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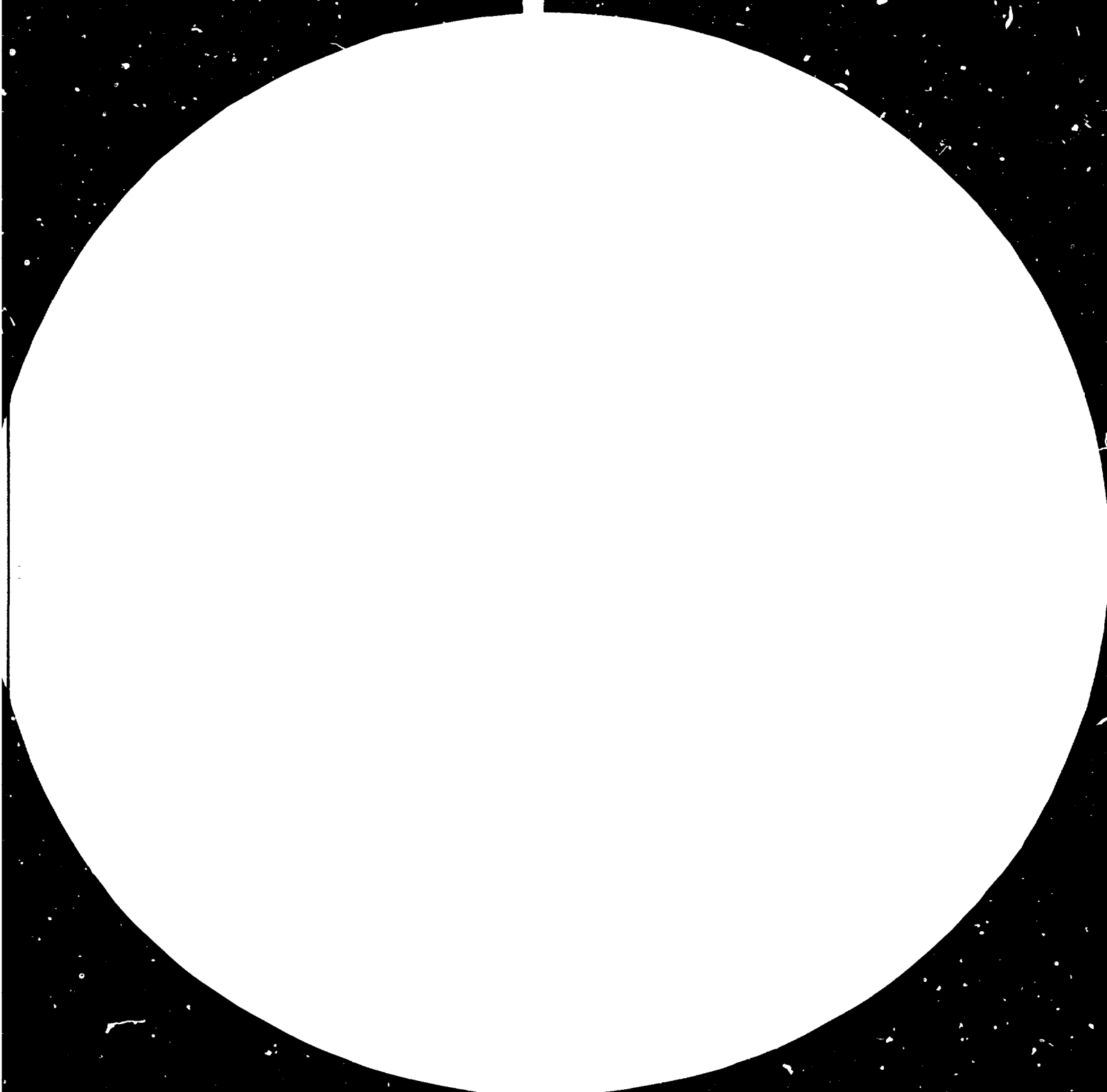

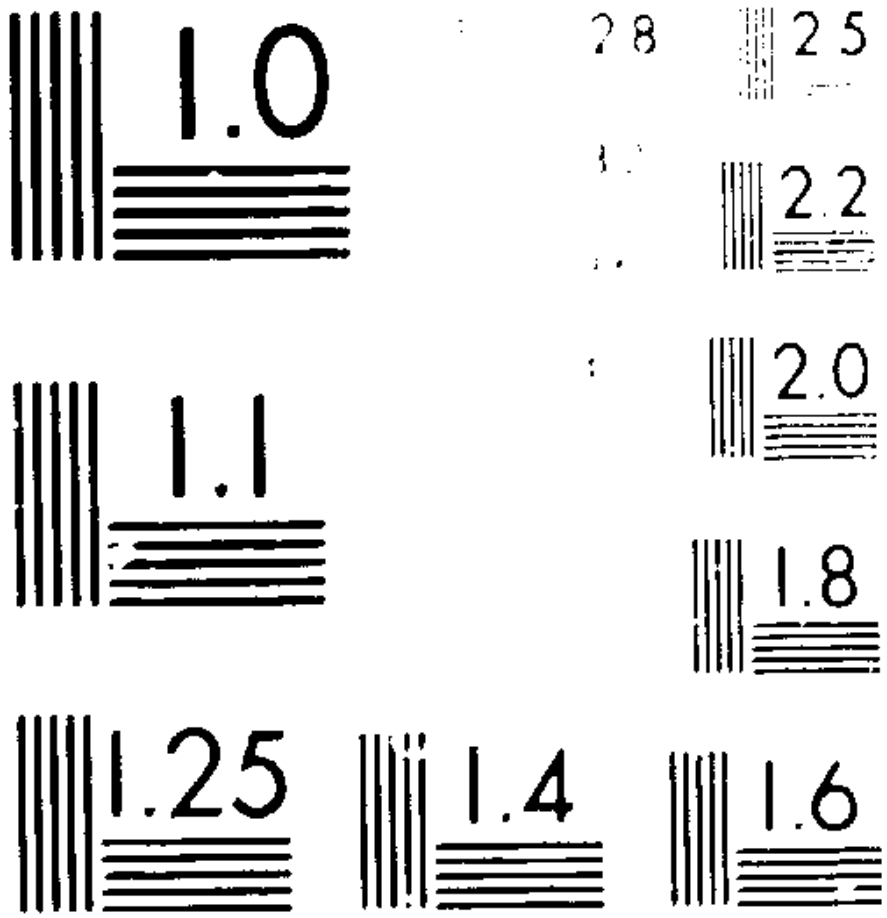
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THE PRODUCTION OF CAPITAL GOODS IN DEVELOPING COUNTRIES AT AN INTERMEDIATE STATE OF DEVELOPMENT: THE CASES OF GUATEMALA AND PERU*/

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CONTENTS

Page

ANNEXES

SUMMARY AND CONCLUSIONS

The main purpose of this study is to establish the possibility of producing capital goods in developing countries at an intermediate state of development; the analysis is based mainly on the situation in the capital goods industries of Peru and Guatemala. An investigation was therefore firstly carried out into the capital goods manufacturing structures in these countries, and the motivations of those responsible for the production of machinery and equipment; subsequently a development strategy was established for the manufacture of capital goods. This strategy defines the machinery and equipment which could be produced in these countries of considerable internal integration, and the resultant changes in the economic structure as a whole.

1. The structure of capital goods manufacture in Guatemala and Peru

   The production of capital goods in Guatemala and Peru mainly involves standard items used in the general manufacturing apparatus, such as machinery and equipment for agriculture, the fishing industry, civil engineering structures (bridges, etc.), transport and the mining industry (Peru only).

   The manufacture of capital goods for engineering processes (machine tools, etc.), for repairs and to a lesser extent, for the manufacture of capital goods, is fairly limited in these countries. The manufacture of heavy machinery for production processes and power generation is only carried out in Peru. Neither country manufactures machinery for physical-chemical manufacturing processes (i.e. steelmaking furnaces, continuous casting, etc.).

2. Diversification of capital goods manufacture

   Guatemala manufactures 48 different six-figure capital items. Peru produces 106 different items, 2.2 times more than Guatemala.

In both countries, the greatest diversification is found in the manufacture of standard capital items used in the normal operation of various manufacturing processes.

The least diversification is to be found in machinery and equipment used for physical-chemical manufacturing processes.

3. Motivation in firms and the structure of production

Differences in capital goods production structures between Guatemala and Peru arise mainly among firms with foreign capital: similarities are found amongst firms operating with national capital.

Firms with foreign capital in Peru manufacture (or in the majority of cases assemble) capital goods which are apparently more complex[1] and which are not manufactured in Guatemala. These firms manufacture heavy electrical items such as transformers, and assemble tractors, lorries, industrial sewing machines, etc. None of these items are manufactured in Guatemala.

Guatemala and Peru are similar in that in both countries firms with national capital favour the production of standard machinery and equipment, hand tools and agricultural machinery and equipment of low complexity.

4. Capital goods industry development strategy

The strategy is based on the structural characteristics of the capital goods industries in the countries concerned, and the need to promote self-sustaining development in the context of a world where it is essential to establish links with other countries.

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(1) Apparently more complex because they are generally assembled and not manufactured, the main exception being transformers.

Within this framework the strategy favours the production of the following capital goods:

a) Machinery and equipment for mechanical processes (machine tools, manual tools for engineering, etc.).
b) Standard machinery and equipment (boilers, cables, springs, compressors, pumps, etc.) used for general production purposes.
c) Machinery and equipment for agriculture, mining and the fishing industry.
d) Machinery and equipment for the industrial sector, designed to meet basic requirements in respect of foodstuffs, clothing and housing.

A detailed list of machinery and equipment which could be produced in these countries is given in Annex 4 to this study.

I. THE STRUCTURE OF PRODUCTION IN COUNTRIES AT AN INTERMEDIATE STAGE OF DEVELOPMENT: GUATEMALA AND PERU

The manufacturing structure will be analysed on the basis of the various sectors involved in the capital goods development process. Therefore we will restrict ourselves to investigating capital goods in accordance with the way in which they are used in the production process[1].

Four sections were used in order to investigate the manufacturing structure. In addition to these sections consideration was given to a section including durable consumer goods in branches which, in general terms, are regarded as capital goods producers.

These sections were established mainly on the utility value of the various items of machinery and equipment. In this context, a differentiation was made in the first instance between machinery used for converting raw materials and machinery used more in the social organization of production.

Likewise, mechanical, electrical and electronic equipment was taken as a whole in the various sections, whereas in actual production processes such items operate together and, in many cases, carry out complementary operations (converting, movement, process control, data processing, etc.).

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(1) An analysis of the capital goods manufacturing structure at branch level does not permit the role of the various capital items in the manufacturing process to be properly taken into account.

Within this theoretical and methodological framework[1], the following sections were established, being based on developing countries at an intermediate stage of development:

1. Section 1: This section includes mechanical equipment based on engineering science, the main purpose of which is the physical converting of the inputs of the production process. It also includes electrical machinery and equipment and electronic equipment used for movement, data processing and control purposes.

2. Section 2: This section includes machines and/or combinations of machines which are based mainly on physical and chemical principles and which generally convert the inputs physically or chemically during the production process.

   This section also includes heavy electrical machinery and equipment used for generating and transforming electricity, and electronic equipment used for data processing and control purposes.

3. Section 3: This section contains machinery and equipment which emphasizes the technical and social division within the production process, that is to say it is specialized machinery and equipment for the various industries. Due to the existing state of development of the overall manufacturing process in developing countries, this section also includes machinery and equipment used to emphasize the social division between the various economic sectors (mining, agriculture, transport, etc.).

4. Section 4: This section includes machinery, equipment, parts and components used in the above mentioned sectors, that is to say machinery and equipment used in the general manufacturing apparatus.

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(1) For further details see Cristian Gillen "Strategy for the development of the capital goods industry in Third World countries at an intermediate state of development: Peru."

5. Section C: This section does not contain capital goods, but a series of durable consumables, including their parts and components. These together form what Harry Braverman[1] calls the domestic work process.

1. The structure of production in Guatemala

The production of capital goods in Guatemala has been concentrated mainly on the manufacture of standard items normally used in the various production branches, i.e. those belonging to Section 4. This type of machinery and equipment accounts for 55.8% of the total produced. Next in importance is the section which does not include capital goods, but domestic consumer goods. This section accounts for 29.8%. Section 3 is third in importance where production is concerned: it accounts for 14.2%. Section 1 is next with only 0.2%. Section 2 shows no production at all. The manufacturing structure by sections is shown below:

TABLE 1

PRODUCTION OF CAPITAL GOODS BY SECTIONS[2]

(In thousands Dollars)

Year : 1977

	Value of production	Production share (%)
Section 1	186	0.2
Section 2	-	-
Section 3	13,410	14.2
Section 4	52,899	55.8
Section C	28,222	29.8
Total	94,717	100.0

Source: Direct investigation

(1) Braverman, Harry. Labor and Monopoly Capital, New York, 1974.

(2) This includes Section C which is not a capital goods producing section.

If the manufacturing structure is analysed only on the basis of capital goods, that is to say without taking Section C into account, the total production is only $66,495 million. Section 4 has the largest share with 79.5%, that is to say that it represents nearly all of the capital goods produced in Guatemala. Section 3 follows with 20.2%, then Section 1 with 0.3%. As stated, Section 2 shows no production whatsoever. The machinery and equipment making up each of the various sections is shown in Annex 1 of this study. The manufacturing structure for machinery and equipment actually forming capital equipment is shown below:

TABLE 2

PRODUCTION OF CAPITAL GOODS

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Section 1	186	0.3
Section 2	-	-
Section 3	13,410	20.2
Section 4	52,899	79.5
Total	66,495	100.0

Source: Direct investigation

As stated, each of these sections includes mechanical, electrical and electronic equipment. In Guatemala, most machinery and equipment manufactured is mechanical: electrical machinery and equipment comes next, whilst no electronic equipment is manufactured at all. If the production of all sections is taken into account, including Section C, the manufacture of mechanical machinery and equipment accounts for 66% of the total produced, while electrical equipment accounts for only 34%. The manufacturing structure by equipment type is shown below.

TABLE 3

PRODUCTION OF CAPITAL GOODS BY EQUIPMENT TYPE(1)

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	62,141	66.0
Electrical equipment	32,576	34.0
Electronic equipment	-	-
Total	94,717	100.0

Source: Direct investigation.

If Section C is ignored, mechanical machinery and equipment takes a larger share of the overall production. This type of machinery and equipment reaches 72%, while electrical machinery and equipment represents 28%. The production of machinery and equipment actually making up capital goods are shown below by equipment type:

TABLE 4

PRODUCTION OF CAPITAL GOODS BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	48,114	72.0
Electrical equipment	18,381	28.0
Electronic equipment	-	-
Total	66,495	100.0

Source: Direct investigation

(1) Includes Section C, the production of durable consumer goods.

1.1 Analysis of the structure of production in the various sections

a) Section 1

In this section, mechanical machinery predominates. It represents 64.9% of the total section production. Electrical machinery and equipment contributes 35.1%. There was no electronic equipment.

The most important mechanical machinery involves simple cold-working machine tools for metal, representing 57.4% of the total mechanical machinery produced. Simple machine tools for wood working take second place, then simple machine tools for metal.

The only electrical equipment produced were electrical panels.

The manufacturing structure for Section 1 is shown below:

TABLE 5

SECTION 1 PRODUCTION BASED ON EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	121,000	64.9
Electrical equipment	65,000	35.1
Electronic equipment	-	-
Total	186,000	100.0

Source: Direct investigation

b) Section 2

In Guatemala, there is no production in this Section.

c) Section 3

Due to the low level of development of the production apparatus in Guatemala production in this section has been concentrated mainly on the production of simple machinery and equipment for other parts of the industrial sector. Machinery and equipment for the industrial sector is restricted to the manufacture of sterilizers for the food industry. The production of machinery and equipment for the service sector is also very small.

Machinery and equipment for economic sectors other than the industrial sector represents 99.8% of the total section production. Machinery and equipment for the industrial sector constitutes 0.2%, while machinery and equipment for the service sector is almost negligible. The following table shows the manufacturing structure for Section 3 as a function of the economic sector in which it is used:

TABLE 6

SECTION 3 PRODUCTION BY ECONOMIC SECTORS

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
For industrial sector	22	0.2
For other sectors	13,381	99.2
For service sector	6	-
Total	13,409	100.0

Source: Direct investigation

This section only includes mechanical machinery. The majority of the machinery and equipment of this type is produced for the infrastructure (bridges, etc.), the transport sector and for agriculture.

The most significant productions are shown below in order of importance:

1) Heavy structural members for bridges
2) Bodywork for buses[1]
3) Machine tools for site working

The production of other machinery and equipment was minimal.

d) Section 4

This section comprises two groups. The first group contains machinery and equipment used in the overall organization of the manufacturing apparatus; the other includes parts and components required to ensure its normal operation.

Machinery and equipment itself represents 97.4% of the total section production, while parts and components account for only 2.6%.

The manufacturing structure of the section is shown below as a function of the above mentioned division:

TABLE 7

SECTION 4 PRODUCTION

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Machinery and equipment	51,541	97.4
Parts and components	1,358	2.6
Total	52,899	100.0

Source: Direct investigation

Mechanical equipment, components and parts represent 65.4% of section production, while electrical machinery, equipment, components and parts represent 34.6%[2].

The manufacturing structure of the section is shown below by equipment type:

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(1) Includes production of 10 complete buses.

(2) This section does not include electronic equipment, assemblies or components.

TABLE 8

SECTION 4 PRODUCTION BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	34,583	65.4
Electrical equipment	18,316	34.6
Total	52,899	100.0

Source: Direct investigation

Mechanical equipment accounts for 96.9% of the total of this type, while parts and components only represent 3.1%. The most important mechanical equipment production was containers, barrels and tubs which account for 41.3% of the total production of mechanical equipment.

The following came next in order of importance: doors, gratings, windows, steel office furniture, nuts, bolts, etc.

The largest number of parts and components were manufactured for agricultural implements.

Conventional batteries and accumulators formed the largest part of electrical machinery and equipment, and accounted for 85.4% of the total electrical machinery and equipment produced. Where electrical parts and components are concerned, only metal electric light fittings were manufactured.

e) Section C

This section does not cover the production of capital goods, but only durable consumable goods to be used for domestic consumer work in accordance with the requirements of the modern sector of the economy. The section has been structured in two groups: the first includes durable consumer goods themselves, the other includes parts and components required to ensure normal operation.

Durable consumer goods represent 91.9% of the overall production in this section, whilst parts and components represent 8.1%. The following table shows the above-mentioned structure of production.

TABLE 9

SECTION C PRODUCTION

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Durable consumer goods	25.923	91.9
Parts and components	2,299	8.1
Total	28,222	100.0

Source: Direct investigation

Mechanically produced goods and components accounted for 49.7% of section production. Electrical items represented 50.3%.

The following table shows the manufacturing structure of the section as a function of equipment type.

TABLE 10

SECTION C PRODUCTION BASED ON EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	14,027	49.7
Electrical equipment	14,195	50.3
Total	28,222	100.0

Source: Direct investigation

The production of mechanical durable consumer goods represent 84.9% of the total for this type of manufacture, while parts and components represent 15.1%.

The largest production of mechanical durable consumer goods involved motor cycles and small motor vehicles, then bicycles and household goods. Motor cycles and small motor vehicles represented 48.7% of the total production of this type of goods, bicycles 30.2% and household goods 20.7%. Simple mechanical components are produced in the largest quantity, then components for bicycles and motor cycles, and goods and components for cookers and hotplates. Simple mechanical components represented 83.8% of the total number of parts and components produced of this type.

The production of electrical durable consumer goods accounted for 98.7% of the total production of this type, while components and parts accounted for 1.3%. The largest production of electrical consumer goods was radios, then television sets. Production of these two items was 63.4% of the total production of this type of goods. The only electrical parts and components produced were simple items for radio and television receivers.

2. Diversification in the production of capital goods in Guatemala

In Guatemala, diversification in the production of capital goods could generally be termed as fairly limited, due to the fact that it is a relatively new industry compared with others, in particular final consumer industries such as textiles, foodstuffs, etc.

The total number of six-figure products (or group of products) was 65, including Section C. Of the various sections, Section 4 showed the greatest diversification of products, and also the highest production level. Sections C, 3 and 1 then follow in decreasing order. In Section 2, there is no production whatsoever, as indicated above. Section 4 contains 31 different products, representing 47.7% of the total of the various products manufactured. Section C includes 17 different products, equivalent to 26.2% of the total produced.

Section 3 includes 13 products or 20%, and Section 1 includes 4 products representing 6.1%.

The diversification of products by sections is shown below.

TABLE 11

DIVERSIFICATION OF PRODUCTION

Year : 1977

	Number of products	Level of diversification (%)
Section 1	4	6.1
Section 2	0	0.0
Section 3	13	20.0
Section 4	31	47.7
Section C	17	26.2
Total	65	100.0

Source: Direct investigation

If Section C is ignored, the number of products is reduced to only 48. Of this total, 64.6% corresponds to Section 4, 27.1% to Section 3 and 8.3% to Section 1. Diversification in the production of capital goods is shown below.

TABLE 12

DIVERSIFICATION IN THE PRODUCTION OF CAPITAL GOODS

Year : 1977

	Number of products	Level of diversification (%)
Section 1	4	8.3
Section 2	0	0.0
Section 3	13	27.1
Section 4	31	64.6
Total	48	100.0

Source: Direct investigation

Of the 31 different products contained in Section 4 23 are mechanical and 8 electrical. Of the mechanical items 18 are machinery and equipment, 5 are parts and components. Of the electrical items 7 are machinery and equipment, one an electrical accessory. Where Section C is concerned 8 of the 17 different products are mechanical, 9 are electrical. Of the mechanical items 4 are durable consumer goods and 4 parts and components. Of the electrical items 8 are durable consumer goods, one a component.

In Section 3, all capital goods are mechanical, 11 being machinery and equipment for various economic sectors other than the industrial sector, 2 are for the services sector and one for the industrial sector. Of the total products in Section 1, 3 are mechanical and one electrical.

2. The structure of production in Peru

Among the various sections under consideration the most important production is that which contains durable consumer goods; as already stated these are not capital goods. This section contributes 38.3% of the total production. Section 3 is next in importance, containing capital goods for industry and other sectors, particularly the latter (fishing vessels) with 37.3%. The production of Section 4 follows with 22.4%, then Section 2 with 1.2% and Section 1 with 0.8%. The capital goods manufacturing structure by sections[1] is shown below.

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(1) The composition of the various sections has undergone slight modification with respect to the previous study entitled "Strategy for the development of the capital goods industry in Third World countries at an intermediate level of development: Peru". The rectifiers and relays listed under Section 1 form part of Section 4. Equipment for telephone exchanges, which were in Section 1, form part of Section 3. Capacitors, considered under Section 2, are now in Section 4. Dryers and evaporators, which were in Section 4, are now in Section 3. Bus bodywork, which was considered under Section C, is now in Section 3.

TABLE 13

PRODUCTION OF CAPITAL GOODS BY SECTION[1]

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Section 1	5,632	0.8
Section 2	8,429	1.2
Section 3	254,510	37.3
Section 4	153,053	22.4
Section C	261,888	38.3
Total	683,512	100.0

Source: Direct investigation

If the manufacturing structure is analysed only on the basis of capital goods (i.e. without considering Section C), the overall production drops to 421,624 million Dollars. Section 3 has the largest production with 60.4%, followed by Section 4 with 36.3% and then Sections 2 and 1 with 2.0% and 1.3% respectively. Appendix 2 of this study shows details of machinery and equipment included in each section. The manufacturing structure for the various sections dedicated to the production of capital goods is shown below:

(1) Section C, which does not include the production of capital goods, is taken into account.

TABLE 14

PRODUCTION OF CAPITAL GOODS

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Section 1	5,632	1.3
Section 2	8,429	2.0
Section 3	254,510	60.4
Section 4	153,053	36.3
Total	421,624	100.0

Source: Direct investigation

Within the various sections, including Section C, mechanical machinery and equipment is most commonly manufactured, representing 70.9% of the total produced. Electrical machinery and equipment and electronic equipment represent 28.1% and 1.0% respectively. The manufacturing structure as a function of equipment type is shown below.

TABLE 15

PRODUCTION OF CAPITAL GOODS BY EQUIPMENT TYPE(1)

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	484,531	70.9
Electrical equipment	182,275	28.1
Electronic equipment	6,706	1.0
Total	683,512	100.0

Source: Direct investigation

(1) Section C is taken into consideration.

If Section C is ignored mechanical machinery and equipment accounts for 82.1%, electrical equipment 17.3% and electronic equipment 0.6%. The following table shows the manufacturing structure for capital goods by equipment type.

TABLE 16

PRODUCTION OF CAPITAL GOODS BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977)

	Value of production (000)	Production share (%)
Mechanical equipment	346,075	82.1
Electrical equipment	73,021	17.3
Electronic equipment	2,528	0.6
Total	421,624	100.0

Source: Direct investigation

3.1 Analysis of the structure of production in the different sections

a) Section 1

In this section the largest production was electrical machinery and equipment, then mechanical machinery and equipment, then electronic equipment. The share of each of these different types of equipment was 50.2%, 39.0% and 10.8% respectively. The largest production of electrical machinery involves multi-purpose welding equipment and electric motors up to 50 kW which are used for drive purposes. Outstanding among the mechanical equipment are simple machine tools for metal. The structure of production in Section 1 is shown below.

TABLE 17

SECTION PRODUCTION BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	2,198	39.0
Electrical equipment	2,828	50.2
Electronic equipment	606	10.8
Total	5,632	100.0

Source: Direct investigation

b) Section 2

In Section 2, electrical machinery predominates, representing 97% of the total production, while mechanical equipment only represents 3%. No electronic equipment is produced. The largest production of electrical machinery involved medium sized transformers. The production of mechanical machinery is reduced to a minimal manufacture of steam boilers. The structure of production in Section 2 is shown below.

TABLE 18

SECTION 2 PRODUCTION BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	252	3.0
Electrical equipment	8,177	97.0
Total	8,429	100.0

Source: Direct investigation

c) Section 3

Production in this section has mainly involved machinery and equipment for economic sectors other than the industrial sector.

Machinery and equipment for sectors other than the industrial sector accounts for 94.3% of the total production. Machinery and equipment for the industrial sector accounts for 3.3%, and for the service sector 2.4%. The following table shows the structure of production of Section 3 as a function of the economic sector involved:

TABLE 19

SECTION 3 PRODUCTION BY ECONOMIC SECTORS

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
For industrial sector	8,314	3.3
For other sectors	240,071	94.3
For service sector	6,125	2.4
Total	254,510	100.0

Source: Direct investigation

The production of this section consists of 99.2% mechanical equipment and 0.8% electrical and electronic equipment. The structure of production in the section is shown below by equipment type.

TABLE 20

SECTION 3 PRODUCTION BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	252,582	99.2
Electrical equipment	6	-
Electronic equipment	1,922	0.8
Total	254,510	100.0

Source: Direct investigation

Mechanical machinery was produced mainly for economic sectors other than the industrial sector. This type of machinery accounted for 94.2% of the total mechanical machinery manufactured. Items produced for the industrial sector represented 3.3% and for the service sector 2.5%.

Of the mechanical machinery and equipment for economic sectors other than the industrial sector, those which reached the highest level of production were fishing vessels, lorry assembly, bus bodywork, trailers and tractor assembly, although the last two items were at lower levels. Production of fishing vessels accounted for 51.7% of the section production, lorries 28.5%, bus bodywork 4.1%, tractors 2.0% and trailers 2.0%.

Mechanical machinery produced for the industrial sector was limited mainly to the assembly of industrial sewing machines, simple continuous conveyors and equipment for mixing and transporting cement. The production of sewing machines represented 2.3% of the section production, conveyors 0.5% and equipment for the cement industry 0.1%.

The manufacture of mechanical machinery and equipment for the production of essential foodstuffs for the population reached a production level of $148 thousand, limited in practice to the manufacture of equipment for the bread industry.

Mechanical equipment for the service sector was limited to the manufacture of machinery and installations for kitchens in hotels, restaurants, etc.

The manufacture of electrical machinery and equipment was limited to special welding equipment, and the manufacture and installation of electronic equipment for telephone exchanges and electronic equipment for vessels.

d) Section 4

This section includes two groups. The first group includes machinery and equipment to be used in the overall organization of production; the other group includes parts and components required to ensure normal operation of the various items of machinery and equipment in the various economic sectors. Machinery and equipment itself accounted for 97.7% of the total section production, whilst parts and components accounted for only 2.3%. The structure of production in the sector is shown below for machinery and equipment and for parts and components.

TABLE 21

SECTION 4 PRODUCTION

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Machinery and equipment	149,577	97.7
Parts and components	3,476	2.3
Total	153,053	100.0

Source: Direct investigation

Mechanical machinery, equipment, components and parts represented 59.5% of the production, whilst electrical machinery and equipment represented 40.5%[1].

The sector structure is shown below by equipment type.

TABLE 22

SECTION 4 PRODUCTION BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	91,043	59.5
Electrical equipment	62,010	40.5
Total	153,053	100.0

Source: Direct investigation

Mechanical machinery and equipment represented 96.2% of the total production of this type, while parts and components represented only 3.8%. The largest production of mechanical machinery and equipment involved containers, barrels and buckets, these accounting for 29.2% of the total production of this type. Production of components for intermediate gearing reached 1.7% of the mechanical production.

The most important electrical machinery and equipment in this section involved cables and conventional batteries and accumulators. Cables represented 30.4% of the production of this type, conventional batteries and accumulators 27.8%.

(1) There was no production of electrical components and parts, and no manufacture of electronic equipment.

e) Section C

This section is not intended for direct reproduction of the manufacturing system, but for organizing urban life in accordance with the logic obtaining in the modern sector of the economy. It has been structured in two groups: the first comprises all durable consumer goods used for organizing domestic life, such as domestic electrical appliances, utility vehicles, etc.; the other group comprises parts and components required to ensure normal operation of these goods.

Durable consumer goods themselves account for 86.2% of the overall production, parts and components accounting for 13.8%.

TABLE 23

SECTION C PRODUCTION

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Durable consumer goods	225,717	86.2
Parts and components	36,171	13.8
Total	261,888	100.0

Source: Direct investigation

Mechanical durable consumer goods and components contributed 52.8% of the overall production, whilst electrical and electronic items contributed 45.6% and 1.6% respectively. The structure of the sector is shown below by equipment type.

TABLE 24

SECTION C PRODUCTION BY EQUIPMENT TYPE

(In thousands Dollars)

Year : 1977

	Value of production (000)	Production share (%)
Mechanical equipment	138,456	52.8
Electrical equipment	119,254	45.6
Electronic equipment	4,178	1.6
Total	261,888	100.0

Source: Direct investigation

The production of mechanical durable consumer goods accounted for 78.1% of the total production of this type, whilst components and parts represented 21.9%. The most important mechanical durable consumer goods were utility vehicles which represented 75.9% of the total of this type of production. Simple mechanical parts and components for vehicles (stud bolts, pistons, etc.) represented 68.4% of the total production of mechanical parts and components.

Production of electrical durable consumer goods represented 95% of the total production of this type, the remaining 5% involving electrical parts and components.

The highest level of electrical durable consumer goods involved refrigerators and television receivers. There was also a considerable production of radios and recorders. The production of components for radios and television receivers is outstanding, as well as instruments for motor vehicles.

In this section the only electronic items produced are cathode-ray tubes for television receivers, etc.

4. Diversification in the production of capital goods in Peru

Diversification of capital goods production in Peru is at an intermediate level among the developing countries in Latin America. That is to say it does not reach the level of diversification of countries such as Brazil, Argentina and Mexico but nevertheless exceeds the level of Central American countries, Ecuador, Bolivia, Paraguay, etc.

The total number of six-figure products manufactured (including Section C) is 135. The highest level of product diversification is in Section 4, which contains 49 different products, and is equivalent to 36.3% of the total products manufactured.

Section 3 follows with 42 products representing 31.1%, Section C with 29 products representing 21.5%, Section 1 with 10 products representing 7.4% and lastly Section 2 with 5 products representing 3.7%. The following table shows the diversification of production by section.

TABLE 25

DIVERSIFICATION OF PRODUCTION

Year: 1977

	Number of products	Diversification level (%)
Section 1	10	7.4
Section 2	5	3.7
Section 3	42	31.1
Section 4	49	36.3
Section C	29	21.5
Total	135	100.0

Source: Direct investigation

In the strict sense(1) the number of capital goods is only 106. Of this total, 46.3% correspond to Section 4, 39.6% to Section 3, 9.4% to Section 1 and 4.7% to Section 2. The diversification of capital goods is shown below.

(1) Excluding Section C

TABLE 26

DIVERSIFICATION IN THE PRODUCTION OF CAPITAL GOODS

Year: 1977

	Number of products	Diversification level (%)
Section 1	10	9.4
Section 2	5	4.7
Section 3	42	39.6
Section 4	49	46.3
Total	106	100.0

Source: Direct investigation

Of the 49 capital items contained in Section 4 36 are mechanical and 13 electrical.

Mechanical capital goods comprise 24 items of machinery and equipment, and 12 parts and components. All electrical capital goods involve machinery and equipment.

Where Section 3 is concerned 38 of the total of 42 products are mechanical, 1 is electrical and 3 electronic. The mechanical capital items comprise 12 machines and equipment for the industrial sector, 22 for other economic sectors and 4 for the service sector. The only electrical equipment is classified under capital goods for the industrial sector, with three items of electronic equipment in economic sectors other than the industrial sector.

Of the 29 durable consumer goods in Section C 10 are mechanical, 18 electrical and 1 electronic. Of the mechanical items 5 are durable consumer goods and 5 are parts and components. Of the electrical items, 16 are durable consumer goods and 2 are parts and components. The electronic item is classified as a durable consumer product.

Of the 10 capital items in Section 1, 6 are mechanical, 3 electrical and 1 electronic. Of the 5 capital items in Section 2, 4 are electrical and 1 mechanical.

5. The most important aspects of the structure of production in Guatemala and Peru

The most outstanding aspects of the structure of production in Guatemala and Peru will be considered at the following levels:

- overall production.
- production in each section, and
- product diversification.

5.1. Overall production

Aspects which must be considered at this level are as follows:

a) The production of capital goods in Peru is 6.3 times greater than the production in Guatemala. If Section C is taken into account it is 7.2 times greater.

b) The capital goods production sections with the highest levels of production are Sections 3 and 4. Where Guatemala is concerned the highest production is in Section 4, then in Section 3. Where Peru is concerned, Section 3 comes before Section 4.

c) The lowest levels of production are to be found in Sections 1 and 2. In the case of Guatemala Section 2 has the lowest production, since no manufacturing is carried out. Where Peru is concerned the same applies to Section 1.

d) Section C is a producer of durable consumer goods; in both countries it has a preponderant share in the overall metal manufacturing production. In the case of Guatemala this Section takes second place in production; in Peru it takes first place.

e) Mechanical capital goods are manufactured in the largest quantity, forming a considerable part of the production. These are followed by electrical goods, then by electronic equipment. Guatemala produces no electronic equipment.

5.2. Production in each section

At this level the following must be pointed out:

a) The production of capital goods in Section 1 is 30.3 times greater in Peru than in Guatemala. In the case of Guatemala mechanical goods predominate, whilst in Peru electrical goods take precedence. In Guatemala the largest production involved simple machine tools for cold deformation of metals; the largest production in Peru involved standard electrical welding equipment.

b) The production of capital goods in Section 2 was limited to Peru, since, as already stated, Guatemala does not produce capital goods in this section. Peruvian production is limited in practice to electrical equipment and machinery, mainly transformers.

c) The production of capital goods in Section 3 is 19 times greater in Peru than in Guatemala.

The production of capital goods in this section is geared mainly to the production of machinery and equipment for sectors other than the industrial sector, where the degree of specialization (in general terms) is less than that obtaining in the industrial sector. In the case of Guatemala the production of capital goods for the industrial sector is practically non-existent, since it involves only one product. In Peru production for the industrial sector is at a high level, although still in an embryonic state. Production for the industrial sector is 378 times that in Guatemala(1).

(1) Where machinery and equipment for sectors other than the irdustrial sector are concerned, Peru produces 17.9 times more than Guatemala.

In this section mechanical capital goods predominate in both Guatemala and Peru. In Guatemala there is no manufacture of electronic and electrical capital goods in this section.

In Guatemala the largest production of machinery and equipment is orientated towards economic sectors other than the industrial sector and involves structural members for bridges, etc., whilst in Peru it involves fishing vessels. To a certain extent this shows the importance given by the State in Guatemala to developing the infrastructure (bridges, roads, etc.), and in Peru the considerable importance of the fish meal industry to the country's economy. In both Guatemala and Peru the second largest production is linked with the transport sector. In Guatemala it involves the production of bus bodywork, in Peru the assembling of lorries. The third highest production in both countries is capital goods for the agricultural sector. However there is a difference in that production in Guatemala is in practice reduced to tools for agriculture, whilst in Peru there is a more extensive range of machinery and equipment, the assembling of tractors being of greatest importance. In the case of Guatemala, the largest and only production for the industrial sector involves sterilizers for the food industry. This production depends on the major importance attributed to the agricultural industry in this country.

In the case of Peru the most important production involves the assembly of sewing machines. Other production is of little consequence.

d) The production of capital goods in Section 4 is 2.9 times greater in Peru than in Guatemala. As can be seen the difference in production levels between these countries is less in this section.

In both countries mechanical machinery and equipment dominates in this section. However, the share taken by this type of machinery and equipment in the overall production volume of the section is less in Peru than in Guatemala.

In Peru, electrical capital goods make a greater contribution to the production of the section than in Guatemala.

The most important mechanical items in Guatemala were containers, barrels, tubs, etc., followed by doors, windows, grilles, etc. In Peru, the most important production also involved containers, barrels, tubs, etc.

These were followed by chrome and nickel plated articles, etc. In Guatemala the largest production in electrical capital goods was conventional batteries and accumulators. In Peru the largest production involved cables, conventional batteries and accumulators.

e) In Peru, the Section C production was 9.3 times the production in Guatemala. In this section electrical durable consumer goods predominate in Guatemala, mechanical goods in Peru. This difference is based mainly on the important role of the motor vehicle industry in assembling vehicles in Peru.

The largest production of durable consumer goods in both Guatemala and Peru is the assembling of radios and television receivers. The largest mechanical production in Guatemala is the assembling of motor cycles and bicycles, in Peru the assembling of utility vehicles.

5.3. Product diversification

The aspects which must be noted in respect of product diversification are as follows:

a) Guatemala produces 48 different capital items as against 106 in Peru. Peru therefore produces 2.2 times more capital goods than Guatemala. If Section C is taken into account the number of different products in Guatemala increases to 65, in Peru to 135, so that Peru has 2.1 times more products than Guatemala.

b) The greatest product diversification in Guatemala and Peru is in Section 4, then in Section 3. However it is important to note that the importance of Section 4 in the capital goods product diversification process is greater in Guatemala than in Peru, due to the lower level of development of production in the remaining sections. In Section 4, Peru has 1.6 times more different capital goods than Guatemala. In Section 3, Peru has 3.2 times more capital goods than Guatemala.

c) The product diversification of Guatemala and Peru is fairly limited in Sections 1 and 2.

   As stated, production drops to only 15 capital items and in Guatemala to only 4. That is to say that Peru has 3.8 times more items of machinery and equipment in these two sections.

d) Guatemala and Peru produce a large variety of durable consumer goods which form part of the urban social system.

   Section C includes this type of product. Its level of diversification in Guatemala is only exceeded by Section 4, while in Peru it is exceeded by Sections 3 and 4.

Peru has 1.7 times more types of goods in this section than Guatemala; the difference in diversification level is not as marked as in Sections 1, 2 and 3. The difference is slightly less only in Section 4.

There is greater product diversification in both countries where electrical durable consumer goods are concerned.

II. PARTICIPATION OF THE VARIOUS TYPES OF FIRM IN THE PRODUCTION OF CAPITAL GOODS

1. General

In Guatemala, foreign capital in the capital goods industry in 1974 (including durable consumer goods) represented 11.3%(1) of the total foreign capital in the industry. In Peru, the share in 1973 was 19.3% (including durable consumer goods)(2).

In Guatemala, foreign capital reached the level of $4.6 million in 1972 in branches 381, 382, 383 and 384. 381 received the greatest share of foreign capital in absolute terms, followed by 383, 384 and 382 in decreasing order. However, 383 received the largest amount of foreign capital in total paid-up capital, followed by 381, 382 and 384. The following table shows the amount of foreign capital in the above branches.

TABLE 27

SHARE OF FOREIGN CAPITAL IN GUATEMALA

Year: 1972

	Total paid-up capital (thousands Dollars)	Foreign capital (thousands Dollars)	Contribution of foreign capital to total capital (%)
381	10.6	2.3	21.6
382	2.3	0.2	10.9
383	4.8	1.6	68.8
384	4.6	0.5	9.5
Total	22.3	4.6	20.6

Source: General Statistical Administration. Industrial Survey, 1972

(1) Source: General Statistical Administration. Industrial Survey, 1974

(2) Source: O.S.P. Ministry for Industry, Trade, Tourism and Integration.

In Peru, foreign capital in the capital goods industry was $40.2 million in 1977.

Branch 383 received the largest amount of foreign capital, followed by 384, 382 and 381 in decreasing order. The largest share of foreign capital in the total amount of paid-up registered capital was in branch 383, followed by 384, 382 and 381. The share of foreign capital in the capital goods production branches is shown below.

TABLE 28

SHARE OF FOREIGN CAPITAL IN PERU

Year: 1977

	Total paid-up capital (thousands Dollars)	Foreign capital (thousands Dollars)	Contribution of foreign capital to total capital (%)
381	38.3	3.6	9.0
382	24.8	5.8	24.0
383	49.1	23.1	47.0
384	28.9	7.7	27.0
Total	141.1	40.2	28.0

Source: Direct investigation.

From the above it can be seen that in absolute values the share of foreign capital in the Peruvian capital goods industry is very much greater than the share in Guatemala. It is approximately 8.7 times greater(1).

The participation of foreign capital in the total capital of the capital goods industry is also greater in Peru than in Guatemala(2).

(1) The difference in the amount of foreign capital in Guatemala and Peru must be treated with reserve, since the figures for foreign capital in these countries relate to the years 1972 and 1977 respectively.

(2) 28% against 20.6%.

In both Guatemala and Peru, the branch in which foreign capital has a larger share in the total capital is 383[1]. In both countries, the share of foreign capital is at a much lower level in the other branches. After branch 383, the branch with the largest share of foreign capital is 381 in Guatemala and 384 in Peru.

2. The various types of firm and the production of capital goods

2.1. Types of firms

Various types of firms produce capital goods. In Guatemala, private national firms, foreign firms and mixed enterprises (created with foreign capital and private national capital) manufacture capital goods.

In Peru, in addition to the types of firms mentioned, there are also mixed companies using state and foreign capital, and enterprises with capital obtained entirely from the State.

2.2. Different types of firm, and manufacturing structure

The various types of firm tend to operate differently, with emphasis on the production of specific capital goods. In this context, the following cases can be shown for Guatemala and Peru:

a) National firms favour the production of standard capital goods of the mechanical type for use in the general production system, i.e. items which are mainly included in Section 4. They also tend to manufacture hand tools for engineering and simple agricultural machinery and equipment belonging to Sections 1 and 3 respectively.

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(1) Branch 383 produces electrical machinery and equipment, as well as electrical durable consumer goods.

It must be stated that part of the production of hand tools and agricultural equipment is carried out by national production units in the traditional sector of the economy, where the production system differs from the modern sector.

b) In Peru and Guatemala foreign and mixed enterprises (i.e. foreign capital plus private national capital) are similar where their modalities are concerned, although they differ in that production in the Peruvian capital goods industry has developed to a greater extent within the framework of existing international relations.

Amongst features common to both countries is the tendency of this type of enterprise to favour the manufacture (or assembly) of durable consumer goods such as television receivers, radios, etc.(1). In other words this type of production unit participates actively in the domestic consumer production process. Likewise there is a tendency, although not so great, for this type of firm to produce standard electrical capital goods belonging to Section 4. The following differences can be seen:

- in Peru this type of firm is responsible for the largest production of machinery and equipment in Section 2, producing the largest amount of electrical machinery and equipment (transformers, etc.). Guatemala has no such production.

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(1) For further details on Guatemala, see "Technical Progress and Transfer of Technology in Guatemalan Industry", National Planning Council; and on Peru, see "Strategy for the Development of the Capital Goods Industry in Third World Countries; Peru", Cristian Gillen.

- In Peru this type of firm is responsible for the largest production in Section 3 for the industrial and other economic sectors, that is the assembly of industrial sewing machines and lorries. Such production does not exist in Guatemala.

- In Peru, this type of firm is responsible for the largest production in Section C, that is the assembly of utility vehicles. This production does not exist in Guatemala.

Summarizing it can be shown that, apart from similarities in the methods used by this type of firm in both countries, there are differences which explain to a large extent the variations in the manufacturing structure between Guatemala and Peru in respect of the existence of Section 2, the considerable production of machinery and equipment for the industrial and transport Sectors in Peru (both in Section 3), and the role of the automotive industry in Section C.

c) Enterprises whose capital is made up from state and foreign capital, and enterprises operating exclusively on state registered capital, only exist in Peru. The first type of enterprise is dedicated mainly to the assembly of capital goods, in particular machine tools forming part of the production of Section 1, and tractors, diesel engines and electronic equipment for telecommunications which are capital goods of Section 3. Machine tools constitute the most important production in the mechanical machinery and equipment of Section 1, while tractors and motors are important productions in Section 3.

Summarizing, it can be shown that the share of these enterprises explains to a large extent the differences in the Section 1 structure between Peru and Guatemala, and helps to explain the differences in Section 3.

Enterprises with exclusively state capital are known as public enterprises in Peru, and are limited in number. They mainly produce standard capital items of the mechanical type, and mechanical parts and components for durable consumer goods.

From the above, it may be concluded that the main difference between the structure of production in Guatemala and Peru is the participation of enterprises whose capital includes foreign capital in different forms.

Similarly it can be shown that the most recent operating methods used by these enterprises (i.e. association of foreign and state capital) is generating manufacturing processes of a new type, such as the assembly of capital goods whose manufacture theoretically requires a high level of technical competence, but which in practice is limited to the simple task of assembling parts and components coming from overseas.

III. THE GENERAL CLASSIFICATION OF CAPITAL GOODS AS PROPOSED BY THE SECTORIAL STUDIES BRANCH OF UNIDO

1. General aspects

For an overall survey of the capital goods industry in developing countries, the Sectorial Studies Branch of UNIDO proposed a list of six-figure capital goods grouped in branches 381, 382, 383, 384 and 385.

These capital goods were arranged by sections(1), following the theoretical and methodological guidelines used for Peru and Guatemala. It was thus possible to ascertain the part they played in the production process, and to provide more concrete data classifying developing countries in accordance with methods and levels of development in their capital goods industries.

2. Proposed classification of capital goods

Through its Sectorial Studies Branch UNIDO proposed an investigation of 477 six-figure capital items. 471 of these were classified into sections, due to the fact that certain items were contained in more than one section(2). In addition items in group 3812 were taken into consideration, since there is a considerable production of this type of goods in countries which are relatively undeveloped.

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(1) Only capital goods of branches 381, 382, 383 and 384 were civided up.

(2) This applies to the following goods: 3829.087, 3833.01, 3839.44, 3839.45, 3841.15, 3841.16 and 3841.17.

However, it must be noted that goods in this group are not really capital goods but durable consumer goods in the same way as many of the goods covered by the Sectoral Studies Section (cars, bicycles, etc.).

Although the classification of these goods into sections is abstract, since it does not refer to any country in particular, due account has been taken of the role of various capital goods in countries whose capital goods industry is in an intermediate or initial state of development(1). Of the total of 471 goods under consideration 430 are capital goods and 41 are durable consumer goods. That is to say, 91.3% are capital goods.

Of the total goods, 4.2% belong to Section 1, 8.3% to Section 2, 45.9% to Section 3, 32.9% to Section 4 and 8.7% to Section C. A detailed list of goods contained in the various sections is given in Annex 3. The following table shows the diversification of capital goods production by sectors.

(1) In particular Peru and Guatemala. It must be pointed out that, as the overall number of products is much more extensive than in other countries, a more rational breakdown into sections has been assumed in many cases.

TABLE 29

DIVERSIFICATION OF PRODUCTION BY SECTIONS

	Number of products	Level of diversification (%)
Section 1	20	4.2
Section 2	39	8.3
Section 3	216	45.9
Section 4	155	32.9
Section C	41	8.7
Total	471	100.0

Source: UNIDO Sectorial Studies Branch

Taking only capital goods into account, we find that 4.7% belong to Section 1, 9.1% to Section 2, 50.2% to Section 3 and 36.0% to Section 4. The proposed diversification of capital goods is shown below by sections:

TABLE 30

DIVERSIFICATION OF CAPITAL GOODS PRODUCTION BY SECTIONS

	Number of capital goods	Level of diversification (%)
Section 1	20	4.7
Section 2	39	9.1
Section 3	216	50.2
Section 4	155	36.0
Total	430	100.0

Source: UNIDO Sectorial Studies Branch

Of the total number of capital goods in Section 1, 65% are mechanical items, 35% electrical and 1% electronic. In Section 2, 53.8% are mechanical, 38.5% electrical and 7.7 electronic.

In Section 3, 31.9% of the capital goods are for the industrial sector, 57% for other economic sectors and 11.1% for the services sector. Of capital goods for the industrial sector, 92.8% are mechanical and 7.2% electrical. Of the machinery and equipment for other economic sectors, 74.8% are mechanical, 9.8% electrical and 15.4% electronic. Of machinery and equipment for the services sector, 79.2% are mechanical, 2% electrical and 3% electronic. In Section 4, 71% is taken up by machinery and equipment, 29% by parts and components for the capital goods themselves. 40% of the machinery and equipment are mechanical, 53.6% electrical and 6.4% electronic. Of the parts and components, 82.2% are mechanical and 17.8% electronic. In Section C, 80.5% are durable consumer goods, and 19.5% are parts and components for these goods. 30.3% of durable consumer goods are mechanical, 60.6% electrical and 9.1% electronic. Of the parts and components, 62.5% are mechanical and 37.5% electrical.

3. The capital goods proposed and countries in a state of "intermediate" development

An analysis of the total number of capital goods proposed for investigation by UNIDO, based on existing manufacturing structures and future possibilities in countries at an intermediate and initial state of development, brings out the following points[1]:

a) the 471 six-figure goods proposed for investigation[2] is far greater than the number of products currently manufactured in Peru and Guatemala. Peru produces 135 different items, Guatemala 65. This means that the total number of products proposed is 3.5 times the Peruvian total and 7.2 times the Guatemalan total.

(1) This analysis has been carried out on the basis of experience in Peru and Guatemala. However, the position is very similar, in general terms, in other Latin American countries at an "intermediate" or "initial" state of development.

(2) Products contained in others have been ignored.

The number of strictly capital goods in the list proposed by UNIDO (430) is 4.1 times the number of products produced by Peru and 9 times the number produced by Guatemala.

b) Among goods proposed for investigation, there is a series of durable consumer goods which must be eliminated (or at least dealt with in a different manner) since their share in the overall production process requires a logic other than that used for capital goods.

c) Diversification of the proposed production tends to favour the following:

- Capital goods, which tend to increase specialization and division of work on standard capital goods used in the general production system, that is to say, which provide greater diversification of production in Section 3 than in Section 4.

- Heavy capital items which favour physical-chemical conversion of inputs. That is to say they favour Section 2 rather than Section 1.

In general terms, this structure contrasts with the structures in Peru and Guatemala where diversification in the production of standard capital items and physically processed capital goods takes priority. In the case of Guatemala, the difference is even more marked.

Since capital goods production in Guatemala is more developed than in other countries in Central America, this situation also applies to other countries in the region and to relatively less developed countries in Asia and Africa.

Within the framework of the above mentioned points the differences in the various sections are as follows:

a) The number of capital goods proposed for investigation in Section 1 is double the number produced in Peru and five times the number produced in Guatemala. The difference between the diversification of production proposed and the cases of Guatemala and Peru is based mainly on mechanical machinery and equipment.

"Theoretical Section 1"[1] contains machine tools of medium to high complexity which neither Peru nor Guatemala produce.

b) In "Theoretical Section 2" the study lists 8 times more capital goods than are produced in Peru. As stated, Guatemala produces nothing in this section.

The most outstanding differences between diversification in the "Theoretical section" and Peru are as follows:

- the "Theoretical section" includes certain mechanical capital goods for basic industry, i.e. castings, forging, etc., which Peru does not produce.

- the "Theoretical section" includes heavy electrical capital goods (i.e. heavy alternators, electrical furnaces, steelworks furnaces, etc.) which Peru does not manufacture.

- the "Theoretical section" includes electronic capital goods such as computers which Peru does not manufacture.

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(1) Sections which include the capital goods proposed for investigation will be termed "Theoretical sections" i.e. Theoretical Sections 1, 2, 3 and 4.

c) "Theoretical Section 3" contains 5.1 times more capital goods than are produced in Peru and 15.4 times more than in Guatemala. Where capital goods destined specifically for the industrial sector are concerned, the "Theoretical section" includes 4.6 times more goods than are produced in Peru and 69 times more than in Guatemala. Where other sectors are concerned, the "Theoretical section" includes 5.3 times more machinery and equipment than are produced in Peru and 11.2 times more than in Guatemala. The "Theoretical section" includes 6 times more machinery and equipment for services than in Peru, and 12 times more than in Guatemala.

The main differences between the level of diversification proposed and the cases of Guatemala and Peru are as follows:

- the "Theoretical section" includes a wide range of specialized machinery and equipment for various branches in the industrial sector (i.e. foodstuffs, chemicals, textiles, leather, shoes, paper, petrochemicals, drinks, tobacco, etc.), whilst Peru produces a minimum range of machinery and equipment for bakeries, cement and clothing. In Guatemala, only one item is produced for the food industry branch.

- The "Theoretical section" includes extensive and complex mechanical machinery and electronic equipment for the building, mining, transport and telecommunication sectors, which Peru and Guatemala do not produce. An outstanding example of the above is the special mechanical machinery and equipment included in the "Theoretical section" for large construction works, oil pipeline stations, caterpillar tractors, power graders, vessels of more than 100,000 tons, etc. Complex electrical machinery and equipment for transport, (tramcars, locomotives, etc.) and large electric motors for mining, etc. Electronic equipment for the telecommunications sector and satellites for telecommunications, radar, satellite telecommunications stations, rockets, equipment for TV stations, etc.

d) "Theoretical section 4" includes 3.2 times the number of capital goods manufactured in Peru and 5 times the number manufactured in Guatemala.

The main difference in diversification of production between the "Theoretical section" and Guatemala and Peru is that the "Theoretical section" has a wide diversification of electrical and electronic capital goods, while Peru and Guatemala show limited diversification of electrical capital goods, and no production of electronic equipment.

In conclusion it can be stated that the capital goods classification proposed applies in general to countries where the capital goods industry is more highly developed than in the large majority of developing countries. The classification is based on the wide diversity, structure and specific nature of a large number of the capital goods proposed for investigation.

IV. A TYPOLOGY OF DEVELOPING COUNTRIES FROM THE POINT OF VIEW OF THE CAPITAL GOODS INDUSTRY

1. General aspects

In order to establish more concrete plans, rather than a single plan, for developing the capital goods industry, the UNIDO Sectorial Studies Branch has established groups of countries based on certain similar characteristics. The following criteria have been used to establish the various groupings:

a) General criteria: Size (as a function of population, per capita GNP, distribution of economically active population, urban and rural population, population living in absolute poverty, etc.

b) Economic criteria: Production of the various economic sectors (agriculture, manufacturing industry, mining industry), and growth of the GDP in the agricultural and manufacturing industries. Investment growth.

c) Criteria relating to trade relations, itemizing of exports and the rate of growth of exports and imports.

d) Criteria relating to education: level of adult literacy, number of people continuing with further education, expressed as a percentage of the population between 20 and 24 years old.

e) Criteria relating to capital goods: production, consumption, imports.

On the basis of the above mentioned criteria, the following six groups of countries were established:

A. Two continents: China and India;

B. 14 countries with a large and diversified industrial base: (Republic of Korea, Republic of China, Hong Kong, Singapore, Brazil, Mexico, Argentina, Turkey, Philippines, Egypt, Colombia, Thailand, Jamaica and Uruguay);

C. 22 countries where an industrial base is being formed: (Algeria, Iran, Venezuela, Pakistan, Guatemala, El Salvador, Costa Rica, Honduras, Nicaragua, Ecuador, Cuba, Zambia, Chile, Peru, Dominican Republic, Mongolia, Korean Popular Republic, etc.);

D. 21 countries producing combustible and non-combustible raw materials: (Nigeria, Jordan, Zaire, Bolivia, Guinea, Tunisia, Morocco, Liberia, Mauritania, etc.);

E. 34 essentially agricultural countries: (Vietnam, Burma, Bangladesh, Tanzania, Ethiopia, small Saharan countries in Africa, etc.);

F. 51 countries and territories with less than 1 million inhabitants, constituting an extremely heterogeneous group: (Gabon, Guinea-Bersan, Equatorial Guinea, Maldive Islands, United Arab Emirates, etc.).

Due to the complexity of the subject and the limitations of existing data this typology of countries has aspects which must be clarified and investigated in depth in order to establish groups of countries which have similar concrete structural characteristics, thus permitting similar strategies for the development of their capital goods industry.

Among others the following aspects must be thoroughly investigated and modified to permit gradual improvements to be made to the country typology:

a) The various groups of countries included in the typology comply with various main criteria at different levels of abstraction. By way of explanation, two groups of countries A and F have been defined using size (i.e. population) as the deciding factor, whilst the four remaining groups are determined on the basis of

the social division of work in the first instance, then on the level of development of the industrial base. Thus, group B and C countries favour industry, group D countries are raw material producers, whilst group E countries are agricultural.

In countries which have a considerable industrial production compared with other sectors (i.e. groups B and C), a division is established based on the level of development of the industrial base[1].

As may be appreciated, the central criteria used comply with various levels of abstraction. Population is the highest level of abstraction, followed by groups of countries based on the social division of production, and then by the level of development of the industrial base.

b) The various main criteria for the typology, and the high and distinct level of abstraction on which the typology has been established, causes capital goods industrial structures of countries in the various groups to be much more similar than countries in the same group. Some examples will illustrate the above point: Peru, Guatemala, Algeria and the Dominican Republic in group C have larger structural differences in their capital goods industry than those, for example, which exist between Honduras/Nicaragua and Bolivia or between Guatemala and Bolivia, these being in different groups.

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(1) For further details regarding this see UNIDO/ICIS Typology of Developing Countries, Dec. 1979.

Likewise, the typology proposed at this early stage will clearly not restrict each of the various countries to a specific group. One country may belong to several groups.

2. Theoretical and methodological factors for modifying the typology of developing countries

The establishment of a typology of developing countries based on the future development of their capital goods industries must be a continuous and systematic process, in view of the complexity of the subject and the lack of adequate information.

Whilst treating the problem of typology in this manner the various countries must be investigated at different levels of abstraction. However, the most concrete items in the country classification must take priority, since they constitute a summary of the more abstract criteria.

The classification to be used must be based on an increasingly detailed knowledge of the position in developing countries at the following levels:

a) The social-economic characteristics of the overall economy.

b) The overall manufacturing structure.

c) The manufacturing and industrial manufacturing structures.

d) The structure of production of capital goods at an overall level and in the different sectors (S1, S2, S3 and S4).

e) The operating logic of the "actors" in the capital goods manufacturing industry.

Each of the various analysing levels forming part of a complete unit must be specified, and a specific set of criteria established[1] which takes account of the more important features of the countries at the various levels of abstraction at which the problems of establishing the typology are dealt with, and which is based on the future development of the capital goods industry.

A set of criteria for each of the various levels is shown below, starting with the level of greatest abstraction:

a) Population, gross national product (GNP), and per capita GNP;

b) Gross domestic product (GDP) by economic sector, economically active population by economic sector (EAP), and GDP/EAP by economic sector.

c) Overall industrial production (IP), production of industrial consumer goods (PIC), production of intermediate goods (PIG), production of capital goods (PCG), overall employment in the industrial sector (E), employment in the consumer goods manufacturing industries (EC), employment in the intermediate goods industries (EI), employment in the capital goods manufacturing industries (ECG), IP/E, PIC/EC, PIG/EI and PCG/ECG.

   Imports and exports in the industrial sector, and share of capital goods in trade relationships.

d) Production of capital goods in the various sections (S1, S2, S3 and S4), showing if possible products with the highest level of production, employment generated by each of the various sections, use of consumables (semi-finished products, components) by sections, detailing the origin (national, foreign), investment in the various sections, level of productivity in the various sections, intensity of capital per section, and levels of complexity per section.

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(1) Many of the criteria shown below were taken from the UNIDO/ICIS study "Typology of Developing Countries", December 1979.

e) Method of operation of the various actors responsible for the production of capital goods (State, multi-national subsidiary, mixed enterprises, national enterprises, etc.) showing the specifications acquired in the different sections making up the capital goods industry.

From an analysis of the criteria it can be appreciated that, as the lower levels of abstraction are dealt with, it is more difficult to obtain adequate information. The above confirms that it is necessary to include regional, sub-regional and national studies with the overall studies in order to perfect the country typology.

Within this progressive process the lowest level of abstraction which details the specialities of the capital goods industry in the various countries must always be used as the main criteria in the country typology, as specified. Within this context it is more convenient, for example, to classify countries in accordance with the structure of production and the production apparatus of their capital goods industry rather than on the basis of the characteristics of the industry as a whole, and so on.

Within the classification one must always use a single main criterion at a specific level of abstraction, wherever possible. For example if data were available on the capital goods manufacturing structure by sections countries could be classified in accordance with the way they favour production of capital goods in sections 1, 2, 3 or 4. Within the various countries which favour production in each of these sections differences must be explained in order to ascertain whether the whole or only part of a country favouring the production of a specific section may constitute a homogenous group. To this end other criteria must be used at other levels of abstraction, such as the structure of the production apparatus, the method of operation of the actors, or any other criteria which provides a better definition of similarity within the diversity.

To summarize, it could be said that once "similar" groups have been established, in the first instance using a main criterion which is as concrete as possible, it is necessary to make use of additional criteria to ensure that the countries are "even more similar". This applies because identical strategies only have the same impact if the essential structural characteristics are similar. To give an example, the strategy for the development of capital goods in Hong Kong, Mexico or Brazil (which belong to the same group in the proposed typology) may lead to completely different results in respect of employment, transfer of technology, trade balance, etc., due to the structural differences in their capital goods production apparatus and differences in the operating methods of the actors involved.

V. STRATEGY FOR DEVELOPING THE CAPITAL GOODS INDUSTRY IN COUNTRIES AT AN INTERMEDIATE STATE OF DEVELOPMENT

1. General considerations

The way in which the capital goods industry in developing countries has been developed, and is being developed, has led to the need to establish a future self-sustaining development plan within the framework of a world where it is often necessary to reinforce links between countries, providing that national independence is not threatened.

Within the framework of a self-sustained development priority must be given to capital goods industries which best meet the requirements of the social systems and the natural resources available in the various countries at their different levels of development.

Within the above mentioned framework the capital goods industries which best contribute to the self-sustained development of developing countries in an intermediate state of development are those which facilitate better application of raw materials within the existing social and economic context, and which contribute most adequately to the level of social and technical specialization which the organization of production requires.

The industries which adapt themselves best to the above requirements are:

a) Those which produce simple capital goods for the mechanical processing of inputs which is required in the manufacturing process.

b) Those which produce capital goods common to various economic activities, i.e. machinery and equipment required for the general production apparatus.

c) Those which produce machinery and equipment for use in agriculture, mining and the fishing industry.

d) Those which produce capital goods for use in industrial production designed to meet the majority of the country's requirements in respect of foodstuffs, clothing and housing.

The list of capital goods industries which should be given priority in no way implies that development may not take place in other capital goods industries, such as those involving the physical-chemical conversion of raw materials, or certain industries which contribute in other ways to the social organization of the manufacturing system. This arrangement is based on the considerable diversity ruling in what is termed the capital goods industry, and the different structural and political characteristics which exist in developing countries, even those with the same "level" of development.

Another aspect worth mentioning is that in many developing countries at an intermediate stage of development some of the industries considered as priorities are those which had high levels of production whilst structuring of the capital goods industry was taking place. However, the selection of machinery and equipment within the wide range covered by each of the capital goods industries was carried out without regard to its role within the context of self-sustained development of the entire capital goods sector and also the possibility of producing all machinery and equipment permitted by the existing infrastructure nationally within the framework of a high level of national integration. This would require a reduction to a specific level of machinery and equipment, so that plans for developing the capital goods industry may be suited to existing

realities. In this sense, and in order to establish plans for developing the capital goods industry in countries whose level of development is lower than the majority, a whole range of products has been established for industries considered as priorities, taking due account of the possibility of extensive national integration and the structural characteristics of capital goods manufacture as a whole in this type of country. In general terms an attempt has been made to establish a manufacturing structure which permits maximum production of capital goods at a level of complexity which can be "standardized" in these countries, without having to fall back on structural assembly processes, or a high level of overseas dependence.

2. The development of priority capital goods industries

Within the framework of the priorities defined certain basic planning factors must be taken into account in the development of priority capital goods industries in order to ensure that they contribute adequately to a self-sustaining development.

2.1. Machinery and equipment for mechanical converting

The development of mechanically produced capital goods in countries with a poorly developed industrial infrastructure must be based on the national production of an extensive range of hand tools used in the production of simple machinery and equipment, and the maintenance and repair of existing machinery. They must also be based on simple universal machine tools which can be manufactured locally, by means of a considerable level of national integration and by increasing the level of manual and intellectual work. Similarly the manufacture of electrical machinery and equipment must be advocated to permit operation and control of the machine tools to be produced.

An extensive range of manual tools may be produced in the countries concerned, ranging from pliers, screwdrivers, etc. to complex automatic hand tools. A detailed list of the various hand tools which may be manufactured is shown in Annex 4 of this study.

The entire range of hand tools may be manufactured both in the modern and traditional sectors: in the favoured modern sector by means of horizontal integration, in the traditional sector by means of a manufacturing process based on vertical integration. Any simple hand tool can be produced in both the modern and so-called traditional sectors. The more complex hand tools, power-driven portable tools and automatic hand tools (to mention a few examples) are produced in the modern sector of the economy.

The diversity of this type of capital goods and the nature of the manufacturing processes permit the large majority of the hand tools to be manufactured in rural zones, or in urban centres in regions with a low level of industrialization.

Because of this the development of this type of capital goods permits the development of any industrial activities which complement and support agriculture, fishing and construction activities developed in zones other than large urban centres.

Where simple universal machine tools are concerned, an entire range may be produced locally in these countries without having to resort to assembly methods.

Among these, basic lathes, drills, milling machines, filing machines, etc. may be mentioned. A detailed list is given in Annex 4.

Although these machine tools are currently used to a considerable extent in the repair and maintenance of existing machinery in these countries, they must give way in the future to machinery and equipment required for the various economic activities.

The nature of the universal machine tool manufacturing process causes production to be carried out in the modern sector where there is an adequate technical infrastructure. Their production favours horizontal-vertical integration. Electric motors must be produced to operate machine tools, thus permitting local manufacture of all machines used for the mechanical production of raw materials.

Summarizing, it can be said that widely diverse capital goods may be produced to permit mechanical production of raw materials in developing countries at an intermediate state of development, ranging from basic hand tools to universal machine tools.

The whole of this wide range may be produced using different methods of production and integration. It constitutes the base for forming a machine sector to produce machines in the various regions, using production methods which co-exist in a developing country.

2.2. Standard capital goods

The developing countries concerned must aim to produce the widest range of capital goods used in the general manufacturing system. This is because the possibility of producing a range of goods of this type locally is not exploited to the maximum.

The countries concerned must produce standard mechanical items such as pipes, cables, springs, hardware, etc., and more complex items such as compressors, various types of pumps, boilers for heating water, etc.

The production of this category of capital goods must not be limited to mechanical items, but must be a means of starting to manufacture electrical machinery and equipment. Amongst such capital goods, there is a whole variety of simple capital items which can be produced in these countries using a high level of national integration. The most outstanding items are cables, conventional accumulators, electric light fittings, electrical equipment for power circuits, etc.

An extensive list of standard mechanical and electrical capital goods which can be produced in developing countries at an intermediate state of development is given in Annex 4.

It is important to be able to produce as wide a range as possible of these capital goods because the nature of their manufacturing processes in general permits them to be "standardized" locally, and they are an important means of generating employment and the use of national inputs.

The main characteristics of their production apparatus also permits considerable flexibility with respect to the type of integration, combined vertical and horizontal integration generally predominating. This permits more rational use of the land in these countries, since it is possible to install a wide range of plants at points other than the main capital, and without the need to rely on an extensive industrial infrastructure.

The maximum use of local manufacturing facilities for this type of product also permits significant savings in currency by replacing imports. For example, in the case of Peru, imports of this type of capital goods reached $166 million in 1977[1], this figure being exceeded only by imports of capital goods in Section 3.

2.3. Capital goods for agriculture, mining and fishing

The economy of the majority of developing countries depends to a considerable extent on agriculture, mining and fishing. In many cases it is these activities which provide the necessary currency for importing capital goods required for their manufacturing systems.

The importance of these economic sectors calls for the progressive production of the entire range of machinery and equipment required in these countries.

2.3.1. Agricultural machinery and equipment

The production of capital goods for agriculture must satisfy the ecological heterogeneity and production methods which coexist in the developing countries. That is to say different technologies must be used, depending on the regions in the various countries and their ecological, social and economic characteristics.

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(1) Section 4 imports represented 32.9% of the total imports of capital goods in 1977.

Due to the high level of heterogeneity in agriculture production must range from simple hand tools (including traditional tools) to special machinery and equipment which meets the requirements of large plantations where the labour system calls for increasing specialization in the various tasks involved in the production process.

Of the entire range of machinery and equipment called for in the agricultural sector local production need only cover those items which permit a considerable level of national integration, and which do not worsen the structural dependence. Within this context the countries under investigation must produce a wide range of hand tools such as hoes, mattocks, scythes, axes, sickles, machetes, spades, pickaxes, etc. In addition the entire range of agricultural implements for the various activities included in the agricultural production process, such as hand rakes, disc ploughs, mouldboard ploughs, disc harrows, seeders, cutters, etc., as well as simple specialized equipment such as sprayers, wheat winnowers, hay loaders, vibrating screens for agricultural purposes, etc. An exhaustive list of agricultural machinery and equipment which could be produced in these countries is shown in Annex 4.

The more complex agricultural machinery and equipment, such as tractors, combines, etc., should not be produced in these countries unless it is possible to achieve a considerable level of national integration.

The manufacture of various capital items for agriculture[1] involves alternative and different methods of production. This variety permits better use to be made of the natural and human resources in the various regions of these countries.

In accordance with regional and national requirements hand tools for the field may be produced either in the modern sector of the economy (favouring horizontal integration) or in the traditional sector using working methods which comply with regional and local traditions where fairly extensive social control of production generally exists. The methods used for hand tools are generally applicable to agricultural implements. Agricultural implements pulled by animals or humans may be produced in the traditional sector (favouring vertical integration), while implements which are to be used with tractors must be produced in the modern sector within the framework of a more distinct division of labour.

2.3.2. Mining and fishing machinery and equipment

Countries with a high level of development in mining must favour the local production of mining machinery and equipment for the various activities carried out in mining. The manufacture of mining equipment in countries which have a significant mining sector must, preferably, be orientated towards the production of equipment and installations for concentration, refining and pelletting, as well as equipment and installations for preparation, breaking and crushing. Likewise in countries which possess oil, equipment and installations must be produced (as a minimum requirement) for drilling oil wells.

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(1) Especially hand tools and implements for agriculture.

In order to produce the entire range of equipment specified above, these countries must reach complexity levels 3 and 4[1].

Where the fishing sector is concerned the manufacture of vessels for owner/operator fishing and vessels with a large draught for industrial fishing must be promoted. Likewise in order to favour links between the fishing and industrial sectors machinery and equipment must be manufactured for the fish meal and oil industry, as well as machinery and equipment for the fish canning industry.

2.4. Machinery and equipment for the industrial sector

Machinery and equipment which has to be manufactured for the industrial sector must be orientated so as to satisfy the basic requirements of the population where food, clothing and housing are concerned. On this basis the developing countries must make an effort to produce machinery and equipment for the following industries.

a) Milk, cheese, etc.
b) Flour, bread, biscuits, etc.
c) Meat
d) Oils and fats
e) Sugar
f) Food pastes
g) Clothing
h) Socks

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(1) The levels of complexity used are those defined by the UNIDO Sectorial Studies Branch.

i) Shoes
j) Thread
k) Cloth
l) Textiles (manufacture, finishing and dyeing)
ll) Leather
m) Bricks
n) Cement

The final aim is to provide a high percentage of machinery and equipment for the above industries. On this basis simple machinery and equipment required by these industries must be provided initially, such items being followed by more complex machinery. Annex 4 gives a list of capital goods whose production is recommended for these industries.

Although we have shown capital goods which should be produced on a priority basis in the medium term in developing countries at an intermediate stage of development, production of the large machinery and equipment of Section 2, such as transformers, generators, and steam boilers (to mention the most important) must be started. Annex 3 gives a list of Section 2 capital goods the production of which is recommended. Likewise the manufacture of capital goods for the transport sector, such as vessels, railways and lorries, must be promoted whenever there is a high level of national integration.

ANNEX 1

G U A T E M A L A

PRODUCTION OF CAPITAL GOODS BY SECTIONS

A) Section 1

Mechanical Equipment		Electrical Equipment	Electronic Equipment
3823.01	Machine tools for metalworking(1)	Electrical panels(2)	
3823.04	Machine tools, metalworking, cold-forming		
3823.07	Simple machine tools for woodworking(3)		

(1) Planing machines.

(2) Not included in the classification proposed by the Sectorial Studies Branch.

(3) Sawing machines.

B) Section 2[1]

Mechanical Equipment

Electrical Equipment

Electronic Equipment

(1) No production in this Sector.

C) Section 3

Industrial Sector

Mechanical Equipment

Sterilizers

Electrical Equipment

Electronic Equipment

Other Sectors

3811.01 Hand tools for field work
3811.04 Tools for bricklaying, plumbing and other work
3813.02 Medium duty structural members for supporting bridges, etc.
3813.03 Heavy duty structural members for bridges, etc.
3822.06 Agricultural machinery for seeding, planting and fertilizers.
3822.09 Agricultural machinery for harvesting, transportation and handling(1)
3841.01 Vessels, barges, lighters, boats, etc.
3841.07 Medium-sized fishing vessels and tugs(2)
3843.07 Bus bodywork(3)
3843.10 Trailers

Services

3829.081 Machinery and equipment for laundries.
3829.082 Machinery and installations for kitchens in hotels, restaurants, industry, etc.

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(1) Threshing machines.
(2) Not included in the Sectorial Studies Branch classification.
(3) Includes the production of ten complete buses.

D) Section 4

Standard machinery and equipment

Mechanical Equipment		Electrical Equipment		Electronic Equipment
3811.06	Hardware, locks, keys, etc.	3839.01	Cables[5]	
3811.07	Steel furniture for industrial offices, etc.	3839.02		
3813.01	Doors, gratings, windows, etc.	3839.35	Conventional batteries and accumulators	
3819.01	Containers, barrels, tubs, etc.	3839.37	Electric light fittings for buildings, etc.	
3819.05	Chains, cables and similar items	3839.54	Standard lamps	
3819.06	All types of springs	3839.55	Mercury vapour lamps, etc.	
3819.07	Nuts, bolts, etc.	3839.60	Watt-hour meters	
3819.09	Metal fittings on valves and pipework	x	Other equipment and accessories for industrial use[6]	
3819.10	Cables, wires and metallic mesh			
3819.12	Chrome-plated, nickel-plated and galvanized items			
3824.11	Cold-storage rooms[1]			
3825.09	Weighing machines			
3829.009	Fans, blowers, etc. up to 5 hp			
3829.016	Cranes, etc.[2]			
3829.024	Hoists			
3829.041	Small and medium sized furnaces[3]			
3829.093	Centrifugal pumps			
3849	Bogies, waggons and trucks[4]			

(1) This heading includes industrial and commercial refrigeration equipment.
(2) Pulleys included.
(3) Includes furnaces.
(4) Includes other transportation equipment. Not included in S.S.B. classification.
(5) It is not possible to specify type of cables.
(6) Not included in S.S.B. classification.

Parts and Components for Machinery and Equipment

Mechanical Equipment		Electrical Equipment	Electronic Equipment
3822.13	Parts and components for agricultural equipment		
3823.10	Parts and components for machine tools for metals and wood		
3829.100	Simple mechanical components		
3829.113	Components for refrigeration systems (excluding compressors)		
3849.19	Parts and components for vessels		
		x Metal accessories for electric light fittings(1)	

(1) Not included in S.S.B. classification.

E) Consumer Goods Section

Durable Consumer Goods

Mechanical Equipment		Electrical Equipment		Electronic Equipment
3812.	Household equipment(1)	3832.13	Manufacture of tapes and records	
3844.01	Bicycles and tricycles	3832.19	Recorders	
3844.02	Motor cycles and light motor vehicles	3832.24	Amplifiers	
		3832.27	Radios (mainly domestic)	
x	Wheelchairs for invalids(2)	3822.28	Television receivers (mainly domestic)	
		3833.06	Heaters for water, food, etc.	
		Others	Standard and small electric cookers(2)	
		x	Other radio and television equipment(2)	
Components and Parts				
3843.13	Simple mechanical comporents	3832.26	Other components for radio and television receivers	
Others	Upholstery, filling, etc.			
3844.04	Components for bicycles and			
3844.05	motor cycles			
x	Parts, components and accessories for standard and small cookers(2)			

(1) Including standard and small gas cookers for domestic use.
(2) Not included in S.S.B. classification.

ANNEX 2

P E R U

PRODUCTION OF CAPITAL GOODS BY SECTIONS

A) Section 1

Mechanical Equipment

3811.02	Hand tools for engineering
3811.03	Hand tools for woodworking
3811.05	Complex hand tools
3823.01	Machine tools for metals
3823.04	Cold deformation machine tools for metals
3823.08	Machine tools for wood

Electrical Equipment

3839.46	Standard electrical welding equipment
3831.03 04	DC and AC electric motors up to 50 kW, with insulation suitable for 120°C
3831.41	Special electrical components for machinery control systems

Electronic Equipment

3831.49	Hybrid integrated circuits for miniaturizing electrical equipment

B) Section 2

Mechanical Equipment	Electrical Equipment	Electronic Equipment
3839.033 Steam boilers	3831.15 Low and medium power alternators	
	3831.17 All types of electrostatic generators	
	3831.21 Standard and medium duty transformers	
	3831.22 Medium and heavy duty transformers	

C) Section 3

Industrial Sector

Mechanical Equipment

3823.09	Machinery and equipment for treating wood
3824.01	Equipment for the food industry: bakeries
3824.05	Other equipment for the food industry
3824.10	Equipment for dehydration, freeze-drying and deep-freezing
3824.19	Machinery and equipment for the pottery, clay, cement and similar industries
3824.21	Equipment for mixing and transporting cement
3824.39	Driers, heaters and decerators
3824.49	Machinery and equipment for printing and similar
3829.027	Standard continuous conveyors
3829.038	Evaporators
3829.044	Equipment and plant for quenching, casehardening and heat treatment in general
3829.079	Industrial sewing machines

Electrical Equipment

3839.47	Special and/or automatic welding equipment

Electronic Equipment

Other Sectors

Mechanical Equipment

Electrical

3811.01	Manual tools for site working
3813.02	Medium structural members for bridges, buildings, etc.
3813.03	Heavy structural members for bridges, buildings, etc.
3821.02	Diesel engines up to 500 hp
3822.02	Tractors
3822.05	Agricultural equipment for soil preparation
3822.06	Agricultural equipment for seeding, planting and fertilizers
3822.08	Pesticide applicators
3824.20	Civil construction, i.e. cranes and hoists
3824.27	Machinery and equipment for mining, drilling and excavation
3824.29	Transport equipment, including special lorries
3824.30	Equipment and plant for preparation, such as breaking, crushing, etc.
3824.31	Equipment and plant for concentrating, refining and pelletting
3824.32	Equipment and plant for prospecting and extracting petroleum
3829.052	Road-building equipment: compressors
3829.053	Road-building equipment: caterpillar tractors
3841.01	Vessels, barges, lighters, boats, etc.
3841.07	Medium and large fishing vessels
3843.03	Lorries up to 5 tonnes

Equipment

Electronic Equipment

3832.01	*Equipment for* telephone exchanges
3832.04	Telephones and telephone exchanges
3839.32	Special electrical and electronic equipment for vessels

3843.07 Bus bodywork
3843.09 Truck bodies for liquid or solid loads
3843.10 Trailers

Services

Mechanical Equipment — Electrical

3829.014 Fire-fighting equipment
3829.065 Equipment for water treatment
3829.073 Equipment for service stations
3829.082 Machinery and installations for kitchens in hotels, restaurants, industry, etc.

D) Section 4

Standard Machinery and Equipment

Mechanical Equipment — Electrical

3811.06 Hardware: locks, keys, etc.
3811.07 Steel furniture for industrial offices, etc.
3813.01 Doors, gratings, windows, etc.
3819.01 Containers, barrels, tubs, etc.
3819.02 .04 Pressings
3819.05 Chains, cables and similar
3819.06 All types of springs
3819.07 Nuts, bolts, etc.
3819.08 Bendable pipes and similar
3819.09 Fittings for valves and pipework
3819.10 Cables, wires and metallic mesh
3819.12 Chrome-plated, nickel-plated and galvanized articles
3824.11 Cold-storage rooms
3825.02 Computers for industrial use
3825.09 Weighing machines
3829.007 Air compressors up to 5 hp

Equipment

Electronic Equipment

Equipment

Electronic Equipment

Mechanical Equipment

3829.009 Fans, blowers, etc. up to 5 hp
3829.011 Windmills
3829.031 Burners and similar
3829.032 Boilers for heating water
3829.047 Air, smoke and dust purifiers and exhausters
3829.093 Centrifugal pumps up to 50 hp
3829.095 Pumps for corrosive fluids
3849 Trucks

Electrical Equipment

3831.24 Static rectifiers
3831.26 Electrolytic capacitors
3831.31 All types of relays apart from electronic relays
3831.34 Equipment for electrical transmission lines and distribution systems
3833.01 Air conditioning equipment
3839.01 Telephone cables, etc.
3839.02 Cables for buildings
3839.35 Conventional batteries and accumulators
3839.37 Electric light fittings for buildings, etc.
3839.38 Electrical equipment for power circuits on general machinery
3839.54 Standard lamps
3839.55 Mercury vapour lamps, etc.
3839.60 Standard watt-hour meters.

Electronic Equipment

Parts and components for machinery and equipment

3822.13 Parts and components for agricultural equipment
3829.101 Mechanical components for intermediate gearing
3829.102 Mechanical components: gears
3829.105 Mechanical components: reduction gears between 11 and 50 hp
3829.112 Pumps and compressors for lubricating systems
3829.114 Valves for water and non-corrosive liquids and gases
3841.18 Parts and components for maritime engines
3841.19 Parts and components for vessels
3841.20 Auxiliary technical equipment for vessels
3841.22 Cast and forged mechanical components
3841.23 Propellers
3841.24 Reduction gears, couplings and associated items

E) Section C

Durable consumer goods

Mechanical Equipment

3812. Cutlery and household equipment
3829.023 Lifts
3843.01 Cars
3844.01 Bicycles and tricycles
3844.02 Motor cycles and light motor vehicles

Electrical Equipment

3831.01 02 Fractional electric motors
3831.20 Small transformers
3832.13 Manufacture of tapes and records
3832.18 Loudspeaker systems
3832.19 Magnetic tape recorders (mainly radio type)
3832.23 Amplifiers
3832.27 Radio receivers (mainly domestic)
3832.28 Television receivers (mainly domestic)
3833.02 Toasters and mixers
3833.03 Polishers
3833.04 Vacuum cleaners
3833.05 Hair driers and hair-cutting implements
3833.06 Heaters for water, food, etc.
3833.07 Driers, irons, etc.
3833.08 Washing machines, dishwashers and similar
Others Refrigerators, iceboxes, cookers, etc. (including refrigerated display units)

Electronic Equipment

Parts and components

3843.13 Simple mechanical components
3843.15 Instruments for measuring petrol, speed, etc.
Others Upholstery, packing, etc.
3844.04 Components for bicycles
3844.05 Components for motor cycles

3832.26 Other components for radio and TV receivers
3839.25 Electrical and/or electronic instruments for motor vehicles

ANNEX 3

UNIDO SECTORIAL STUDIES BRANCH DIVISION OF GROUP OF PRODUCTS CONSIDERED IN THE CLASSIFICATION BY BRANCHES

A) Section 1

Mechanical Equipment

3811.02	Simple hand tools for engineering, spanners, hammers, etc.
3811.03	Hand tools for woodworking
3811.04	Tools for bricklaying
3811.05	Complex manual tools
3823.01	Basic machine tools for metals: lathes, drills, planing machines, milling machines, etc.
3823.02	Conventional machine tools of medium complexity for metals
3823.03	Highly complex machine tools for metals
3823.04	Basic cold-working machine tools, guillotine shears, benders, shapers, etc.
3823.05	Complex cold-working machine tools for metal
3823.06	Hot-working machine tools for metals
3823.07	Basic machine tools for wood
3823.08	Advanced machine tools for wood
3829.092	Power-operated portable tools

Electrical Equipment

3831.03	DC electric motors up to 50 kW, insulation to 120°C
3831.04	AC electric motors up to 50 kW, insulation to 120°C
3831.12	Linear motors
3831.41	Special electrical components for controlling machinery
3839.46	Standard electrical welding machines
3839.48	Spark cutters

Electronic Equipment

3831.49	Hybrid integrated circuits, ultraminiaturization of electrical circuits

B) Section 2

Mechanical Equipment

3821.04	Gas and other engines
3821.05	Steam engines
3821.06	Steam turbines(1)
3821.07	Gas turbines
3821.08	Hydraulic turbines
3821.09	Non-conventional engines (atomic, etc.)
3823.11	Blast furnaces
3823.12	Steelworks furnaces
3823.13	Continuous casting
3823.14	Rolling mills
3823.16	Equipment for stretching, drawing, cold rolling and extension
3823.17	Equipment for ferrous and non-ferrous casting
3823.18	Equipment for special castings
3823.19	Equipment for noble metal casting
3823.20	Special equipment for producing noble metals
3829.033	Steam boilers, specific production up to 20 kg/m^2.h
3829.034	Steam boilers, specific production up to 70 kg/m^2.h
3829.035	Steam boilers, specific production more than 70 kg/m^2.h
3829.036	Nuclear steam generators
3829.037	Steam accumulators and similar
3829.043	Large furnaces

Electrical Equipment

3831.05	DC electric motors up to 50 kW, insulation to 120°C
3831.11	Special AC and DC motors over 560 kW
3831.13	DC generators up to 50 kW
3831.14	DC generators over 50 kW and special DC generators
3831.15	Low and medium power alternators
3831.16	Medium and heavy duty alternators
3831.17	Electrostatic generators
3831.18	MHD generators
3831.21	Standard and medium duty transformers
3831.22	Medium and heavy duty transformers
3831.23	Special very heavy duty transformers
3839.50	Electrical furnaces for continuous and intermittent operation
3839.51	Electrical furnaces for continuous and intermittent operation up to 2,000°C
3839.52	Steelworks electrical furnaces
3839.53	Electrical furnaces for more than 2,000°C

Electronic Equipment

3825.05	Desk computers and peripherals
3825.06	Computers and peripherals
3825.07	Card and tape punches, magnetic storage and similar

(1) includes 3841.17

C) Section 3

Industrial Sector Machinery and Equipment

Mechanical Equipment

3823.09 Machinery and equipment for treating wood
3824.01 Equipment for food industry: bakeries
3824.02 Equipment for food industry: biscuits, pastas and similar
3824.03 Equipment for food industry: milk and cheese
3824.04 Equipment for food industry: icecreams, juices, etc.
3824.05 Other equipment for the food industry
3824.06 Equipment for forage industry
3824.07 Equipment for drink industry
3824.08 Equipment for nursery industry
3824.09 Equipment for slaughterhouses
3824.10 Equipment for dehydration, freeze-drying and deep-freezing
3824.13 Textile machinery: spinning
3824.14 Textile machinery: weaving
3824.15 Textile machinery: knitted goods
3824.16 Textile machinery: washing and dry cleaning
3824.17 Other textile machinery
3824.18 Machinery and equipment for producing cement
3824.19 Machinery and equipment for the pottery industry
3824.21 Equipment for mixing and transporting cement
3824.23 Fixed installations for preparing concrete

Electrical Equipment

3831.09 Special AC and DC motors up to 50 kW, insulation to 180°C
3831.10 Special AC and DC motors up to 500 kW, insulation to 180°C
3839.18 Ultrasonic welding
3839.42 Equipment for hydrogen peroxide solution and other electro-chemical installations
3839.47 Special electrical welding machines

Electronic Equipment

3824.25	Asphalt plants
3824.26	Special equipment for the plate glass industry
3824.36	Chemical and petrochemical equipment: towers and columns, reactors
3824.37	Heat exchangers, coolers, evaporators
3824.38	Pressure vessels (chemical and petrochemical industry)
3824.39	Chemical and petrochemical equipment: furnaces, dryers, ovens, deaerators, autoclaves
3824.40	Chemical and petrochemical equipment: spheres, storage tanks and steel silos
3824.41	Mixers, filters and other equipment for the petrochemical and chemical industry
3824.42	Equipment for the chemical-pharmaceutical industry
3824.43	Equipment and installations for the fertilizer industry
3824.44	Equipment and installations for the mineral oil industry
3824.45	Equipment and installations for the vegetable oil industry
3824.46	Special equipment for manufacturing cellulose
3824.47	Special equipment for manufacturing paper and cardboard
3824.48	Machines for printing, book binding, etc.
3824.49	Machinery and equipment for printing houses and similar
3824.50	Installations for treating waste
3824.52	Machinery for leather and shoe industry
3824.53	Machinery for manufacturing tyres
3824.54	Other machinery for rubber industry

3829.001	Machines for injecting plastics, bakelite and similar
3829.006	Vacuum machinery
3829.017	Travelling cranes, gantry cranes, standard cranes, etc. of more than 50 t
3829.021	Stackers of more than 4 t with I.C. engine
3829.027	Fixed and portable standard continuous conveyors
3829.028	Medium and heavy duty conveyors except those used for mining, covered in 3824.28
3829.030	Autogenous machinery and equipment
3829.038	Evaporators
3829.039	Steam condensers and similar
3829.040	Heat exchangers
3829.044	Equipment and installations for quenching, case hardening and heat treatment
3829.045	Standard equipment for electroplating(1)
3829.046	Automatic equipment for electroplating(2)
3829.048	Equipment and installation for sand and shot blasting, etc.
3829.066	Machinery for tobacco industry
3829.067	Equipment and installations for sugar refinery
3829.068	Equipment and installations for sugar alcohol plants and associated items
3829.069	Equipment and installations for vegetable alcohol units
3829.070	Machinery and installations for collecting and processing cotton
3829.077	Packing machines
3829.078	Wrapping machines
3829.079	Industrial sewing machines
3829.080	Machinery for clothing industry and similar

(1) Includes 3839.44
(2) Includes 3839.45

Machinery for Other Sectors

Mechanical Equipment

3811.01 Hand tools for site working
3813.02 Medium duty structural members for bridges
3813.03 Heavy duty and extra heavy duty structural members for bridges
3813.04 Steel sections for vessels and similar
3821.02 Diesel engines up to 500 hp
3821.03 Diesel engines over 500 hp
3822.01 Wheeled tractors up to 25 hp
3822.02 Wheeled tractors over 25 hp
3822.03 Caterpillar tractors
3822.04 Articulated tractors
3822.05 Agricultural machinery: soil preparation
3822.06 Implements for seeding, planting and fertilizers
3822.07 Cultivators
3822.08 Pesticide applicators
3822.09 Harvesting, transportation and handling
3822.10 Agricultural machinery: processing, storage and steel silos
3822.11 Agricultural machinery, water supply, irrigation and other agricultural implements
3824.20 Civil engineering: cranes and hoists
3824.22 Civil engineering: special equipment for large works
3824.24 Civil engineering: equipment for surfacing
3824.27 Machinery and equipment for mining: drilling and excavation

Electrical Equipment

3831.06 AC electric motor up to 500 kW, insulation to 130°C
3831.07 DC and AC electric motors over 500 kW, insulation up to 130°C
3831.35 Marine electric motors
3831.36 Special electric motors for aeronautics and astronautics
3831.37 Electric motors for trains
3831.38 Electric motors and DC generators for road-building equipment, tractors and similar(1)
3839.29 Lighthouses and other items for maritime navigation
3839.41 Electrochemical equipment for metallurgy and similar
3839.43 Equipment for powder metallurgy
3842.02 Electric locomotives
3842.04 Diesel electric locomotives
3842.06 Standard and articulated tramways

Electronic Equipment

3829.085 Telephone exchanges for airports
3829.086 Orbital rockets and similar
3832.01 Equipment for telephone exchanges
3832.02 Telex equipment
3832.03 Phototelegraphy and similar
3832.04 Telephone exchanges, etc.
3832.05 Equipment for central radio stations
3832.06 Equipment for TV studios and stations
3832.07 TV repeater stations
3832.08 Equipment for closed circuit TV
3832.10 Transmitting and receiving antennas for telecommunications
3832.11 Satellite telecommunication stations
3832.12 Telecommunication satellites (includes 3829.087)
3832.20 Radar and related equipment

(1) Does not include electric motors for motor vehicles

3824.28 Machinery and equipment for mining: continuous conveyor systems
3824.29 Machinery and equipment for mining: special conveyor systems
3824.30 ME, mining: equipment for preparation
3824.31 ME, equipment for concentrating, refining and pelletting
3824.32 Equipment and installations for land-based oil prospecting and extraction
3824.33 Equipment and installations for offshore oil prospecting and extraction
3824.34 Oil and gas pipelines
3824.35 Oil pipeline stations
3829.022 Portable cranes
3829.029 Cableways, overhead conveyors and similar
3829.049 Road-making machinery: excavators and loaders
3829.050 RM: power graders
3829.051 RM: self-powered scrapers
3829.052 RM: compressors and compactors
3829.053 RM: caterpillar tractors
3829.054 RM: standard and special wagons
3829.055 Stationary and transportable soil plants
3829.056 Crushers, pulverizers and similar
3829.057 Screening and sieving equipment, and separators
3829.058 Loading terminals for ports: vegetable products
3829.059 Loading terminals for ports: mineral products
3829.060 Floating docks and similar(1)
3829.061 Medium-heavy duty gates and smaller
3829.062 Heavy duty and extra heavy duty gates

(1) See 3841.13

3832.21	Radiotelescopes
3839.31	Electrical and/or electronic equipment for spacecraft and aircraft
3839.32	Electrical and/or electronic equipment for vessels
3839.33	Electrical and/or electronic equipment for trains, etc.
3839.34	Electrical and/or electronic equipment for tractors, etc.

3841.01	Vessels, barges, lighters and similar
3841.02	Merchant and/or mixed vessels up to 20,000 tonnes
3841.03	Merchant and/or mixed vessels up to 100,000 tonnes
3841.04	Merchant and/or mixed vessels over 100,000 tonnes
3841.05	Specialized vessels of more than 100,000 tonnes
3841.07	Medium and large fishing vessels
3841.08	Lake and river cargo vessels
3841.09	Passenger vessels
3841.10	Hovercraft
3841.11	Other high speed vessels(1)
3841.12	Floating dredgers
3841.13	Floating docks, platforms and floating harbours
3841.14	Marine engines(2)
3842.01	Steam locomotives
3842.03	Diesel locomotives
3842.05	Motor cars
3842.07	Passenger coaches
3842.08	Goods wagons
3842.09	Air-cushioned vehicles and similar
3842.13	Narrow-gauge and storage-battery locomotives
3843.02	Mail cars
3843.03	Lorries up to 5 tonnes
3843.04	Lorries from 5.1 to 15 tonnes
3843.05	Lorries over 15 tonnes
3843.06	Special lorries
3843.07	Bus bodywork
3843.08	Trolleybus chassis
3843.09	Truck bodies for liquid or solid loads
3843.10	Trailers
3843.11	Motorized equipment for snow-clearing
3843.12	Equipment for airports, other than 3829.84 and 85
3845.01	Single piston-engine aircraft(3)

(1) Included in this section, although it may be placed elsewhere in accordance with its use in Section C.
(2) Includes 3841.15 and 3841.16.
(3) All aeronautical machinery and equipment in Section 3 is included, although when investigating actual cases, it may be included in other Sections, depending on its use.

3845.02 Aircraft with two or more piston engines
3845.03 Dual turbojets up to 25 t
3845.04 Turbojets
3845.05 Single-jet aircraft
3845.06 Twin-jet aircraft up to 25 t
3845.07 Twin-jet aircraft over 25 t
3845.08 Other aircraft with more than two jets
3845.09 Supersonic aircraft
3845.10 Light helicopters
3845.11 Medium and heavy helicopters
3845.12 Airships
3845.13 Piston engines
3845.14 Turbojets
3845.15 Jet engines
3845.16 Ram-jet and other advanced technology engines

Machinery for Services

Mechanical Equipment

3824.51 Equipment for collecting and transporting waste
3825.01 Cheque, postal, etc. machines
3829.013 Standard fire-fighting equipment
3829.014 Sophisticated fire-fighting equipment
3829.015 Motor fire engines
3829.065 Equipment for water treatment
3829.071 Equipment and installations for conventional painting
3829.072 Equipment and installations for non-conventional painting
3829.073 Equipment for service stations
3829.074 Equipment for motor vehicle maintenance: engines
3829.075 Equipment for motor vehicle maintenance: chassis
3829.081 Machinery and equipment for laundries
3829.082 Machinery and installations for hotel kitchens
3829.083 Machinery for cleaning public sites
3829.084 Distribution equipment etc. at airports

Electrical Equipment

3839.12 Electrostatic painting equipment
3839.49 Electrical industrial cookers and similar for hotels, restaurants, etc.

Electronic Equipment

3825.11 Copying machines
3825.12 Copying and reproducing machines
3839.17 Ultrasonic equipment for medicine

3829.088 Test benches for engines, turbines and similar
3829.089 Motorised equipment for town cleaning
3829.090 Mechanical equipment for electrical power transmission
3829.091 Automatic vending machines

D) Section 4

Standard Equipment

Mechanical Equipment

3811.06 Hardware: locks, keys, etc.
3811.07 Steel furniture for offices, restaurants, etc.
3813.01 Doors, gratings, windows, fixed staircases, etc.
3819.01 Containers, large barrels, drums, barrels, tubs, etc.
3819.02 Steel pressings of standard size and accuracy
3819.03 Micro-pressings
3819.04 Large pressings
3819.05 Chains, cables and similar
3819.06 All types of springs
3819.07 Nuts, bolts, washers, rivets, etc.
3819.08 Flexible pipe and similar
3819.09 Fittings for valves and pipework
3819.10 Cables, wires and metallic mesh
3819.12 Chrome-plated, nickel-plated and galvanized, etc. items
3823.15 Switches
3824.11 Cold-storage rooms
3824.12 Refrigerating systems and similar
3825.02 Basic calculating machines for personal use, without memory
3825.09 Weighing machines, mechanical dynamometers, etc.
3825.13 Mechanical typewriters

Electrical Equipment

3825.14 Electric typewriters
3829.19 Electrical stackers up to 4 t
3831.19 Speed variators
3831.24 Static rectifiers
3831.25 Rotary rectifiers
3831.26 Fixed capacitors
3831.27 Variable capacitors
3831.28 Converters and switchgear
3831.29 Synchronizers
3831.30 Stabilizers
3831.31 All types of relays excluding electronic relays
3831.32 Low and medium voltage circuit-breakers
3831.33 High voltage circuit-breakers
3831.34 Equipment for electrical transmission line and distribution not mentioned
3831.39 Electromagnetic clutches and brakes
3831.40 Magnetic couplers
3831.42 Special electrical equipment for power circuits on machinery up to 50 kW
3831.43 Special electrical equipment for power circuits on machinery over 50 kW
3831.44 Servomechanisms and automatic control
3831.45 Solenoid valves and similar

Electronic Equipment

3825.03 Calculators with memory for personal use
3825.04 Calculators for industrial accounting purposes and similar
3825.08 Cash registers
3825.10 Electronic weighing machine
3832.15 Application of ultrasonics to data
3832.16 Application of ultrasonics to obtain transformation effects
3832.17 Computer peripheral equipment for microfilm

3829.003	Cold producing compressors over 5 hp	3831.46
3829.005	Air conditioning equipment over 5 hp(1)	3831.14
3829.007	Air compressors up to 5 hp	3832.15
3829.008	Air compressors over 5 hp	3832.16
3829.009	Fans, blowers, etc. up to 5 hp	
3829.010	Fans, blowers, etc. over 5 hp	3832.22
3829.011	Windmill and other machines for aerotechnics	3832.23 3839.01
3829.012	Dryers and similar	3839.02
3829.016	Travelling cranes, gantry cranes, jibs and cranes, etc. up to 10 t	3839.03 3839.04
3829.020	Stackers up to 4 t with I.C. engine (excluding engine)	3839.05
3829.024	Hoists	
3829.025	Mechanical garages	3839.06
3829.026	Mechanical staircases	
3829.031	Burners and similar	3839.07
3829.032	Boilers for heating water	3839.08
3829.041	Small and medium furnaces up to 1000°C	3839.09 3839.10
3829.042	Small and medium furnaces for over 1000°C	3839.11 3839.13
3829.047	Air, smoke, dust, etc. purifiers and exhausters	3839.14 3839.19
3829.063	Standard anti-pollution equip.	3839.20
3829.064	Heavy duty and special anti-pollution equipment	3839.35
3829.076	Vibrators and vibratory equip.	3839.36
3829.093	Centrifugal pumps up to 50 hp for non-corrosive liquid	3839.37
3829.094	Centrifugal pumps over 50 hp for non-corrosive liquids	3839.38
3829.095	Pumps for corrosive fluid, all powers	3839.39

(1) Includes 3833.01

Diodes, triodes, thyratrons, tetrodes, etc.
Office machines: recorders, dictaphones and similar
Microfilm projection equipment
Equipment for producing, holding, locating and enlarging microfilm
Fixed and variable capacitors
Picture tubes
Telephone, telegraph, etc. cables
Cables for buildings and machinery in general
LV cables for overhead distribution
MV and HV cables for overhead distribution
LV cables for underground distribution
MV and HV cables for underground distribution
Lightning arrestors
Permanent magnets
Low and medium power electromagnets
High power electromagnets
Magnetic separators
Saws
Loudspeakers
Straight line particle accelerators
Circular particle accelerators
Conventional batteries and accumulators
Non-conventional batteries and accumulators
Electric light fittings for buildings, industry, etc.
Electrical equipment for power circuits on machinery in general
Electrical equipment for power circuits for industrial uses

3839.40 Electrical and electronic signalling equipment
3839.54 Standard lamps
3839.55 Mercury vapour lamps
3839.56 Standard precision circuit-testers, ammeters, etc.
3839.57 High precision circuit-testers, ammeters, etc.
3839.58 Oscilloscopes, potentiometers, etc.
3839.59 Other electrical instruments for measuring non-electrical values (temperature, etc.)
3839.60 Watt-hour meters for standard use
3839.61 Watt-hour meters for industrial purposes
3839.62 Resistors, rheostats, etc.
3839.63 Industrial capacitors
3839.64 Other capacitors
3839.65 Insulated conduit and accessories

Parts and Components for Machinery and Equipment

Mechanical Equipment

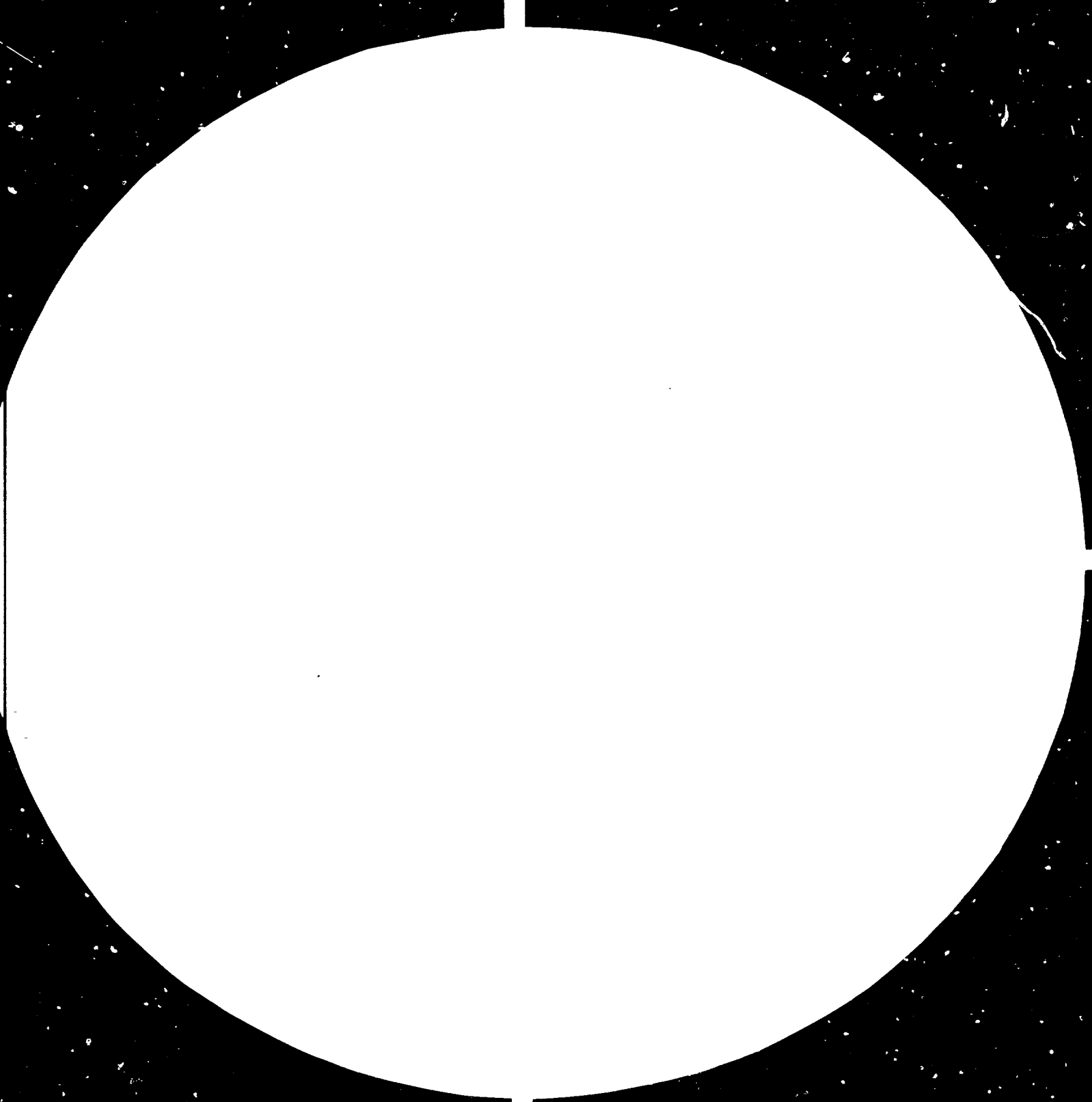
3821.10 Special parts, components and accessories for motors
3821.11 Special parts and components for turbines
3822.12 Parts and components for tractors
3822.13 Parts and components for agricultural implements and machinery
3823.10 Parts, components and accessories for machine tools for metals and wood
3829.100 Simple mechanical components with one or few parts
3829.101 MC for intermediate gearing
3829.102 MC : gears

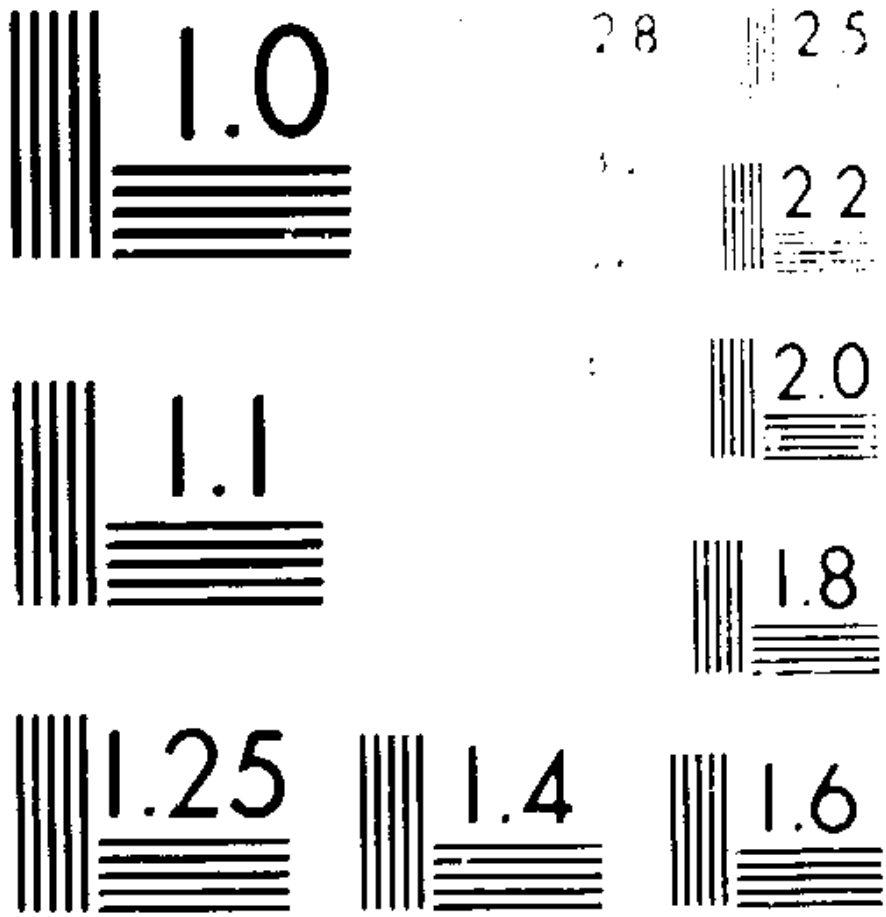
Electrical Equipment

Electronic Equipment(1)

3839.21 Electrical and/or electronic equipment for rockets and satellites
3839.22 Electrical and/or electronic instruments for aircraft
3839.23 Electrical and/or electronic instruments for vessels
3839.24 Electrical and/or electronic instruments for trains, underground, etc.
3839.26 Electrical and/or electronic instruments for spacecraft launching centres

(1) It has been assumed that instruments are mainly electronic. However, this is simply an assumption.




2.8
2.5
1.0
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2.0
1.1
1.8
1.25
1.4
1.6

3829.103	MC: standard and special bearings
3829.104	MC: reduction gears up to 10 hp
3829.105	MC: reduction gears between 11 and 50 hp
3829.106	MC: reduction gears over 50 hp
3829.107	MC: speed variators up to 10 hp
3829.108	MC: speed variators over 10 hp
3829.109	Components for oleodynamic systems
3829.110	Components for air systems
3829.111	Components for vacuum systems
3829.112	Pumps and components for lubricating systems
3829.113	Components for cold systems
3829.114	Manually operated valves for water
3829.115	Automatic valves for water
3829.116	Valves for corrosive liquids and gases
3841.18	Parts and components for marine engines
3841.19	Parts and components for vessels: hoisting equipment
3841.20	PCV: auxiliary technical equipment
3841.21	PCV: navigation instruments
3841.22	PCV: chains, anchors, etc.
3841.23	PCV: fixed and variable pitch propellors
3841.24	PCV: reduction gears and applicators and related items
3841.25	PCV: transmission shafts, supports and related items
3842.10	Metallic components for conventional rolling stock: bogies, couplings, etc.
3842.11	Miscellaneous mechanical components for rolling stock (wagons and locomotives)
3842.12	Components for railway lines
3845.17	Helicopter screws and blades
3845.18	Landing gear
3845.19	Hydraulic equipment
3845.20	Other equipment, parts and components for aircraft

3839.27	Electrical and electronic instruments for airports
3839.28	Electrical and electronic instruments for ports
3839.40	Electrical and electronic instruments for railway stations

E) Consumer Goods Section

Durable Consumer Goods

Mechanical Equipment

3812.	Cutlery and household equipment
3819.11	Non-electrical stoves and heaters
3821.01	Reciprocating petrol engines
3829.002	Cold-producing compressors up to 5 hp
3829.00⅞	Air conditioning equipment up to 5 hp
3829.023	Lifts
3843.01	Utility vehicles
3844.01	Bicycles and tricycles
3844.02	Motorcycles and light motor vehicles
3844.03	Engines for bicycles

Electrical Equipment

3831.01	DC fractional electric motors, insulation to 120°C
3831.02	DC fractional electric motors, insulation to 120°C
3831.08	Special fractional motors
3831.20	Small transformers
3832.13	Manufacture of tapes and records
3832.18	Loudspeaker systems(1)
3832.19	Magnetic tape recorders(1)
3832.24	Amplifiers(1)
3832.27	Radio receivers(1)
3832.28	TV receivers(1)
3832.29	Portable transmitters and receivers(1)
3832.30	Telephone associated with TV
3833.02	Toasters, mixers, etc.(1)
3833.03	Fans, exhausters(1)
3833.05	Hair dryers(1)
3833.06	Heaters for water, food, etc.(1)
3833.07 08	Washing machines, dryers, etc.(1)
3839.66	Electric stoves(1)

Electronic Equipment

3831.47	Cathode-ray tubes and similar
3831.48	Active semi-conductors such as transistors, etc.
3832.09	TV antennas

(1) These goods are mainly used for domestic purposes.

Parts and Components

Mechanical Equipment

3843.13 Simple mechanical components
3843.14 Other mechanical components
3843.15 Measuring and indicating instruments
3844.04 Components for bicycles
3844.05 Components for motorcycles

Electrical Equipment

3832.25 Oscillators and modulators
3832.26 Other components for radio and TV
3839.25 Electrical and/or electronic instruments for motor vehicles

Electronic Equipment

ANNEX 4

CAPITAL GOODS WHICH MAY BE PRODUCED IN DEVELOPING COUNTRIES AT AN INTERMEDIATE STATE OF DEVELOPMENT

A) Section 1

Mechanical equipment

- Manual sharpeners
- Pliers
- Adzes
- Carpenters braces
- Bits for hand tools
- Chisels
- Hand shears
- Trimming knives
- Screwdrivers
- Benders
- Rasps
- Chisels
- Hand tools for bricklayers
- Hand tools for cutting stone
- Tools for carving
- Hand tools for blacksmiths
- Precision tools for mechanics
- Tools for crushing
- Threading tools
- Tools for cutting glass or shaping metal
- Tools for planing machines
- Power driven portable tools
- Automatic hand tools
- Blades for saws
- Files
- Adjustable spanners
- Spanners
- Hammers for manual use
- Clamps
- Punches
- Handsaws
- Saws
- Blowtorches
- Hand drills

Electrical equipment

- Portable electric drills
- DC and AC electric motors up to 50 kW with insulation up to 120°C
- Control panels
- Standard electrical welding machines

Electronic equipment

- Cutters
- Sharpeners, except manual sharpeners
- Bits for machine tools
- Planing machines
- Mechanical shears
- Cutting and welding equipment (not electrical)
- Welding/soldering equipment
- Reamers for machine tools
- Basic milling machines
- Milling tools
- Shapers
- Mandrels
- Grinders
- Shapers
- Drawing machines
- Pneumatic hammers
- Mechanical saws
- Standard drills
- Standard lathes

B) Section 2

- Steam boilers with specific output up to 20 kg/m^2h
- Steam boilers with specific output up to 70 kg/m^2h
- Equipment for ferrous and non-ferrous casting
- Continuous casting (without components)
- Medium power alternators
- Electrostatic generators
- Medium duty transformers
- Medium and heavy duty transformers
- Electrical furnaces for continuous and intermittent operation to 500°C

C) Section 3

Industrial sector

- Homogenizing equipment
- Cream separators
- Equipment for pasteurization
- Equipment for dehydration, freeze-drying, deep-frozen products

- Ovens for bakeries
- Machinery for sugar mills
- Machinery for condensing milk
- Machinery for packing and canning foodstuffs
- Machinery for sterilization
- Machines for evaporating milk
- Machines for making biscuits
- Basic machines for the edible oil and fat industry
- Machinery for slaughterhouses
- Machinery for flour mills
- Machinery for bakeries
- Machinery for making pasta
- Machines for making cheese
- Industrial mixers for foodstuffs
- Presses for cheese
- Machinery and equipment for the fish canning industry
- Machinery and equipment for the fish meal industry
- Wrapping machines
- Machinery for making hosiery
- Machines for making shoes
- Machinery for making thread
- Machines for making cloth
- Machinery for manufacturing textiles
- Wire mesh for looms
- Machinery for finishing textiles
- Machinery for dyeing textiles
- Machinery for tanning
- Machines for cutting leather
- Machines and equipment for tannery
- Machines for making bricks
- Equipment for mixing and transporting cement
- Machines and equipment for printing press and similar (paper cutters, brass guide rods for printing works)
- Machines and equipment for the pottery, clay, asbestos and similar industries
- Industrial moulds
- Industrial conveyors.

Other sectors

- Hoes
- Trench hoes
- Scythes
- Axes
- Machetes
- Shovels
- Pickaxes
- Sprayers
- Manual rakes
- Manual harrows
- Coulters or furrows for ploughs
- Mechanical feeders for agricultural use
- Disc ploughs
- Mould-board ploughs
- Wheat winnowers
- Hay loaders
- Cultivators
- Seed dusters
- Grain stackers
- Hay stackers
- Fertilizer distributing machinery
- Forage mixers
- Grain crushing mills
- Disc harrows
- Mechanical raking machines
- Seed dryers
- Harvesters
- Grain sorters
- Seeders
- Threshing machines
- Vibrating screens for agricultural use
- Steel pens for livestock
- Egg graders
- Metal pens for dairies
- Incubators
- Steel scaffolding for construction
- Steel structures for buildings
- Steel structures for bridges

- Sand mixers
- Concrete mixers
- Trucks and cars for mines
- Equipment and installations for concentrating, refining and pelletting
- Equipment and installations for preparation, breaking and crushing
- Equipment and installations for drilling oil wells
- Equipment for oil refineries
- Machinery and equipment for mining, drilling and excavation
- Oil and gas pipelines
- Equipment for surfacing
- Road-making machinery: compressors
- Road-making machinery: compacting machines
- Mechanical shovels
- Chassis and structures for locomotives
- Barges, lighters, etc.
- Cargo vessels
- Vessels - dredgers
- Vessels - tankers
- Lorries
- Horsedrawn carts
- Manually drawn carts
- Wheelbarrows
- Bogies
- Railway wagons
- Chassis
- Steel structures for vessels
- Diesel engines
- Flatcars
- Refrigerator cars
- Tank cars
- Vehicles for horsedrawn loads.

D) Section 4

Standard machinery and equipment

- Bottle openers
- Steel pulley blocks
- Locks, etc. for racks and consoles
- Hardware for builders
- Metal items for harnesses

Metal items for suitcases
- Hinges
- Padlocks
- Locks
- Bolts
- Keys
- Metal filing cabinets
- Metal cabinets
- Toolboxes
- Metal screens
- Steel racks for tools
- Portable steel racks for stores
- Steel benches for laboratories
- Steel counters for stores
- Steel furniture for industry, offices, etc.
- Steel furniture for laboratories
- Doors, grilles and windows
- Pails, buckets, etc.
- Steel barrels
- Steel boxes
- Steel rollers
- Steel tanks and vessels
- Steel tanks
- Hoppers
- Stamping dies
- Pressings of standard and medium size and precision
- Steel cables
- Steel chains
- Drive chains
- Steel rope
- Steel kegs
- All types of springs
- Rivets
- Tacks
- Bolts
- Nuts
- Elbows or unions for pipework
- Elbows for steam systems
- Water cocks
- Pipework

- Electrical switching or control equipment
- Electrical terminal boxes
- Chargers
- Capacitors (not electronic)
- Standard rectifiers
- Static convertors
- Rotary convertors
- Current regulators
- Voltage regulators
- All types of relays (excluding electronic relays)
- Electrical insulators
- Wire for electrical installations
- Switchgear for electrical installations
- Items for partial installations
- Distribution or cut-out boxes
- Power socket boxes
- Electrical switches
- Electrical terminals
- Power outlets
- Telephone cables, etc.
- Cables for building machinery in general
- Overhead distribution low voltage cable
- Conventional batteries and accumulators
- Electric light fittings
- Electrical equipment for power circuits and machinery in general
- Standard lamps
- Mercury vapour lamps, etc.
- Standard watt-hour meters
- Electrical resistors

- Unions
- Valves
- Wire
- Metallic mesh
- Aluminium items
- Tinplate items
- Chrome plated, nickel plated and galvanized items
- Switches
- Cold storage rooms
- Refrigerating systems and similar
- Standard calculators without memory for personal use
- Weighing machines
- Calipers
- Mechanical dynamometers
- Gas, steam, etc. regulators
- Mechanical typewriters
- Cold producing compressors over 5 hp
- Centrifuges
- Air conditioning systems over 5 hp
- Air compressors
- Fans, blowers, etc.
- Centrifugal dryers
- Freight lifts
- Derricks
- Loaders
- Lifts
- Cranes
- Pulleys for mechanical transmission
- Pulley blocks
- Mechanical stackers
- Hoists
- Steel staircases
- Injectors
- Burners
- Boilers for heating water
- Small and medium furnaces
- Air, smoke, dust, etc. purifiers and exhausters
- Standard anti-pollution equipment
- Centrifugal pumps up to 50 hp for non-corrosive liquids
- Centrifugal pumps over 50 hp for non-corrosive liquids
- Pumps for corrosive fluids

Parts and components

- Parts and components for agricultural machinery
- Dies and accessories for machine tools
- Accessories for railways
- Suspension shock absorbers for freight and transport vehicles
- Axles and bodies
- Clutches
- Reduction gears
- Bearings
- Brakes
- Steering mechanisms
- Lubricating systems
- Fuel tanks
- Parts and components for vessels
- Parts and components for marine engines
- Components for railway tracks

- Accessories for light fittings
- Accessories for lighting
- Electrical accessories for transmission