undertaken using different combinations of these two factors. Through a process of iteration combined with some intuition an optimum solution was found that maximizes the value of output and exhausts available resources.

(ii) *Criteria for evaluation or ranking of projects*

269. One of the most used criteria is the rate of return over investment, which is sometimes used in its reciprocal form of "pay-off" or capital recapture period. In the United States and other countries a more sophisticated method is sometimes used, where both the costs and returns are calculated in actuarial equivalents of current value. Other criteria mentioned were value added by manufacturing per unit of investment cost, foreign exchange savings, and financial cash flow analysis.

270. As regards the use of "shadow" or accounting prices³⁶ it has been pointed out in the discussions that this could be a purely theoretical exercise unless used as a policy tool in allocation of resources, and it was suggested that in the economies predominantly based on private enterprise, that use could be made effective only by means of direct and indirect government measures such as subsidies, taxes, etc. In this connexion, the experience of several countries was mentioned. In Mexico, shadow prices were used in the determination of the location of steel plants in relation to transport costs. Transport rates were essentially discriminatory; low for bulk products such as coal and coke and high for finished goods. A study was made to determine the economics of transport costs of the

³⁵ "Evaluation of projects in predominantly private enterprise economies: selected procedures based on case studies", op. cit.

³⁶ "Shadow" or accounting prices may be defined in several ways. The concept derives from the equilibrium price of a given factor determined by its supply and demand; thus the shadow price for foreign exchange would in a given country be obtained at the point of equilibrium of the demand for, and supply of, foreign exchange.

Mexican railways, as a result of which a new tariff schedule was devised; the latter was then used as a "shadow" rate to study the location of steel plants. On the basis of these calculations the location originally contemplated appeared to be not an ideal solution and another location was recommended. In the same context, it was mentioned that Japan uses a concept similar to shadow prices in regard to planning of its exports and imports. As a result of a study of various export items and their future trends and a comparison of their domestic prices with those abroad, the Planning Agency has established a theoretical pricing system to be used as a guide in the government policy of export promotion; these theoretical prices are from 20 and 40 per cent lower than the domestic prices. Through various fiscal measures and other methods of intervention at the disposal of the Government the prices of some export items were correspondingly adjusted. Similarly, the present and future trends in prices of imported goods were studied with the aim of developing theoretical prices which were then used by the Government in devising their import policies.

271. Turning again to the experience in some Latin American countries, the method of project evaluation in connexion with the establishment of new industries or expansion of established industries used in Ecuador was mentioned by one of the participants. The selection criteria are the social cost to the country of the establishment of the industry and efficiency in the use of resources. With respect to the first, comparison is made between local cost of production and the cost of imports. All industries whose level of costs does not exceed 50 per cent of the value of corresponding imports are selected as candidates. Feasibility studies are then conducted for these projects and a priority ranking established.

272. In Bolivia, project evaluation proceeds in several stages. First is the "idea" stage where the project is briefly described. In the second stage a "pre-project" is prepared. It includes the general economic and technical characteristics of the industry, a preliminary study of the market, technological alternatives, and the requirements in fixed investment. In the third stage a more detailed project is prepared in connexion with an application for a loan from a financing institution. The final stage involves a complete engineering study. In Brazil, the criteria used in the evaluation of projects submitted for financing to the Development Bank for North East Brazil, are: (1) the labour-capital intensity of the projects; (2) value added in manufacturing per unit of investment; (3) the yield in foreign exchange; and (4) the "essentiality" (priority) of the industry.

273. It was pointed out that in most Latin American countries there was a gap in the link of project evaluation to macro-economic planning. Sectoral planning was predominant. The criteria used revolved either around direct import substitution, or the development of industries which would reduce and overcome the bottlenecks in industrial branches linked to import substitution. Project evaluation proper was largely left to the private sector. In applying to government authorities for assistance, a projection of the demand and market conditions covering a period generally of 5-10 years was usually undertaken by the interested

private concerns. On the basis of these data the agencies concerned (e.g., the Development agency) were requested to extend financial aid or tariff protection. The role of the agencies was usually confined to checking the dependability of the submitted data.

274. Another aspect brought out in the discussion related to evaluation of projects in the context of an industry, a sector or a region as a whole. It was pointed out that, for instance, in Japan economic evaluation did not concern itself with single projects but was carried out on a more aggregate basis, by industry or region. To illustrate, in the case of the petrochemical industry, a study was made for the industry as a whole and when it was found that this industry showed a promising growth potential, the Government stepped in and promoted its establishment by providing the necessary investments in infrastructure.

(iii) *Experience of international financial institutions*

275. The representative of IBRD quoted the experience of that institution in project evaluation. The Bank's task in this area consists in a detailed appraisal of a specific project. From the point of view of the Bank there was scarcity rather than excess of eligible projects and under the circumstances there was no need for complicated methods of project evaluation.

276. Before beginning lending operations in a country the Bank would normally send an economic mission to gain first-hand knowledge of the economic situation, development prospects and priorities, and Government policies. Such a mission would often include one or two members of the Bank's Technical Operations Department responsible for evaluating the situation in agriculture, manufacturing industries, power, transportation, etc. It would also try to locate profitable projects suitable for Bank financing. In certain cases, where no adequate programming of general economic development or of the development of a particular sector was available, the Bank assisted the country by organizing a "survey mission" to produce an inventory of the country's resources and make recommendations as to the desirable lines of future economic development and the policies required to foster such development. Against the background of such prior studies, an agreement would then be reached with the Government concerned regarding projects which the Bank would examine with a view to possible financing. In the manufacturing field, the Bank would normally finance only very large projects in capital-intensive industries, e.g., steel, pulp and paper mills, nitrogen fertilizer plants, coal and ore mines, etc., for which it was generally difficult to get financing in the developing countries. Another consideration was that much less time and effort would be proportionally spent in the financing of one large project than in a number of small projects. Finance for smaller projects was sometimes made available by the Bank through industrial development banks or finance corporations which the Bank has assisted in setting up in several countries (e.g. in Colombia). In the industrial field the Bank lent only to private enterprise, although Government guarantee of the loan was required by the Bank's statutes. However, the Bank's sister organization, the International Finance Corporation, provided financial assistance to private enterprise without a Government

guarantee, either in the form of loans or direct equity participation.

277. In evaluating the economic justification and priority of manufacturing and mining projects, the Bank normally did not resort to sophisticated economic formulas. This was because many of the projects submitted to the Bank had a rather obvious economic justification (e.g., steel mills in India or Japan or mining ventures with a view to the export market). Hence, the main emphasis was placed upon a detailed appraisal of the technical, commercial, and financial aspects of the projects. However, in the subsequent discussion an illustration was given of a Bank financed project, in which the criterion of economic justification was very much in the foreground.

278. A brief comment was made regarding IBRD procedures in the appraisal of industrial and mining projects. Great emphasis was placed upon the aspect of markets and management. Reference was made to several projects where the prices used in the Bank's financial projections were considerably below the current market prices reflecting, for instance, the expected repercussions on the steel price structure of the rapid construction of continuous strip mills or the heavy price declines to be expected for new chemical products, e.g., polyethylene, once the industry has reached a certain maturity. When investments of millions of dollars for lending or investing in a new industrial venture were involved confidence in management was essential. This might sometimes raise delicate issues for which there was no standard solution. Sometimes it might suffice to strengthen either the technical or financial side of the top management of the company. In other cases, the alternative might be to insist on a more radical change or to withdraw from the project at an early stage of examination. In some cases, the Bank would find the degree of project preparation insufficient, and might recommend employment of consultants to elaborate a more complete and more thoroughly analysed project. With respect to financial appraisal, the following points were made. While the Bank was required by its statutes to obtain a Government guarantee for its loans it would not lend money for an industrial project, unless that project was sound enough to qualify for a loan even without a Government guarantee. The Bank could not compromise with sound financial standards, e.g., by extending the period of a loan to make repayment easier; the time of the loan was determined by what might be defined as the "expected economic life" of the project, which may be very short in industries which are in the process of rapid technological evolution. On the other hand, the Bank realized that finance is short in developing countries and was willing to devote much effort to help in defining a project within the scope of the financial resources of the borrowers, mobilizing additional local finance and, in some cases, arranging with prior creditors for some degree of subordination of existing debt as a necessary condition for the infusion of new capital essential to the future of the company.

279. Although the technical and financial aspects are in the foreground of the Bank's project appraisal, sometimes the question of economic justification became a central point. The example of the Bank's loans to two Chilean coal mines was mentioned. The coal mining industry in Chile was vitally threatened by the pressure

of competition with oil, and no conventional financing was available for the heavy investments required to put the industry on its feet — such investments promising only modest returns compared with the risks involved. It was found, however, that there was sufficient economic justification of the project in terms of employment and foreign exchange benefits and also because of the importance of the industry's survival to the region where it is located. A certain number of government measures were also required to assist the industry and to preserve it as a major supplier of energy to Chile.

280. In the case of the Inter-American Development Bank, the method of project evaluation involved an analysis of the technical, economic, financial and other aspects of the project as parts of an integrated evaluation. The technical analysis was made in considerable detail, as was the economic evaluation. The latter consisted of a dynamic market, raw material and cost study, and a determination of a number of separate criteria such as: value added, foreign exchange savings, employment effects, an analysis of comparative advantage (e.g., comparison of production cost with c.i.f. price or Latin American price level), and finally an evaluation of the over-all effect of the project on the economic development of the country.

(iv) *Formulation and preparation of projects*

281. The general feeling that emerged from the discussion was that by and large there is a scarcity of financeable projects in Latin America, i.e., of projects which have been sufficiently elaborated to be analysed in a meaningful way; clearly project evaluation procedure has to be applied only when there is an excess of projects compared to the available resources.

282. The lack of adequately processed projects was in the opinion of the participants due to lack of competence; in this connexion there was an acute need for the establishment of institutions that would produce eligible industrial projects.

283. The preparation of projects includes several stages. The early stage is that of formulation of candidate projects and the final stage is a full engineering study including blueprints and placement of orders with suppliers of equipment. The engineering studies are generally very expensive and should be left to the concern which undertakes the project once the decision on implementation has been made; the preparation of projects, which is under discussion, does not apply to this final stage but primarily to the preparation of projects for selection of prospective industries.

284. The availability of industry studies of the type submitted by the United Nations Secretariat and discussed under another topic of the agenda³⁷ would be extremely useful. These studies provide for each industry a summary of the economic and technical characteristics as well as other relevant data. In view of the limited resources at the disposal of the Secretariat it was possible to undertake only a limited number of studies and it is suggested that a comprehensive effort be undertaken by technological research institutes, universities and interested governmental and international agencies to follow up the prototype studies of the Secretariat.

³⁷ See section B.I.5: "Basic data and criteria for programming".

285. The feeling was also expressed that the United Nations and other international organizations could help greatly by offering proper training for personnel to undertake this type of research; also by directing assisting countries in feasibility studies and evaluation and selection of projects. In this connexion the Director of the Research and Evaluation Division of the Centre for Industrial Development outlined the activities undertaken at United Nations Headquarters in this field and the areas where this type of assistance was being provided. He mentioned, in particular, that through its technical assistance programmes and the facilities of the Special Fund the United Nations was in a position to extend aid to countries in feasibility studies and general industrial surveys. Assistance of the latter type has been extended to several countries of South-East Asia. There were, however, certain limitations on financing specific feasibility studies by the Special Fund since the latter did not concern itself with projects below a certain minimum amount which exceeded the order of magnitude of the costs involved in carrying out the general run of feasibility studies. The Special Fund would be, however, under its present terms of reference, in a position to assist countries in establishing national or regional project preparation institutes of the type suggested above.

286. It was mentioned by one participant that the Organization of American States which is actively interested in promoting private industrial projects, is in the process of establishing a unit the function of which would be among other things, to finance research for preparation and formulation of projects so as to identify areas with good prospects of investment for private enterprise.

2. Evaluation of projects in centrally planned economies³⁸

(a) SUMMARY OF THE DISCUSSION PAPER PRESENTED TO THE MEETING

287. At the starting point of their development planning some of the countries with centrally planned economies were on a level of economic development similar to that of the less developed Latin American countries of today; they presented the typical structural characteristics of underdeveloped economies, such as scarcity of capital and large unutilized labour resources. On the other hand, there existed a more developed infrastructure and a fairly developed capital goods industry. The political and social reforms introduced in these countries put the Governments in a position to engage in a vigorous development policy, based on central economic planning. Planning agencies were established on the national and sectoral levels and, later on, for purposes of regional planning. In the course of time, planning units were established in all economic organizations and enterprises.

288. In the earlier period no sophisticated techniques were used in general economic planning. From the very beginning the emphasis was on implementation. The development policies which were designed and implemented, were based primarily on a certain num-

ber of macroeconomic criteria; conventional rentability considerations of single enterprises were subordinated to these criteria.

289. The first general objective consisted in full utilization of existing labour and capital resources. This resulted in rapid growth of national income at a rate of more than 10 per cent annually, with higher rates of growth in industry and construction, although because of this policy productivity in certain sectors may have decreased. Certain adverse results also emerged. Full utilization of capacity and of manpower in industry required introduction of a system of subsidies which in certain countries, eventually played havoc with the price system. It took some time to restore prices to more or less rational levels. In many cases excessive employment appeared. This was not a subject of serious concern since new plants were coming continuously into operation to take up the slack and the growth of industrial employment even when excessive, was considered a positive factor in itself because it contributed towards the development of skills. Some unfavourable developments also appeared in the income distribution patterns.

290. The second objective of the development policy consisted in raising the level of investment. This objective was strongly emphasized, a high investment ratio being considered as a basic condition for rapid and steady development. Very little was known, however, in the early period as to what a feasible and acceptable investment rate should be and this was mostly a matter of trial and error. Attention was paid in the first place to eliminating the bottlenecks that limited the expansion of investments which were concentrated in the sectors of capital goods and foreign trade. The financial policy was subordinated to this objective; whenever the necessity appeared to increase capacity, the necessary financing was provided. The planned maximum input of labour resources was based first of all on full utilization of the existing capacities in the capital goods sector.

291. The investment policy of the Government followed the following lines: (i) new investment was restricted in all "unproductive" sectors and in transportation, and (ii) as far as "projective" sectors are concerned, investment was concentrated mainly in the dynamic sectors, particularly capital goods. This policy resulted in very considerable achievements along the desired lines. Thus, within a period of ten years the rate of investment in Poland reached the level of about 25 per cent of national income, with a balanced foreign trade in capital goods. At its present rate of investment the country is able to maintain a rate of growth of about 7 per cent.

292. During the initial period the immediate rentability of investment in capital goods industry was not studied in detail. The main consideration was long run rentability which was considered as given once the premises of the policy objectives were accepted. Only two factors could put such rentability in question: lack of skilled manpower and economies of scale. The first possibility was rejected *a priori*. If lack of skills could be considered as an argument against developing industry, the possibility of industrialization of underdeveloped countries should be rejected in the first place. The factor of economies of scale was more important

³⁸ The following paper was presented for discussion: "Evaluation of projects in centrally planned economies" (ST/ECLA/CONF.11/L.30).

and because of this consideration, capital investment was concentrated in certain sectors.

293. Within the described policy framework the problem of economic choice (e.g. in the capital goods sector) involved the following considerations: (i) determination of the volume of total investment; (ii) time-sequence of the establishment of the various plants; (iii) the kind of plants to be established to produce the final goods; (iv) technico-economic factors, such as size of single plants, their location, raw materials, technology to be used, etc. These problems were tackled in the following way: (i) the total volume of investment was limited in the first period to the capacity of building plants producing the main capital goods (e.g. steel), (ii) the time-sequence of construction of the plants was governed by the technological inter-relationships, since imports were restricted because of balance-of-payments difficulties; (iii) the final goods to be produced were selected on the basis of an analysis of the country's own demand for capital equipment and the availability of skills, taking into account the economies of scale. The problem left for economic evaluation was thus the last element above, namely the choice of appropriate technico-economic solutions. For this purpose, various methods were developed, which are discussed below.

294. The above describes the general approach to project evaluation in the early period of planning which as mentioned above, involved largely very general macroeconomic thinking, taking into account the general objectives of the development policy, the experience of other countries, the existing resource limitation, etc. Most of the investment decisions were taken on that basis without the benefit of more refined methods.

295. The situation is somewhat different at the present time. The countries with centrally planned economies have already undergone radical structural changes and moved closer to a more balanced development. Less emphasis is put on structural changes and more on rational economic choice. The methods of project evaluation are being applied at the present time in these countries within an institutional and physical framework which did not exist in the earlier period. Project evaluation is first, intimately related to general economic planning; second, the so-called territorial or geographical (locational) planning is very widely developed; third, there exists a widely developed network of project-designing bureaux, and technological institutes engaged in development of industry projects.

296. As an example of the first point could be taken a commodity such as cement which is produced mainly for the domestic market, and for which substitution does not play an important role. The evaluation takes into account the fact that the demand for cement is related to other sectors of the plan and that the cement industry should be considered as a whole. Thus, if the volume and structure of capital investment is known for some ten years ahead, and if there are also some indications as to the location of the prospective investment projects, a reasonable estimate of the volume, structure and location of the demand for capital goods can be made. Thus it is possible to estimate the requirements for new cement capacity. The problem is then to select the number of new plants, their size, location, technology, etc. Similarly, in the case of machine tools

the development of this industry is being related to the general plan of industrial development. The demand for machine tools is first derived from the demand for domestically produced machinery; then the scale of that industry as a whole, the direction of specialization, and the sizes and location of individual plants are determined.

297. It has been found that considerable assistance in project appraisal can be derived from geographical planning. The latter developed in Poland at a very early stage. Even before the first development plan had been completed, a draft plan was prepared indicating the most desirable location of new industrial regions and of the required infrastructure facilities. Since that time, geographical planning has greatly developed and plans are now being elaborated not only for greater economic regions but also for cities; these have a considerable bearing upon the location of new investment projects.

298. As to the project designing bureaux, these have been established for a large number of industrial sectors; they are engaged in studies relating to modernization of existing plants, establishment of new plants, introduction of new technologies, etc. The work of these bureaux is not always directly geared to elaboration of plans; they supply, however, the basic material for planning by putting at the disposal of the planning agencies a wide choice of carefully prepared studies of projects and of project alternatives which are then evaluated in the context of the sectoral and global targets. They also provide the main source of new industrial initiatives. As an example, the project designing bureau for the steel industry prepared a study of the long-run development of the national steel industry up to 1980, comprising a number of variants; this was done before the long-run economic plan for Poland was elaborated.

299. In summary, considering the methods of project evaluation in centrally planned economies, it could be stated that;

(a) The methods of evaluation are essentially in the nature of cost calculation where output is given, and the problem consists in minimizing investment and operating costs;

(b) In these calculations, prices are considered to be the most important factor and are the subject of a careful analysis. For capital investment goods and for export and import commodities certain general rules have been laid down to be followed in the calculations; the method is essentially similar to that of accounting prices;

(c) The evaluation and analysis generally cover not separate projects but sets of inter-related projects;

(d) In all calculations account is taken not only of direct costs and effects but also, as far as possible, of indirect costs and effects.

(b) DISCUSSION

300. In the course of the discussion, questions were raised as to the applicability to the case of mixed economies of the methods applied by the centrally planned economies to make full use of their surplus labour.

301. It was argued that a policy of intensive employment under conditions of inelastic supply of consumer goods which are characteristic of under-developed coun-

tries would lead to strong inflationary pressures, unless effective consumption controls could be imposed, which was unlikely. It was stated that the policy of maximum employment has had inflationary effects also in the centrally planned economies, where consumer goods prices had been increasing in the early post-war years at a rate from 10 to 20 per cent per annum. (The rate of increase has subsequently declined to 2 to 5 per cent.)

302. The policy of increasing employment possibilities by a maximum use of productive capacity in existing plants and the adoption of more labour-intensive techniques in new plants, especially in certain branches of industry and special operations, came under discussion. It was considered that the same techniques might be applicable in mixed economies; however it was emphasized that the adoption of maximum employment as a primary objective in industrial programming and project evaluation may have in the long run adverse effects on the process of capital formation and the rate of economic development.

303. Considerable attention was given to the pricing policies in the centrally planned economies, particularly as applied in evaluation of investment projects and of export industries. It was pointed out that in general, prices in the centrally planned economies were based on costs; the cost calculations took, however, into account the relative scarcity of certain factors of production, especially of foreign exchange and amounted essentially to using accounting prices for capital, labour and foreign exchange that differed from market prices. A discussion developed on the practical significance of accounting prices in project evaluation in mixed economies aside from their value as tools of theoretical analysis. It was mentioned that in the centrally planned economies the authorities disposed of an arsenal of financial and fiscal tools (by means of pricing, subsidies, etc.) to make the financial operation of individual enterprises compatible with the cost calculations based on accounting prices. It was suggested that while in some selected cases similar procedures might be applied by the authorities in mixed economies so as to make projects based on accounting prices compatible with the operation of private enterprise in terms of market

costs and prices, such cases could be exceptions rather than the general rule.

304. In referring to the capital input factor, the premises for the calculation of the coefficient of "effectiveness" as used in project evaluation in the centrally planned economies, were explained. In several centrally planned economies this coefficient was of the order of 15 per cent on the invested capital. In fact, the analysis of the experience of modernization of a number of plants in Poland has produced such a figure which was considered to be a realistic minimum return in new projects. Attention was drawn to the similarity that exists between this coefficient and the interest rate used in the evaluation of alternative investment projects in private enterprise or mixed economies.

305. With regard to labour cost, it was mentioned that in Poland the accounting prices used in cost calculation make allowance for greater or lesser abundance of labour in various regions by using different coefficients for nominal labour costs. These coefficients range from 0.6 to 1.0 of the actual wage rates.

306. On the question of the current pricing policy in regard to products in foreign trade, it was stated that while in some centrally planned economies prices of the main imported and exported products were related to world prices, the foreign exchange rates applied in the cost calculations varied from one product to another; for certain groups of products they may be set at a rather high level. These accounting exchange rates are applied with a view to guiding the rentability of exports and imports in line with the objectives of economic policy.

307. In general, it was considered that the methods and approaches used in the centrally planned economies in programming and project evaluation in the industrial sector present certain features which could be usefully studied and applied in mixed economies. It was emphasized, however, that unless the techniques used in evaluation, in particular the device of accounting prices, are supplemented by appropriate Government fiscal and financial measures to make them effective in terms of rentability of individual enterprises, the evaluation procedures would be lacking in realism.

B.III. FORMULATION OF SECTORAL INDUSTRIAL PROGRAMMES: PROBLEMS OF DYNAMIC AND OF TRADITIONAL SECTORS

1. Sectoral programming of dynamic industries

(a) DEFINITION OF THE PROBLEM

308. The industrialization process implies structural changes within the manufacturing sector itself. These changes are reflected, as development advances, in a relative decline of industries producing consumer goods and in an increase in industries manufacturing intermediate goods, and even to a greater extent, those producing capital goods. The last two industries have been designated as dynamic industries; they often expand at a higher rate than domestic demand, as a result of important substitution and the introduction of export industries. The establishment of these industries also generates an additional demand.

309. The formulation of programmes for dynamic industries has acquired particular significance in de-

veloping countries. These programmes carry with them serious implications such as the limitations of the import substitution process; the selection of alternatives (allocation of resources); the selection of techniques and scales of production, and the training of skilled manpower at the level of workers, management and technicians.

310. Some of the programmes for dynamic industries have been derived from a general plan and their execution has been co-ordinated with other sectors of the economy. But most of them have originated from decisions taken singly with more limited and specific objectives. A typical example of the second case is the programming of the motor vehicle and shipbuilding industries in Brazil. On the other hand, in the same country the development in the case of the machine-tool industry has been considered in co-ordination with other economic sectors.

311. For Latin American countries it would be desirable to take advantage of the experience acquired in the formulation of such programmes, particularly as regards the methodological aspects in order to see to what extent it is applicable in other countries.

(b) THE ESTABLISHMENT OF MOTOR VEHICLE INDUSTRIES IN BRAZIL AND MEXICO AS A CASE OF SECTORAL PROGRAMMING

312. On the basis of the document presented by the ECLA Secretariat³⁹ and the discussions which took place on the subject, it was quite clear that there are differences between Brazil and Mexico in programming this sector. Programming of the motor vehicle industry was undertaken in Brazil, in the first instance, because of the interest in saving foreign exchange used to import vehicles, which amounted to about 20 per cent of total foreign exchange expenditure and showed a definite upward trend due to the increasing orientation towards road transport.

313. In Mexico, the foreseen demand was much lower than in Brazil and therefore the problem was less important from the foreign exchange point of view. It was thought nevertheless that the establishment of a motor vehicle industry in Mexico would bring with it a series of other positive elements in fostering general economic development. The example of Brazil showed that this sector gave rise to a broad industrial complex and favoured the establishment of highly specialized industries, many of which were not specifically related to motor vehicles.

314. In both countries the development of the motor vehicle industry was left entirely in the hands of private enterprise, with contributions of foreign capital. In both cases the incentives provided were of either a fiscal nature or in terms of guaranteed markets. The second method was applied differently in Brazil and in Mexico, because of the differences in exchange control systems. In both countries import quotas were fixed for each enterprise in respect of parts and components not yet manufactured in the country, in line with the production volumes envisaged. Other differences in programming arose because of specific economic conditions prevailing in each country, in particular, the size of the respective markets.

315. In Brazil, programming was based, along strictly orthodox lines, on the principles of free enterprise. The only requirement in return for the incentives offered was inclusion of parts manufactured in the country, based on given percentages of the total weight of the vehicle and on specific dates. The industrialists were left otherwise completely free. Concerning the selection of vehicle types preference was expressed for current types and models already known in the country and of proven efficiency.

316. In Mexico the programming adopted provided for much more state intervention. The industry was to be built up horizontally and was planned so as to introduce uniformity and standardization of parts and sub-assemblies which could be used in the manufacture of different final vehicles. The targets were less ambitious than in Brazil, where it was considered that

national components should account for 90 to 95 per cent of the weight of the vehicle.⁴⁰ The Mexican targets envisaged that the manufacture of parts in the country should be equivalent to 60 per cent of the value of the vehicle by 1965 and that exchange controls for entrepreneurs would be lifted if such parts exceeded 70 per cent. These percentages, calculated on the basis of fully assembled vehicles, corresponded to about 75 per cent of the weight of the knocked-down vehicle.

317. Annual production of vehicles in Brazil, including tractors, amounted in 1962 to some 200,000 units which, including replacement parts for vehicles in use, represents a gross foreign exchange saving of around US\$500 million. Imports of motor vehicle products amounted, in that same year, to US\$25 million, of which only US\$5 million related to imported parts incorporated into the manufacture of vehicles in the country. In Mexico, the execution of the programmes is in its initial stage, and the response of private enterprises has been highly satisfactory. Eighteen projects were put forward and eight of them approved, although in some cases important adjustments had to be made in order to adapt them to the requirements of the programme. The results of this experiment will not be known for two or three years. Brazil's experiment completed its first cycle in 1962 with the establishment of eleven factories—for trucks, motor cars and tractors and four tractor factories which operate almost entirely as assembly shops and resort extensively to sub-contracting.

318. There are also in Brazil some 1,200 factories making parts, with a very wide range of size and technical importance, in addition to large plants which in addition to their activities also work for the motor vehicle market, such as heavy forging, foundries, etc. The prices of national vehicles underwent successive rises in 1962 because of the devaluation of the cruzeiro. Even so, assuming an average rate of 600 cruzeiros to the dollar, these prices were equal to or slightly below those for the imported product, in the case of trucks and commercial vehicles; however, this was not the case for motor cars and some European commercial vehicles, whose price level as of November 1962 was higher by about 40 per cent. Only in the case of one United States motor car model was the price below that in the country of origin.

319. During the discussion, information was provided about the programming experiment in Venezuela. The basic lines of this programming may be considered as a variant of the Mexican model. In Venezuela, the decision to engage in programming was due to the need to create new sources of employment and to train skilled labor. The saving of foreign exchange and maximization of the product were not as important here as in the cases of Brazil and Mexico. Due to the market restrictions and the absence of a suitable metal-transforming industry, the targets were much less ambitious than in the other two countries. During the first stage, which is to be completed in 1966, the aim is to incorporate domestic parts up to a proportion of 33 per cent of the vehicle's weight. In the second stage, this proportion is to be raised to 62 per cent, leaving

³⁹ See *La creación de la industria automovilística brasileña analizada como un caso de programación sectorial* (ST/ECLA/CONF.11/L.31).

⁴⁰ These targets have already been exceeded. Imported parts represent 1 per cent in weight, and by the end of June 1962 the figure was reduced in some cases to 0.28 per cent.

for a third stage the manufacture of motor vehicle bodies and of some very specialized parts. In Venezuela, as in Mexico, the aim is to have a horizontal structure of the industry.

320. It was recommended during the discussion that other Latin American countries, however small their markets, carefully consider the possibility of developing a motor vehicle industry—if necessary on a partial basis—because of the dynamic effect which this sector exerts on the rest of the economy.

(c) THE MACHINE-TOOL INDUSTRY IN BRAZIL ⁴¹

321. The work undertaken in Brazil was aimed at determining the basic elements which would facilitate the programming of machine-tool manufacture in the country. With that aim in view, the immediate objectives were centred on establishing, on the one hand, a quantitative and qualitative assessment of the future market, that is, the framework within which this activity should be set during its next stage of development and, on the other, determining the present operating conditions of the established industry with a view to assessing its magnitude, the possibilities of its meeting future demand and, at the same time, the changes which it would be advisable to introduce in its structure in order to supply a higher proportion of domestic consumption.

322. In order to carry out this study it was necessary to undertake intensive field work in order to gather the basic information which would facilitate an understanding and an analysis of the present situation both in terms of demand for machine-tools and of domestic output. At the same time, in order to apply the methodological process which had been adopted, a series of assumptions had to be made, based on the experience in the industrially more advanced countries and which would be improved in the future through research and a better knowledge of this sector in the various Latin American countries. The machine-tool sector is, in this respect, a particularly complex one and no laws or criteria appear to exist that could be applied in a general way or extended from one region to another without the introduction of a number of factors which are difficult to quantify.

323. In order to establish future demand for machine-tools, both the needs arising out of the country's industrial development and the machines needed for replacement purposes were considered. In order to estimate the first item, the national machine-tool park in existence in 1960 was taken as a starting point, and was determined by a survey. To simplify the field work in this first stage, the survey was centred principally on machines intended primarily for the metal transforming industries which are the main users; estimates were subsequently made of the machines in maintenance work in other industrial activities such as textiles, chemicals, rubber, etc., on the basis of the experience observed in other countries. As a criterion for projecting demand, it was decided to relate it to the personnel employed in the transforming industries since, according to observations in other countries, there appeared to be a certain constant factor in the relation-

ship between personnel employed and machines used which apparently is not affected by the country's degree of industrial development. Having estimated the personnel that would be employed by these industries in 1971, the number of machine-tools was determined, applying the ratio of the growth of employment between that year and 1960 to the machines in existence in 1960. A correction had to be introduced in the results thus obtained in the breakdown by types of machines so as to reflect the technological changes which would logically take place through the development of the transforming industries themselves, and consist mainly in the replacement of universal and more simple machines by production units of more advanced design. Because it is impossible to make a quantitative assessment of this factor, it was decided to estimate the composition of the machine tool park assumed for 1971, according to the level of industrial development in that year, using for reference purposes the patterns of more advanced countries at different stages of their industrial evolution. The probable size of demand was established by using the difference between these two machine parks and adding those which would be replaced during the period. In order to calculate replacements it was conservatively estimated that one third of the machines which were over twenty years old in 1960 would be replaced by 1971. All this led to an estimate of total demand for machine-tools of around 180,000 units between 1961 and 1971.

324. The partial results that were obtained as the study advanced were, within the available possibilities and means of information, valued in order of magnitude by comparing them with figures or situations observed in other countries. For instance, it was found that the size of the machine park determined for 1960 was adjusted to the number of persons employed in the transforming industries and the gross industrial product according to the way in which these same ratios appear in countries like the USSR, the United States, France, the Federal Republic of Germany, Italy, Japan and so forth. Similarly, the demand so established was compared with indices obtained from these countries, particularly in relation to steel consumption, and it was found that it was within a reasonable order of magnitude.

325. As for the existing machine-tool industry, it was the subject of a special inquiry in order to learn more about its location, structure, production methods, types of machines made, volume of manufacture and so on. The conclusions drawn from this study, after checking the magnitude of demand and the operating conditions of the established industry, showed that in order for this metal-transforming sector to achieve a greater participation in the supply of future consumption—approximately 70 per cent of total consumption—it would have to develop along the four lines indicated below:

- (i) The average size of the machine-building enterprises must be increased;
- (ii) The present machine park of the manufactures must be expanded and complemented;
- (iii) Some machines in the present manufacturing lines must be perfected both as to quality and output;
- (iv) Manufacture of new machine models must be started, particularly in metal-cutting.

⁴¹ See *La industria de máquinas herramientas en el Brasil: elementos para la programación de su desarrollo* (ST/ECLA/CONF.11/L.32).

326. The study ends with the recommendation to establish in the country a Brazilian Institute of Machine-tools which would provide technical assistance to the industrialists in solving the complex problems involved in the advanced building of machine-tools and, at the same time, guide the evolution of this sector along lines similar to those followed in other countries through national institutes or university laboratories.

327. The discussion stressed the valuable contribution made by ECLA in carrying out this work on machine-tools and other similar studies, which have provided significant technical information for sectoral programming purposes. It was considered necessary to continue with this type of research for other industrial branches, if possible in several countries at once, in order to establish the industry patterns of Latin America and the possibilities of complementation and integration.

328. The difficulties involved in collecting the technico-economic information on machine-tools were specifically recognized and it was suggested that a special effort should be made to assess the effects of structural and technological changes in the development of the sector. Furthermore, it was indicated that it was necessary to check the degree of validity of application of technical ratios derived from the more advanced countries.

(d) THE CASE OF THE SHIPBUILDING INDUSTRY IN BRAZIL

329. The first steps towards shipbuilding programming which is now in force in Brazil were taken with the issuing of targets No. 11 for renovation of the merchant marine and No. 28 for establishing the naval construction industry.⁴² Subsequently, Act No. 3381 of March 1958 established the Merchant Marine Fund and the replacement rate for the merchant marine; conditions were also defined for developing this activity, setting forth the replacement and expansion needs of the maritime fleet in work orders for the national shipyards. This provided the necessary resources in domestic currency for improving the merchant fleet, while the establishment of the shipyards reduced the dependence of the country on foreign exchange for this purpose. The funds recommended in this Act amounted in 1962 to around 11,300 million cruzeiros, that is, about 20 million dollars.

330. The organizations in charge of the shipbuilding programme are the Executive Group of the Shipbuilding Industry (GEIN) and the Merchant Marine Commission (CMM). The first, originally called Executive Group of the Naval Construction Industry (GEICON) negotiated with the industrialists, established the production targets, defined the incentives to be granted by the Government to approved projects and determined the responsibilities of the shipbuilders. The second, which is a policy executing agency and depository of the Merchant Marine Fund, generally decides the uses to which the latter will be put.

331. The incentives offered to the shipbuilding industry are of a very varied nature and may be divided into two broad groups: those conducive to providing a guaranteed market and those relating to investments

aimed at speeding up the development of this activity and achieving production targets more rapidly. Among the incentives granted, the following are particularly to be noted:

(a) Concession of premiums to the national shipbuilding industry for an amount which does not exceed the difference between the cost of local production and the international price. Hence the amount paid by the shipowner will depend on the size of the premium granted.

(b) Incentive orders given by the Government to approved shipyards.

(c) Financing facilities for the work orders entrusted to the national shipyards.

(d) Barriers to imports of products competing with this industry.

(e) Financing and stock participation by the official credit agencies.

(f) Exemption from customs duties and other customs tariffs for imports of machinery and equipment for the shipyards.

(g) Exchange facilities for importing machinery and equipment.

(h) Favourable exchange treatment for imports of parts supplementing those made in the country.

(i) Facilities for obtaining land intended for building shipyards.

(j) Designation of the products approved as being of interest for the national economy.

Together with these concessions have been defined the obligations of the entrepreneurs which may be summed up in the four following points: (1) To respect the deadlines established for building the shipyards; (2) To fulfil the industrial programme and the approved nationalization scheme; (3) To provide the Government with information on production costs and accept that they be controlled by the authorities; (4) To adopt the standardized types of ships approved by the Government.

332. The shipbuilding programme, as outlined by the Government, attracted several entrepreneurs, both national and foreign, and twelve projects were approved. Three of them may be considered as large scale, each having a capacity to produce some 25,000 tons deadweight (TDW) per year. At present, six shipyards are in full production with a total of 6,450 persons employed, executing orders for thirty-five ships of a total of 200,000 tons (TDW) and a value of 31,600 million cruzeiros. The "nationalization" index of the ships built has already reached 75 per cent of the value and the price is estimated as being between 24 and 49 per cent higher than the world prices, although there has been a marked downward trend in 1962.

333. Total capacity of the shipyards amounted in 1962 to 150,000 tons (TDW) as foreseen in the targets. Nevertheless, because of the shortfall in the receipt of funds from the merchant marine for shipbuilding, there may be only a partial use of this capacity, that is, some 70,000 tons (TDW). The funds derive from the following charges: (a) 15 per cent on coastal maritime freight; (b) 5 per cent on international import and export freight; (c) 32 per cent on the rate for customs

⁴² Taken from the Target Programme established by the Federal Government in 1956.

clearance, which is 5 per cent on the value of all imports, excluding petroleum and its by-products. It is estimated that the fact that the tariffs of the internal maritime freights have not been adjusted to the level of the general inflationary rise in prices in the country has reduced the real resources of the fund. To this should be added the fact that the conversion exchange rate used for international freight and customs clearance produces a similar effect.

334. The effects of the shipbuilding programme have had a favourable impact on related activities as well as on complementary industries, not only those making naval equipment but also the steel industry, which will soon be in a position to supply steel plate in accordance with the specifications required for shipbuilding purposes. This simultaneous development will ensure that in the next few years there will be a high degree of "nationalization" of shipbuilding. It was pointed out during the discussion that this is a very special and interesting case since programming was not limited to the establishment of an industry but covered the organization of demand which hitherto had existed only in potential form.

2. Sectoral programming in traditional industries

(a) DEFINITION OF THE PROBLEM

335. The essential difference between the dynamic and traditional industries is that the former are generally new industries, where a fresh start can be made with programming, and development is very rapid, whereas the latter have already developed extensively in most under-developed countries, and have reached a stage where growth is much slower, depending on the increase in population, rise in incomes and income distribution. In these circumstances past statistical series can be used in programming, and more extensive use can be made of analytical methods. It is also possible, of course, that new production lines may emerge that could tap a large potential market, or that external markets could be sought.

336. The need for programming in the traditional industries derives from their importance in developing countries, since they usually constitute a substantial part of the industrial sector of such countries. As they have benefited from large and often excessive investments in the past, they usually have a considerable amount of idle capacity. Better use of this capacity would make it possible to channel new investment in the country into non-traditional industrial sectors. Moreover, when the bulk of the machine park is too obsolete to permit increased output, it may be found necessary to modernize it. In this case programming should aim at limiting investment to the most economic level and making better use of factors and resources, ensuring as far as possible that the new investment does not result in unemployment. From this standpoint the essential difference between the dynamic and traditional industries lies in the growth rate, and in the technology that should be planned.

337. The textile industry has been chosen as an example of the planning of traditional industries for two reasons. First, ECLA has made a number of studies in this field, and secondly, this is an industry found in most of Latin America and one of the first

to be established in the region, which presents certain difficulties because it has often been established with second-hand worn machinery. Textile manufacture does not require large investment per unit of output, or highly specialized technical knowledge. Consequently it has attracted small investors, whose plants have not been efficiently planned, but who operated behind the shelter of tariff protection that has been often excessive, or lack of competition due to the structure of the industry itself.

(b) THE ELEMENTS OF PROGRAMMING

338. The basis of a programme is a sectoral study that includes a diagnosis of the existing situation from the point of view both of the operation of the industry and the institutional situation. This type of study should be made specifically on a country basis, since each country faces different problems at both the national and international level.

339. Among the matters to be considered in relation to programming is an estimate of what demand is likely to be during the period covered by the plan. Demand varies with population growth and the income of the various social groups, and generally increases as a result of price reduction. Thought must also be given to the possibility of producing textiles for export, either within the Free-Trade Area or to countries outside the region.

340. The development of consumption by type of fibre is difficult to forecast. Although there is a trend for man-made fibres to gain at the expense of natural fibres, in relative figures, the consumption of the latter continues to increase in absolute terms, although more slowly. For plain weaves, synthetic fibres alone, which were at one time in great demand, are giving way to mixtures with natural fibres, although the recent introduction of texturized synthetic yarns has reversed this trend. On the other hand, an attempt is being made to recover or maintain the market for natural fibres by physical and chemical treatments that give them characteristics resembling those of the synthetic fibres. As the population's purchasing power increases, the weight per metre of fabrics tends to decrease. With respect to wool, this trend has been accentuated by the spread of heating and air conditioning systems. In addition, the introduction of unwoven fabrics and felted goods tends to influence traditional fabrics.

341. In conclusion it can be stated that although there is a trend towards stabilization of the position of the natural fibres market relative to the market for chemical fibres, there may still be gains by the latter. As regards competition between the various chemical fibres, further changes in the structure of consumption are to be expected. However, it may be noted that rayon has held a relatively stable position, because of its low price and the possibility that this may be reduced even further.

(c) USE OF EXISTING INVESTMENT

342. Insufficient use is generally made of the installed capacity of the existing industry as regards both the hours of operation of the machinery and the output in operation. As regards old machinery that is largely amortized, three-shift operation is not always to be recommended, since in many cases such equip-

ment can no longer operate economically on a continuous basis because of the greater need for maintenance and repairs. Furthermore, there is not much inducement for the industrialist to operate three shifts because the higher hourly wage for the night shift usually exceeds the gains resulting from accelerated use of machinery. Only for recently purchased equipment is a three-shift operation economical in order to amortize the equipment more rapidly. A common system is to have two eight-hour shifts and one six-hour shift, to allow for cleaning, and maintenance. It was stated that some modern plants in Mexico had four six-hour shifts for seven days a week, which made it possible to reduce to the minimum the incidence of amortization on costs and to maintain constant air temperature and humidity and thus reduce stoppages due to yarn breaks.

343. With respect to degree of utilization, the ECLA studies indicate that most of the textile plants do not operate for over 75 or 80 per cent of the 300 working days in the year. Moreover, few plants obtain from their machinery the full output of which it is capable. In many cases improvement of the efficiency of the machinery would suffice to supply consumption for several years ahead without the need for any new investment. An appropriate reorganization should be possible without any appreciable reduction in employment. However, in many cases a substantial increase in the output of the equipment is not possible because the machinery is worn out or obsolete. In these cases a quantitative estimate is needed of the effect of obsolescence on the loss of productivity, that is, of the difference between actual production and the optimum possible. In one of the submitted ECLA studies,⁴³ it is shown that in Brazil the loss of the machinery obsolescence factor accounted for only 33 per cent of the total loss, whereas the loss due to operating conditions (raw materials, workloads, administrative organization and training of the labour force) accounted for the remaining 67 per cent.

344. A number of participants, especially among those with plant experience, agreed that in practice it was almost impossible to increase labour productivity without making at least some investment in machinery modernization. The obstacles consisted not only in the worn state of the equipment, but also in the high degree of resistance of workers to changes in work contracts unless a physical basis existed to justify such changes. Furthermore, it was stated that investment represented by modernization gave the owner a powerful inducement to modernize working methods.

(d) PRODUCTION COSTS

345. Apart from improving the rate utilization of capital, programming should make for reduced costs and changes in the operating and institutional conditions that affect costs. The following points were stressed in relation to cost reduction:

(i) For raw materials of domestic origin, there should be an improvement in quality and marketing;

(ii) For raw and other materials, machinery, etc., that are essential to the industry and are not produced

in the country, there should be a reduction or even abolition of customs duties;

(iii) There should be a moderate level of tariff protection for textile products, permitting the industry to function normally but not to virtually exclude imports; this would stimulate competition and promote the improvement of operating conditions inside the plants;

(iv) Greater productivity in the industry should be encouraged, by means of a far-reaching reorganization of operating conditions in the plants; as regards labour, it was stated that despite the levels of salaries that represented 20 per cent of those in the United States and Europe, labour inputs per unit in the Brazilian textile industry are respectively 13 and 8 per cent higher, because of the low level of labour productivity;

(v) There must be a change in distribution methods, to reduce the margin between factory sales prices and prices to consumers.

(e) WAYS OF IMPROVING THE INDUSTRY

346. There are three possible ways of improving the industry, namely, reorganization of internal working methods, modernization of the equipment, and complete renewal of the equipment. Reorganization, which is the most economic alternative, requires an action that extends from the individual plant to changes in the structure of the industrial sector as a whole.

347. At the plant level, an example was given of the reorganization of a spinning mill where problems of four kinds were faced: psychological problems; the articles to be produced, technological problems, and the redistribution of the labour force. The psychological problem consisted in convincing the labour union and the plant technicians of the need for change, which was achieved by lectures and visits to other plants, the establishment of a study group, and the assistance of a consultant engineer responsible for programming and co-ordinating the studies and the actual changes. The second problem was to determine which products could be most economically produced in the light of existing conditions in the plant. The third problem had two aspects: to create conditions favourable to production, and to improve the factors of production. The former involved modification and extension of the air-conditioning systems; improved lighting; changes in the placing of the equipment; a study of workloads, and a change in wage policy. The second aspect involved action to reduce yarn breaks through better cotton blending; installation of vacuum cleaning systems; strict quality control; simplification of the processes related to production by improving in-plant transport between the various stages of production; an increase in the size of the receptacles; simplification of manual processes; improvement in machine efficiency by properly controlled preventive maintenance, and reduction of wastage by strict control. The problems relating to the redistribution of the labour force were dealt with by a more thorough selection of staff for production operations; retraining by instructors of senior workers for tasks in control, maintenance and generally more responsible work; reduction or suspension of recruitment, and agreements between plants for absorption of staff.

⁴³ See *Elementos de una metodología para la programación sectorial de industrias tradicionales: la industria textil* (ST/ECLA/CONF.11/L.21).

348. The Seminar considered that in the reorganization of individual plants, productivity centres and consultant firms had a decisive role to play by disseminating the general principles of productivity and their application to individual plants. This led to a discussion of the desirability of establishing such specialized centres in the various countries that would be in contact with each other.

349. It was also pointed out that reorganization at the national level would have to provide for changes in the structure of the industrial and the related trade sectors. As to the former, there was no doubt that the importance of the finishing process in the commercial value of a textile product was steadily increasing, and should be studied with a view to making the maximum use of the production capacity of machinery since the latter was generally very expensive and its installation could not be justified in every spinning mill because the rate of production was not sufficient to permit full use of such machinery. Thus it was essential to provide for finishing plants which would serve a number of textile plants in common. Similarly, in the wool industry, washing and combing of wool was much more economic when carried out in specialized plants. In Mexico, for example, consideration was being given to the establishment of plants of this type, in place of having a combing section in integrated plants, as is the case now. This also applied to other Latin American countries.

350. Another form of reorganization at the national, and perhaps also the regional, level for Latin America, was standardization of workloads as follows: (a) standardization of the terminology for workers' functions; (b) description of the work corresponding to each function; (c) scientific determination of minimum workloads on different hypotheses as to the technical level, by means of time studies of actual work, supervision and rest periods; and (d) the setting of wages for each function, by means of collective agreements with the workers. It was essential that workers' representatives should participate in such studies. It was also essential that training programmes for workers at all levels—workers, supervisors, technicians and managers—should be initiated during the reorganization.

351. Lastly, the Seminar stressed the need to encourage the establishment, or further develop the existing activities of national or regional technological textile institutes to study and disseminate information on techniques of processing material and synthetic fibres, separately and in combination, and to follow closely the new developments in synthetic fibres developed that were constantly being put on the market (nylons, polyesters, vinyls, etc.).

352. It was also considered essential to undertake studies of economies of scale for plants producing synthetic fibres, in order to determine the possibilities of installing continuous fibre and staple fibre plants, on the basis of imported monomers and polymers, until such time as the increase in consumption warranted national or regional production of these basic raw materials.

353. Although reorganization can be effected without significant investment, modernization implies fairly expensive re-equipment. At first view it appears para-

doxical to make new investments in a traditional industry in countries where there is a shortage of capital, especially since it is known that the new investment will entail a reduction in employment, whereas the need is to create new sources of employment.

354. Nevertheless, in many cases, as in Brazil, a large part of the machinery of the textile industry is obsolete; its output is no longer economic, and it will have to be discarded through lack of parts. As stated in the study on the subject,⁴³ multiple shift operation is not technically or economically feasible. Furthermore, these plants will find themselves threatened by the establishment of modern efficient plants. A well-programmed renewal of equipment that would raise the efficiency of the oldest plants and permit them to reduce costs is an alternative that would reduce to a minimum the displacement of labour.

355. Countries such as Uruguay are in a good position to export textiles made from domestic raw materials and although there is at present a margin of idle capacity, especially in the processing of wool products, new investment aimed at modernizing the equipment and attaining an internationally comparable level of quality, would make it possible to develop exports and thus increase production and reduce the margin of idle capacity of the remaining machinery. This type of modernization could make it possible to increase production and maintain or increase the level of employment in the industry.

356. Some participants stated that the maintenance of the textile industry at a too low technical level would lead to an imbalance in the industrial sector. New branches would have a modern technology, whereas the traditional industries, such as textiles, would remain semi-obsolete, which would accentuate the difference between the two groups. In fact, some countries have deliberately planned to confine different production activities in separate compartments with different levels of technology, with a view to increasing employment. In another meeting of the Seminar, reference was made to the case of India, where some of the cotton textiles produced for the domestic market are entirely hand-made. This more primitive type of industry produces coarser fabrics at a higher cost, while the output of the modern plants is wholly exported, the domestic market being reserved for the hand-made products.

357. In Latin America, where old industries exist side by side with those that are modern and efficient, it appears advisable to undertake a moderate and gradual modernization of equipment, the overriding consideration being that it should be in line with an over-all national plan; that it should be based on existing manufacturing centres, rather than on the establishment of new plants outside the existing centres; and that obsolete equipment should be destroyed so as to prevent the reopening of the problem. The re-equipment of the industry should be carried out in such a way that the reconditioning of certain types of machinery should be undertaken only when it is sufficiently modern and well maintained so that reconditioning is justifiable from a technical and economic point of view.

⁴³ See ST/ECLA/CONF.11/L.21.

358. One participant suggested that it might be advisable, in countries where there was no unemployment, to adopt the most advanced techniques in order to ensure that optimum technical conditions are ensured for a long time ahead. This form of renewal of equipment is current practice in Europe, where the relative costs of capital and labour are different from those in Latin America; it would have to be accompanied by a plan of accelerated retraining of the labour force that would be displaced through the modernization of the textile industry.

(f) TECHNICAL EVOLUTION OF PLANTS
AND MACHINERY

359. Programmers must be familiar with technological trends in the industry under consideration. As regards textiles, one of the participants mentioned that there was a trend towards the disappearance of the difference that existed at present between equipment for wool, cotton and synthetic fibres, and that it was to be hoped that the textile industry of the future would have only two types of machinery: one for short fibre with a length of up to 60 millimetres, and another for long fibre with a length of between 50 and 250 millimetres. In addition, thought must be given to what might happen in the future as regards the technical evolution of existing types of machinery, and the firm adoption of the modifications that at the present time were emerging from the experimental stage. There is also the likelihood that in the future the textile industry will be increasingly oriented towards production of mixed fibres with simplified machinery specially designed to operate with such mixtures.

360. The various automatic spinning systems which are at present in final experimental stage would make possible a radical reduction of the labour force, to 0.5 workers per 1,000 spindles, against the present 7.5 workers in Brazil, and 10 workers and over in certain other Latin American countries. The question arises whether such techniques which represent very heavy capital investment were in line with conditions in Latin America. Even in Europe and the United States it did not appear that such techniques permitted a desirable economic balance between the capital charges (amortization and interest) and savings in labour. In view of the shortage of labour in Europe and the United States it might be necessary to use such techniques in order to meet the increase in consumption, unless the latter is met by an increase in imports from countries that were more favourably situated to produce them, a tendency already observed in a number of highly developed countries. This might open the door to an export market for Latin America.

(g) EXAMPLES OF PROGRAMMING IN THE TEXTILE
INDUSTRY

361. The need to programme the development of the textile industry has been recognized in a number of countries, including Venezuela, Mexico and Brazil. In Venezuela, where there was an import substitution problem, the number of spindles rose from 94,000 in 1958 to over 200,000 in 1962. The bulk of this increase was the result of a programme worked out jointly by the private sector and the Government. In the first place, a selection was made of the products that could

be manufactured on an economic basis; those needing high tariff production, and luxury articles, were eliminated. Next a programme was established for the improvement of domestic cotton which was low in quality and very expensive. Minimum production standards were established, programmes were worked out for training the workers and plant managers in the various processes, operations and administrative problems, and quality control was instituted. In 1958 the Venezuelan textile industry supplied 33 per cent of the consumption of cotton goods. This figure has now risen to 70 per cent, and it is expected to increase within a short time to 85 per cent, while the artificial and synthetic fibre industry will supply 90 per cent and the wool industry 85 per cent of domestic consumption.

362. In Mexico a committee consisting of the Bank of Mexico, Nacional Financiera S.A. and the industry is working out an over-all programme for the modernization of the textile industry. This provides for a reduction in installed capacity, merging of certain plants, and reorganization of others. A plan is being worked out for the readjustment of the labour force that will deal with the financial problem of displaced workers, and an attempt is made to place them in other activities. The programming of the wool industry in Mexico involves a complete structural change, including the closing of some existing combing sections in certain plants, and concentration of this process in specialized plants. An effort is being made to encourage plants established in the Federal District to move to the interior.

363. In North East Brazil, the SUDENE has included in its master plan for the area the modernization of the textile industry. Economic and social problems were involved in this type of action since there was an urgent need to find employment for excess labour. However, the modernization of this industry, which holds a particularly important place in the North-Eastern State, was recognized to be indispensable in order to avoid its total collapse. Certain basic precautions were taken in working out the plan: (a) no modernization programme was to be begun before a rate of industrial growth had been attained that would make it possible to absorb at least part of the workers displaced by the modernization; (b) no exchange or financial facilities would be granted for the execution of isolated projects, and all projects would have to conform to the programme drawn up; (c) in order to limit displacement of labour, no project would be considered that had not been properly planned; (d) the carrying out of modernization projects would be in principle the responsibility of private enterprises, but in cases of known weakness of the entrepreneurial sector intervention by the Government or of the financing bank on a temporary basis might be envisaged by means of appointment of temporary administrators, in order to prevent the breakdown of the programme, and (e) acceptance of re-equipment projects would be subject to proof that (i) the plant is in the process of administrative reorganization; (ii) supervisors are taking part in the training courses organized by the SUDENE; (iii) production lines are being brought up to standard as promptly as required; (iv) an effort is being made to improve the enterprise's economic

position by grouping or relocating plants; (v) the obsolete equipment replaced is to be destroyed; and (vi) steps are being taken to make better use of the factors of production.

364. The individual projects submitted by enterprises in the North-Eastern area were worked out in a standard form and consisted of a series of numerical tables that permitted evaluation of the project. ECLA, in co-operation with the textile associations in the Central-Southern area of Brazil, has made a sectoral study of this branch.⁴⁴ In the light of the diagnosis, the industrialists set up a private committee to work out a programme for re-organization and re-equipment. This committee, known as COMITEX, consisted of one member for each textile association in the States concerned, plus a representative of the Association of Manufacturers of Textile Machinery of the State of São Paulo. The Committee drew up an integrated programme for the improvement of the various branches of the sector, covering the following points; (a) improvement of training at the level of supervisors, technicians and heads of sections; (b) improvement of plant productivity; (c) improvements in the quality and classification of textile raw materials; (d) vigorous action to extend the market and a programme to rationalize distribution; (e) renewal of machinery, with preference for domestically produced machines provided that they meet minimum basic standards of up-to-dateness and output; this also involved the programming of the manufacture of these machines. Similarly, preference was given to the reconditioning of existing machinery, provided that modification was possible from the technical and economic standpoint. To carry out this programme COMITEX, which is essentially a private institution, sought the support of official and financial organizations, and of all agencies interested in the execution of the programme.

(h) EXECUTION OF THE PROGRAMMES

365. Each country or region has to select the solution that suits best its particular problems and this choice will depend on the objectives that it seeks to attain. From the examples referred to above, it can be seen that there are many ways of carrying out a programme, which may differ even within a single country. These may include the establishment of State bodies endowed with full powers to press on with the execution of the programme, and funds necessary to carry it out, as in North East Brazil; of co-ordinating bodies set up by private enterprise, where no State intervention is involved in the working out of the plan, but the necessary support is sought from the Government and financing bodies, once the programme has been prepared, as in the case of the COMITEX in Brazil; or of mixed bodies in which private enterprise collaborates with the Government both in working out the programme and in carrying it out, as in Mexico and Venezuela. The second of these three alternatives appears most attractive, since it is particularly suited to countries with a free enterprise economy; however, the execution of the programme may be slower than in the other alternatives, since it depends essentially

⁴⁴ See *A indústria têxtil do Brasil: pesquisa sobre as condições de operação nos ramos de fiação e tecelagem* (E/CN.12/623 and Add.1).

on the ability of the programming body to influence not only the industry as a whole, but also the bodies that are in a position to provide the necessary incentives.

(i) ECONOMIES OF SCALES IN THE COTTON INDUSTRY

366. The purpose of this document submitted by ECLA⁴⁵ was to study the most economic size for new plants to be installed. Three different types of products were chosen, currently produced in Latin America, and a fully standardized production was assumed, that is production of one single weave and a balanced spinning and weaving output, with the weaving absorbing the whole of the spinning output. For each type of product three hypotheses were considered, representing different operating hours for that part of the machinery whose output is indivisible (opener-pickers), namely, one, two or three shifts, respectively, while the rest of the plant operated at a uniform level of three shifts.

367. The study showed that above the levels of 4,200 spindles and 205 looms for regular or coarse goods, 8,250 spindles and 250 looms for medium goods and 16,200 spindles and 375 looms for fine goods, there was little scale effect. Below these levels, on the other hand, the imbalance between the different sections, and the lesser possibility of allocating optimum workloads, have a considerable effect on unit investment, labour cost and cost in general. Since there are many integrated plants in Latin America below the size indicated, it can be taken that industry in general suffers from the effect of the small scale of its installations.

368. In the production process only the spinning and weaving sections were considered; dyeing and finishing were left out of account, since the conclusions of studies made in different Latin American countries showed that in most cases full integration of production, from raw material to the finished fabric, was not satisfactory from either a technical or economic standpoint. In fact, since modern finishing machines are high-cost and high-output machines, under-utilization was to be avoided, and there are few plants whose production would permit full use of the capacity of such machines. Consequently it was advisable to send the grey goods to specialized finishing plants that can make full use of the production capacity of the finishing machines by working for a number of weaving mills. However, there is no doubt that where a finishing section can be economically integrated with spinning and weaving sections, much larger economies of scale are possible. In this connexion the participants expressed an interest in the extension of ECLA's studies to include finishing and dyeing sections, for the purpose of showing what the structure would be.

369. The examples studied in the secretariat document related to completely standardized plants producing a single type of product. In practice, with the exception of plants that produce fabrics for sacks and bags, which are often highly standardized, there were few enterprises engaged in producing a single product. Nearly all the Latin American plants, including even the smallest, produced a wide range of goods, and also undertook combing and carding, so that there is

⁴⁵ *Economías de escala en la industria textil* (ST/ECLA/CONF.11/L.20).

generally complete vertical integration. It was suggested that a study should be made of the difference in economies of scale that might exist between plants of the

type widely encountered in Latin America, and plants of ideal size, standardized and specialized, of the type used as an example in the document in question.

B.IV. INDUSTRIAL PROGRAMMING AND POLICIES WITH PARTICULAR REFERENCE TO PARTICIPATION OF THE PRIVATE SECTOR

370. A coherent and comprehensive programme of industrial development in private enterprise and mixed economies will have to deal, *inter alia*, with the two following problems. First, the establishment of targets to be achieved in the various industrial branches. Second, the means of action by government authorities for successful implementation of these targets. To the extent that the planning targets relate to the public sector, direct action by the government could ensure effective implementation. However, as regards the private sector complex problems of integration arise both in the formulation and implementation stages of planning. These problems are discussed in the following. After a brief statement of the problems, reference is made in particular to the experience of France, which provides a particularly interesting case.

371. The problem of integration arises from the fact that the private sector consists of numerous individual enterprises whose decisions on production and investment are in general based on the response of the particular enterprise to the market price mechanism. On the other hand, the planning objectives including optimum allocation of resources in a developing economy, involves in many cases production and investment decisions which depart significantly from a market-oriented pattern. The discrepancies between the privately motivated and socially desirable economic action will have to be composed and reconciled. This reconciliation is achieved on the one hand, through provision of adequate incentives to private enterprise so as to translate the planned targets in terms acceptable to it and, on the other hand, by imposition of certain controls or restraints. The two sets of tools, incentives and restraints take the form of direct or indirect measures of government intervention.

372. Direct intervention may include such measures as control of prices, rationing (of consumer goods or strategic investment materials), grant of subsidies, government procurement of industrial goods, exchange and import quotas and embargoes, etc. Indirect intervention consists of various financial and fiscal incentives, provision of infrastructure (e.g., transport, power, housing, education and training and other economic and social overhead facilities, establishment of industrial zones and estates), etc. Among the indirect measures, financial and fiscal incentives may be considered as the most effective instruments of "steering" the production and investment decisions of private enterprise.

(a) THE FRENCH EXPERIENCE IN PLANNING

373. The structure of the economic system of France may be characterized as a mixed economy. While a very large public sector exists in that country, which has developed particularly during the post-war years, the private sector plays a leading role in the economy, especially in industry. Industrial planning covers both the public and private sectors. In order to achieve an

effective implementation of industry targets, it has been considered essential to enlist active co-operation of the private sector, at the stages of both formulation and implementation of the plan.

374. The plan targets are set up in accordance with priorities determined by the economic and social objectives and are based on a mutually consistent set of projections of demand for the various final and intermediate goods and services. The plan does not only cover the setting up of targets but also defines the relevant government policies and measures intended to steer national economic activities in accordance with the plan.

375. The organization of the planning process has been conceived so as to enroll maximum collaboration of the private sector, including the appropriate economic and social institutions and private individuals. The bureaucratic organization of the planning office itself has been deliberately kept to a minimum; even adding the counterparts in the Ministry of Finance and the National Institute of Statistics and Economic Studies, the total number of persons engaged in planning does not exceed 200. The major part of the planning work is carried out in the so-called "modernization commissions" which include, in addition to representatives from the Government, managers of private industrial enterprises and representatives of both manufacturers' associations and trade unions. These commissions, numbering 27, are "vertical," covering various economic sectors (agriculture, mining, steel, chemicals, transforming industries, etc.) and "horizontal," which deal with across-the-board-problems affecting all sectors, the two major horizontal commissions being those for financing and employment. The modernization commissions organize, as required, working groups to study in detail particular questions. For instance, the commission on transforming industries has organized 60 working groups studying 240 industries.

376. These commissions and working groups ensure the effective participation of the private sector in the formulation of industrial programmes. As a result, more than 3,000 individuals participated in the formulation of the fourth French plan, of whom about 1,000 in the Commissions and 2,000 in the working groups. The group included 210 managers, 560 representatives of industrial associations and 280 representatives of trade unions. These were selected on the basis of their personal qualifications as well as their functions—on the assumption that having participated in the formulation of the plan they are in a particularly effective position to carry out its implementation.

377. The method of French planning thus consists in bringing together various viewpoints within a coherent and consistent framework of economic studies and projections geared to a well defined general economic policy. Planning starts with global projections of growth of a number of macro-economic magnitudes

geared to a few key targets, such as the rate of growth of the national product, the rate of capital formation, etc., taking several alternatives of the latter. The projections thus include several variants. This preparatory study enables the Government to issue directives for the general orientation of the plan, including the over-all growth rate on the basis of various alternatives and to define major objectives of national and international economic policy (e.g., the raising of the competitiveness of the French economy within the Common Market). Subsequently, a provisional set of balanced accounts is prepared for the end-of-period-year to serve as a basis for the studies to be undertaken by the commissions.

378. The functional commissions carry out studies on the perspectives of growth in their respective sectors, including domestic and foreign markets, and establish end-of-period targets; in these studies extensive use is made of statistical data and of information which are normally collected by the various trade associations themselves. The individual industry reports are then reviewed by the "horizontal" economic and finance commission, with the participation of the rapporteurs of the relevant commissions; appropriate adjustments are then made in line with the general plan objectives. On the basis of these modified targets, the commissions revise their sectoral plans, define the means of carrying them out (including capital requirements, fiscal and price policies, etc.) and make recommendations on measures to increase productivity.

379. The reports of the commissions constitute the basis for formulation of the final plan, as well as reference documents for public authorities, and information to entrepreneurs for the orientation of their own plans. The resulting draft plan is submitted, first, to the Supreme Economic Council consisting of the Prime Minister and representatives of professional organizations, manufacturers' associations, trade unions, etc., which prepares a report on the plan for the Government. The draft plan is in turn sent to the Economic and Social Council for preparation of a final report, for submission to the Parliament for approval.

380. As mentioned above, the plan does not establish targets for individual industrial enterprises, but for branches of industries and broad sectors of the economy. For the implementation of the targets assigned to the private sector, the Government relies on a number of "steering" measures designed to reconcile private and social objectives and integrate the activities of private enterprise into the Plan. Some of these measures of intervention are summarized below:

(i) *Price controls*: The price of certain strategic industrial products (e.g., steel, aluminium, cement) is fixed with the approval of the Government. This provides the authorities with a means to influence the profitability and possibilities of self-financing of these industries as well as their decisions as regards future expansion plans. Clearly, it also has repercussions on prices of other commodities and, ultimately, the cost of living.

(ii) *Import controls*: These provide effective protection of domestic industries in competition with imported goods. The level of import duties affects the spread between prices of domestic manufactured goods and imports and thus influences the profitability of

domestic production. Other measures are import quotas and embargoes. The existence of international trade and tariff agreements clearly places certain limitations on the use of these devices.

(iii) *Government purchases*: The procurement activities of the Government are sometimes used as an effective tool of intervention; for instance, Government purchases account for between 70 and 80 per cent of the output of the electronics industry, between 10 and 15 per cent of the textile industry, etc.

(iv) *Regulatory controls*: Through its regulatory power and the licensing system the Government can exercise control over the establishment of new production facilities and their expansion; it also enables it to influence the geographical distribution of investments.

(v) *Information and training*: In addition to the general information provided by the plan, various organizations have been set up, especially so-called "development centres," which provide industrialists with information on investment opportunities by branches of industry and by regions. This information is often based on studies prepared by semi-public institutes organized for that purpose. The "productivity centres" provide assistance to entrepreneurs in management and training.

(vi) *Financial policies*: More than one-half of the total amount of annual investment, or about one-third of investment in directly productive projects, is financed from public funds or subject to direct government control. Through their power of control of loans and credits to industrial establishments the public authorities are thus in a position to influence considerably the pattern of investment in industry. Grants of loans and credits on easy terms provide a particularly effective instrument in this respect.

(vii) *Fiscal policy*: The Ministry of Finance, after consultation with the planning office, may grant tax concessions to industries provided that the activities of the latter are in accordance with the plan objectives. These concessions are essentially designed to sustain their profitability. They may be used to influence the structure of industry by favouring either the development of small and medium-sized industries or, conversely, concentration of enterprises, etc., and also make it possible to influence the location of industries. An interesting fiscal device that was recently introduced in France is the tax on value added by industrial enterprises; it replaced the former "taxe à la production" which was levied on the gross value of output and involved in many cases double taxation to the extent that inputs of one firm are outputs of another at an earlier stage of production.

(viii) *Quasi-contracts*: The development of certain branches of industry or products is being promoted through certain contractual arrangements between the Government and industrial enterprises. This device has been applied to such uses as promotion of exports, decentralization of industry, acceleration of scientific research, etc. As an example, "quasi-contracts" concluded with the automobile industry resulted in raising the exports of motor cars from France from 10 per cent of gross value of output in 1957 to 50 per cent in 1960.

Discussion

381. It was stated that the basic problem in the formulation and implementation of industrial development programmes in private enterprise and mixed economies consisted in the co-ordination of the activities of individual enterprises with the targets of the plan and the reconciliation of private and social objectives. This required close co-operation and, first of all, the existence of effective channels of communication between the government planning offices, and the representatives of private enterprises, trade unions, etc. As a result, there emerges a collectively elaborated plan which consolidates and reconciles the interests of the different groups with the national economic and social objectives instead of merely imposing a set of targets from the top. It was felt that the success of the French experience was due largely to the fact that industrial programming in France represented a two-way process of communication and collaboration between the Government and the private sector. The French industrial programmes are neither normative nor mandatory, but designed in such a way as to reconcile public and private objectives.

382. It was emphasized in the course of the discussion that the situation in Latin America was very much deficient in this respect, and it was agreed that wider participation of the private sector in the formulation of industrial programmes would greatly contribute to the successful implementation of the targets assigned to the private sector. It was felt in this connexion that an essential prerequisite was a climate of mutual trust between Government and the private sector, similar to the one that had been gradually built up in France during the years of planning efforts.

383. It was stated that as a major inducement to the private sector the Government should provide adequate economic and social infrastructure, such as power, transport, training facilities, housing and education for the labour force, which would establish a favourable physical climate for private investment.

384. In reply to some questions with regard to the organization of planning in France, it was mentioned that in spite of the participation in the formulation of the plan a very large group of people (about 3,000 persons), the plan proved to be workable in practice because of the decentralization of the planning procedure. Each modernization commission had the responsibility for preparing the plan of its particular sector, and in each of these commissions the President and the Rapporteur were responsible for the major part of the planning work, taking into account views expressed by the members. It took from twelve to eighteen months to complete the planning work and submit it to the Parliament for approval. Once the plan was approved by the legislative body there was little likelihood of changes in the targets and instruments of implementation unless there was a major shift in govern-

ment policies. The major planning objectives, however, could be changed from one plan to another. Thus, the first French plan emphasized the development of basic industries; the second plan, the expansion of transforming industries; the third plan concentrated on achieving greater efficiency and profitability of the industrial enterprises and the fourth on regional and social development.

385. In discussing the problems involved in the formulation of industrial programmes in mixed economies, specific reference was made to the problems posed by projection of demand for machine tools and projection of exports. It was stated that although both projections involved many variables so that it was difficult to establish precise targets, it was nevertheless possible to make a rough estimate of the demand for machine tools by estimating the demand for machinery and equipment of the various sectors of the economy, while export projections could be made on the basis of studies of foreign markets. In all such cases the aim of the plan was to reduce the degree of uncertainty of future prospects and provide at least rough orders of magnitude for the production targets. As to the co-ordination of the French planning activities with other members of the European Common Market, it was mentioned that this was being achieved to some extent through co-ordination of national economic policies of which the plan was a quantitative expression.

386. In referring to the very considerable role played by the public authorities in France in financing economic and industrial development, it was stated that government intervention in this field was a result of practical necessities. The French economy was subjected during the post-war years to strong inflationary pressures which affected unfavourably the rate of domestic private saving. In order to provide adequate financing of industrial growth the public authorities had to step in and undertake a number of financing operations which included, *inter alia*, conversion of short-term credits into long-term investment loans and provision of government financial guarantees.

387. Because of the importance of the problem discussed under this item of the agenda the meeting recommended that a special seminar on this problem be organized by the United Nations Secretariat. It was considered that there were two areas on which an exchange of views would be highly useful. First the experience of various countries which have adopted similar policies aiming at the integration of the private sector into the planning process. Second, a formulation of general policies on the basis of the analysis of countries' experience. In this connexion reference was made to the studies of industrial planning in India and Japan discussed earlier in this meeting which provided a great deal of information relevant to this particular area, and the desirability of undertaking further country studies as preparatory work for the proposed Seminar, was stressed by the participants.

ANNEX I

Attendance list

COUNTRY PARTICIPANTS

- Almeida, Miguel Osorio
Department of Economics, Ministry of Foreign Affairs
Rio de Janeiro, Brazil
- Bello, José Luiz Almeida
(Secretary General of the Seminar), Brazilian Association
for the Development of Basic Industries (ABDIB)
São Paulo, Brazil
- Cardoso, Fernando Henrique
Faculty of Philosophy, Science and Literature, Department
of Social Sciences
São Paulo, Brazil
- Cunha, Sebastião Advincula
São Paulo, Brazil
- De Andrea, Tulio
Manager, Industrial Bank of Peru
Lima, Peru
- Dengo, Jorge Manuel
Fertilizers of Central America, S.A.
San José, Costa Rica
- Diederichsen, Ernesto
Coordinator, National Committee of Textiles (COMITEX)
São Paulo, Brazil
- Fuendalida, Luis Arturo
Director of Planning, Production Development Corporation
(CORFO)
Santiago de Chile
- Flores, Roberto
Director of Industries, Secretariat of Industry and Com-
merce
Mexico D.F., Mexico
- Gortari, Petro Abel
Federal Council of Investments
Buenos Aires, Argentina
- Goldman, Hans
National Confederation of Industry
Rio de Janeiro, Brazil
- Holanda, Alberto Craveiro
Bank of Northeast Brazil, S.A.
Fortaleza, Ceará, Brazil
- Ianni, Otavio
Department of Social Sciences, Faculty of Philosophy, of
the University of São Paulo
São Paulo, Brazil
- Irigoyen, Fernando
Central American Bank for Economic Integration
Tegucigalpa, Honduras
- Kock, Einar Alberto
President, Association of Machine Manufacturers
São Paulo, Brazil
- Lattini, Sidney
Executive Secretary, Executive Group of the Automobile
Industry (GEIA)
Rio de Janeiro, Brazil
- Ledesma, Antonio
Director, Central Bureau of Coordination and Planning
Caracas, Venezuela
- Manne, Alan S.
Graduate School of Business, Stanford University
Stanford, California, United States
- Mejía, Hernán
Manager, Institute of Industrial Development
Bogotá, Colombia
- Melentovytsch, Bogdan von
National Economic Council
Rio de Janeiro, Brazil
- Mercier, René
Director General, Organization for Studies on Economic,
and Social Development
Paris 7, France
- Naón, Moisés Raúl
Administration for Industrial Development of the Industrial
Bank
Buenos Aires, Argentina
- Orosco, Eros
Industrial Adviser
Rio de Janeiro, Brazil
- Pajestka, Josef
Institute for Economic Research of the Planning Com-
mission
Warsaw, Poland
- Pegurier, Fabiano J. F.
Executive Secretary, Executive Group for the Metallurgical
Industry (GEIMET)
Rio de Janeiro, Brazil
- Pegurier, Guilherme A.
Executive Secretary, National Planning Council (COPLAN)
Rio de Janeiro, Brazil
- Pinto, Pedro A.
National Council of Economic Planning and Coordination
Quito, Ecuador
- Quintana, Carlos
Manager, Industrial Programming, National Financing
Mexico 1, D.F., Mexico
- Rezende, Jorge de Souza
President, Máquinas Piratininga, S.A.
São Paulo, Brazil
- Romi, Giordano
President, Máquinas Agrícolas Romi, S.A.
São Paulo, Brazil
- Santos, Genival Almeida
Director, National Bank of Economic Development (BNDE)
Rio de Janeiro, Brazil
- Santos, José Cruz
Industrial Adviser
Rio de Janeiro, Brazil
- Strout, Alan
Agency for International Development,
Department of State
Washington 25, D.C., United States
- Tangari, Alberto
Executive Secretary, Executive Group for Heavy Mechanical
Industry
Rio de Janeiro, Brazil
- Tejada, David
Chief, Division of Studies and Projects,

Development Corporation of Bolivia
La Paz, Bolivia

Toledo, Julio Sauerbronn
President, Association of Manufacturers of Industrial
Chemical Products
São Paulo, Brazil

Vidossich, Franco
Industrial Adviser
São Paulo, Brazil

Watanabe, Tsunehiko
Associate Director, Economic Research Institute, Economic
Planning Agency
Tokyo, Japan

OBSERVERS

Alamo Blanco, Roberto
Chief, Studies, Planning and Research Division,
Venezuelan Corporation of Guayana
Caracas, Venezuela

Calcagno, Alfredo E.
Secretary-General, Federal Council of Investments
Buenos Aires, Argentina

Castro, Alberto Pereira
Director, Brazilian Rolling Stock Company (COBRASMA)
São Paulo, Brazil

Gana Barrientos, Eduardo
Steel Institute of Chile
Santiago de Chile

Ganz, Alexander
Chief Economist, Harvard — MIT Joint Center — Guayana
Project
Corporación Venezolana de Guayana
Caracas, Venezuela

Lessa, Carlos
Center of Economic Development (ECLA/NBED)
Rio de Janeiro, Brazil

Maal, Pedro
Deputy Chief, Studies, Planning and Research Division,
Venezuelan Guayana Corporation
Caracas, Venezuela

Mazzitelli, Aurelio F.
Deputy Credit Manager,
Industrial Bank of the Argentine Republic
Buenos Aires, Argentina

Moore, Frederick T.
Rand Corporation
Santa Monica, California, United States

Perazich, George
Harvard-MIT Joint Center, Guayana Project,
Corporación Venezolana de Guayana
Caracas, Venezuela

REPRESENTATIVES FROM INTERNATIONAL ORGANIZATIONS

Baskind, Irwin
Organization of American States (OAS)

Delaplaine, John
Inter-American Development Bank (IDB)

Walstedt, Bertil
International Bank for Reconstruction and Development
(IBRD)

UNITED NATIONS

Centre for Industrial Development, Headquarters, New York

Lurié, Samuel
Director, Research and Evaluation Division, Centre for
Industrial Development, and Director of the Seminar

Yeganeh, Mohammed
Chief, Industrial Economics Section,
Research and Evaluation Division,
Centre for Industrial Development,
General Rapporteur of the Seminar

Abu El-Haj, Ribhi
Economic Affairs Officer,
Research and Evaluation Division,
Centre for Industrial Development

Economic Commission for Latin America (ECLA)
Figueiredo, Nuño Fidelino de
Director, Industrial Development Division, and Director of
the Seminar

Leuschner, Bruno
General Rapporteur of the Seminar

Izcúe, Joaquín M.
Matthews, Roberto
Oberdorfer, Max R.
(Paper and Cellulose Advisory Group for Latin America)
CEPAL/FAO/DOAT

Petipas, Roberto
Pollner, Marco
Seijas Román, Germán
Suárez, Ramón

Economic Commission for Africa
Nomvete, Bax
Chief, Industry Section

Economic Commission for Asia and the Far East
Menon, A. G.
Chief, Industries and Resources Division

Latin American Institute of Economic and Social Planning
Soza, Héctor
Bureau of Technical Assistance Operations
Haour, Roger
Nolff, Max
Saxl, Victor

ANNEX II

Agenda and list of documents *

A. PROGRAMMING OF INDUSTRIAL DEVELOPMENT AT THE COUNTRY LEVEL

I. *Methodology of industrial programming in the context of general economic programming*

1. General economic programming and the formulation of industrial development programmes

Documents:

ECLA, Algunas notas sobre problemas de programación industrial (ST/ECLA/CONF.11/L.2)

Reference documents:

Instituto Latinoamericano de Planificación Económica y Social, *Análisis y programación industrial*

ECLA, Introducción a la técnica de programación (E/CN.12/363)

ECAFE, Programming techniques for economic development, report by a group of experts (E/CN.11/535)

* The names of organizations responsible for submitting documents precede each document. "CIDHQ" indicates that the document was submitted by the United Nations Centre for Industrial Development in New York.

- ECAFE, Formulating industrial development programmes, report by a group of experts (E/CN.11/567)
- CIDHQ, "Use of models in programming", *Bulletin on Industrialization and Productivity*, No. 4 (background document No. 5)
- CIDHQ, Investment in infra-structure versus direct production facilities, by J. Pajestka (background document No. 17)
2. Structural changes in production and demand; import substitution and promotion of export trade
- Document:*
ECLA, Algunas notas sobre problemas de programación industrial (ST/ECLA/CONF.11/L.2)
- Reference documents:*
Instituto Latinoamericano de Planificación Económica y Social. Análisis y programación industrial
CIDHQ, A study of industrial growth (background document No. 9)
CIDHQ, Material, labour, capital, and flow inputs in construction in Soviet Union (ST/ECLA/CONF.11/L.25)
CIDHQ, Classification of industrial structures in the Soviet Union (ST/ECLA/CONF.11/L.26)
- Reference document:*
CIDHQ/ECLA/BTAO, Report of the Meeting of the Expert Working Group on Industrial Development Programming Data (background document No. 8)
- II. *Evaluation of industrial projects: selection of individual projects and preparation of feasibility or pre-investment studies*
1. Evaluation of projects in predominantly private enterprise economies
- Documents:*
CIDHQ, Evaluation of projects in predominantly private enterprise economies: selected procedures based on case studies (ST/ECLA/CONF.11/L.27)
CIDHQ, The Inter-American Development Bank and industrial development in Latin America by IDB (ST/ECLA/CONF.11/L.28)
CIDHQ, Project appraisal, by IBRD (ST/ECLA/CONF.11/L.29)
2. Evaluation of projects in centrally planned economies
- Document:*
CIDHQ, Evaluation of projects in centrally planned economies, (ST/ECLA/CONF.11/L.30)
- III. *Formulation of sectoral industrial programmes: problems of new and of traditional sector*
1. Sectoral programming of dynamic industries
- Documents:*
ECLA, La creación de la industria automovilística brasileña analizada como un caso de programación sectorial (ST/ECLA/CONF.11/L.31)
ECLA, La industria de máquinas-herramientas del Brasil: elementos para la programación de su desarrollo (E/CN.12/633) (ST/ECLA/CONF.11/L.32)
- Reference documents:*
ECLA, The manufacture of basic equipment in Brazil (E/CN.12/619)
ECLA, Estudio sobre la fabricación de equipos industriales de base en la Argentina (E/CN.12/629 and Add.1 to 5)
2. Sectoral programming in traditional industries
- Document:*
ECLA, La programación de industrias: elementos de una metodología para la industria textil (ST/ECLA/CONF.11/L.21)
- Reference documents:*
ECLA, La industria textil de Chile (E/CN.12/622)
ECLA, A indústria têxtil do Brasil: pesquisa sobre as condições de operação nos ramos de fiação e tecelagem, 2 vols. (E/CN.12/623 and Add.1)
- IV. *Implementation and other aspects of industry programming with particular reference to the private sector*
1. Industrial programming and policies with special reference to participation of private sector
- Documents:*
CIDHQ, Industrial promotion policy and industry programming (ST/ECLA/CONF.11/L.33)
CIDHQ, French experience in industrial planning (documentation provided by the French Planning Commission) (ST/ECLA/CONF.11/L.34)
- Reference documents:*
CIDHQ, Investment in infra-structure versus direct production facilities, by J. Pajestka (background document No. 17)
CIDHQ, Organizational aspects of planning (background document No. 11)
ECLA, La experiencia de los Grupos Asesores y los problemas prácticos del desarrollo económico (E/CN.12/584)
CIDHQ, Proposals for an industrialization programme in Singapore, excerpts from the report prepared by a BTAO team of experts (background document No. 13)
2. Directions for further work and research on industrial programming and policies with special reference to participation of the private sector.
- Documents:*
ECLA, Economías de escala en las industrias químicas (ST/ECLA/CONF.11/L.17)
CIDHQ, Fertilizers based on natural gas (ST/ECLA/CONF.11/L.18)
- Reference documents:*
ECLA, La industria química en América Latina, 2 vols. (E/CN.12/628 and Add.1 to 3)
CIDHQ, "Problems of size of plant in industry in under-developed countries", *Bulletin on Industrialization and Productivity* No. 2 (background document No. 3)
CIDHQ/ECLA/BTAO, Report of the Meeting of the Expert Working Group on Industrial Development Programming Data (background document No. 8)
3. Basic data and criteria for programming in the pulp and paper industry
- Document:*
ECLA/FAO/BTAO, Economies of scale in the pulp and paper industry (ST/ECLA/CONF.11/L.19)
4. Basic data and criteria for programming in the textile industry
- Documents:*
ECLA, Economías de escala en la industria textil (ST/ECLA/CONF.11/L.20)
ECLA, La programación de industrias tradicionales: elementos de una metodología para la industria textil (ST/ECLA/CONF.11/L.21)
- Reference document:*
ECLA, A indústria têxtil do Brasil, 2 vols. (E/CN.12/623)
5. Basic data and criteria for programming other industries

Documents:

- CIDHQ, Programming data and criteria for food processing industry (ST/ECLA/CONF.11/L.22)
- CIDHQ, Pre-investment data and criteria for the cement industry (ST/ECLA/CONF.11/L.23)
- CIDHQ, Programming data and criteria for the aluminium industry (ST/ECLA/CONF.11/L.24)
- CIDHQ, Manpower requirements in industrial planning, the Japanese experience by S. Okita (background document No. 14)
- CIDHQ, Economic roles of the dualistic natures in the industrial development of Japan, by T. Watanabe (background document No. 12)

B. PROGRAMMING AT THE SECTOR AND PROJECT LEVELS

I. Basic data and criteria for industry programming

1. Basic data and criteria for programming in the steel-transforming industries (including steel-making)

Documents:

- ECLA, Algunos problemas metodológicos planteados por la programación de la industria de máquinas-herramientas y otros equipos (ST/ECLA/CONF.11/L.11)
- ECLA, Criterios y antecedentes para la programación de la industria de máquinas-herramientas (ST/ECLA/CONF.11/L.12)
- ECLA, Economías de escala en la fabricación de tubos de acero con costura (ST/ECLA/CONF.11/L.14)
- ECLA, Economies of scale in steel making: a progress report (ST/ECLA/CONF.11/L.15)
- ECLA, Uma análise preliminar das economias de escala na indústria automobilística do Brasil (ST/ECLA/CONF.11/L.16)

Reference documents:

- CIDHQ, Engineering estimates of capital-labour substitution in metal machining operations, by A. S. Manne and N. Kurz (background document No. 15)
- ECLA, The manufacture of basic equipment in Brazil (E/CN.12/619)
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ANNEX III

Opening statement by Admiral Lucio Meira, President of the Executive Groups of the Brazilian Industry

In opening the proceedings of this Seminar on Industrial Programming, I am happy to acclaim the felicitous and timely thought that prompted the three illustrious sponsoring agencies to convene it in the capital of the State of São Paulo, outstanding as a dynamic centre of Latin American industry. The Economic Commission for Latin America—our familiar ECLA—, the United Nations Centre for Industrial Development and the Bureau of Technical Assistance Operations are indeed to be congratulated on promoting a conference of such vital significance in our country, with the co-operation of the executive groups of Brazilian industry, the National Confederation of Industry and the Federation of Industries of the State of São Paulo, whose members include the most active and eminent captains of private enterprise in Brazil.

On our part—that is, on behalf of the executive groups of which I have the honour to be the Chairman, and which are brilliantly represented here—I should like to assure this meeting that we will do everything in our power to further the success of the Seminar now being inaugurated. GEIA, GEIN, GEIMAPE, GEIMAR and GEIMET, which are responsible, respectively, for matters pertaining to the motor-vehicle, ship-building, and heavy metal-transforming industries, the manufacture of agricultural and road-building machinery and the metallurgical industry—all of which activities have been installed in this country under their direction—are proud to have been invited to co-operate in the work of the Seminar, and to have been given the opportunity of presenting papers for consideration here that focus attention on various aspects of Brazil's experience of sectoral programming in the decidedly complex field of the above-mentioned manufacturing activities.

May I take this opportunity of extending my warmest greetings to the distinguished representatives of all the expert bodies—national and international—to which I have just referred, together with my sincerest good wishes for their unqualified success in the discussion of the difficult technical matters that constitute the agenda for the present series of meetings.

I have chosen two subjects about which I should like to talk to you. The first relates to what we are doing here in Brazil with regard to the sectoral programming of our industry; and the second may be defined—perhaps with a touch of pretentiousness, which I know you will forgive—as the *strategy and tactics of the executive groups* in whose hands we have placed, with a degree of success that has sometimes exceeded our expectations, the tasks involved in the industrialization of this country on modern lines.

I must begin by admitting that up to a very short time ago no serious attempt had yet been made in Brazil to tackle, as would be desirable, the over-all programming of economic activity. The steps we have taken in this field have been somewhat less bold, and our area of exploration has been that of sectoral programming, in respect of which we are managing to accumulate a valuable stock of experience, despite all the difficulties we have had to overcome.

Nevertheless, to induce you to be lenient towards us, especially those of you who have come from abroad to give us helpful advice on programming, it must be made clear from the outset that in countries at our stage of development, where, as a general rule, scales of production are adversely affected by the small size of the markets, and where for this very reason manufacturing activities are not really industrial and modern in character, over-all programming is a task that must await the right moment. Until the time is ripe for it, an advantageous substitute may be found in sectoral programming, within whose scope it lies, first to encourage domestic production of a substantial proportion of the industrial inputs, at present imported, that existing industry requires, and secondly, as a result, to provide the necessary conditions for the expansion and gradual integration of the country's industrial

sector. This integration, by making external economies possible, has in fact enabled us to raise the productivity of the whole system in two different ways: through the installation of productive units characterized by a higher level of technology, and greatly superior to those previously in existence; and through more efficient utilization of the production capacity of the entire industrial plant.

These gains, for which our sectoral programming has paved the way very satisfactorily and to an increasingly marked extent, represent a decisive step along the road that will bring us, at the appropriate juncture—in my opinion already at hand—to the stage of over-all economic programming, which constitutes an objective that all of us, including the ordinary man in the street, have present in our minds today.

Patently, moreover, the idea that it is not merely possible, but essential, to programme economic development has already taken root in this country and is gaining ground with every passing day. The new generations of Brazilians, who are beginning to move up into the posts of authority in our national life, are taking more and more pains to acquire mastery of the scientific instruments of analysis and adapt them to the purposes of dealing with our problems.

It would be an injustice to deny recognition of the role played in this process by ECLA, with its already lengthy history of fruitful action in the field of our economic development. And it would likewise be unfair to refrain from pointing out that the attitude described, with all its many valuable implications for our future as an independent nation, derives from the successes we have achieved in recent decades, thanks to the programmes we have resolutely formulated for the industrial sector of our economy.

Without going into unnecessary details, I will cite a few cases in point.

Encouraging progress has been made in our metallurgical sector, where for some years not only steel-making but also the metallurgical industries working in aluminium and in other non-ferrous metals (mainly lead, zinc, nickel and copper) have been the object of special programming; and in the chemical industries, where innumerable developments may be noted, especially with regard to petroleum refining, the petrochemical industry, the manufacture of fertilizers, and the pulp, plastics, alkali and cement industries.

Noteworthy advances have also been achieved in the complex and diversified sector of the metal-transforming industries, and are dealt with in some of the papers presented at this Seminar by our executive groups. It is there, and particularly in the sub-sectors concerned with the manufacture of industrial machinery and equipment, of electrical and communications material and of transport equipment, that the most rapid expansion has been registered. And it was precisely in those fields, as we have long recognized, that the Brazilian economy used to display the most flagrant shortcomings.

The output of the engineering industry proper—that is, the manufacture of industrial machinery, apparatus and equipment—is not too easy to assess in terms of statistics, but it can safely be asserted, on the basis of the data available, that production in this sector has more than doubled in the last seven years. The same is true of the manufacture of electrical and communications equipment, but it would seem to be beyond question that in the same period the output of this industry in Brazil has been at least trebled. These are facts of which the ECLA secretariat is fully aware, and which it has corroborated in recent studies, one on the manufacture of basic equipment in this country, and the other relating to the Brazilian machine-tools industry.

But it must not be forgotten that the manufacture of transport equipment is the sector in which the most spectacular expansion has taken place. First came the installation, under

the aegis of GETA, of the motor vehicle industry, planned at the beginning of the fifties, during the second term of office of President Getúlio Vargas; and this was shortly followed by the establishment of the shipbuilding industry, in accordance with plans drawn up by the now defunct Grupo Executivo da Indústria de Construção Naval (GEICON). And as a normal and inevitable result of these two undertakings (in which I had an active share in my capacity as Chairman of the groups in question), special encouragement was given to important enterprises in the heavy forging, casting, machining and boiler-making sectors, where the weakness was formerly most serious—so serious, indeed, that it threatened to represent a bottleneck impeding the development of the metal-transforming industries in general.

The programme for the motor vehicle industry, which for me is a source of particular gratification, is the most striking of all, and the fact that Brazil has become, in the space of a few years, a major producer of motor vehicles—the tenth biggest in the world as regards volume of output, and the seventh where the manufacture of commercial vehicles is concerned—has surprised all observers, and fills us, as Brazilians, with justifiable pride. The motor vehicle industry entered production in 1957, and its deliveries to the home market up to now have amounted to about 700,000 units, with a value of more than 2,000 million dollars, and, since last year (except in the case of heavy lorries) with more than 97 per cent of their weight constituted by parts manufactured in Brazil; that is, their domestic content index may be regarded as virtually 100 per cent.

The impact of the motor vehicle industry on the national economy still remains to be analysed in all its aspects, but there can be no doubt that it is exerting a decisive influence on all sectors of industry, besides having promoted, in only six years, a process of manpower training and an improvement in the technical level of Brazilian industry which would normally have been unattainable in a much longer period.

Thanks, moreover, to sectoral programmes specially drawn up by the Grupos Executivos da Indústria Naval e da Indústria de Máquinas Agrícolas e Rodoviárias (GEIN and GEIMAR), domestic production, formerly negligible or non-existent, has now reached, in a little over two years, about 220,000 tons deadweight of shipping, some already delivered and some still in process of completion, and over 9,300 tractors, with domestic content indexes which by now average more than 80 per cent, while cases are to be found, among the large-scale manufacturers that account for a major proportion of total output in which they already exceed 90 per cent.

Consequently, it is unquestionably true that sectoral programming, in a number of instances, marks a decisive phase in Brazil's industrialization process. By its means, at the end of the fifties, fresh impetus was given to the movement—already under way—towards shifting the centre of gravity of economic development from the consumer goods sector to that of production goods, with the result that industrial production as a whole was ensured high rates of expansion, comparable to those registered in the countries where circumstances had been most favourable in the immediately preceding five-year period the most notable of the very few exceptions being Japan.

It should be pointed out, in this context, that as early as 1956 the rate of development of the production goods sector of Brazilian manufacturing industry outstripped that of the consumer goods sector. Estimates place the levels attained by the capital goods and consumer goods sectors in that year at 207 and 154, respectively, in relation to a benchmark year (1949 = 100).

For these results we were indebted to the whole set of industrial programmes which were put into execution during that period, and which contemplated the raising of the indexes for the production goods and consumer goods sectors, by 1959, to 425 and 178, respectively, in relation to 1949.

Accordingly, it can legitimately be averred that with these programmes, sectoral though they were, Brazil, like many other under-developed countries, including those which are only now emerging as independent States or initiating their industrialization process, embarked upon its first national programming effort. In many cases this attempt may have left something to be desired; but today it is supported by a widespread regional programming movement, capable of paving the way for national programming of a better type, which will be based on a realistic view of the country's economy as a ganglionic structure determined by the defects of the prevailing system of competition among the productive units distributed throughout the different regions.

In other words, it will not be long before we produce a development plan designed to show us where the resources at our disposal can be most advantageously applied and how to expand those resources by the fuller and wiser use of our existing potential: a plan that will be capable of solving the problems that arise and susceptible of adjustment to the general lines along which the Brazilian nation develops; that will consequently equate economic and political problems; and lastly, that will be consonant with our juridical and institutional conditions, or will indicate how best these may be adapted to it, whichever proves appropriate.

Let us now pass on to the other topic which I said at the outset I would like to discuss with you today.

I will begin with a story that will undoubtedly awaken your curiosity. From the old trunk of the Brazilian public administration, which many might regard as dead wood, has sprouted in recent years a new and remarkably thriving offshoot. I refer to the Study Group, or Working Group, which, when it has achieved its ends, i.e., when it has correctly determined the policy to be pursued for the solution of a given problem, becomes an Executive Group, or brings such a body into being.

I may tell you in this context that difficulties of two kinds were hindering the satisfactory equation and solution of certain vital problems with which we were confronted, from the standpoint of the country's economic development: on the one hand, the way in which the public administration was split up into bureaucratic units not uncommonly led the State to pursue a self-defeating policy, through decisions which were adopted without an over-all picture of the matters to be dealt with, and which, for that very reason, were mutually conflicting and frustrating; and, on the other hand, the fact that private enterprise operated in closed cells, each jealous of its "secrets"—which, as a general rule, were no secret at all—precluded the preparation of undertakings whose very nature called for a much higher degree of co-operation or synchronization of efforts.

Unless the public administration is capable of co-ordinated and therefore consistent action, it will never be able to "line up" the dozens and often hundreds of enterprises, great and small, on whose synchronized operation the solution of certain problems depends. Consequently, this want of co-ordinating capacity throughout the whole of the public administration was revealed, at a given moment, as the only real obstacle in the way of valid solutions to some of the important problems awaiting attention.

To give you an example, the studies I carried out, with the full support and sympathy of that great President, Getúlio Vargas (of whose advisory council on the military side I was at that time the deputy chief), on domestic manufacturing prospects, with a view to the installation of the motor vehicle industry, led to the exhibition organized at the Santos Dumont Airport, at the beginning of 1953, and convinced the President and myself that many of the indispensable prerequisites for such an undertaking already existed in Brazil. In their turn, the private enterprises potentially concerned with the problem visualized their own possibilities, for the first time, as a more integrated whole; and the outcome of our discussion of the question, on the basis of the material assembled, was the determination of the strategy and tactics to be applied in the

campaign that ought to be, and in fact was launched, with the backing of legislation which had previously been passed by the Executive, and had, so to speak, made the installation of the motor vehicle industry an ineluctable reality.

The strategy referred to consisted in the conception of the incipient industry that was to be adopted. It was not to be envisaged as a vertical combination, an approach which virtually excluded private enterprise from the front line of battle, implied extremely costly and indivisible projects, and gave no opportunity for efficient utilization of the vast production potential already existing, but lying idle, in hundreds of enterprises disseminated throughout the country's industrial sector; on the contrary, the horizontal organization of the industry in question was felt to be absolutely essential.

The tactics consisted in increasing the domestic content of the vehicles produced on the basis of *weight*, which enormously simplified the application of Government policy, although the criterion may seem a rough one, of only relative value.

Once this had been decided, the process of increasing the domestic content of the products manufactured—which culminated, in a very short space of time, in the appearance of the domestically-produced motor vehicle—was ready to be set in motion. What remained to be done was of relatively little importance, since the very system of interests which the plan called into life began to exert pressure in the direction of the adoption and application of the necessary measures. Moving rapidly on into the sphere of action, we established (still under the Government of President Vargas) the Comissão Executiva da Indústria de Material Automobilístico (GEIMA), the operation of which was hampered by the political difficulties that supervened, but which, when favourable conditions were restored, was converted into the Grupo Executivo da Indústria Automobilística: that same GEIA which became the prototype and the forerunner of all the future executive groups. Once again, the function created its organ.

It must be acknowledged that not all the other executive groups were as successful as GEIA. The reason lies in that, besides being unsatisfactorily organized, they grew up out of imperfect and inconclusive studies, or at a juncture when the problems they aimed at solving were not yet ripe to be dealt with. I will not cite any examples of these unsuccessful "GEIAS", but will confine myself to observing that no plan of action can turn out well if the problem is tackled prematurely, if the conditions that are essential prerequisites have not yet been created, and if the preliminary studies have been conducted on the wrong lines, and do not permit the definition of a strategy and of tactics appropriate to the problems concerned and compatible with the means at the disposal of the authorities.

But there were several "GEIAS" that did succeed. The first that may be mentioned is the Grupo Executivo da Indústria de Construção Naval (GEICON), which afterwards became the Grupo Executivo da Indústria Naval (GEIN). The strategy, in this case, consisted in the prior creation of the market, through the institution of the Fundo da Marinha Mercante (Merchant Marine Fund). Previously, there was not and could not have been a steady real demand for shipping, and in such circumstances no administrative or economic plan could have wrought the miracle of bringing a domestic shipbuilding industry into being. For the rest, everything depended upon co-ordinated action on the part of the public administration, calculated to ensure the essential market reserve, and exert pressure in the direction of increasing the domestic content of the vessels built, by combining the provision of encouragement and incentives with compulsory measures. A decisive innovation, in the case of GEIN, was the Government's explicit reservation of the right to stipulate that parts which could not yet be produced in Brazil should be imported from areas that suited its interests in the light of foreign exchange considerations. Thus, the appearance of debtor areas alongside the creditor areas in our balance of payments was used as an additional means of reducing the foreign exchange pressures originating

in the derived demand of the new industry, and, indirectly, promoting a more rapid increase in the domestic content of the latter's products.

The starting-point of the Grupo Executivo da Indústria de Máquinas Agrícolas e Rodoviárias (GEIMAR) was the exploitation of external economies in the motor vehicle industry—which represented idle capacity within the national economy—and, as in the case of the shipbuilding industry, the prerequisite was to ensure real internal demand, i.e., to establish a virtual market reserve. For this purpose, however, it sufficed to guarantee the financing of purchases of domestically-produced tractors, exclusively, by the Carteira de Crédito Agrícola e Industrial of the Banco do Brasil.

The Grupo Executivo da Indústria Mecânica Pesada (GEIMAPE) was, of course, a product of the experience of its predecessors, thanks to which the public administration had gained a fairly comprehensive knowledge of the production goods *market*, and, in consequence, some measure of validity was acquired by the device of the *register of similar products*—normally inoperative when the products concerned are not off-the-shelf goods, but specially built machines. Each individual machine is, in many instances, *unique*, inasmuch as it has to correspond to the strict specifications furnished by its user; this being so, the institution of the register of similar products can hardly be regarded as a satisfactory means of making the *market reserve* effective, established as it was to suit the conditions prevailing at a time when Brazilian industry was still confining its activities to import substitution in respect of consumer goods, most of which did represent off-the-shelf products.

The problem of the market reserve cannot yet be regarded as solved in relation to the domestic engineering industry. Although our producer sector is not yet among the biggest in the world, it is undoubtedly one of the most flexible as regards the specification of the final product. The fact is that its equipment is still basically universal, which means that with it almost anything and everything can be done. In these conditions, an efficacious market reserve can result only from the creation of an equally efficacious system of financing its sales, although not necessarily of the same sort as that established for the agricultural machinery and tractor industry. A first step has already been taken with the establishment of a fund specially earmarked for this purpose in the Banco do Estado de São Paulo, and with the constantly increasing use of bills of exchange as vehicles of credit.

In the meantime, this is a problem claiming more consistent and systematic attention on the part of the State, for it is not a purely private question. During the next few years, according to estimates, about 1,100 million dollars' worth of equipment will be imported, much of which could already be supplied by our own engineering industry, if a satisfactory solution to the financing problem were found. Thus, not only could a substantial additional saving of foreign exchange be promoted, but the incipient effort to sell the products of the industry in question on external markets, as a means of earning foreign exchange, could be pushed farther. As a first approximation, the industry might be assigned the task of absorbing one-half of the balance-of-payments deficit on current account for the present three-year period, which is estimated at 545 million dollars.

The performance of this task, which to a great extent could already be honourably discharged by our engineering industry, will be facilitated when the national engineering services now being put into execution by the Companhia Brasileira de Projetos Industriais (a recently-established subsidiary of the Companhia Siderúrgica Nacional), and by other specialized enterprises, begin to yield all the results that may legitimately be expected, and also when the studies initiated by GEIMAPE, with a view to the establishment of a body of Brazilian technical standards, bear fruit. These undertakings, for which our industry has long been calling, will open up new and unexpected opportunities for Brazil's heavy metal-

transforming sector to acquit itself well in the vitally important mission that the country has entrusted to it in the fight for economic development.

There remains one problem for me to discuss which is of perennial importance for us in relation to the service rendered by the executive groups. Before they existed, whenever we spoke of the need to co-ordinate the action of the public administration, the suggestion was put forward, as the only possible solution for the problem, that a veritable super-Ministry should be created, which, invested with virtually discretionary powers over the whole of the administrative apparatus, would come to exercise nothing short of a dictatorship over the whole of the national economy.

Such an institution is not in harmony with Brazil's traditions, and could lead to nothing but a hidebound and unproductive bureaucracy. The emergence of the executive groups revealed another way out, much more democratic and affording much more scope for the spirit of enterprise existing in broad sectors of the national life. And experience has shown that to line up the various sectors of the administration, dozens or hundreds of private enterprises, and the administrative organs of the States and even the municípios, there is no need for everything to be hierarchically subordinated to a supreme authority; all that is necessary is to *consult* the parties concerned, *listen to* their views and opinions, *co-ordinate* the suggestions received and, finally, *crystallize* these in resolutions which, although lacking legal sanction, operate in practice, in the vast majority of cases, as if they were in fact legally binding.

The executive group, therefore, is not merely an efficacious

administrative expedient of which the cost is negligible. It also represents a democratic mode of planning and promoting, capable of capitalizing the wealth of social and economic experience that is constantly being amassed in all sectors of the body politic.

I must apologize for having dwelt so long on these topics, but it was essential for me to tell you, in my own plain unvarnished words, something of our experience in respect of programming questions and of administrative action designed to ensure the attainment, without empiricism and without vacillation, of our major national objectives in the field of economic organization.

May I now express my confidence that the proceedings of the present Seminar will be of the greatest use in improving our industrial programming technique, and adding new knowledge to that we have succeeded in acquiring on our own account, in Brazil and throughout Latin America. I am sure that all we learn here in respect of programming will exert a fruitful influence on the history of the economic and social development of my own country and of the other members of the Latin American community—that development for which we are all striving with the crude weapons at our disposal, and in quest of which we shall press on undaunted; for it is the inescapable destiny of the young nations of the New World to grow and progress, since only thus will they free themselves once and for all from the shackles of under-development and poverty that fetter them in a state of economic, political and social marginality which, at this stage of the twentieth century, is both intolerable and degrading.

ANNEX IV

Address delivered by Mr. Nuño F. de Figueiredo, Director of the Industrial Development Division of the ECLA secretariat and Director of the Seminar, at the inaugural meeting held on 4 March 1963

On behalf of Mr. Raúl Prebisch, Executive Secretary of the Economic Commission for Latin America (ECLA), in my own person and in the name of my colleagues here present, I have pleasure in expressing our appreciation of your presence at this inaugural meeting of the Seminar on Industrial Programming.

In convening this Seminar—under the auspices and with the efficient co-operation of the Executive Groups of Brazilian Industry, of the National Confederation of Industry and of the Federation of Industries of the State of São Paulo—the United Nations Organization took a step dictated by the feeling, which is becoming increasingly widespread in Latin America, that certain basic aspects of the economic and social development process of our countries are urgently in need of reconsideration and reorientation. Our participation in international trade, instead of constituting the mainspring of national development, as was the case some decades ago, is now, on the contrary, creating increasingly formidable obstacles to the rapid and balanced development of the national economies. This weakening of the stimulus represented by international trade—we might go so far as to say, in some cases, this reversal of the role it formerly played—is particularly untimely, in that it coincides with a universal desire on the part of the Latin American peoples to attain a higher level of living. The satisfaction of their legitimate aspirations calls for an acceleration of economic and social development, and this will depend more and more on the degree of success attending industrialization efforts.

It is therefore indispensable to improve the efficacy of the industrialization process both from the standpoint of the growth of the aggregate product and from that of regional equilibrium and the levelling-up of distributional disparities. But the experience of Latin America suggests that only in exceptional circumstances, which do not easily arise, can a spontaneous and unprogrammed industrialization process fulfil such requi-

sites. Hence it is that increasing attention is being devoted to the establishment of flexible planning systems and the improvement of economic programming techniques. Within the framework of these efforts the United Nations has convened the present Seminar, for the purposes of analysis and critical discussion of industrial programming techniques, and an exchange of experience in this field among countries with varying characteristics and aptitudes and different approaches to economic policy.

The fundamental objective of our Seminar is to explore new ways of imparting greater efficiency to the industrial development process. Thus, for example, consideration will have to be given to guiding principles for the selection of the branches of industry to be developed and the production techniques and equipment to be used, so that as far as possible the use of labour may be intensified and the volume of capital per unit of final output may be reduced. The rapid growth of the population in our countries, the weakness of the internal capital formation process, and the vicissitudes inherent in external co-operation in capital formation, all make this problem one of supreme importance. Moreover, in order to introduce new, non-traditional export lines—so necessary as a means of expanding the capacity to import—it will in many cases be essential to resort to such a reorientation of the industrial development process on the principle of using manpower and saving capital, since only on this basis will it be possible to place Latin America's manufactured goods in a position to compete on the world market.

To cite another example of the problems that will engage the attention of the Seminar, mention may be made of the question of methods and procedures whereby to close the gap which, in planning techniques, opens between over-all programmes—whether they relate to the economy as a whole or merely to the whole of the manufacturing sector—and individual investment projects. The practical orientation of an industrial

development programme presupposes a choice between alternatives, which are often numerous and considerably diversified, in respect of the branches of industry to be developed, the structure of the industries to be installed, the techniques and procedures to be adopted, and other aspects of the problem. Appraisal of the advantages and drawbacks of these alternatives on the basis of the specific development projects concerned implies the preparation of a vast quantity of individual projects, many of which will be rejected once the comparison has been made, in favour of others that are deemed to be of greater potential value for the economic and social development process. The waste of technical resources involved in the preparation of the rejected projects has led to exploration of the possibility of bridging the gap between over-all programmes and individual projects by means of the systematic preparation of certain technical data, on the basis of which the costs and benefits of the alternative projects could be evaluated with a sufficient degree of accuracy to obviate the need for the complete preparation of the projects in question.

In this and other fields experience has been accumulated in a number of different countries. In organizing the present Seminar, a primary concern of the United Nations was to promote the exchange of such experience, so that the Latin American countries which are in process of creating their planning systems could adapt the lessons deriving therefrom to their own situation and requirements. While it is true that countries throughout the world develop in very heterogeneous conditions, it is equally certain that there is always some respect in which a marked similarity with Latin America exists, and where the experience acquired can be of great value. Thus, for example, Japan's experience as regards industrial planning may shed some light on the difficult question of how to link up the sector comprising artisan and small-scale industries with the process of attaining the programme targets and objectives. Industrial planning in India may suggest, among many other useful and timely lessons for Latin America, formulas and criteria for organizing the operation of the private sector in smooth co-ordination with a public sector that is important not only in the field of basic social capital, but, very particularly, in that of manufacturing activities. Again, the *planning* experience of the French may be extra-

ordinarily valuable for our countries, since they have managed, with acknowledged success, to reconcile systematic planning on a distinctly ambitious scale with an almost unconditional respect for private enterprise. The formulas and systems used in government planning to draw in the private sector by persuasion rather than coercion are of special interest for the Seminar. Lastly, we shall also have something to learn from the centrally planned economies, as, for instance, the methods and procedures they apply in the evaluation of alternative investment projects and development programmes.

We hope, therefore, that the Seminar on Industrial Programming will constitute a veritable clearing-house of national planning experience.

The fact that this Seminar on Industrial Programming is being held in Brazil, and in the city of São Paulo in particular, means much to those of us who work with the United Nations. We are anxious to ascertain at first hand the special features of Brazil's experience in respect of industrialization, the difficulties that have arisen and the methods whereby they have been overcome; in short, we want to know how this noteworthy industrial sector has gradually been shaped and built up. It must be confessed, moreover, that in deciding upon the venue for the Seminar we were also actuated by a touch of sentiment. By our presence here, and by that of the group of distinguished economists and engineers from Latin America and from other regions who have come to bear us company, we want to convey the United Nations deep appreciation of the generous and fruitful co-operation whereby, for some years past, the Executive Groups and other representative bodies of Brazilian industry have been contributing to ECLA's work on industrial development.

To the participants who, in response to our appeal, have journeyed here from the four corners of the earth, we extend our best wishes for a very happy stay in São Paulo. Once again we offer our sincerest gratitude to all the distinguished figures who have come to honour our cause with their presence; and to the Federation of Industries of the State of São Paulo, which is extending us a hospitality that promises to be truly superb, we would say: Thank you very much. We will do everything in our power to ensure that you are not disappointed in the result of our labours.

ANNEX V

Address delivered by Mr. S. Lurié, Director, Research and Evaluation Division, Centre for Industrial Development of the United Nations, and Director of the Seminar, at the inaugural meeting, held on 4 March 1963

Mr. Representative of the Governor of the State of São Paulo, Mr. Secretary of Labour, Representatives of Federal and State Authorities, Mr. President of the Federation of Industries of the State of São Paulo, Participants and Observers, Ladies and Gentlemen, I wish to convey to this meeting the greetings and best wishes of the Secretary-General of the United Nations, the Under-Secretary for Economic and Social Affairs and the Commissioner for Industrial Development. The Commissioner for Industrial Development, Mr. Mayobre, who is well known to many of you in this area particularly regrets not to be able to attend this meeting which is co-sponsored by the Economic Commission for Latin America, an organization with which he has been actively associated for a long time. Mr. Mayobre is at the present time on a prolonged official visit to a number of countries in South-East Asia following his attendance of the Committee of Industry and Resources in the ECAFE Region.

I would next like to convey our sincere thanks and acknowledge the co-operation and generous hospitality extended by our Brazilian hosts, namely, the Confederação Nacional da Indústria, the Federação das Indústrias de São Paulo and the Grupos Executivos GEIA, GEIN, GEIMAPE and GEIMET.

It is largely because of this co-operation that it was possible for us to have this Seminar in this splendid city of São Paulo which provides an outstanding demonstration of what can be achieved in the way of Industrial development when there is a will and a drive behind the will for development. It seems to me that there could be no better physical, intellectual and psychological environment for the work of a gathering such as this Seminar which had been planned by us with a view to having an impact upon the thinking and activities of industrial planners not only in Latin America, but also in other industrializing countries of the world.

The highly industrialized area of São Paulo which provides the physical environment of this meeting and which reflects the spectacular achievements in industrial progress of this region is a most appropriate background for this Seminar; indeed we would like this meeting to be above all oriented towards practical achievements. The Seminar was planned so as to be devoted not merely to an academic discussion of problems of industrial programming, but as a common meeting ground where economists, engineers, administrators and industrialists will have the opportunity for a mutual exchange of experience, with a view to learning from each other and com-

plementing each other's experience. The problem of industrial development is indeed one of many dimensions. It involves technology and engineering, industrial economics and economics of growth; it involves social and labour problems including training of cadres; it covers problems of financing and management. It also implies the existence of an appropriate ecological, social and institutional climate within which the individual industrial enterprise can operate efficiently. This Seminar which is devoted to industrial programming touches upon many of these problems. By studying, refining and applying methods of industrial programming the newly industrializing countries can hope to achieve a harmonious and co-ordinated development of their economy, a rational utilization of their resources and a consistency in their individual production targets

The United Nations and in particular the regional commissions have done extensive work in programming of industrial development. It is my privilege to recall here the pioneering studies which had been carried out in this region by ECLA in this field by its teams of economists and engineers. I should also mention here the highly successful Seminar on Industrial Programming held in the ECAFE region some two years ago. The present Seminar is a result of a co-operative effort of the Centre for Industrial Development at Headquarters and the Economic Commission for Latin America, whose highly successful efforts in bringing about the widest co-operation of the economic and industrial circles in Latin American countries and, in particular, those of Brazil, I would like gratefully to acknowledge here.

Programming of industrial development and, above all, its effective implementation is a matter of successful co-operation and meeting of minds of all those who conceive, plan, co-ordinate and execute industrial development projects. This Seminar in which we have the good fortune of having gathered many high level specialists in the various related fields, is intended to provide a bridge between the macro-economist, the model builder, the industrial economist, the engineer and the industrialist. This is reflected in the agenda which covers a wide area of problems ranging from theoretical aspects of programming of industrialization, sectoral planning of industrial branches to evaluation of individual industrial projects.

It will be noted that one of the items in the agenda is devoted to the place and role of the private sector in industrial

programming. Most of the developing countries are of the "mixed economy" type where the public and private sectors are engaged side by side in the process of industrial development. This is no place to discuss the relative role of the two sectors in the industrial development. Aside from providing the necessary infrastructure, incentives and a generally favourable climate for the development of the private industrial sector, Governments have in many cases to engage directly in implementation of industrial projects which are carried out by the public sector. However, there are major areas of industry in which the private sector plays a key role and no Government aiming at effective implementation of its programme of industrialization can fail to take into account the fact that not only through adequate integration of the private sector in the process of planning and implementation could the targets provided in the plan be carried out. The tools and policies which are indicated in order to provide for such an integration are a subject of the discussion in this meeting. They aim broadly at effectively reconciling the private and social objectives of industrial development. The Seminar will have before it a certain number of country studies which illustrate in a concrete way the methods in which the integration of the private sector in a planned effort of industrial development has been achieved. As regards Brazil, particularly, the device of Executive Groups which has been applied with such outstanding success in the development and planning of certain branches of industry, in particular as regards the "nationalization" of the automobile industry, is an outstanding example of an experience which should be studied with great attention elsewhere.

Finally, I would like to mention that aside from the objective of an integrated exploration of the various aspects of industrial programming, this Seminar is also intended as a clearing house of the experience of various regions and countries of the world at various levels of economic development and various institutional structures

I again wish to express my sincere gratitude for the splendid co-operation which this meeting received from the public authorities and private institutions of this country and particularly the State and City of São Paulo, and I formulate the hope that the results of this Seminar will contribute materially to the cause of advancement of economic and industrial growth of the developing countries of the world.

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