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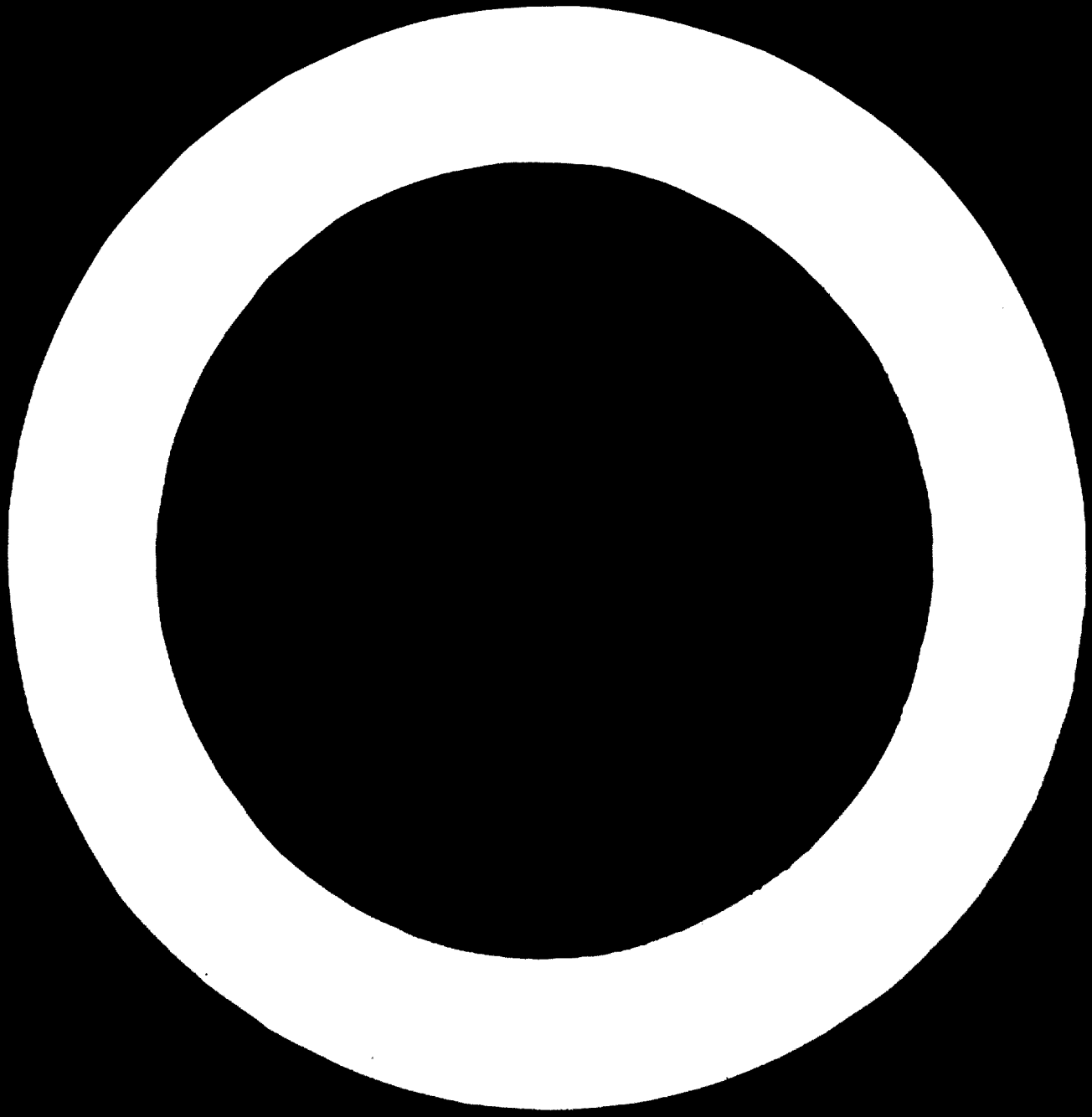
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The Metal-Transforming Industry in Venezuela: An Import Substitution Development Programme*

By the ECONOMIC COMMISSION FOR LATIN AMERICA

THIS ARTICLE reviews the possibilities for establishing a metal-transforming complex in Venezuela. Although several of the Latin American countries have already achieved a relatively high level of development in metal transforming, most of the others are just beginning to programme such industrial complexes and considerable importance has been given to the advantages of such development at the Latin American Symposium. The present study, although directed to the Venezuelan economy, reviews the factors which influence the prospects for success in the establishment of such an industry complex. It also provides guidelines for the selection of product manufacture and supporting institutional structures necessary to launch such a programme successfully.

VENEZUELA'S NATIONAL development plan for 1963-1966 establishes targets for the various economic activities, with a view to an annual average growth rate of 7.9 per cent for the gross domestic product. This programme assigns the metal-transforming industries an outstanding role in the expansion of the manufacturing sector, within which their projected rate of development is the highest.

The initial object of the present study was to consider the possibility of the metal-transforming sector's meeting the targets established under the National Plan (Plan de la Nación), in the light of various earlier studies and of the existing industry's characteristics. During this first phase of the work, serious deficiencies in the structure of the industry were noted, as well as a lack of any specific plan for the metal-transforming activities. It was for these reasons that the sector had not fully responded to the incentives provided by the Government and was unlikely to succeed in reaching the targets set up under the Plan.

In the present study, therefore, emphasis is placed on the correction of structural defects rather than on the actual fulfilment of the Plan's objectives. To this end a development programme is outlined for the metal-transforming sector, designed to fill the technological gaps in the existing industry and thus gradually to create a sectoral infra-

structure which will enable the metal-transforming activities to improve their competitive position both on the domestic and on the world market, and also to undertake more complex lines of manufacture in the future.

The National Plan laid stress on the promotion of new industrial activities through a policy primarily of import substitution, stating that "in this connexion the sectors producing intermediate and capital goods hold out the best prospects".

In 1962, imports of the products of the metal-transforming industries amounted to a volume of 309,000 tons with a value of 1,731.4 million bolivares, and included many goods that could feasibly be manufactured in Venezuela. With 1962 as the base year, a preliminary selection of products was made, taking into consideration not only which import substitutions would be possible almost at once, but also those which would be recommended because of the technical processes and know-how that would be brought into the country. The following were the product descriptions on which selection was based:

(a) Simple products that can be manufactured in small-scale and medium-scale industrial establishments by relatively labour-intensive procedures;

(b) Products which have manufacturing processes that are not yet familiar to Venezuela, or those requiring perfecting of techniques, could be introduced through medium-scale and small-scale enterprises;

(c) Products that are required for the integration of other

* This study was prepared by the Economic Commission for Latin America (ECLA) for the Latin American Symposium on Industrial Development and is one of several ECLA documents presented at that meeting on the progress and problems of industrialization in Latin America.

activities, such as inputs in more complex metal-transforming processes.

From the selection made it appeared that about 25 per cent of imports in terms of volume, or 23 per cent in terms of value (77,540 tons and 398.1 million bolivares, respectively), could be replaced by domestic production. At a conservative estimate these figures could be reached within four or five years. The programme would be largely implemented through the establishment of new medium-scale or small-scale enterprises, whose organization and operation would be in keeping with the country's incipient entrepreneurial capacity. This procedure would make it easier to put the programme into effect, and at the same time would contribute to more widespread diffusion of metal-transforming technology and the training of a larger number of workers.

A first evaluation of the programme suggests that its implementation would entail investment in fixed assets amounting to approximately 204.9 million bolivares, and a labour force of 7,150 workers, some 3,300 of whom

would be skilled workers, whose availability would be a basic requisite for the execution of the programme.

It would also be essential to adopt a number of measures and lines of action of various kinds that would provide the appropriate institutional framework, and would include, primarily, organization for implementation of the programme; mobilization of external technical assistance resources; definition of targets and of industrial policy; establishment of financing and credit systems; and technological research.

Lastly, the metal-transforming industry's prospects under a regional integration plan are analysed with due regard to the objectives of this development programme and of others prepared in Venezuela for the manufacture of heavy machinery and equipment. This programme has been adopted by the Venezuelan Development Corporation (Corporación Venezolana de Fomento) for the expansion of the country's metal-transforming industries.¹

¹ See Corporación Venezolana de Fomento, *Promoción Activa*, April 1965.

THE 1963-1966 DEVELOPMENT PLAN IN RELATION TO THE METAL-TRANSFORMING INDUSTRY

THE AIM OF THE National Plan was to raise the average annual growth rate of the gross domestic product to 7.9 per cent in 1963-1966, as against the rates of only 3.7 and 2.8 per cent registered in 1957-1960 and 1960-1962, respectively. Although this rate of increase is lower than that attained in 1950-1957 (9.3 per cent), which was attributable to an exceptionally favourable situation in the world petroleum market, it will necessitate a rapid expansion of the manufacturing sector of the economy. According to the development targets established under the Plan, the industrial product should increase during the period under consideration at an annual rate of 13.5 per cent, as compared with 11.6 per cent in the 1950's. Consequently, the volume of additional employment afforded by the manufacturing sector would absorb 82,100 workers; the annual average number of workers is a little over 20,500. The significance of this objective, as is noted in the Plan, will be realized if it is borne in mind that in the whole of the last decade (1950-1960) manufacturing industry created only 84,200 employment opportunities, that is, absorbed only about 7,650 workers a year. The aim is almost to treble the effort made in the past.

The attainment of these production and employment targets will call for a systematic promotion effort on the part of the responsible authorities and for private enterprise an energetic determination to use its initiative and to outdo its previous achievements. Venezuela's manufacturing industry is entering upon a phase which, both economically and technically speaking, is broader and more difficult than the one that ended in the 1950's. The stage now reached involves the installation of heavier industries with more

complex techniques, some of which must compete on foreign markets and must therefore operate efficiently at competitive costs. Furthermore, the industries already established will have to embark upon a rationalization process designed to raise productivity and to improve the quality and lower the prices of the goods they manufacture—another complex and ambitious task.

Concurrently with the diversification of production, effort must be concentrated on industrial integration with a view to the introduction of structural changes required for more efficient operation of the whole industrial complex; in other words improving interindustrial relations.

For the promotion of new industrial activities, according to the Plan, an import substitution policy would be the most appropriate to pursue. In this connexion the sectors producing intermediate and capital goods hold the best prospects.

An import substitution programme, however, does not preclude the promotion of exports. On the contrary, this objective should be regarded as being derived from such a programme and should be the natural outcome of an over-all consolidation and diversification of the manufacturing sector for which the dynamic impetus is generated in the first place by a selective import substitution policy.

In the outline of general policy for the promotion of the manufacturing sector as a whole (whose share in the gross domestic product should rise from 16.4 per cent in 1962 to 20.0 per cent in 1966), the following are salient directives:

(a) Import substitution should be the mainspring for the installation of new activities;

(b) The selection of new activities should be directed

towards the improvement of interindustrial relations, with a view to gradual establishment of a better-balanced industrial structure characterized by maximum interaction of enterprises;

(c) In manufacturing activities, products and processes should be introduced which will develop technological progress in industry as a whole; their mastery by domestic industry will open up prospects for manufacturing other more complex products and thus develop and gradually expand the domestic market;

(d) Absorption of manpower should be maximized through proper selection of the lines of manufacture to be introduced, as well as proper selection of production processes and equipment to be adopted.

The leading role in the expansion of the manufacturing sector falls to the metal-transforming industries, which should show the most intensive development. Table 1 sums up the production objectives formulated for manufacturing industry in general and for the metal-transforming industries in particular, the latter being broken down by sub-sectors corresponding to four major groups (35 to 38)

in the International Standard Industrial Classification (ISIC):

- (a) Manufacture of metal products;
- (b) Manufacture of machinery (except electrical);
- (c) Manufacture of electrical machinery, apparatus, appliances and supplies;
- (d) Manufacture of transport equipment.

From an examination of the targets established for these four groups, certain inferences can be drawn which relate to the approach adopted in the present report.

The annual growth rate of apparent consumption is almost the same (a little over 10 per cent) in the first three groups and more than twice as high in the fourth (transport equipment). In the period under consideration the shares corresponding to domestic production and to imports will have to undergo radical changes, which will differ from one group to another. It seems likely that between 1962 and 1966 the proportion of apparent consumption represented by imports will decline more sharply in industries producing electrical equipment (from 82 to 44 per cent) and machinery (from 95 to 69 per cent) than in those

Table 1
VENEZUELA: TARGETS FOR MANUFACTURING INDUSTRY AND FOR THE METAL-TRANSFORMING INDUSTRIES ESTABLISHED IN THE NATIONAL DEVELOPMENT PLAN FOR 1963-1966

Item	Years				Variation between 1962 and 1966		Annual per-centage increase 1962-1966
	1960	1962	1963	1966	Thousands of persons	Percentage	
1. Apparent consumption of manufactured goods	9,898	11,060	12,738	17,001	—	53.7	11.4
Products of the metal-transforming industries	1,225	1,393	1,720	2,530	—	81.6	16.1
G.35 Metal products	573	604	667	809	—	48.8	10.5
G.36 Machinery	35	164	181	244	—	48.8	10.4
G.37 Electrical equipment	88	119	131	177	—	48.7	10.4
G.38 Transport equipment	529	506	741	1,210	—	139.1	24.4
2. Value of manufacturing output	8,521	10,063	11,476	16,210	—	61.0	12.7
Products of the metal-transforming industries	535	634	903	1,721	—	171.5	28.4
G.35 Metal products	309	365	429	609	—	91.5	17.6
G.36 Machinery	6	8	9	75	—	837.5	75.0
G.37 Electrical equipment	18	21	25	100	—	376.2	47.5
G.38 Transport equipment	202	240	440	847	—	252.9	37.1
3. Value of gross product in the manufacturing sector	3,914	4,648	5,320	7,720	—	66.1	13.5
Metal-transforming industries	283	337	432	840	—	149.3	25.6
G.35 Metal products	189	223	263	428	—	91.9	17.7
G.36 Machinery	3	5	6	55	—	1,000.0	82.1
G.37 Electrical equipment	11	12	14	80	—	566.7	60.6
G.38 Transport equipment	80	97	149	297	—	206.2	32.3
4. Value of exports	1,850	2,184	2,367	2,939	—	34.6	7.7
Metal-transforming industries	—	—	—	—	—	—	—
5. Value of imports	3,227	3,181	3,629	3,730	—	17.3	4.1
Metal-transforming industries	690	759	817	809	—	6.6	1.6
G.35 Metal products	264	239	238	200	—	() 16.3	() 4.4
G.36 Machinery	29	156	172	169	—	8.3	2.0
G.37 Electrical equipment	70	98	106	77	—	() 21.4	() 4.9
G.38 Transport equipment	327	266	301	363	—	36.5	8.1

Table 1 (continued)

Item	Years				Variation between 1962 and 1966		Annual percentage increase 1962-1966
	1960	1962	1963	1966	Thousands of persons	Percentage	
<i>As a percentage of value of apparent consumption</i>							
5A. Imports of manufactured goods	32.6	28.8	28.5	21.9	—	—	—
Metal-transforming industries	36.3	54.5	47.5	32.0	—	—	—
G.35 Metal products	46.0	39.6	35.7	22.2	—	—	—
G.36 Machinery	82.9	95.1	95.0	69.3	—	—	—
G.37 Electrical equipment	79.5	82.4	80.9	43.5	—	—	—
G.38 Transport equipment	61.8	52.6	40.6	30.0	—	—	—
6. Employment (thousands of persons)	309.3	323.1	340.5	405.2	82.1	25.4	5.8
Metal-transforming industries	18.0	17.2	21.0	40.3	23.1	134.3	23.7
G.35 Metal products	5.0	4.8	5.3	7.3	2.5	52.1	11.1
G.36 Machinery	0.3	0.3	0.3	2.6	2.3	766.7	71.6
G.37 Electrical equipment	1.0	1.1	1.2	4.4	3.3	300.0	41.4
G.38 Transport equipment	11.7	11.0	14.2	26.0	15.0	136.4	24.0
7. Product per employed person (thousands of bolivares)	12.7	14.4	15.6	19.1	—	32.6	7.3
Metal-transforming industries	15.7	19.6	20.6	20.8	—	6.1	1.5

Source: Plan de la Nación 1963-1966 (Caracas, May 1963).

industries manufacturing metal products (40 to 22 per cent) and transport equipment (53 to 30 per cent). In absolute figures, however, the production increments are considerably higher in the case of transport equipment and metal products.

To judge from these larger increases in the output of the metal products and transport equipment groups, the volume of additional employment in 1962-1966 will range from 15,000 workers in the transport equipment sector to 2,500 in the manufacture of metal products. The expected increase in the number of persons employed in the metal-transforming industries as a whole is slightly over 23,000.

Concerning the product (value added) per employed person, the Plan estimates that it will be 28,000 bolivares in 1966, compared to 22,800 bolivares in 1962, for manufacturing industry as a whole (excluding artisan industry). The

metal-transforming industry should show an added value amounting to 20,800 bolivares in 1966, as against the 19,600 bolivares registered in 1962.

Investment requirements for the expansion of metal-transforming activities are estimated at 640 million bolivares (at 1960 prices), which implies a *per capita* investment of a little over 33,000 bolivares, or more than half the figure for manufacturing industry in the aggregate. This high proportion is due to the heavier incidence of the markedly capital-intensive basic and petroleum industries on the over-all figure.

From the foregoing data, the hypotheses adopted do not assume any significant increase in labour productivity nor, probably, in rates of return on capital, and therefore seem realistic considering the brief period covered by the analysis.

CHARACTERISTICS OF THE EXISTING METAL-TRANSFORMING INDUSTRY

THE EXISTING metal-transforming industry constitutes the springboard for the sectoral expansion programme propounded below. Upon its characteristics of products manufactured, organization, plant size, technological progress, manpower supply conditions at various levels of skill, capital and value added per worker, etc., will depend the nature of the programme and the intensity of the promotional effort required. Accordingly, the next step will be to give a brief description of the main characteristics of Venezuela's existing metal-transforming industry, based on the findings of CORDIPLAN's industrial survey (1961) and on data obtained by means of another survey, much

more limited in its scope, carried out by ECLA during the first half of 1964.

The presented figures in table 2 give some idea of the magnitude of the sector in question, as well as its relative significance within the manufacturing industry. In general terms, the table shows that in 1961 the metal-transforming industries contributed 9.7 per cent of the value added in the whole manufacturing sector and provided employment for 22,215 workers, or 14.2 per cent of personnel employed in industry as a whole. It can be said that metal-transforming activities have achieved some small degree of importance in Venezuela. To this over-all evaluation,

Table 2
VENEZUELA: THE METAL-TRANSFORMING INDUSTRY IN RELATION TO
MANUFACTURING INDUSTRY, 1961
(Values in millions of bolivares)

	Large-scale industry	Medium-scale industry	Small-scale industry	Total	Manufacturing industry	Percentage share of the metal- transforming industry
Number of establishments ^a	7	195	1,574	1,776	7,531	23.6
Number of persons employed ^b	2,799	6,724	12,692	22,215	156,038	14.2
Gross value of production	292.7	294.8	278.5	866.0	9,261.5	9.4
Value added	85.2	141.8	160.9	287.9	3,990.4	9.7
Fixed capital ^c	66.3	91.5	106.1	263.9	6,316.0	4.2

Source: Central Co-ordination and Planning Office (Oficina Central de Coordinación y Planificación—CORDIPLAN), Industrial Survey 1961.

^a Reference is made to "industrial units", i.e., to a plant, group of plants or an industrial complex belonging to a single owner and situated in one and the same place.

^b Including, in addition to operatives and employees, other types of workers such as partners, members of the entrepreneur's family and home workers.

^c Excluding the value of the site.

however, must be added a few indications of the real significance of these figures and the true structure of the sector under study. The first striking point is that fixed capital in this industry accounts for only 4.2 per cent of the total amount registered for manufacturing activity, which, by comparison with the level of employment, implies a very low capital density per employed person, while at the same time it shows that servicing and maintenance enterprises dominate over what may be classed as productive activities in this sector. Secondly, it should be stressed that a breakdown of industrial units by plant-size reveals a high proportion of medium-scale and small-scale establishments, especially the latter, which represent about 90 per cent of the units in question and account for approximately

57 per cent of the personnel employed. No further evidence is needed to show that the sector, despite its relative importance within Venezuelan industry from the standpoints of value added and employment levels, is seriously under-productive because of its low *per capita* investment rate, and is handicapped by a structural composition of the artisan-industry type making it ill-fitted to tackle or develop the production techniques involved in metal-transforming activities.

If the various branches of the metal-transforming sector are analysed individually, their operational characteristics become even more patent. From the figures presented in table 3, showing the composition of production in the metal-transforming industry, it can be seen clearly how

Table 3
VENEZUELA: BREAK-DOWN OF GROSS VALUE OF PRODUCTION AND OF
VALUE ADDED, BY MAJOR GROUPS, 1961

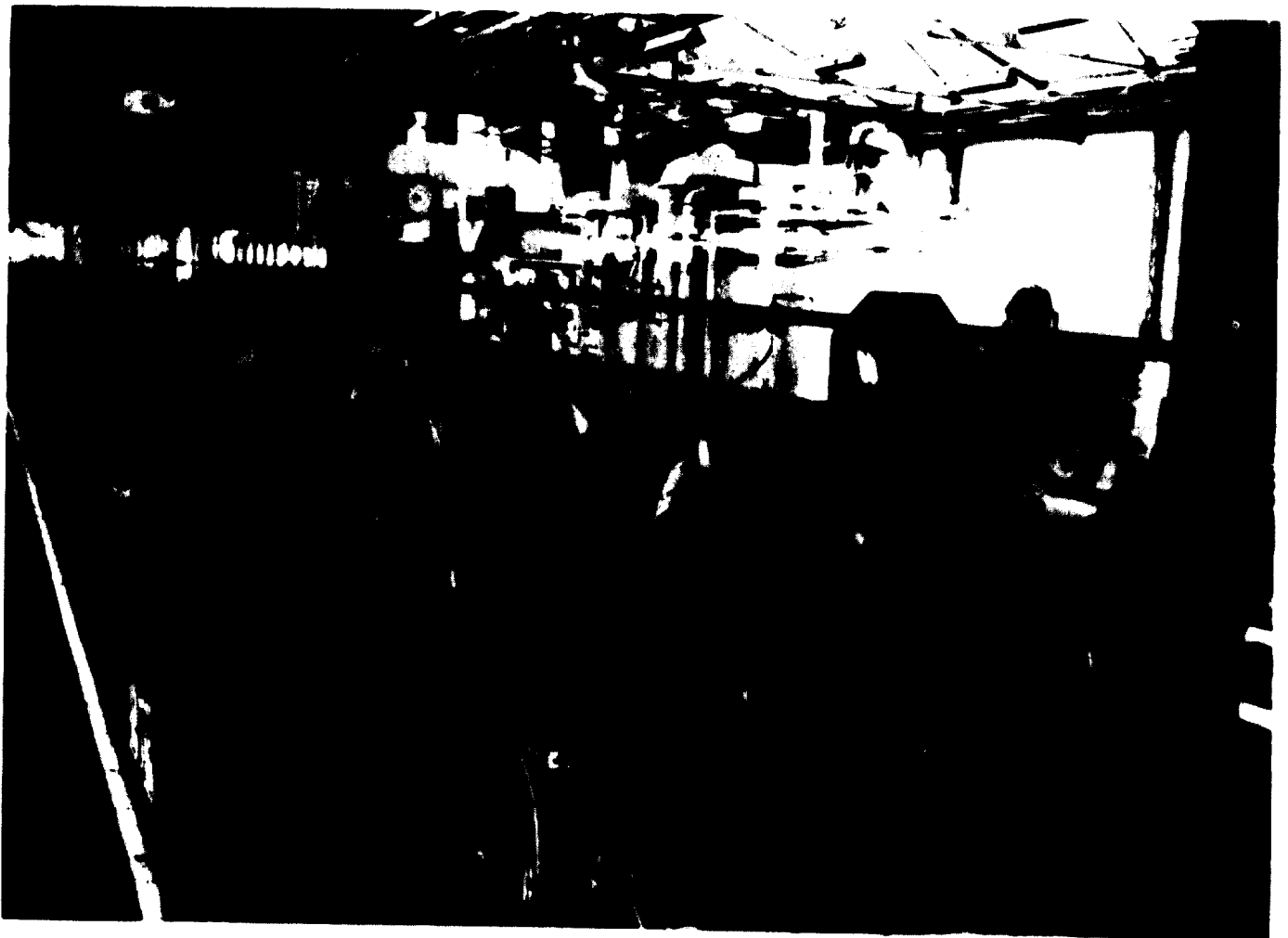
	Large-scale industry	Medium-scale industry	Small-scale industry	Total
Millions of bolivares				
A. Gross value of production	292.7	294.8	278.5	866.0
35. Metal products	97.6	56.9	52.6	207.1
36. Machinery	—	11.7	8.2	19.9
37. Electrical equipment	8.4	93.5	46.4	148.3
38. Transport equipment	186.7	132.7	171.3	490.7
B. Value added	85.2	141.8	160.9	387.9
35. Metal products	47.4	28.4	24.0	99.8
36. Machinery	6.2	4.4	10.6
37. Electrical equipment	2.8	36.4	24.6	63.8
38. Transport equipment	35.0	70.8	107.9	213.7
Bolivares per annum				
C. Value added per operative	40,242	28,029	17,865	23,978
Thousands of bolivares				
D. Fixed capital per operative	31.3	18.1	11.8	16.3

Source: CORDIPLAN, Industrial Survey 1961.

large a proportion is represented by transport material—more than 55 per cent in terms both of gross value of production and of value added. This branch is made up of vehicle assembly plants which can be classified among the large-scale and medium-scale industrial establishments, and small and medium-sized repair and maintenance workshops. The former constitute a primary activity using a very low proportion (not more than 10 per cent) of domestically-manufactured parts, most of which are not products of the metal-transforming industries. Consequently, in terms of value added the contribution made by these plants in the aggregate is very small, and does not amount to 20 per cent of the value of the vehicles assembled. The main activity of the other establishments in this branch is the servicing and maintenance of motor vehicles. A similar situation, on a more limited scale, is to be found in the manufacture of electrical equipment, where the enterprises assembling radio sets and other household appliances, and those providing maintenance services and installing electrical fittings, show a heavy incidence. In this group, however, there are sizable industrial establishments engaged in the manufacture of steel-reinforced electric cables and accumulators. The group producing non-electrical machinery is almost negligible, with an output slightly exceeding 2 per

cent of the whole sector's, and here too the great majority of the establishments concerned are not manufacturing enterprises in the proper sense of the term. The oldest and most important metal-transforming industries in Venezuela are those in the metal products group. Outstanding among them are the plants manufacturing metal structures, wire products and other goods for the construction sector. Their installation was motivated by the fact that these lines of manufacture do not require highly skilled labour. Because of this structure of production in the existing industry, productivity and capital-density indexes and other production ratios deducible from the figures given are of little significance, and hardly applicable as a means of quantifying installed production potential and its future prospects. Similarly, the machine-tool inventory at the industry's disposal displays the usual characteristics of an activity primarily concerned with metal-transforming services: a high proportion of metal-forming machines and only a very few cutting machine-tools, mainly of the simplest all-purpose type. Accordingly, there is a shortage of manpower at various levels of skill, and this lack may constitute a serious obstacle to the development of the metal-transforming sector.

All this clearly testifies to the structural weakness and



Tractor-manufacturing plant located on the outskirts of Córdoba, Argentina

under-development of Venezuela's metal-transforming industry. Growth prospects are closely linked to the establishment of new enterprises whose characteristics and structure fit them for definitely productive activities. In

this connexion, the contribution of the existing industry, with its marked predominance of service and maintenance workshops and metal-transforming activities, will be very limited.

ANALYSIS OF IMPORTS

SINCE THE DOMESTIC metal-transforming industry plays only a small part in the satisfaction of consumer demand, a study of imports (trends, volumes, types of goods imported, etc.) is tantamount to a survey of consumption itself in Venezuela.

The basic data used for the present analysis are those published in the Venezuelan foreign trade bulletins. But in order to evaluate the trends followed over a reasonable length of time (about ten years), the foreign trade figures had to be retabulated, because in 1959 a new tariff code came into effect which introduced, *inter alia*, changes in the nomenclature and classification of products, causing a hiatus in the direct comparability of the data published. For that purpose, the International Standard Industrial Classification (ISIC) was adopted, and this procedure, besides facilitating the reconstruction of the desired ten-year series, opened up the possibility of making international comparisons and relating import figures to the data for the existing industry, which had been classified in the same way.

The results of this tabulation are presented in table 4, which also includes, for illustrative purposes, data on the basic metal products corresponding to ISIC Group 34.

This table and the supplementary figure show the evolution of Venezuela's imports of products of the metal-transforming industries, which is characterized by two clearly demarcated phases. In the first, a sharp upward trend in both volume and value was registered, reaching its peak in 1957; and in the second, imports dropped abruptly to levels which in 1962 were lower than those attained in 1952, in terms of tonnage. In terms of national currency, the increase in value from 1960 onwards is largely the result of the devaluation of the bolivar. The trends in these two periods are consonant with the country's capacity to import and they run closely parallel to it. During this decline in Venezuela's external purchasing power the first industrial promotion measures were adopted: imports were restricted, customs duties on final goods were increased, and intermediate products and production equipment were granted exemption. Little advantage was taken of these incentives by the metal-transforming industry, and the import substitution lines that developed, although significant as efforts, were limited in comparison with total imports and with the opportunities created for the establishment of new productive activities.

In consequence of these promotional measures, a structural change can be noted from 1957 in imports of products of the metal-transforming industry, stemming not only

from the new metal-transforming activities but also—and perhaps in greater proportion—from the lines of manufacture undertaken in the rest of the industrial sector. Up to that year the composition of the imports in question had been fairly constant with respect to each of the metal-transforming groups' relative share in the total (in terms both of weight and of value), whereas it has undergone radical changes in recent years, as can be seen in table 5.

Thus, for example, ISIC Group 35 (manufacture of metal products) has come to account for a high proportion in terms of volume—despite the substantial import, substitution efforts made in respect of metal structures and wire products—mainly owing to the marked expansion of demand for containers deriving from the development of the food-processing industry. Conversely, the slackening of activity in the petroleum and construction sectors has reduced imports of machinery and, consequently, the relative significance of ISIC Group 36, despite the increases observable in imports of tractors and of metal-working and textile machinery. In the other major groups, the restrictions imposed on imports of durable consumer goods did not so much modify their incidence as bring about changes in the internal structure of the groups, final goods being superseded by imports of intermediate products.

In absolute terms, and measured by weight, imports of metal products (group 35) increased by 25 per cent during the period under consideration, and those of electrical equipment (group 37) by 12 per cent; those of machinery and transport material, in contrast, decreased by about 27 per cent and 33 per cent, respectively. The aggregate result of these variations in 1962 was a reduction of about 10 per cent in the tonnage imported, which implies that *per capita* consumption in that year amounted to practically 39 kilogrammes, almost 40 per cent less than in 1952. The *per capita* value of imports stood at approximately 60 dollars, which is not an unduly high figure for a country with Venezuela's characteristics. These statistics to some extent bear witness to the import substitution process carried out in the metal-transforming sector. The products whose manufacture was undertaken were the simplest, with low unit prices; the average unit price of imports rose from \$1.00 per kilogramme to about \$1.50 in 1962.

Accordingly, 1962 would seem to have been a year in which import volumes were low on the whole, although not excessively so. Structural changes made their appearance as a result of imports of products of the metal-trans-

Table 4
 VENEZUELA: IMPORTS OF PRODUCTS OF THE METAL-TRANSFORMING INDUSTRY, 1952-1962
 (Volume in thousands of tons and values in millions of bolivares)

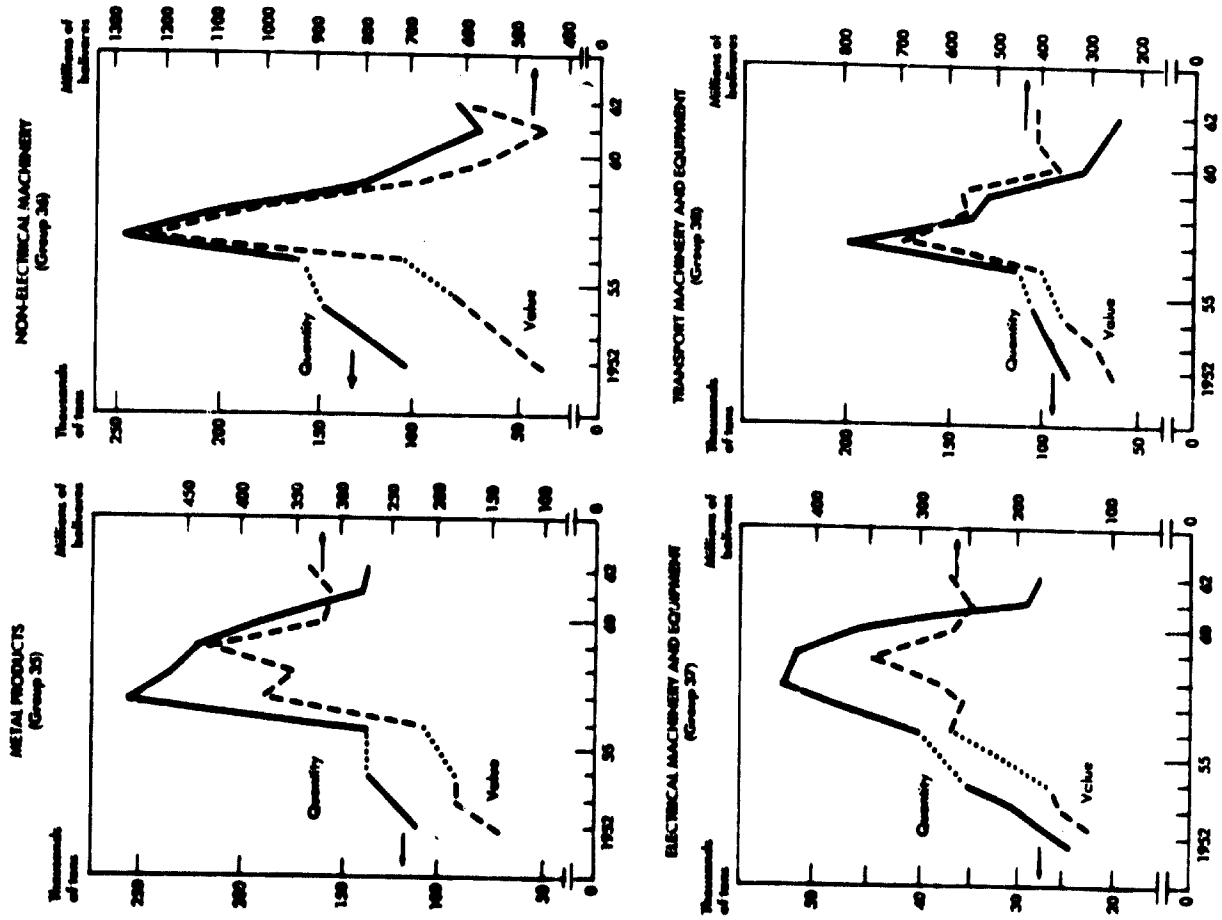
Group	Description	1952		1953		1957		1961		1962	
		Volume	Value	Volume	Value	Volume	Value	Volume	Value	Volume	Value
34.	Basic metal industries.....	401.5	311.3	397.8	282.6	1,339.6	1,117.5	274.7	274.1	350.3	265.6
341	Basic iron and steel industries.....	387.9	271.3	383.6	241.2	1,318.8	1,052.0	255.2	200.7	334.2	218.8
	Basic non-ferrous metal industries.....	13.6	40.0	14.2	41.4	20.8	65.5	19.5	46.4	16.1	46.8
35.	Manufactures of metal products.....	111.0	148.0	125.3	187.4	258.3	380.9	141.3	312.3	139.7	338.0
A	Manufacture of metal containers.....	16.4	22.2	16.7	24.1	13.5	21.8	48.5	48.3	68.5	65.2
B	Manufacture of hand tools, hardware and the like.....	5.2	22.6	6.5	31.2	9.5	54.8	12.9	84.9	12.2	101.7
C	Manufacture of metal structures, including welding.....	52.2	53.9	54.7	63.3	127.0	147.5	18.6	38.3	10.8	30.9
D	Electro-plating, engraving, nickel-plating, etc., of metal products.....	0.1	0.2	0.1	0.2	0.1	0.4	1.7	3.1	2.2	4.1
E	Manufacture of wire products.....	21.2	10.8	30.1	22.8	38.4	36.8	29.5	29.2	15.9	25.0
F	Manufacture of metal products, n.e.s.....	15.9	38.3	17.2	45.8	69.8	119.6	30.1	108.5	30.1	111.1
36.	Manufactures of non-electrical machinery.....	108.8	465.5	129.1	521.1	246.2	1,241.5	67.5	446.9	79.1	596.2
A	Tractors and spare parts therefor.....	1.7	5.7	2.7	8.7	22.0	85.0	5.9	28.5	9.8	49.4
B	Agricultural machinery.....	12.4	35.6	18.7	48.0	16.0	48.4	5.5	13.1	6.4	26.4
C	Machinery for working metals.....	1.0	0.8	0.3	0.4	0.7	1.1	8.5	50.5	9.3	50.2
D	Machinery for mining, civil construction and basic industries, non-electrical.....	17.5	83.1	20.6	93.4	52.4	265.4	12.7	84.3	10.2	95.6
E	Pumps for liquids and gases.....	2.6	11.5	2.6	11.3	6.1	31.9	5.1	35.8	6.5	53.0
F	Wood-working machinery ^a	—	—	—	—	—	—	0.5	3.4	0.6	4.6
G	Textile machinery.....	3.0	15.1	4.8	15.6	4.4	23.3	6.1	37.9	6.5	54.4
H	Office machines.....	0.4	10.0	0.6	12.6	1.4	25.1	2.3	37.8	0.8	25.7
I	Other machinery, apparatus and mechanical measuring instruments.....	70.2	303.7	78.8	331.1	143.2	761.3	20.9	155.6	29.0	236.9
37.	Manufactures of electric machinery, apparatus, accessories and articles.....	24.7	122.5	30.0	158.0	48.3	259.8	28.9	253.1	27.7	275.8
A	Machinery for electric power generation and transformation.....	5.7	26.9	6.9	31.0	11.9	54.3	5.4	31.7	5.3	40.4
B	Apparatus and material for electric power transmission and distribution.....	6.2	22.2	6.9	24.1	13.7	41.6	4.6	23.8	3.9	28.6
C	Electric motors ^a	—	—	—	—	—	—	0.9	6.5	1.1	8.2
D	Radio, television and communications apparatus and spare parts therefor.....	2.1	30.4	3.8	48.7	6.1	81.3	4.6	95.2	4.6	90.5
E	Electrical equipment for vehicles.....	0.2	2.2	0.2	1.8	0.2	3.0	1.4	14.2	1.7	20.5
F	Primary cells, batteries, accumulators and lamps.....	5.5	19.2	5.5	19.6	6.3	31.3	6.3	26.2	6.2	30.6
G	Gramophones and tape-recorders.....	0.7	8.9	0.8	8.9	1.3	18.6	0.7	12.3	0.7	11.7
H	Electrical apparatus for household use.....	4.3	12.7	5.9	23.9	8.8	29.7	1.7	16.9	1.6	18.2
I	Machinery and apparatus for industrial uses ^a	—	—	—	—	—	—	3.3	26.3	2.6	27.1
38.	Manufactures of transport equipment.....	89.8	266.4	93.8	293.3	198.5	694.4	69.6	415.0	59.5	417.2
381	Ship-building and repairing.....	13.2	19.8	6.2	10.1	62.8	139.5	0.2	0.6	0.1	0.3
382	Manufacture and repair of railroad equipment....	7.9	6.8	14.2	15.3	24.6	43.4	1.9	5.6	1.0	3.7
383	Manufacture and assembly of motor vehicles....	64.4	217.9	69.2	236.7	104.5	435.8	63.0	344.7	52.8	360.8
385	Manufacture and repair of motorcycles and bicycles.....	1.6	6.2	2.6	9.9	1.7	6.6	2.2	9.2	2.1	9.9
386	Assembly and repair of aircraft.....	0.3	9.0	0.5	18.0	0.8	55.4	0.6	48.3	0.7	31.5
389	Manufacture of transportation equipment, n.e.s.....	1.9	6.7	1.1	3.3	4.1	13.7	1.7	6.6	2.8	11.0
39.	Miscellaneous manufacturing industries ^b	6.9	75.0	7.2	86.3	13.3	184.5	3.4	110.1	3.0	104.2
391	Professional instruments, scientific measurement and control instruments.....	4.3	34.9	4.8	40.2	9.8	104.4	2.0	40.7	1.8	47.8
393	Manufacture and repair of clocks and watches....	0.3	5.9	0.5	7.2	0.5	7.9	0.1	16.3	0.1	15.9
	Total groups 35, 36, 37, 38 and 39 (excluding 34)	340.7	1,077.4	385.4	1,246.1	764.6	2,761.1	310.7	1,537.4	309.0	1,731.4

Source: Data obtained from Venezuela's *Boletines de Comercio Exterior*, and reclassified by ECLA.

^a A new tariff schedule has been in force since 1959, introducing some changes in nomenclature as reflected in this classification of imports. The lack of figures for the years prior to 1959 means that although Venezuela no doubt imported these articles, they were recorded under other items.

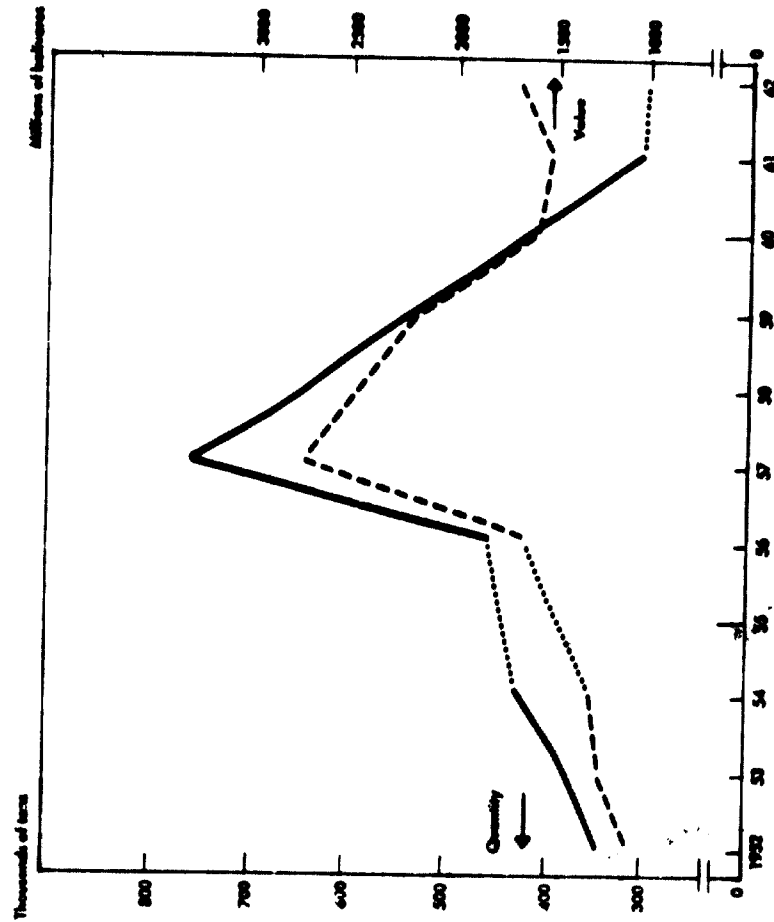
^b Those figures represent total imports of products of the metal-transforming industry that may be included in this group. Only two sub-items shown are of interest to the present study.

Figure II
VENEZUELA: IMPORTS OF PRODUCTS OF THE METAL-TRANSFORMING INDUSTRIES



Source: Table 4.

Figure I
VENEZUELA: IMPORTS OF PRODUCTS OF THE METAL-TRANSFORMING INDUSTRIES: TOTAL FOR GROUPS 35-36-37-38-39
Normal scale



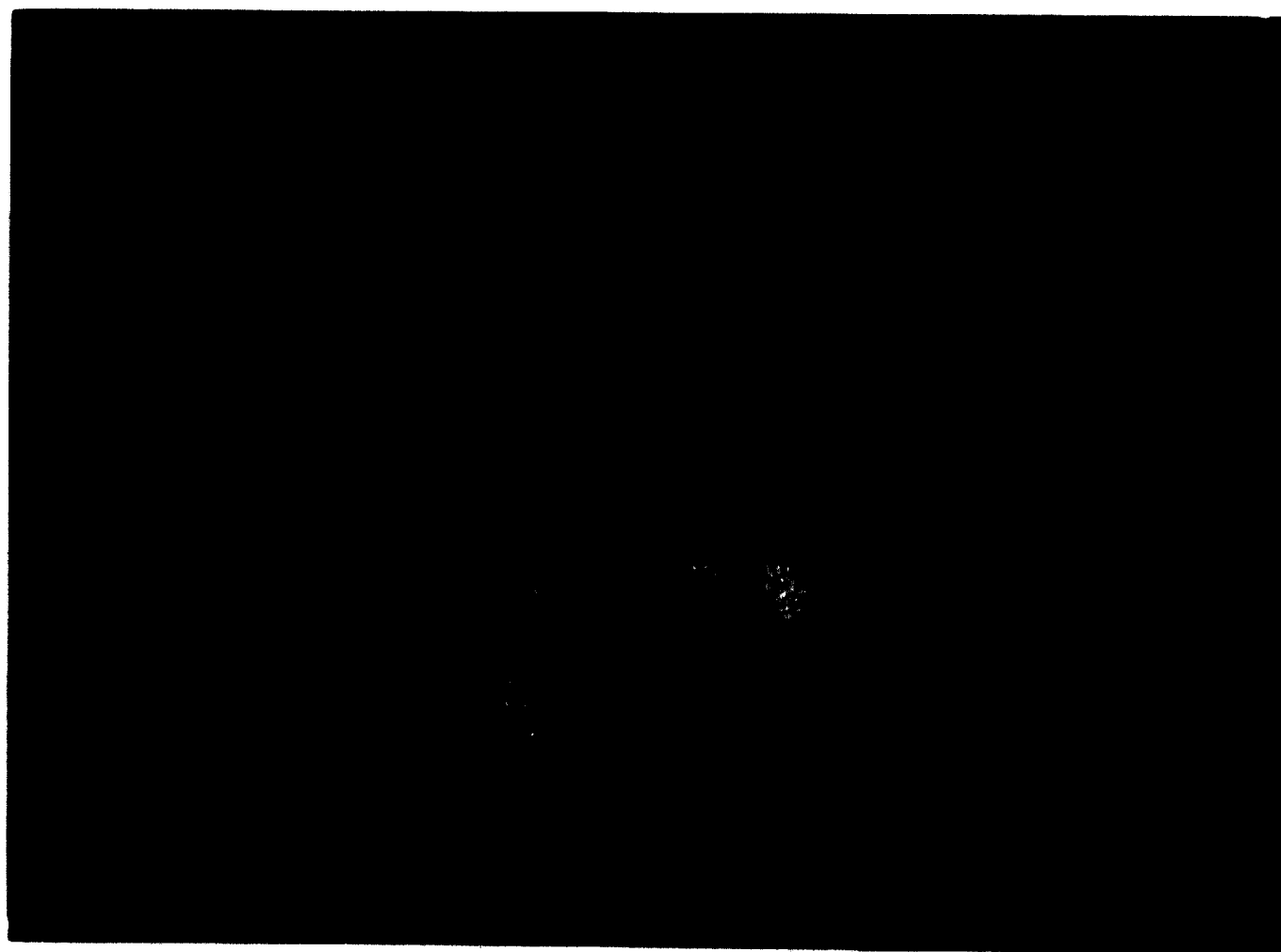
Source: Table 4.

Table 5
 VENEZUELA: COMPOSITION OF IMPORTS OF PRODUCTS OF THE METAL-TRANSFORMING INDUSTRY
 (Percentages)

	1952		1953		1957 <i>In terms of:</i>		1961		1962	
	Weight	Value	Weight	Value	Weight	Value	Weight	Value	Weight	Value
Metal products (35)	32.6	13.7	32.5	15.0	33.8	19.8	45.5	20.3	45.2	19.5
Non-electrical machinery (36)	31.9	43.2	33.5	41.8	32.2	45.0	21.7	29.1	25.5	34.4
Electrical machinery and equipment (37) ..	7.2	11.4	7.8	12.7	6.3	9.4	9.3	16.5	9.0	15.9
Transport equipment (38)	26.2	24.7	24.3	23.5	26.0	25.2	22.4	27.0	19.3	24.1
Other manufactures, n.e.s. (39)	2.1	7.0	1.9	7.0	1.7	6.6	1.1	7.1	1.0	6.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

forming industries deriving from the development of other industrial activities. This circumstance, combined with the fact that a fairly full list of imports was available for the year in question, determined the adoption of 1962 as the base year for analysis of substitution possibilities. Observations relating to volumes which appear to warrant the installation of specific lines of manufacturing activity may be regarded as on the safe side in respect to the real size of the market.

In a country such as Venezuela, with a metal-transforming industry whose characteristics and structure are of a primary type, service and maintenance activities predominate. Therefore, with a limited knowledge of metal-transforming techniques and processes, the choice of an import substitution programme is closely linked to the actual development of the metal-transforming sector. The selection criteria should, in the early stages particularly, attach more importance to the latter than to the effect on



Partial view of the assembly line at the Fiat Concord plant, Córdoba, Argentina

the balance of payments itself, and even considerations relating to internal manufacturing costs will have to play a secondary role in the adoption of decisions. Consequently, the primary function of the products chosen for the initial and immediate phase of the import substitution programme must be to act as "catalysts" in the metal-transforming industry's development process by promoting the installation of enterprises that will consolidate existing industry, will raise its technological level and will fill up the lacunae at present observable in manufacturing processes and in the training of manpower. The aggregate result will be a sound basis established upon which the metal-transforming industry can undertake more complex lines of manufacture in the future, and thus broaden its prospects in the domestic and world markets. Naturally, this function is not confined to the selected products themselves; an important part is also played by proper methods of organizing and executing the manufacturing programme, in the sense of determining the most appropriate plant sizes and geographical locations, establishing the desirability of grouping some enterprises together because their production processes are complementary or their skilled labour requirements similar, and so forth. These matters will be discussed in later sections of the present study. They have only been introduced here in order to provide an adequate frame of reference for the procedure followed in studying import substitution possibilities.

The foreign trade data available for 1962 are broken down in sufficient detail to permit a preliminary analysis of substitution possibilities, although not far enough for the situation at the product level to be specifically defined. To that end some field work must be done later in order to identify the products singled out as offering attractive substitution prospects.

As mentioned earlier, the essential aim in the first phase of the substitution process should be to introduce a number of manufacturing processes and techniques of basic importance for the development of metal-transforming activities. With this in mind, the imports effected in 1962 were reclassified as follows according to the manufacturing processes involved:

1. *Containers and tinware* (including lithography and painting of same). Chiefly products whose manufacture entails sheet-cutting by means of presses, guillotine cutters or shears, and shaping of containers in special flanging and sealing machines; and, in addition, simple items mass-produced by stamping with multiple cutting and shaping dies;

2. *Hot-forged and hot-pressed products*. Hot forging or stamping is the main process in the manufacture of these products; finishing adds very little to their value;

3. *Wire products*. Goods whose manufacturing processes are characteristic of the activity in question and are usually carried out by special machinery;

4. *Small products, primarily stamped*. Products shaped by pressing, cutting, drilling and bending. Most of them are simple parts, which do not require high tolerances, and finishing of which is usually confined to polishing, painting or galvanizing.

5. *Small products and parts, primarily machined*. Products which are manufactured mainly by machining with metal-cutting machine-tools (lathes, milling-machines, planers and shapers, etc.), which require certain working tolerances, and which can be made in short series;

6. *Boiler shop products and metal structures*. All those products for which plate, tubes and profiles are used as raw materials, and which are manufactured essentially by means of bending in presses and rollers, cutting, and joined either by welding or riveting;

7. *Sheet-metal work, with or without metal spinning*. Products manufactured from fine sheet-metal by stamping and bending processes.

8. *Light machinery and machine parts*. Products obtained primarily by machining, but calling for strict quality controls and greater precision.

9. *Medium-weight and heavy machinery and machine parts*. Heavier machined products, usually made individually;

10. *Other products*. All those in which no specific process predominates their manufacture.

In addition to the processes listed above, others should be developed which are equally essential for metal-transforming activities in respect to the manufacture of intermediate products, such as castings, for example. They will be identified and their relative importance for the substitution programme will be shown when the balance of the requisite raw materials is drawn up.

Table 6 presents the results of this classification by processes, and shows that for each process Venezuela's current imports include a number of items for which domestic production possibilities would be worth investigating in the initial phase under discussion. Of course, this classification merely serves as a guide to the main process in the manufacture of the product concerned, which may also entail other metal-transforming processes, not of paramount importance, but nevertheless able to affect the decision as to whether domestic production of specific goods is or is not recommendable. The adoption of a final decision in this respect will require additional research at the level of the products which the tariff classification includes in each tariff group. From the standpoint of manufacture, these products may present or require different conditions of production. Nevertheless, for this first analysis a few hypotheses have been tentatively adopted which permit an approximate quantification of the substitution programme and an evaluation of the inherent problems, as well as an indication of the areas in which future research might be continued profitably.

Table 6

VENEZUELA: IMPORTS, BY MAIN MANUFACTURING TECHNIQUES AND PROCESSES, 1962

Tariff schedule number	Description	Imports 1962	
		Tons	Thousands of bolivares
	<i>1. Containers and tinware</i>		
681-0701-1/2	Printed tinplate, lithographed or in sheets	69,359	68,008
699-2106-2	Tin cans, n.e.s., whether or not painted	7,215	9,120
699-2906-1	Miscellaneous metal covers	2,430	7,162
681-0701-9	Tinplate, n.e.s.	1,148	5,735
699-2906-2/10	Capsules or caps, tinned, galvanized, etc.	57,716	43,017
	Other products	724	2,401
		126	573
	<i>2. Hot-forged and hot-pressed products</i>		
699-1201-1/2	Machetes and agricultural tools, n.e.s.	25,285	173,382
699-1202	Hand tools for artisan industry	1,423	4,128
699-1203-3/5	Axes, hatchets and other hand tools, n.e.s.	2,100	17,625
699-2902-1/9	Metal chains, and parts and accessories therefor (except for ships)	238	1,912
699-2901-2/4	Springs for railway coaches and vehicles, n.e.s., and springs, n.e.s.	595	2,823
681-1304	Iron or steel fittings for tubes and pipes	1,369	3,087
732-0619	Chassis, without engines, chassis-frames and other accessories, n.e.s.	3,925	12,420
712-0101	Ploughs	10,672	109,340
	Other products	996	2,427
		3,967	19,620
	<i>3. Wire products</i>		
699-0701-1/3	Nails, staples for fencing, wire nails and insulated staples	15,849	24,942
699-0301-2	Miscellaneous steel wire products, whether or not covered	3,960	3,320
699-0802-1/4	Pins, safety-pins, hairpins, etc.	3,493	6,406
699-0401/4	Wire products of non-ferrous metals	314	2,090
699-0502/3	Metal screening and mesh	528	4,625
	Other products	1,467	2,777
		6,087	5,724
	<i>4. Primarily stamped products</i>		
699-1801-1/7	(In part) Hardware, locks and padlocks, castors for furniture and doors	7,286	55,382
699-1802/3-1/5	(In part) Locks, etc., of copper and copper alloy, aluminium and aluminium alloy	1,200	6,000
699-2916-1/7	Miscellaneous fastenings for leather goods	205	2,450
721-1907	Plugs, switches, sockets and other electrical accessories	345	4,859
699-1602	Knives, forks and spoons of iron or steel	996	8,894
721-0401-3/4	Radiotelegraphic and radiotelephonic receivers (in part)	314	2,812
732	Vehicles, manufactured or assembled (in part)	255	5,583
	Other products	3,000	15,000
		971	9,784
	<i>5. Small products and parts, primarily machined</i>		
716-1501-2/9	Taps, cocks and valves of base metal	11,381	57,414
812-0305-1/4	(In part) Hardware, locks, padlocks and castors for furniture	2,151	20,245
699-1801-1/7	(In part) Cookers, ovens, stoves and water heaters	850	4,651
699-2201-1/9	Screws, nuts, washers and other similar products, n.e.s.	391	2,551
699-0701-1 D/E	(In part) Machines and mechanical utensils, non-electric	2,819	6,741
716-1324-9 A/B	Other products	705	4,874
		4,465	18,352
	<i>6. Boiler shop products and metal structures</i>		
699-0102	Columns, pillars, towers and posts of iron or steel	10,156	31,252
699-0104-3	Girders, beams and structural shapes whether or not assembled	362	1,149
699-2101/02	Metal silos, steel tanks and receptacles	4,692	9,542
711-0101/4	Boilers for farm use, n.e.s., and parts and accessories therefor	714	1,380
716-1324-2/4	Retorts, stills, filters, etc.	1,168	7,177
711-0109	Economizers, reheaters, condensers, etc.	2,170	7,076
	Other products	105	1,022
		945	3,906

Table 6 (continued)

Tariff schedule number	Description	Imports 1962	
		Tons	Thousands of bolivares
	<i>7. Sheet-metal work, with or without metal spinning</i>	19,502	100,843
699-2102-1/9	Small tanks and receptacles, nickel-plated, enamelled, etc.	241	677
699-2103-1/19	Metal drums and tanks, with a capacity of up to 500 litres	1,218	2,505
699-2106-1/9	Boxes, casks and other containers of metal other than tinplate.	177	784
699-2201-1/9	(In part) Cookers, ovens, stoves and water heaters	4,000	17,000
699-1301/2	Cast iron kitchenware, enamelled, n.e.s.	429	1,370
699-1302	Ferrous metal ware	607	1,521
699-1401/1501	Aluminium kitchenware; tableware and household utensils of other metals	761	4,744
721-0104-1/9	Electric transformers	2,447	13,902
	Other products	9,622	58,340
	<i>8. Light machinery and machine parts</i>	40,374	249,637
715-0101	Machine-tools for working metals ^a	2,470	9,515
716-0101	Special pumps for the sale of liquid fuels	341	3,904
716-0803	Looms of all types and spare parts therefor	1,175	7,815
716-1101-2-9	Sewing-machines and spare parts therefor	2,337	18,908
714	Typewriters and other office machines	832	25,644
721-0102	Electric motors ^a	1,064	8,237
	Other machinery and machine parts	32,655	175,614
	<i>9. Medium-weight and heavy machinery and machine parts</i>	33,334	330,377
716-1318	Moulds, n.e.s., for miscellaneous materials	322	2,969
713-0101-1	Complete agricultural tractors, weighing less than 4 tons net	5,095	18,121
715-0202	Machinery for working metals, n.e.s.	1,572	15,384
716-0304-1	Well-drilling machinery	1,492	15,844
716-1501-1	Pressure regulating valves for the petroleum industry	672	6,371
716-0303	Miscellaneous lifting machinery	1,973	11,681
716-0304-9	Earth-excavating, levelling or boring machinery, fixed or mobile	558	3,541
716-0401/09	Machine-tools for working wood, bone, etc., and spare parts therefor	552	4,610
	Other products	21,098	251,856
	<i>10. Other products</i>	75,974	640,161
	Other manufactures, n.e.s., of base metal		
	Other agricultural and poultry-keeping appliances, n.e.s.; television receivers, weighing up to 50 kg.; spark-plugs; gramophones and record-players; wheel-barrow and wheel-chairs; other household utensils, n.e.s., weighing up to 15 kg.; industrial electric ovens; heating devices for riveting, gluing, welding and vulcanizing; neon signs of all types; spare parts and accessories, n.e.s., for industrial trucks; pianos and musical instruments, etc.		
	TOTAL	309,000	1,731,400

^a Although the figures include machinery and motors of all sizes, only light machinery and motors will be considered for substitution purposes.

THE IMPORT SUBSTITUTION PROGRAMME

THE PRECEDING chapters show that the existing metal-transforming industry is not in a position, either from the technical standpoint or from that of the supply of skilled labour, to embark upon a far-reaching programme, and consequently will find it hard to meet the targets set up for the sector in the National Development Plan. These assertions are borne out by foreign trade statistics, from

which it is clear that the products imported include a fairly large number of articles characteristic of the early stages of a country's metal-transforming activities. These products do not call for complex techniques, highly skilled labour, or long production series, but nevertheless, they constitute the basic nucleus for the gradual development of the sector.

The main objective of the import substitution programme is not, at this stage, to solve a balance-of-payments problem, but to establish the basic stratum that will promote the use of new manufacturing techniques and will encourage the training of manpower at the various levels of skill. Such a programme is consistent with the objectives indicated in the National Plan, but it can hardly, in such a short space of time, be expected to serve as a means to attain the targets established for 1966.

Given the characteristics of the existing industry and the objectives described, this phase of development should be carried out mainly through the installation of medium-scale and small-scale enterprises. Their organization and operation is not beyond the country's incipient entrepreneurial capacity, and also this procedure would facilitate the implementation of the programme, would foster widespread diffusion of metal-transforming technology and would train a large number of skilled workers.

Concerning the actual choice of the products to be included in this initial substitution programme, a preliminary selection along the following lines was made:

(a) Comparatively simple metal-transforming products that can be manufactured by means of relatively labour-intensive procedures;

(b) Products which have manufacturing processes that are not yet familiar to Venezuela, or those requiring perfecting, and that are considered indispensable for raising the technological level of the industry can be introduced through medium-scale and small-scale enterprises;

(c) Products that are rather difficult to manufacture, but are essential for the integration of other activities, such as inputs in more complex branches of the metal-transforming industry already existing or to be installed in the near future.

By applying the above criteria to each of the 1962 import groups, the whole programme was established; it is sub-divided in table 7, into the ten groups of manufacturing processes under which imports were classified. The volume of the substitution possibilities considered to be attractive amounts to 77,540 tons, and their value to 398.1 million bolivares, which implies a unit value of about \$1.30 per kilogramme. This potential output would correspond to about 25.1 per cent of total imports of products of the metal-transforming industries in terms of weight, and 23 per cent, about 100 million dollars, in terms of value.

The attainment of these production targets will call for a substantial effort on the part of both the agencies responsible for the implementation of the programme and of the industrialists taking part in it; but no very great difficulties should be encountered if a period of about four or five years is allowed for the purpose, and the programme is properly graduated and co-ordinated.

Unquestionably, one of the factors determining the length of time required and the scheduling of the programme is the training of the labour force. In this connexion, the list of imports that could be replaced by domestic production affords ample room for the initiation

of operations permitting the training of skilled workers. For example, it includes products whose manufacture could be started at once (containers and tinware, wire products, screws and nuts, etc.), as in their case neither technological questions nor the uses to which they will be put involve any major complications or dependence on other undertakings. The other extreme is probably represented by the construction of certain machines and parts which, although not requiring complex techniques, do entail the development of other activities and the training of more highly skilled labour.

As table 7 shows, the manufacturing lines that could be tackled almost immediately and would yield the outputs postulated in a relatively short space of time, are those classified in the first seven groups, which account for approximately 62 per cent and 44 per cent of the programme outlined, in terms of weight and value, respectively. Another inference consistent with all that has been previously said is that the first manufacturing activities to be undertaken will produce goods to replace import items whose unit value averages about \$1.00 per kilogramme, i.e., simple products whose manufacture requires only minimum technical demands. On the other hand, those produced towards the end of the period will be substituted for more highly processed goods whose price per kilogramme will probably be in the neighbourhood of \$2.00. Of course, these differences in degree of manufacturing complexity (and consequently differences in unit price) are found



Blast furnace operator working at slag-extraction

Table 7

VENEZUELA: IMPORT SUBSTITUTION PROGRAMME

Tariff schedule number	Description	Volume		Value	
		Tons	Percentage ^a	Thousands of bolivares	Percentage ^a
	<i>1. Containers and tinware</i>				
681-0701-1/2	Printed tinplate lithographed or painted	9,550	13.8	19,560	28.7
699-2106-2	Tin cans, n.e.s., whether or not painted	4,328	60	5,472	60
699-2906-1	Miscellaneous metal covers	1,944	80	5,730	80
681-0701-9	Tinplate, n.e.s.	918	80	4,588	80
699-2906-2/10	Capsules or caps, tinned, galvanized, etc.	1,731	3	1,720	4
	Other products	579	80	1,921	80
		50	40	129	22
	<i>2. Hot-forged and hot-pressed products</i>				
699-1201-1/2	Machetes and agricultural tools, n.e.s.	8,221	32.5	34,982	20.1
699-1202	Hand tools for artisan industry	213	15	619	15
699-1203-3/5	Axes, hatchets and other hand tools, n.e.s.	315	15	2,644	15
699-2902-1/9	Metal chains, and parts and accessories therefor (except for ships)	36	15	287	15
699-2901-2/4	Springs for railway coaches and vehicles, n.e.s., and springs, n.e.s.	288	50	1,412	50
681-1304	Iron or steel fittings for tubes and pipes	1,232	90	2,778	90
732-0619	Chassis, without engines, chassis-frames and other accessories, n.e.s.	3,240	80	9,836	80
712-0101	Ploughs	1,067	10	10,934	10
	Other products	298	30	728	30
		1,532	38	5,744	29
	<i>3. Wire products</i>				
699-0701-1/3	Nails, staples for fencing, wire nails and insulated staples	3,800	23.9	6,500	26.2
699-0301-2	Miscellaneous steel wire products, whether or not covered	2,376	60	1,992	60
699-0802-1/4	Pins, safety-pins, hairpins, etc.	349	10	641	10
699-0401/4	Wire products of non-ferrous metals	157	50	1,045	50
699-0502/3	Metal screening and mesh	158	30	1,387	30
		760	50	1,435	51
	<i>4. Primarily stamped products</i>				
699-1801-1/7	(In part) Hardware, locks and padlocks, castors for furniture and doors	3,250	44.6	16,160	28.7
699-1802/3-1/5	(In part) Locks, etc., of copper and copper alloy, aluminium and aluminium alloy	300	25	1,500	25
699-2916-1/7	Miscellaneous fastenings for leather goods	50	25	610	25
721-1907	Plugs, switches, sockets and other electrical accessories	276	80	3,887	80
699-1602	Knives, forks and spoons of iron or steel	498	50	4,447	50
721-0401-3/4	Radiotelegraphic and radiotelephonic receivers (in part)	88	25	703	25
732	Vehicles, manufactured or assembled (in part)	51	20	1,116	20
	Other products	1,500	50	3,000	20
		487	50	897	9.1
	<i>5. Small products and parts, primarily machined</i>				
716-1501-2/9	Taps, cocks and valves of base metal	5,460	47.9	25,059	43.6
812-0305-1/4	(In part) Hardware, locks, padlocks and castors for furniture	1,921	80	16,196	80
699-1801-1/7	(In part) Cookers, ovens, stoves and water heaters	255	30	1,395	30
699-2201-1/9	Screws, nuts, washers and other similar products, n.e.s.	274	70	1,786	70
699-0701-1 D/E	(In part) Machines and mechanical utensils, non-electric	1,610	50	3,371	50
716-1324-9 A/B	Other products	141	20	975	20
		1,259	28	1,336	7
	<i>6. Boiler shop products and metal structures</i>				
699-0102	Columns, pillars, towers and posts of iron or steel	5,900	58.1	15,948	50.8
699-0104-3	Girders, beams and structural shapes whether or not assembled	254	70	805	70
699-2101-02	Metal silos, steel tanks and receptacles	3,474	80	7,534	80
711-0101/4	Boilers for farm use, n.e.s., and parts and accessories therefor	714	100	1,380	100
716-1324-2/4	Retorts, stills, filters, etc.	350	30	2,153	30
711-0109	Economizers, reheaters, condensers, etc.	651	30	2,123	30
	Other products	53	50	511	50
		404	42	1,442	37

Table 7 (continued)

Tariff schedule number	Description	Volume		Value	
		Tons	Percentage ^a	Thousands of bolivares	Percentage ^a
	<i>7. Sheet-metal work, with or without metal spinning</i>	11,550	59.2	57,522	53.2
699-2102-1/9	Small tanks and receptacles, nickel-plated, enamelled, etc.	193	80	542	80
699-2103-1/19	Metal drums and tanks, with a capacity of up to 500 litres ...	609	50	1,252	50
699-2106-1/9	Boxes, casks and other containers of metal other than tinplate	106	60	470	60
699-2201-1/9	(In part) Cookers, ovens, stoves and water heaters	2,800	70	11,900	70
699-1301/2	Cast iron kitchenware, enamelled, n.e.s.	304	70	950	70
699-1302	Ferrous metal ware	420	70	1,065	70
699-1401/1501	Aluminium kitchenware; tableware and household utensils of other metals	532	70	3,321	70
721-0104-1/9	Electric transformers	1,468	60	8,340	60
	Other products	5,118	54	29,673	50.9
	<i>8. Light machinery and machine parts</i>	13,367	32.7	108,054	43.6
715-0101	Machine-tools for working metals ^b	123	5	475	5
716-0101	Special pumps for the sale of liquid fuels	170	50	1,952	50
716-0803	Looms of all types and spare parts therefor	352	30	2,344	30
716-1101-2/9	Sewing-machines and spare parts therefor	985	42	8,026	42
714	Typewriters and other office machines	166	20	5,129	20
721-0102	Electric motors ^b	212	20	1,647	20
	Other machinery and machine parts	11,359	35	88,481	50
	<i>9. Medium-weight and heavy machinery and machine parts</i>	9,532	28.5	75,478	22.8
716-1318	Moulds, n.e.s., for miscellaneous materials	129	40	1,188	40
713-0101-1	Complete agricultural tractors, weighing less than 4 tons net	254	5	906	5
715-0202	Machinery for working metals, n.e.s.	78	5	769	5
716-0304-1	Well-drilling machinery	298	20	3,168	20
716-1501-1	Pressure regulating valves for the petroleum industry	201	30	1,911	30
716-0303	Miscellaneous lifting machinery	394	20	2,336	20
716-0304-9	Earth-excavating, levelling or boring machinery, fixed or mobile	111	20	708	20
716-0401/09	Machine-tools for working wood, bone etc., and spare parts therefor	109	20	922	20
	Other products	7,958	38	63,570	25
	<i>10. Other products</i>	6,910	9.1	38,838	6.1
	Other manufactures, n.e.s., of base metal; other agricultural and poultry-keeping appliances, n.e.s.; television receivers, weighing up to 50 kg.; spark-plugs; gramophones and record-players; wheelbarrows and wheelchairs; other household utensils, n.e.s., weighing up to 15 kg.; industrial electric ovens; heating devices for riveting, gluing, welding and vulcanizing; neon signs of all types; spare parts and accessories, n.e.s., for industrial trucks; pianos and musical instruments, etc.				
	TOTAL	77,540	25.1	398,101	23.0

^a Relates to figures for 1962.

^b Light machinery and motors only.

within each of the ten groups, but they are less marked, and the price per kilogramme is linked more closely to the value of the raw material than to the manufacturing process itself.

The outline under consideration was drawn up after each of the 1962 import groups had been carefully analysed and the situation in the existing industry had been studied. Owing to the heterogeneity displayed by many tariff groups with respect to products, processes, quality standards, etc., the percentages adopted must be checked at a

later stage, when the actual composition of the groups has been ascertained in detail, and manufacturing projects can be established at the level of specific products. The criteria followed in determining the percentages for each process group were approximately those described below.

1. *Containers and tinware.* Consideration of the item "Printed tinplate, lithographed or painted" (681-0701/1/2) shows that the volume imported is large enough to justify the installation of the lithographic equipment, ovens, etc., required for this line of manufacture. A reasonable propor-

tion for replacement by domestic production is thought to be 60 per cent, so that initially operations can be started on the basis of the simpler printing processes. In the case of "tinplate containers" (699-2106/2), a higher figure of 80 per cent was adopted, since their manufacture presents no major difficulties and mass production is possible. The composition of this group of imports must be ascertained, however, since in the case of certain types of containers domestic production may not be an attractive proposition. The item described as "tinplate, unspecified" (681-0701-9) is known to include parts which can be made in Venezuela, such as tin foil ready-cut to measure for the manufacture of a specific container. Here a very low percentage was adopted, merely in order to prevent the exclusion of this item on which research is recommended. The proportions of import substitution fixed for this group averaged 13.8 per cent in terms of weight and 28.7 per cent in terms of value.

2. *Hot-forged and hot-pressed products.* In the case of this group, it is recommended that 32.5 per cent of the total weight of imports and 20.1 per cent of their value should be replaced by domestic production. This implies substitution in respect of the simpler types of product. Where "hand-tools for artisan industries" (699-1202) are concerned, import substitution is envisaged for only 15 per cent, because of the wide variety of products included under this head, and it is suggested that domestic production should be confined to the simpler articles imported in the largest quantities, such as hoes, spades, and similar items. But for "iron and steel accessories for tubes and pipes" (681-1304) a proportion as high as 80 per cent was adopted, in view of the simplicity of the manufacturing process, the feasibility of fairly long production series, and the stability of the consumer market, which is constituted mainly by the petroleum industry. Conversely, a figure as low as 10 per cent was assigned to "chassis without engines, chassis-frames and other accessories n.e.s." (732-0619), because in the case of these items production series would be short, as so many different types of vehicles are involved and therefore their manufacture would be inadvisable because of the heavy investment in tooling required.

3. *Wire products.* For this group, whose manufacturing processes and techniques are already being introduced in Venezuela, percentages were adopted which will be easy to attain or even to surpass, especially for "nails, staples, wire nails etc." (699-0701-1/3) and "pins, hairpins, etc." (699-0802-1/4). "Metal meshes" (699-0502/3) were put down for 50 per cent, because of possible competition from plastic fabrics, woven or non-woven.

4. *Small products, primarily stamped.* In this group, import substitution possibilities relate for the most part to simple products, as is suggested by the average percentages worked out in terms of weight and value. The articles classified under this heading are generally manufactured in long series, with costly tools, and consequently the production of a wide range of types would not be feasible, thus the percentages adopted are low. Exceptions to this rule are

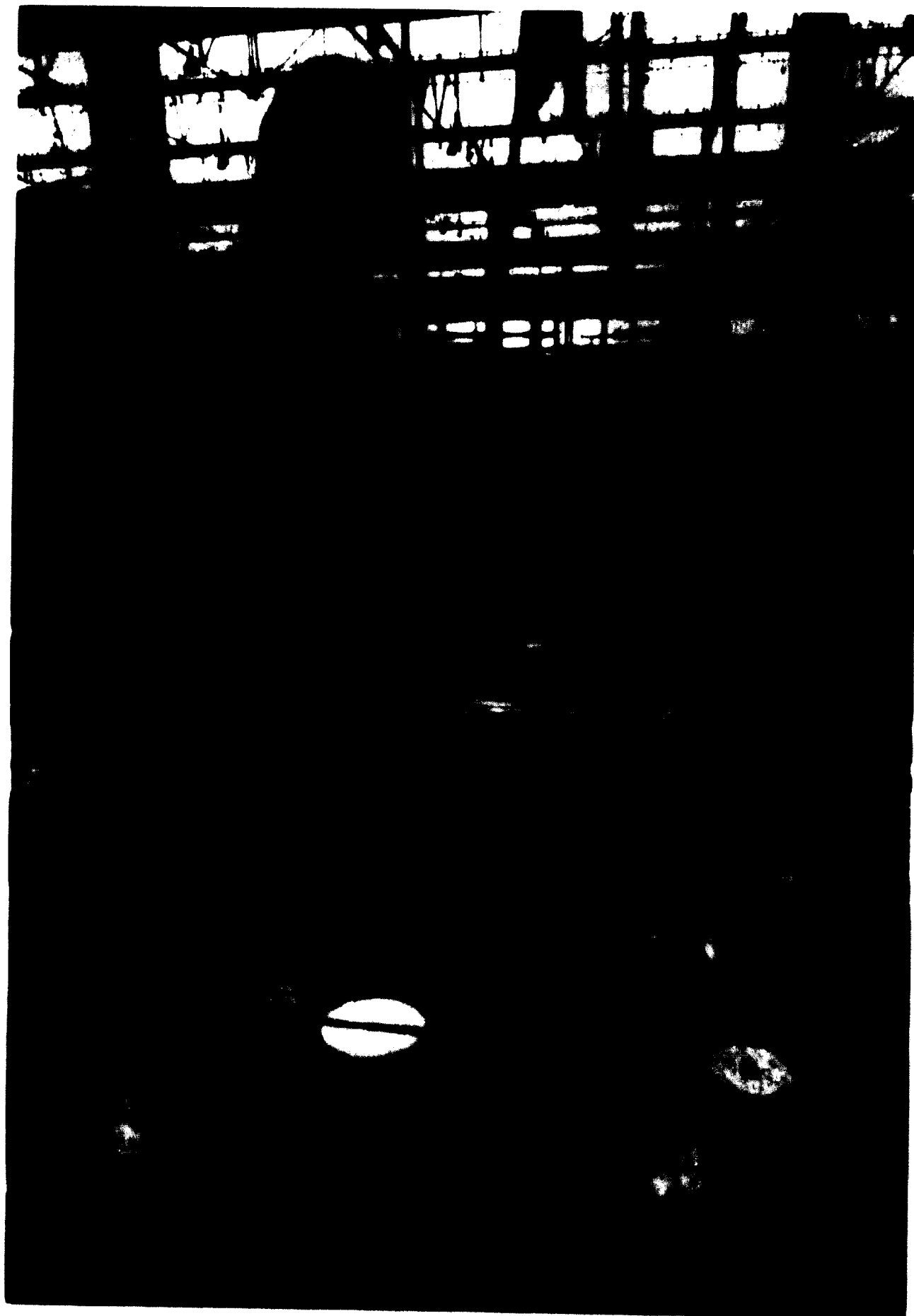
"miscellaneous fastenings for leather goods" (699-2916-1/7) and "plugs, switches, sockets and other electrical accessories" (721-1907), for which suitable scales of production might be possible if such parts and spares were standardized.

5. *Small products and parts, primarily machined.* For "taps, cocks, valves, of base metal" (716-1501-2/9) the level of import substitution adopted was 80 per cent, inasmuch as the standardization of specific types of products will undoubtedly mean that they can be manufactured on a worth-while scale. Moreover, this is the sort of manufacturing line that will aid the diffusion of technical know-how and the training of manpower, as the articles concerned are usually current consumer goods, small in size with low unit values, and are made chiefly of material which is almost entirely recoverable by melting down, thus learners' mistakes are not irremediable. In the case of the item "ironware, locks, padlocks, castors for furniture, etc." (699-1801-1/7) a proportion of only 30 per cent was suggested, in view of the same limiting factors mentioned in connexion with stamped parts. The figure postulated for "screws, nuts, washers, and similar articles" (699-0701-ID/E)—50 per cent—is considered to be easily attainable, if high-precision or technically exacting threaded products are excluded.

6. *Boiler shop products and metal structures.* In this group, significant import substitution efforts have already been made by the existing industry, which possesses the requisite techniques for the expansion of its field of action. Thus, the high percentages proposed for structures and sheet products such as silos, tanks or other receptacles will not be difficult to attain. To pave the way for more exacting operations, it is recommended that a start should be made on substitution in respect to other items such as "boilers for farm use" (711-0101/4), "retorts, stills, filters, etc." (716-1324-2/4), and "economizers, super-heaters, condensers, etc." (711-0109). For the latter, a higher percentage of import substitution is contemplated, in view of the fact that their tubular structure entails a simpler manufacturing process. Nevertheless, these products call for more advanced knowledge of design engineering.

7. *Sheet-metal work, with or without metal spinning.* The present achievements of the existing industry fully warrant the adoption of a high import substitution percentage; besides, sheet-metal work is as a rule fairly simple to execute.

8. *Light machinery and machine parts.* This group is made up of a number of items whose individual share is not very large, and it is probably here that the greatest importance is attached to technical, skilled-labour and complementary problems, both within the metal-transforming sector, with respect to production, and outside it, in relation to demand which will be largely conditioned by the development of other branches of manufacturing industry. Moreover, the success of these lines of manufacture is closely linked to the possibility of obtaining know-how from abroad, either by offering foreign firms inducements to establish branches in Venezuela, or through manufacturing and technical assistance agreements with the enterprises concerned. Thus, the



A rocker-arm being installed on the cylinder head of a diesel engine, automobile assembly line

possible percentages of domestic production indicated are highly provisional and tentative, apart from the fact that the items are broadly generic and cover a wide variety of products with very different manufacturing characteristics. Minimal import substitution percentages were adopted with the idea that they would represent the simplest products within each group, a premise which must be more carefully checked. In the case of some items, however, such as "special pumps for the sale of liquid fuels" (716-0101) and "sewing-machines and parts thereof" (716-1101-2/9), because of the actual size of the market, it was thought that a higher substitution percentage could be reached, despite the complexity and delicacy of the manufacturing processes involved. This could lead to adequate production series and thereby permit a certain degree of specialization to be achieved in certain manufacturing operations.

9. *Medium-weight and heavy machinery and machine parts.* The same observations made for the preceding group apply to this category, and all that must be added is that the articles of which it is comprised are not as a rule mass-produced, and many of them are made to order in accordance with highly individual characteristics and specifications. For them extremely advanced technical experience and know-how is indispensable, both for the designing and for the manufacture of the equipment. Consequently, the import substitution percentages are still lower than in the case of the previous group, and they represent certain simple machine components and parts rather than the entire manufacture of any one piece of machinery. In this group, attention should be drawn to the item "moulds, n.e.s., for various materials" (716-13-18), which includes dies for stamping and forging workshops, and for which the proportion of the domestic share envisaged is 40 per

cent. This might be considered an unduly high percentage, given the present stage of development of Venezuela's metal-transforming industries; but in view of the importance of this line of manufacture, the feeling was that its installation in Venezuela should be encouraged, even if the die-sinkers have to be brought in from abroad. Their skill is a special one which is acquired only after many years of practice.

10. *Other products.* Owing to the wide variety of products grouped under this head, which in many cases are difficult to identify separately, and which require highly diversified manufacturing techniques, it is impossible to make a detailed study of import substitution prospects for each item. The aggregate percentage indicated—9.1 per cent in terms of weight, and 6.1 per cent in terms of value—represent a first approximation which will have to be corrected after careful research on the composition of the products and their respective markets.

This analysis of import substitution possibilities has enabled the establishment of gross figures for the manufacturing programme and consequently does not reveal the real effect of the programme on the volume of imports or the saving of foreign exchange that will be achieved. Selection of the proposed articles for Venezuela manufacturing will be based, in widely varying proportions, on imported raw materials or intermediate products, so that in this preliminary study, carried out at the group level instead of at the product level, it is difficult to give an accurate net import substitution figure. An aggregate estimate would seem to suggest that this figure should be established at somewhere around 330 million bolivares, a sum which represents 80 per cent of the gross production value and is equivalent to about 80 million dollars.

EVALUATION OF THE PROGRAMME AND DETERMINATION OF THE CORRESPONDING INPUTS

IN ORDER TO evaluate the programme, even if only on an over-all basis, and to determine labour inputs and investment, a number of coefficients were established whereby the production targets could be expressed in terms of the inputs required. The figures adopted correspond to average manufacturing conditions for the product structure and are based on the findings of various surveys undertaken in Venezuela, as well as on data collected by ECLA in several studies carried out in other Latin American countries.

For the purpose of a preliminary estimate of the suggested programme, the average figures established were considered to be reasonably representative of the approximate scale of operations. Once manufacturing projects have been determined at the product level, of course, these coefficients will have to be revised in the light of the scales of production adopted, the plant sizes selected and the

manufacturing techniques chosen. But in the case of the great majority of the imported products whose replacement by domestic production is recommended, considerations of technology or scale of operations will not exert much influence in this connexion.

For the value of production per operative, the average figure for the manufactures proposed was estimated at some 69,000 bolivares, which compares satisfactorily with the findings of the above-mentioned surveys. According to the industrial survey carried out by CORDIPLAN in 1961, the average for the metal-transforming industry was 53,522 bolivares; while the result obtained in the survey made by the metallurgists' association (Asociación de Metalúrgicos) was about 56,000 bolivares. In view of the fact that at the date in question the metal-transforming industry was operating at low performance levels, it may be concluded that the coefficient adopted is reasonably realistic.

Similarly, these surveys establish densities of fixed capital per operative in the neighbourhood of 16,300 bolivares and 22,500 bolivares, respectively, which are considered too low for new activities. In the case of the Guayana Project,² average investment comes to 63,000 bolivares per operative, a ratio which, because of the type of equipment that will be manufactured, corresponds to a high-category metal-transforming activity. It was thought that for the type of products under consideration in the present study, investment coefficients ranging from 25,000 to 50,000 bolivares per operative would be representative, the overall average thus being 36,000 bolivares.

By application of these coefficients to the figures presented in table 7 it can be shown that manpower requirements will amount to 5,722 operatives, and that 204.9 million bolivares must be invested in fixed capital (see table 8).

Consistently with this number of operatives, it is estimated that the total personnel required will be about 7,150 employees, of whom approximately 70 will be mechanical engineers and metallurgists, and some 210 will be technicians and draughtsmen. It may be supposed that the skilled operatives will number about 3,300, and that they can be tentatively classified in the following categories:

Metal-cutting machine operatives	1,540
Adjustors	820
Toolmen	200
Foremen	240
Others	500

² Corporación Venezolana de Guayana (Joint Centre—Guayana Project), *Preliminary Programme for the Heavy Machinery Building Complex, Guayana Region, 1962.*

Since the proposed programme is meant to be carried out within the space of four or five years, a sizable manpower training effort will be required; no fewer than 800 workers must be trained every year. The annual investment figure will not be less than 10 million or 12 million dollars, to cover production equipment, construction and other ancillary services.

Raw material inputs were determined by direct reference to the volumes of production established, and the amounts given in table 9 represent net requirements in respect to each. A point that emerges clearly from this evaluation is the importance of castings for the implementation of the programme, since the volume needed will slightly exceed 20,000 tons, which means that it will account for 30 per cent of the total weight of the products to be manufactured. In order to meet these requirements the existing foundries must be expanded and new ones installed equipped with a plant and using techniques that will enable them to satisfy the demands of the new metal-transforming activities. Table 10 lists manpower and investment requirements for the new foundries as well as for the drawing of steel bars, production of which is inadequate at present.

In table 8 an indication will be found of the number of enterprises that might be installed to cover the manufacturing requirements shown for each group of products. This is intended merely as a rough guide as the figures in question cannot be established accurately until the products have been determined and manufacturing costs have been fixed at the product level. Many of these enterprises may be integrated in a single unit, but the advantages or disadvantages of this procedure can only be assessed once the possible geographical location of the plants and of the markets they will supply has been settled. Transport costs are a factor that will weigh heavily in decisions as to

Table 8
VENEZUELA: MANPOWER AND INVESTMENT NEEDS FOR THE IMPORT SUBSTITUTION PROGRAMME

	Output		Number of operatives	Fixed capital (thousands of bolivares)	Probable number of enterprises
	Tons	Thousands of bolivares			
1. Containers and tinware	9,550	19,560	257	12,850	5-7
2. Hot-forged and hot-pressed products	8,221	34,982	603	24,120	4-8
3. Wire products	3,800	6,500	75	2,625	1-3
4. Primarily stamped products	3,250	16,160	207	7,245	8-13
5. Small products and parts, primarily machined	5,460	25,059	501	15,030	6-12
6. Boiler shop products and metal structures	5,900	15,948	182	4,550	3-6
7. Sheet-metal work, with or without metal spinning	11,550	57,522	770	26,950	10-20
8. Light machinery and machine parts	13,367	108,054	1,544	54,040	20-30
9. Medium-weight and heavy machinery and machine parts	9,532	75,478	1,161	40,632	20-30
10. Other products	6,910	38,838	422	16,880	5-10
TOTAL	77,540	398,101	5,722	204,925	82-139

Table 9
 VENEZUELA: APPROXIMATE CONSUMPTION OF RAW MATERIALS IN IMPORT-SUBSTITUTION METAL-TRANSFORMING ACTIVITIES
 (Net weight in tons)

Activity	Plate and thin sheet					Total
	Timplate	Forged products	Other rolled products	Miscellaneous materials	Drawn products	
1. Containers and tinware	8,000			1,000	200	9,550
2. Hot-forged and hot-pressed products		4,000	4,000			8,221
3. Wire products					3,800	3,800
4. Primarily stamped products				3,000		3,250
5. Small products and parts, primarily machined			200			260
6. Boiler shop products and metal structures			4,000	600	2,000	5,900
7. Sheet-metal work, with or without metal spinning			1,000	10,500	500	11,550
8. Light machinery and machine parts		500		500	3,000	3,677
9. Medium-weight and heavy machinery and machine parts		800	2,000		500	3,300
10. Other products	6,000	5,500	1,000	1,200	1,000	9,532
TOTAL	14,000	10,500	12,200	16,800	11,000	69,110

Table 10
 VENEZUELA: MANPOWER AND INVESTMENT NEEDS FOR THE INSTALLATION OF NEW FOUNDRIES AND DRAWING-WORKSHOPS MILLS

	Output		Fixed capital (thousands of bolivares)	Probable number of establishments
	Tons	Thousands of bolivares		
Iron casting, meeting all the requirements of up-to-date foundry techniques, primarily in electric furnaces	8,000	24,000	20,000	4-6
Casting of non-ferrous metals, mainly bronze and brass	3,000	20,000	12,000	5-7
Casting of steel machine parts, etc.	2,000	10,000	8,000	1-2
Drawing of round, hexagonal and square steel bars, using scourers and grinders for the round bars. (Light bars are made mainly for use in automatic machines) . . .	6,000	15,000	12,000	2-3

whether some of the proposed lines of production should be integrated or whether certain units should be widely scattered throughout the country—a matter calling for careful study.

If this manufacturing programme is evaluated in relation to the existing industry, the progress it will bring about is obvious and is indicated in table 11, which presents some of the most characteristic ratios of the two situations. The following points are worthy of emphasis:

(a) Personnel requirements for the manufacturing programme represent 30 per cent of current employment in the metal-transforming industry;

(b) The new investment will increase the existing industry's fixed capital by about 80 per cent;

(c) The value of production will rise by approximately 50 per cent in relation to its present level.

Furthermore, the new manufacturing activities will indirectly exert a favourable influence on the existing industry, which will benefit both by the manpower to be trained and by the products to be manufactured. This benefit will undoubtedly be an incentive to improve current operational conditions as well as to expand and diversify present lines of manufacture.

The production ratios given in table 11 bring to light the differences between the two industrial groups as to the structure of production—the new enterprises call for more capital per employee and also show a higher level of productivity. The low ratio between the value of production and fixed capital indicates pre-eminently productive operational conditions, in contrast to the figure registered for the existing industry, which is greatly distorted by the heavy incidence of service and maintenance activities.

Table 11
VENEZUELA: COMPARISON BETWEEN THE IMPORT SUBSTITUTION PROGRAMME
AND THE EXISTING METAL-TRANSFORMING INDUSTRY

	Number of employees	Fixed capital (millions of bolivares)	Production value (millions of bolivares)	Fixed capital per employee (bolivares)	Production value per employee (bolivares)	Ratio of production value to fixed capital
Existing metal-transforming industries	22,215	263.9	866.0	11,800	38,982	3.28
New industries	7,150	204.9	398.1	28,700	55,680	1.94
TOTAL	29,365	468.8	1,264.1	15,965	43,050	2.70

MEASURES AND ACTION TO IMPLEMENT THE PROGRAMME

THE IMPORT substitution programme to promote the development of Venezuela's metal-transforming industries, as outlined in the foregoing chapters, will necessitate the adoption of a number of measures and lines of action of widely differing kinds, designed to ensure that in the implementation of the programme its objectives and targets are attained. It is not the purpose of the present chapter to analyse these measures in detail, or to establish the criteria that should be followed and the scope of the action to be taken in each individual case. In many instances, decisions in this connexion and recommendations as to the changes that should be introduced will have to be taken on a basis of co-ordination to ensure their compatibility with the situation in other sectors, and with Venezuela's over-all economic policy. Consequently, before any decision relating to the metal-transforming sector is adopted or recommended, it will be necessary to carry out a series of specific studies whereby the problem can be evaluated as a whole. Such studies are of course beyond the scope and aims of the present report, and the points touched upon here are those that relate more specifically to the metal-transforming sector, and can be dealt with independently. This should not be interpreted as indicating an

order of priority in the adoption of measures and lines of action; on the contrary, the specific studies in question should be undertaken at the earliest possible date, to permit the definition of the policy and measures that should be adopted in the tax, tariff and credit fields, as well as in other fields of basic importance for the implementation of the programme.

AGENCIES RESPONSIBLE FOR THE CO-ORDINATION AND IMPLEMENTATION OF THE PROGRAMME

The potential success of the programme is largely dependent upon the care devoted to organizational arrangements and to supervision of its implementation. This aspect of the development process has already been taken into account; Venezuela's Manufacturing Industry Programme assigns responsibilities for the various functions and phases covered by that programme.

In the special case of the metal-transforming industries, a prerequisite for the implementation of the programme will be a series of studies whose object is, in the first place, to define the institutional measures required, and, secondly, to evaluate and select specific manufacturing projects. During the phase of putting the programme into execution,

it will be necessary to keep a constant check on the status and intensity of the process, which, in view of the complexity of the sector and the close manufacturing inter-relationships between the enterprises concerned, will have to adhere to a fairly rigid investment schedule. Lack of co-ordination, or delay in initiating specific lines of production contemplated in the programme, may make it impossible for other manufactures to be started, and consequently may seriously hamper the attainment of the targets established.

The Central Co-ordination and Planning Office (Oficina Central de Coordinación y Planificación—CORDIPLAN) should act in this instance as the responsible agency, and as the top-level co-ordinator of implementation of the programme. In turn, the Venezuelan Development Corporation (Corporación Venezolana de Fomento), through its Project and Promotion Division, should play an important part in the preparation and formulation of specific manufacturing projects, as well as in all matters connected with putting the programme into effect. These functions may be summed up under the following heads: (a) identification, within the tariff items selected, of the products whose domestic manufacture offers most inducement based on criteria established in section 5; (b) determination of the consumer market for these products; (c) production feasibility studies and consideration of alternative techniques and possible location of enterprises; (d) conclusion of contracts, where appropriate, for the requisite technical assistance and manufacturing licences from abroad; (e) preparation of final production projects and evaluation of them and of manufacturing costs, tariff protection needed, etc.; (f) financing of investment; (g) processing of basic statistics whereby the progress of the programme and market trends for new products can be kept under regular observation and any necessary corrective measures can be indicated.

DEFINITION OF TARGETS AND OF INDUSTRIAL POLICY

The metal-transforming industry is closely linked to the development of other manufacturing activities in both the raw materials it needs and the products it makes. Moreover, the decision as to whether certain lines of metal-transforming production should or should not be promoted must be based on an evaluation formulated at the national level, within the framework of Venezuela's over-all economic policy criteria.

Thus, a definition of the economic and industrial policy that will be pursued and the establishment of production targets for activities allied to the metal-transforming sector will be indispensable prerequisites for an assessment of the feasibility or the desirability of embarking upon the manufacture of several of the products included in the proposed programme.

More specifically, two aspects of the question that deserve priority must be stressed in this connexion: one relating to the processing of raw materials and semi-manufactured products, and the other to the manufacture of motor-vehicles in Venezuela.

In the case of raw materials and intermediate products, which are regarded as belonging to the basic industries sector, it will be necessary to demarcate the fields of action and the development responsibilities corresponding, respectively, to the public sector and to private enterprises. At the present time, there are differences of opinion in Venezuela in this regard, a circumstance which will unquestionably have an adverse effect on supplies of these inputs in the metal-transforming sector, particularly in relation to such new activities as the rolling and drawing of light profiles and thin steel and other metal bars; to the manufacture of pig iron for iron foundries; and to the iron foundries themselves.

With respect to the motor-vehicle problem, a clearly-defined manufacturing programme will also have to be established, specifying targets and phases for its progressive expansion. The manufacture of a certain number of parts and spare parts for motor-vehicles is included in the import substitution programme proposed here, but probably this will not be practicable without a specific promotion programme for this sector. Apart from the considerations of national significance in mapping out the future evolution of this activity, the possibilities of complementarity with neighbouring countries at similar levels of industrialization should also be explored.

MOBILIZATION OF TECHNICAL ASSISTANCE RESOURCES

Basically, there are four fields in which the need for technical assistance will be most marked and pressing: (a) operational methods and processing; (b) the training of manpower; (c) the establishment of technical standards; and (d) the organization of enterprises and productivity.

In each of these fields Venezuela possesses various institutes which will be called upon to play a significant role in the process of tapping and channelling external technical assistance resources. Thus, for example, where the training of manpower is concerned, the National Institute of Educational Co-operation (Instituto Nacional de Cooperación Educativa—INCE) should be given technical advice on vocational education curricula and methods which would enable it to modernize and expand its present educational programme, and to incorporate new specialities. To this end, a survey of the specialities and numbers of personnel that will be needed must be carried out beforehand. The provisional estimates formulated in the present section (6) bear eloquent witness to the magnitude of the task that lies ahead, and may serve as a basis for the initiation of a preliminary reform programme.

With respect to technical standards and quality controls, the Venezuelan Commission on Industrial Standards (Comisión Venezolana de Normas Industriales—COVENIN) will have to shoulder the responsibility for the preparation of manufacturing and quality specifications and standards when the development process creates the need for them.

Regarding the organization of enterprises and of productivity it will be the responsibility of the Institute of Pro-

ductivity (Instituto de Productividad—INPRO) to give *entrepreneurs* guidance and advisory assistance in these respects, particularly concerning the introduction, both in the existing industrial establishments and in the new ones to be installed, of accounting methods which will keep them informed of their real production costs. Cost accounting as a regular practice in industrial management will be beneficial not only from the standpoint of the book-keeping itself, but also—and this is perhaps more important—because it is a necessary instrument for the control of costs, for steering the production process through its various stages, and for facilitating the application of appropriate measures to ensure maximum efficiency in the utilization of the productive resources available.

These institutes will have to define their programme of action and decide what they need in the way of technical assistance, most of which could be provided by the various international agencies. A preliminary evaluation of the most immediate requirements in respect to co-operation from abroad suggests that experts will be wanted in the following special fields: industrial programming and industrial projects; iron foundries; metal-transforming methods and processes; manufacture of motor-vehicle parts; metallurgy and smelting of non-ferrous metals; manufacture of equipment for the petroleum industry; manufacture of electrical engines and appliances; machinery projects and design; die-sinking and cutting tools. These specialists will be needed both for advisory assistance at the entrepreneurial level and for manpower training in the appropriate centres. Their functions would be supplemented by the collaboration of local personnel.

FINANCING AND CREDIT SYSTEMS

The plans for the financing of investment drawn up by the Venezuelan Development Corporation should meet the requirements of the present programme, particularly the scheme for the hire of fixed assets, which may well become one of the most effective instruments for promoting industrialization, especially through small-scale and medium-scale industry. It would be expedient, however, to study a credit system that would satisfy working capital requirements, which, in the case of the metal-transforming industries, may come to represent an amount equalling or exceeding that of fixed assets.

TECHNOLOGICAL RESEARCH

There is little need to emphasize the fundamental importance of technological research in relation to the development of the metal-transforming industries. The existence of an institute of technological testing and research which could give the various branches of industry advisory assistance in connexion with the reception and selection of materials, and which would act as a consulting agency for specific production problems and as a supervisor of the products manufactured (whose quality it would guarantee), would represent an invaluable contribution to the development of Venezuela's metal-transforming sector,

as well as to that of other manufacturing activities.

Apart from the immediate and obvious advantages that would be attached to an institute of this kind, would be its contribution to high-level vocational training and to the dissemination of knowledge and experience concerning manufacturing methods and techniques.

Thus, it would be advisable to consider the possibility of remodelling and strengthening the Institute of Technological Testing and Research (Instituto de Ensayos e Investigaciones Tecnológicas) so that it could act as the rod and staff of the industrial development process, while at the same time providing an indispensable supplement to the activities of other institutes in the fields of vocational training, technical standards and productivity.

THE METAL-TRANSFORMING INDUSTRY AND REGIONAL INTEGRATION PROSPECTS

The immediate and principal object of the present study is to formulate a short-term development plan for the metal-transforming sector, with the sole intention of offering a few guidelines to domestic production that would help to raise the technological level of the existing industry and form a metal-transforming infrastructure indispensable to the consolidation of the sector's future development. Thus, the selection of products was essentially based on two considerations that were deemed fundamental for this preliminary approach: the prevailing techniques used in their manufacture; and the size of the domestic market. The study of the existing industry—structurally weak and under-productive—was sufficient to suggest that it would be advisable to adopt a development plan directed towards the attainment of certain levels of technological progress and training of skilled workers, rather than towards quantitative achievements entailing a substantial manufacturing effort with a powerful impact on the expansion of the gross domestic product. Consequently, in the programme presented here economic considerations have played a secondary role, in the sense that recommendations for the manufacture of new products are not backed by comparative cost-studies.

Broadly speaking, this procedure is justified by the conviction, first, that the development of the metal-transforming sector must be a gradual process, and that it is impossible to move on to more complex manufactures until certain basic production methods have been introduced, and, secondly, that the vast range of products of the metal-transforming industry—especially durable consumer goods and building materials—includes a large number of articles which entail relatively simple manufacturing processes. The developing countries should start to produce these articles as they reach more advanced stages of industrialization, as they are the very means of introducing new techniques and manufacturing processes. In Venezuela it can be seen that the metal-transforming sector is lagging far behind the country's level of industrialization, especially in view of the size of its market and the *per capita* income available.

The volume of the domestic market was the principal determinant of the production targets established for the development of the metal-transforming industry. This, however, does not mean that no thought was given to the possibilities that would be opened for this activity under a regional integration programme. On the contrary, the ultimate objective is to equip the domestic industry with production media sufficient not only to provide the home market with adequate supplies but also to supply in part the markets of the other countries having integration agreements in connexion with the manufacture of the more complex products of the metal-transforming industry. This no doubt will be the market for a major share of future intraregional trade. Moreover, manufactures for export will be vitally necessary for Venezuela if substantial and uninterrupted rates of industrial growth, which the domestic market alone will be incapable of sustaining, are to be developed over the long term. It must be borne in mind that in the metal-transforming sector production for export cannot be undertaken on a makeshift or short-term basis since, apart from cost considerations, a lengthy process of manpower training and adaptation of techniques are required before products can be manufactured that conform to the specifications and quality standards, especially if they are to be exported as complements to the metal-transforming activities in other countries.

In this context, short-term export prospects may be described as non-existent, except perhaps in the case of a few products which may be saleable on occasion to neighbouring countries where they are not yet manufactured or where domestic production is insufficient to meet requirements. In any event, in the present state of affairs such a situation could not be other than purely temporary. From the standpoint of the development of the metal-transforming sector, this would not represent an immediate obstacle, inasmuch as the domestic market affords opportunities favourable enough for high growth rates to be attained, at least during the next five years.

The solution of the longer-term problem has been engaging attention in Venezuela for years, and one of the studies put forward in this connexion is the project for the formation in the Guayana area of a complex for the manufacture of heavy machinery and equipment. The manufacturing lines envisaged in the preliminary project³ comprise the construction, in horizontally-integrated plants, of large-scale machinery and equipment for mining and building, for the petroleum industry, for the transport of materials, for the wood and machine-tool industries, etc. By 1975, according to estimates, the output quantum may reach about 476.4 million dollars (at 1957 prices), of which 150 million dollars' worth of output would be exported to other Latin American markets, and would cover about 21 per cent of domestic demand, which by that year would amount to 1,535.1 million dollars. At the same time, it is

estimated that the medium-weight and light-weight machinery constructed in the rest of the country would represent about 347.6 million dollars, which is nearly 23 per cent of the domestic market. The investment required for the building of this complex would be approximately 370 million dollars, and for its operation about 26,500 workers would be needed.

The decision to locate this complex in the Guayana area is justified in the preliminary project by the existence of an integrated steel mill in this part of Venezuela, which, in addition, possesses an up-to-date machining-shop and a big iron foundry; by the fact that there is a project for an aluminium plant in the same locality; and by the availability of good transport communications with internal and external markets. The economic justification of the project is based on the expectation of low manufacturing costs; the reduction of investment which the location itself would facilitate; the organization and structure of the complex in terms of horizontal integration, with many services in common and maximum utilization of capacity; and the many economies of scale that would be achieved.

Irrespective of the volumes of demand and investment and the levels of productivity hoped to be attained, the execution of this project, which calls for highly-developed technical know-how, seems premature in view of the current entrepreneurial and technological conditions in Venezuela. Probably, when the project was devised, it was thought that the rest of the metal-transforming industry, which from every point of view undoubtedly has a key role to play in the establishment of this complex, would develop as contemplated in the National Plan. But, for want of appropriate programming in this sector this has not happened, and, therefore, the Guayana project will probably have to be postponed or the time schedules and manufacturing programmes thoroughly overhauled.

In the latter case, the Guayana programme should not be carried out in isolation, regardless of the development of the other metal-transforming activities. The mere observation of the evolution of this sector indicates that it is impossible to embark upon complex undertakings in the metal-transforming industry without a certain amount of ballast in the shape of basic know-how and metal-transforming tradition. The building of heavy machinery and equipment of the type intended for Guayana constitutes one of the most advanced states in the development of the metal-transforming sector. Because of the constructional complexities and responsibilities it involves, it is not a suitable activity for the training of manpower, especially in the case of Guayana, where such training would have to be given almost in entirety from the beginning. Another aspect of this project which should be subjected to a more careful review is that of economies of scale. The equipment concerned is large and heavy, usually made on a unit basis, each piece virtually representing a new project because of the modifications that are generally requested by the consumers to suit their working requirements and procedures. Furthermore because of the technical innovations which

³ See *Preliminary Programme for the Heavy Machinery Building Complex, Guayana Region*, op. cit.

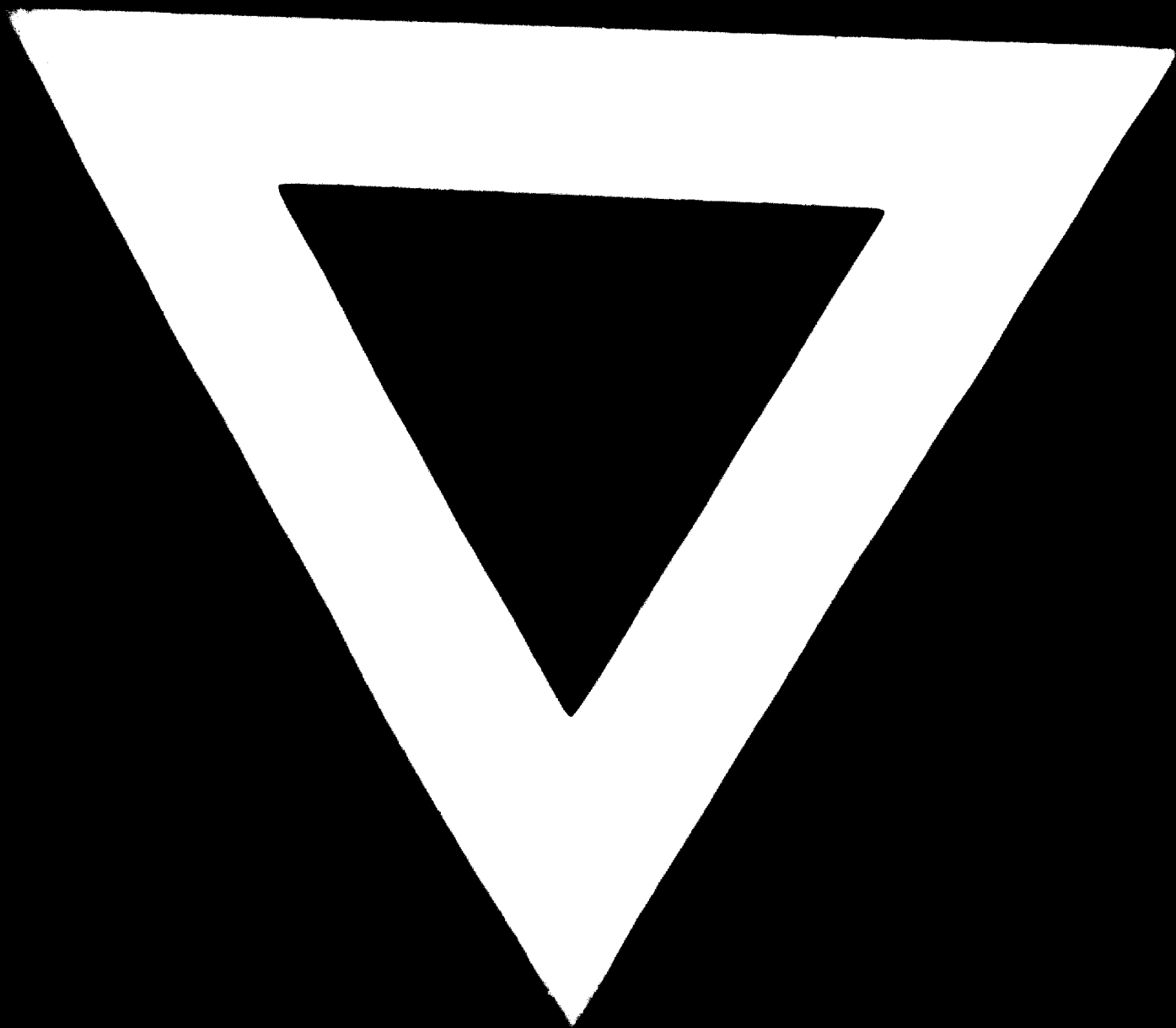
are constantly being introduced in such machinery, it quickly becomes obsolete.

The foregoing considerations give some idea of the tremendous gap between the existing industry and the demands implicit in the Guayana programme—a gap that will have to be narrowed if the project in question is to materialize. In this connexion, the import substitution programme suggested in this study plays an important role, and constitutes a basis for technical improvements and for the initial phases of manpower training. Nevertheless, other stages must be achieved before the final objectives embodied in the Guayana industrial complex can be reached. To prevent the execution of this project from being held up—if in the course of its revision no situations emerge that might cast doubt on the practicability of the targets originally established—the manufacture of some of the products included in the prospective manufacturing lines of the Guayana complex should be started on schedule as an integral part of the national programme for the sector. Special consideration should be given to the production of equipment and accessories for the petroleum industry. Owing to the exceptional conditions and dimensions of this industry in Venezuela, the metal-transforming sector would do well to undertake the manufacture of products to meet its needs, particularly as many of the products are common to other industrial activities, such as the petrochemical industry. The wide variety of products used in this activity, ranging from the simplest (such as flanges and connexions) to the most complex (such as pumps, compressors, etc.), makes it possible to graduate the programming of production in accordance with the progress made in technology and in the training of skilled workers. As this is an activity for products, of which intraregional export prospects might be very promising, steps could be taken to negotiate integration agreements with other Latin American countries. The most attractive feature of the manufacture of equipment for the petroleum industry is that the internal market is in itself large enough to sustain an efficient domestic industry, and therefore reliance upon ex-

ternal markets would not be immediately necessary.

Another activity which would be worth careful study with a view to its incorporation in Venezuela's plans for the metal-transforming industries is the motor-vehicle industry, especially the manufacture of parts. According to estimates, in 1964, Venezuela's motor-vehicle inventory consisted of about 430,000 units, and the number assembled probably exceeded 40,000 units. Although these figures—especially those relating to assembly work—are not high enough to be described as optimum in countries where the manufacture of motor-vehicles is traditional, they may be regarded as satisfactory starting-points for the manufacture of specific parts and spare parts at reasonable price levels. Apart from the fact that domestic manufacture of spare parts for the maintenance of the inventory may come to constitute a significant import substitution item, and may at the same time open up new opportunities for employment and for obtaining technical know-how, it would facilitate the establishment of a programme for the manufacture of motor-vehicles. Once this activity had been developed for the home market, it might secure a footing in the markets of adjacent countries.

In summary, Venezuela's integration prospects for the metal-transforming industry are closely linked to the formulation of a national development plan for the sector, envisaging, in an initial phase, the rapid improvement of the industry's present technological status and the intensive training of skilled labour at all levels. During this stage, the manufacture of simpler products of the metal-transforming activities should be initiated. These products would not only enjoy significant export prospects but would have an internal market broad enough to sustain an efficient domestic industry. Over the long term, when the initial stage of development has been left behind, consideration should be given to the manufacture of the heavy equipment contemplated in the Guayana complex, if this seems advisable in the light of the revision and verification of the data and the practical conditions for the execution of the project.



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