

Table 4-3-4 SCALE OF THE JAPANESE COMPANY ESTABLISHED IN EUROPE IN 1990
(Manufacturing)

Amount of investment		Number of Employee		Sales Amount	
(million\$)		(person)		(million \$)	
[1]		[1]		[1]	
1100-	17	1000-	23	100-	46
50-99	9	500-999	25	50-99	36
10-49	82	300-499	29	10-49	85
5- 9	58	200-299	33	5- 9	28
1- 5	99	100-199	59	1- 5	47
- 1	60	50-99	40	- 1	18
	325	1-49	91		
Average 29(million\$)		Average 320 persons		Average 66.7(millions \$)	

Note: [1] Nos. of companies replied

Study on the Japanese companies established in Europe;

Source: JETRO

Table 4-3-5 MOTIVATION OF JAPANESE DIRECT INVESTMENT TO EUROPE BY SUB-SECTOR
(MANUFACTURING)

Motivation	Processing Parts/				Total
	Assembling	Component	Material	Other	
1 Trade Friction with EC	120	38	25	4	187
To evade from the quantitative restriction for imported goods from Japan	45	12	5	2	64
Fear for protectionism after unification of EC market	37	16	12	1	66
To evade from the anti-dumping tax system	27	5	2	1	35
To evade from the anti-dumping tax system for imported parts	11	5	6	-	22
2 Superiority or Advantage in Local Production	144	68	108	42	362
To reduce the production cost	7	4	6	14	31
To cope with to increasing demand in Europe	70	28	34	17	149
To procure cheaper material	-	3	10	-	13
To evade from the fluctuation of the exchange rate	20	4	10	3	37
To receive the economical advantages derived from EC market integration	35	16	29	4	84
Incentives or tax exemption for the Foreign Investment	12	13	19	4	48
3 Globalization Policy	210	131	171	43	555
A series of globalization policy	101	58	85	19	263
To penetrate European Market including Eastern Europe	18	7	12	2	39
To respond to the consumer's needs	47	17	25	17	106
To respond to the request of the parent company	7	5	6	2	20
To introduce the design originated in Europe	6	4	7	1	18
To establish the research and development center	14	10	8	1	33
To establish production base in Europe through M & A	3	3	-	-	6
To supply the parts and components to Japanese Company existing in EC	14	27	28	1	70
4 Other Reason	8	9	17	3	37

Source: JETRO Survey in December, 1990

Table 4-3-6 JAPANESE DIRECT INVESTMENTS IN EC
(AUTOMOBILE INDUSTRY)

Country	Name of the Japanese Investor (Portion of the Capital %)	Partner's (same as the left)	Company name in the Country	Amount of the Capital	Establishment Date	Number of Employee (Japanese)	Remark
	1 Nissan Motor Co (100)	-	Nissan Motor Manufacturing(UK)	£150 million	84, 4	2,069(49)	
U.K.	2 Honda Motor Co (80)	Honda UK The Rover Group	Honda of the U.K. Manufacturing	£ 23 million	85, 2	313(43)	
	3 Isuzu Motors Ltd (40)	General Motors	IBC Vehicles	£ 18 million	87, 9	1,780(4)	
Germany	4 Toyota Motor Co (-)	Volks wagen (-)	(same)	-	89, 1	n.a.	Technical Cooperation
	5 Nissan Motor Co (70)	Banco Uргuіjо Other	Nissan Motor Iberica S.A.	55.800 millionP	80, 1	6,767(17)	53,000 cars/year
Spain	6 Suzuki Motor Co (32)	Rover Cars Others	Land-Rover Santana S.A.	4,439 millionP	84, 5	3,652(3)	24,000 cars/year
	7 Toyota Motor Co (27)	Salvador Caetano (73)	Salvador Caetano S.A.	5,000 millionESC	72, 3	2,200(3)	13,600 cars/year (CXD)
Portugal	8 Mitsubishi Motor Co (49.75) Mitsubishi Co (49.75)	Private Person (0.5) Automoveis e Camioes S.A.	Univex Comercio industria de Automoveis e Camioes S.A.	942 millionESC	82, 8	316(3)	5,000 cars/year

Table 4-3-7 JAPANESE DIRECT INVESTMENTS IN EC
(VTR, TV)

Country	Name of the Japanese Investor (Portion of the Capital %)	Partner's Name	Company name in the Country	Amount of the Capital	Establishment Date	No. of Employee (Japanese)	Remark (Main Product)
	1 Sharp Co	(100)	Sharp Manufacturing Company U.K.	38.4 million£	80, 2	1,178(28)	VTR
	2 Mitsubishi Electric Co	(100)	Mitsubishi Electric U.K.	43.9 million£	79, 3	1,300(33)	VTR
U.K.	3 Sanyo Electric Co	(80)	Sanyo Industries U.K. (10)	5 million£	81,11	428(13)	TV
	4 NEC Corporation	(100)	NEC Technology U.K.	21 million£	87, 1	653(n.a)	VTR
	5 Hitachi Ltd.	(100)	HITACHI Consumer Products U.K.	9 million£	84, 3	850(12)	VTR, TV
	6 Funai Electric	(100)	FUNAI Electric U.K.	2 million£	87, 3	120(4)	VTR
	7 Toshiba Corporation	(-)	Toshiba Consumer Products Ltd	17 million£	81, 5	686(5)	TV
	8 Matsushita Electric Industry	(100)	Matsushita Electric Ltd.	15 million£	74, 6	1,268(28)	TV
	9 Victor Co. of Japan Ltd	(50)	JVC Video (Ber.l.in)	45 millionDM	82, 5	1,045(1)	VTR
	10 Matsushita Electric Industrial Co. Ltd.	(65)	MB Video	10 millionDM	82,12	754(12)	VTR
Germany	11 Hitachi Ltd	(100)	HITACHI Consumer Products Europe	20 millionDM	82,11	450(9)	VTR, TV
	12 Toshiba Corporation	(100)	Toshiba Consumer Products	48.9 millionDM	90, 4	424(11)	VTR
	13 Funai Electric	(100)	Funai Electric Europe	14.7 millionDM	88, 9	220(7)	VTR
	14 Sanyo Electric Co	(100)	Sanyo Industries Deutschland	13.5 millionDM	84, 3	446(8)	TV
	15 Sony Corporation	(100)	Sony France S.A.	293 millionFr	73, 2	1,900(n.a)	VTR
France	16 Akai Electric Co	(62.7)	Akai Electric France S.A.	10.8 millionFr	81, 8	478(10)	VTR
	Mitsubishi Electric Industry	(30)					
	17 Victor Co. of Japan Ltd	(50)	JVC Video (Tonnerre) S.A.	47 millionFr	87, 3	560(0)	VTR
	18 Matsushita Electric Industry	(100)	Panasonic France S.A.	60 millionFr	68, 3	330(18)	VTR
	19 Matsushita Electric Industry	(86.7)	Panasonic Espana S.A.	1,000 millionPT	73, 9	778(18)	VTR
	20 SANYO Electric Trading Co	(100)	SANYO Espana S.A.	205 millionPT	67,12	788(10)	TV
Spain	21 Sony Corporation	(100)	Sony Espana S.A.	750 millionPT	73, 1	980(n.a)	TV
	22 SHARP Co	(98.4)	SHARP Electronica Espana S.A.	1,783 millionPT	86, 4	490(9)	TV
			Alberto Faus				

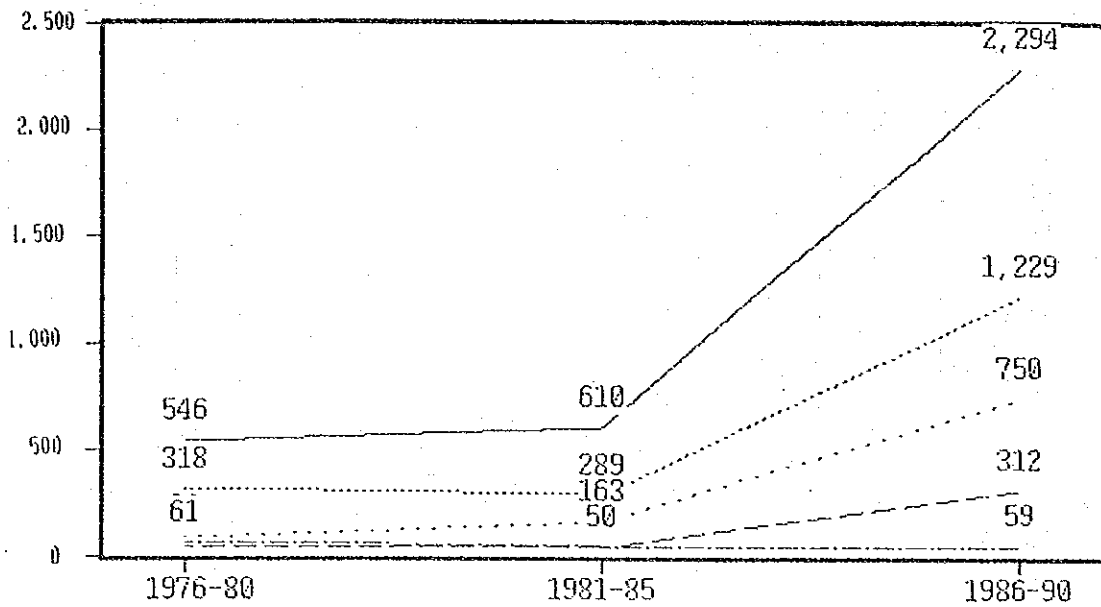
Source: Electronic Industries Association of Japan 'List of overseas company originated in Japan'
Toyo Keizai Inc. 'List of overseas company originated in Japan 91'

Table 4-3-8 JAPANESE DIRECT INVESTMENTS IN EC
(SEMICONDUCTOR)

Country	Name of the Japanese Investor (Portion of the Capital %)	Partner's Name	Company name in the Country	Amount of the Capital	Establishment Date	Number of Employee (Japanese)	Remark
U.K.	1 NEC Corporation (100)	-	NEC Technologies U.K.	21.9 million£	1981,1	653	Former Process Later Process
	2 FUJITSU Ltd. (100)	-	FUJITSU Microelectronics	6 million£	1983,8	118(3)	Later Process
Ireland	3 NEC Corporation (100)	-	NEC Semiconductors Ireland	1.7 million£	1974,7	310	Later Process
	4 FUJITSU Ltd. (100)	-	FUJITSU Microelectronics Ireland	8.6 million£	1980,8	238(7)	Later Process
Germany	5 Hitachi Ltd. (100)	-	HITACHI Semiconductor GmbH	30.4 millionDM	1980,8	220(6)	Later Process
	6 Mitsubishi Electric Co (100)	-	Mitsubishi Semiconductor GmbH	18 millionDM	1989,12	100(4)	Later Process

Source: Electronic Industries Association of Japan "List of overseas company originated in Japan"

Nos.



— World --- Asia - - - North America - - - Europe - - - Latin America

Figure 4-3-1 THE NUMBER OF DIRECT INVESTMENT FROM JAPAN BY REGION AND PERIOD
(Manufacturing)

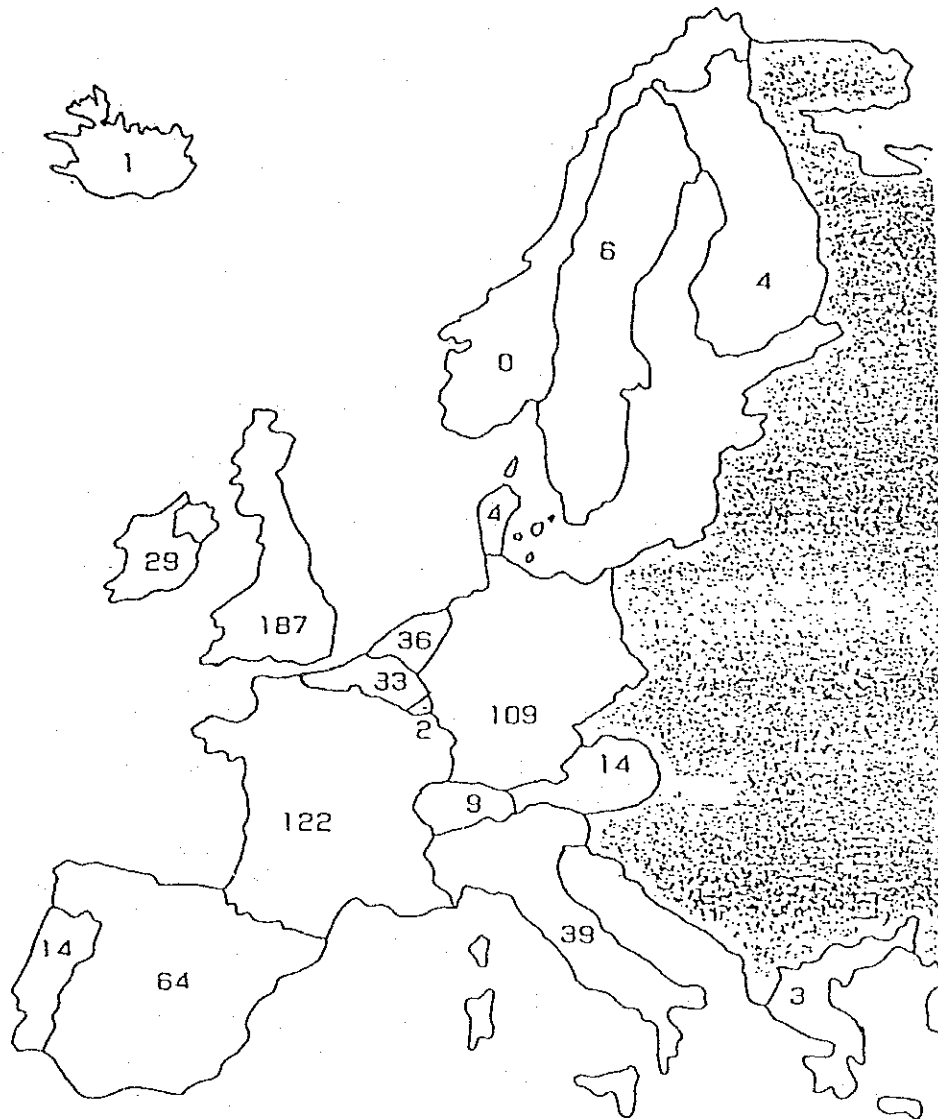


Figure 4-3-2 JAPANESE DIRECT INVESTMENT IN EUROPE (No. of Establishment)

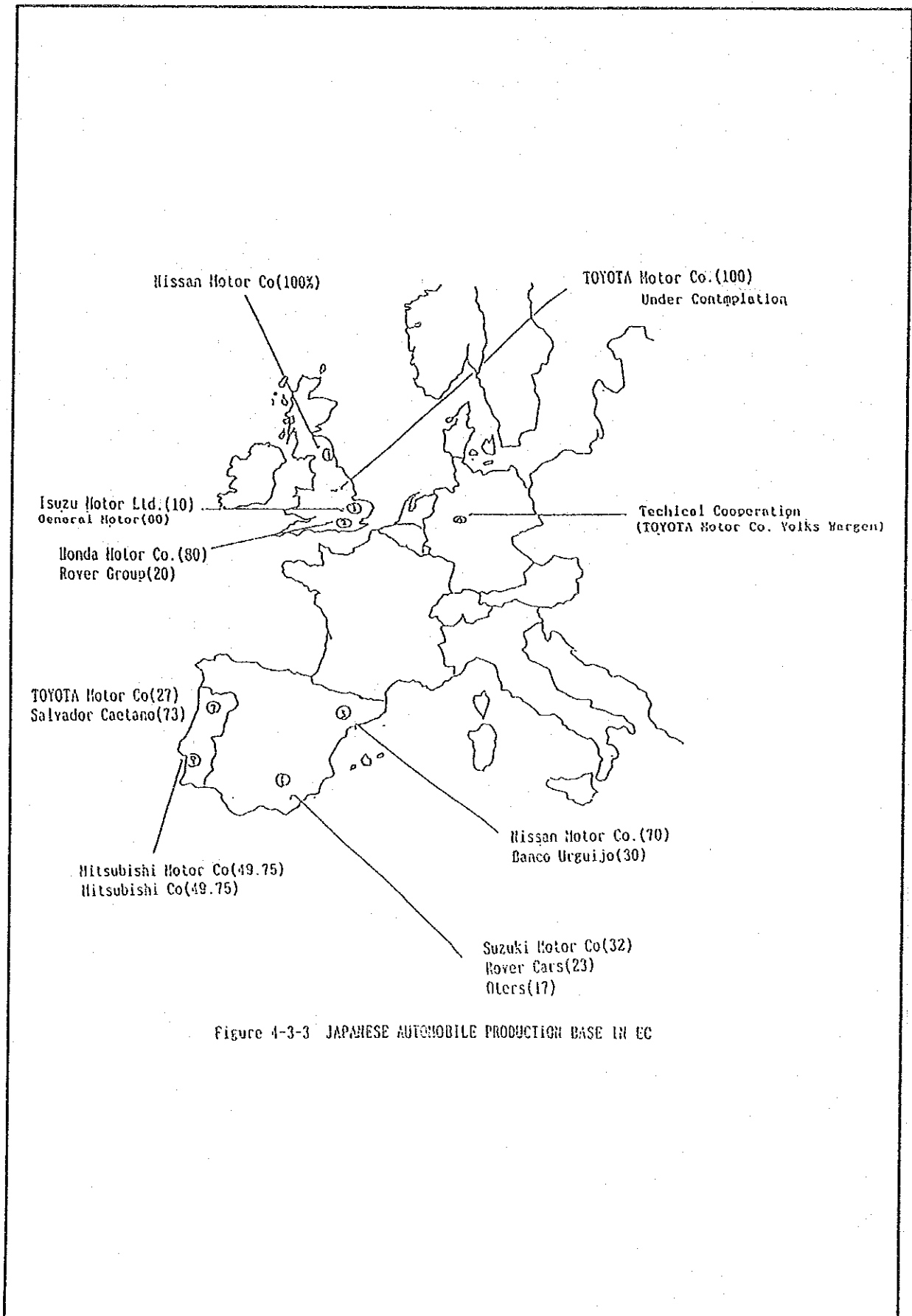


Figure 4-3-3 JAPANESE AUTOMOBILE PRODUCTION BASE IN EC



Figure 4-3-4 JAPANESE AUTOMOBILE PARTS PRODUCTION BASE IN EC

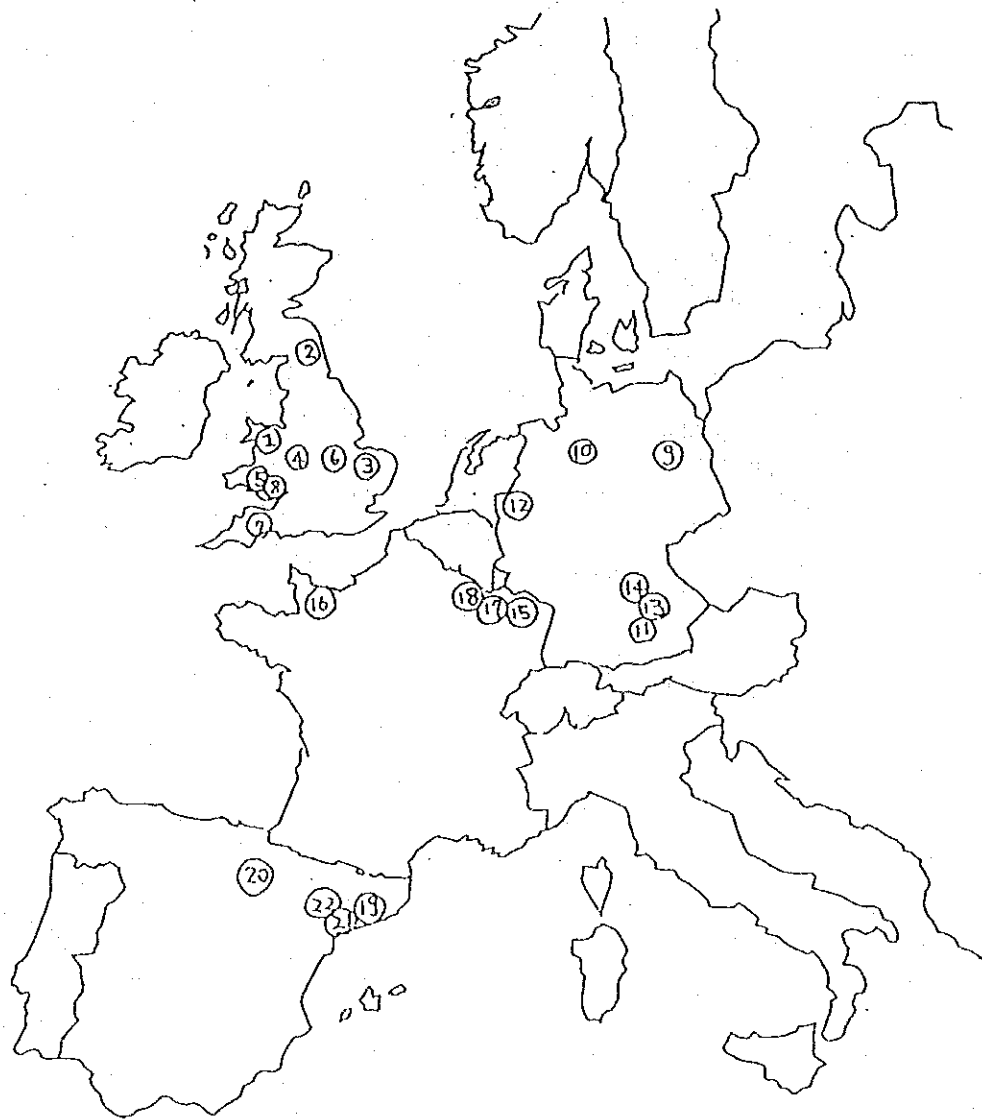


Figure 4-3-5 JAPANESE VTR, TV PRODUCTION BASE IN EC

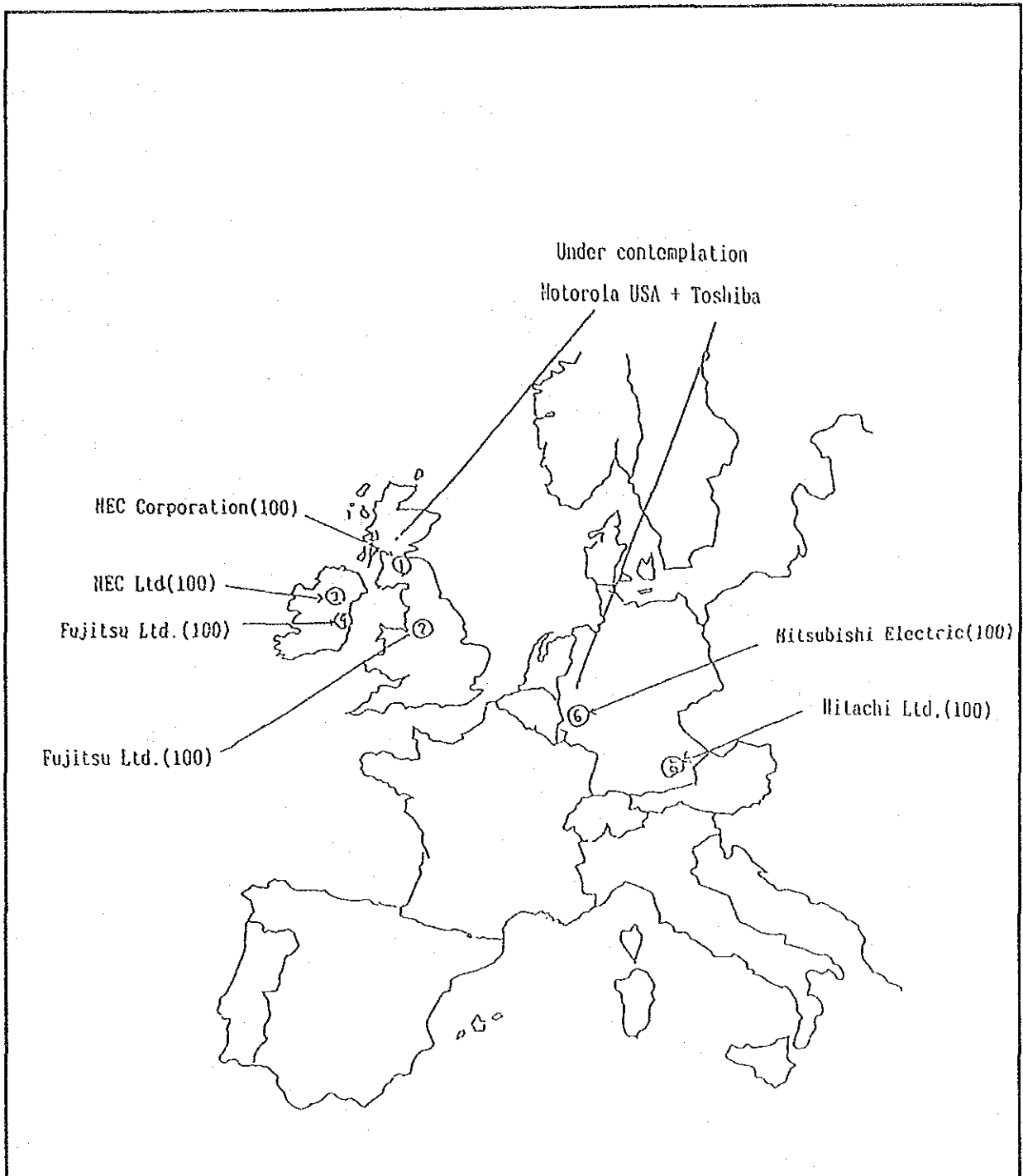


Figure 4-3-6 JAPANESE SEMICONDUCTOR PRODUCTION BASE IN EC

Chapter 5
OUTLINE OF THE PROJECT AREA

Chapter 5 Outline of the Project Area

5.1 Economy and Industry

5.1.1 Delineation of the Project Region

Portugal is made up of 18 administrative districts (distrito) on mainland, and 2 districts on Acores and Madeira islands, each of which is given the significant autonomy. Each district is further divided into municipalities (concelhos), and there are 305 municipalities in 18 districts on mainland. At the same time, the country is divided into 7 regions for the purpose of regional economic development, 5 on mainland and 2 on the islands, as shown in Fig.5-1-1. The Aveiro-Viseu region covered by the present study belongs to the Central (Centro) Region, which planning is controlled by the secretariat located in Coimbra.

It should be noted here that administrative boundaries do not agree with boundaries of development regions. For instance, as shown in Fig.5-1-1, northern parts of the Aveiro, Viseu and Guarda districts are incorporated into the Northern (Norte) Region, while southern parts belong to the Central Region. Also, each of Leiria and Santarém is divided into the Central Region and the Lisbon and Valle do Tejo Region. Thus, the development regions are delineated as an aggregate of "municipalities" on the basis of similarities in geographical, environmental and weather conditions, and the progress of regional development.

The Central Region is further divided into the following 8 areas for the sake of regional development:

	<u>Name</u>	<u>Urban center</u>	<u>Number of municipalities</u>	<u>Characteristics</u>
	1) Baixo Mondeco	Coimbra	5	Academic/administrative center
*	2) Baixo Vouga	Aveiro	14	Coastal/industrial center
	3) Cova da Beira	Covilha	3	Agriculture
*	4) Dao-Lafoes	Viseu	15	Forestry, agriculture
	5) Pinhal Interior	Arganil	19	Textile, agriculture
	6) Pinhal Litoral	Leiria	5	Coastal/industrial center
	7) Raia	Castelo Branco	12	Bordering to Spain
	8) Serra da Estrela	Seia	5	Mountainous region

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Among them, 2) Baixo Vouga and 4) Dao-Lafoes, marked by "*" have been covered by the present study. In this study, the former is referred to as the "Aveiro area" from its core city,

and the latter as the "Viseu area". In addition, the both areas are to be jointly called as the "Aveiro-Viseu region" or "Project area" in this study. Thus the "Aveiro area" does not coincide with the "Aveiro district", and so on.

(Note)

- i) Although the Central Region may be divided into 3 subregions (Central, Inland forest, and Central border), the present study does not use this classification because of complexity involved, e.g., 8) Serra da Estrela above is divided into three areas.
- ii) Definition of "Aveiro" varies widely as different territories are delineated by various ministries; the name refers to the city, the district, the municipality, the development region, the classification for tourism, the telecommunications service area, or the road district.
- iii) For the reason stated in ii) above, various statistical data are not necessarily collected from the same area. One solution is to sum up data for municipalities which belong to a given area, but recent data are very difficult to obtain or do not exist.

The area subject to the present study is shown in Fig.5-1-2, and 29 municipalities within the project area are listed as follows:

Project area: Aveiro-Viseu region

Municipalities in sub regions:

<u>Aveiro area</u> (Baixo Vouga)	<u>Viseu area</u> (Dao-Lafoes)
1 Agueda	1 Aguiar da Beira
2 Albergaria-a-Velha	2 Carregal do Sal
3 Anadia	3 Castro d'Aire
4 Aveiro	4 Mangualde
5 Cantanhede	5 Mortagua
6 Esiarreja	6 Nelas
7 Ilhavo	7 Oliveira do Frades
8 Mealhada	8 Penalva do Castelo
9 Mira	9 Santa Comba Dao
10 Murtosa	10 Santao
11 Oliveira do Bairro	11 S.Pedro do Sul
12 Ovar	12 Tondela
13 Sever do Vouga	13 Vila Nova de Paiva
14 Vagos	14 Viseu
	15 Vouzela

In addition, some data in this report are based on the "district", instead of "area" due to availability. The "district" and "area" are distinguished as shown in Table 5-1-1. And Table 5-1-8

shows distance between seat of municipalities in km.

5.1.2 Characterization of Major Industries in Aveiro-Visou Region

As shown Table 5-1-2, the Aveiro-Visou region accounts for 6.3% of land, 6.9% of population, 5.7% of GDP, and 5.7% of employment in Portugal. Thus, the region's economy is considered to have a size equivalent to slightly above 6% of the national economy. Then, when the region is divided into the Aveiro and Visou areas, there is a marked difference in industrial structure between them. While the Aveiro area is an industrialized area (coastal industrialized area), Visou is dominated by agriculture and forestry (inland rural area).

As seen in Table 5-1-2 (1988/1989 data), the Aveiro area has population density equivalent to 1.61 times the national average, and the Visou area 0.75 of the national average. In terms of composition of GDP by economic sector, the secondary sector accounts for 59% of GDP in the Aveiro, far above 38% of the national average, compared to 34% in the Visou area. Another indicator to discern economic structure of the two areas is composition of employment by economic sector (1988 data), the percentage of population employed by the primary sector is 20% in the Aveiro area, more or less the same level with the national average of 21%, making a sharp contrast to 51% in the Visou area. Thus, two of ten people are engaged in agriculture and forestry for Aveiro area, but five of ten people for Visou area.

Table 5-1-3 compares the number of enterprises of manufacturing industry in the Aveiro-Visou region, by subsector, to that in the national average. Also, Table 5-1-9 and Table 5-1-10 shows ranking of commodity groups of the region in number of enterprises.

Clearly, one subsector "Textile, Garments, Footwear in CAE 3.2" shows a distinctive difference between the Aveiro-Visou region and the national average; 4% versus 28%, respectively. Thus, the textile/garments/footwear industry - the largest manufacturing subsector in the country - is not a major industry in the region, but it is dominated by the footwear industry, rather than textile and garments.

In addition, the Aveiro-Visou region shows much higher percentage in food processing (processing of agricultural products, dairy products, and fishery products), compared to the national average; 42% versus 12%. Thus, it is roughly said that the food processing has replaced the textile, garments, and footwear industry in the region when compared to the nation's industrial structure. Then, industrial structure is analyzed for the Aveiro and Visou areas. While the Visou area has a higher percentage of the food processing industry (agricultural products) than the Aveiro area. On the other hand Aveiro area has a larger share in the machinery and metalworking industry. Again, the Visou area is dominated by processing of primary products, 66% (CAE 3.1 + 3.3), compared to 55% in the Aveiro area.

5.1.3 Classification of the Aveiro-Viseu Region by Level of Industrialization

Table 5-1-4 shows a set of data concerning 14 municipalities of the Aveiro area (Baixo Vouga) and 15 municipalities of the Viseu area (Dao Lafoes). Of these data, two parameters - population density (per km²) and density of manufacturing enterprises (per km²) - are plotted on the map, as shown in Fig.5-1-3. Notably, the two parameters are closely related to each other, depicting the level of industrialization in the municipalities. In general, municipalities with relatively a high level of industrialization (relatively a large number of manufacturing enterprises) shown higher population densities. At the same time, the level of industrialization seems to be affected by geographical conditions to some extent. To identify this, a topographical map of the project area is attached as Figure 5-1-4. In the following section, municipalities are classified according to their level of industrialization, as determined on the basis of the above data, with some consideration to local conditions peculiar to each municipality.

(1) Aveiro area

Level I Zone: Industrialized zone

(7 municipalities)

- 1) Ovar
- 2) Estarreja
- 3) Aveiro
- 4) Ilhavo
- 5) Agueda
- 6) Oliveira do Bairro
- 7) Anadia

These municipalities form a coastal industrialized zone centering around Aveiro and Agueda. Agueda and Andia show relatively low population densities because eastern portions of these municipalities are situated in mountainous areas. In this zone, manufacturing enterprises have been developing without control in farmland or forest areas, calling for reallocation of manufacturing plants to provide proper environmental protection. The area is characterized by relatively small percentages of food processing (agricultural, dairy, and fishery products) and woodworking industries, while having a larger percentage of the machinery and metalworking industry subsector.

Estarreja has a chemical complex, and Agueda is featured that production of bicycles and motor cycles accounts for more than 95% of national output. In summary,

industrialization has progressed in the area, with Aveiro, Agueda and Estarreja serving as industrial centers, around which manufacturing activities have spread in other municipalities.

Level II Zone: Zone with potential for industrialization

(2 municipalities)

- 1) Albergaria-a-Velha
- 2) Mealhada

Albergaria-a-Velha has the highest potential for industrialization because of its strategic location, e.g., newly inaugurated IP1 and IP5 intersect in the municipality. There is as much as 300 ha of industrial land and can accommodate manufacturing enterprises relocating from the nearby industrial zone (Aveiro, Agueda, and Estarreja). Mealhada is closer to Coimbra, the educational and administrative center in the region, rather than Aveiro, and is located along IP1 and south to Agueda. Thus, the municipality can be attractive to manufacturing activities extending northward from Coimbra.

Analysis of industrial structure in comparison to the national average indicates that the zone has a higher percentage of the food processing industry and less textile industry, with other industry subsectors showing similar distribution to the national average.

Level III Zone: Zone having a high percentage of non-manufacturing activities, or less industrialized area

(5 municipalities)

- 1) Mira
- 2) Murlosa
- 3) Sever do Vouga
- 4) Vagos
- 5) Cantanhede

Major economic activities in this zone are fishery, tourism, agriculture, dairy farming, and forestry. A coastal line around Mira is a resort area aligned with pine forest, and Cantanhede is dominated by agriculture and dairy farming, producing grapes for wines. Of these five municipalities, only Sever do Vouga is located inland, and its eastern part is situated in a mountainous area.

Comparison of industrial composition in the zone to the national average, as shown in Table 5-1-5, reveals peculiar characteristics; the food processing industry (CAE 3.1) shows a 58.6% share, which is nearly 5 times the national average (12.1%), while the textile industry (CAE 3.2) only 0.9%, 1/30 the national average (28.0%). Similarly, a share of the machinery and metalworking industry (CAE 3.8) is slightly above the national average. Thus, major manufacturing activities in the area are the processing of primary products, particularly food processing (CAE 3.1) and woodworking (CAE 3.3), which have a combined share of 78.2%, while a small number of manufacturing enterprises produce capital and intermediate goods.

In terms of transport access, only IP1 pass through a northern part of Sever do Vouga, and it is important for other municipalities to establish access to these arterial roads.

(2) Viseu area

There is a 1,000m level mountain between the Aveiro and Viseu areas, serving as a barrier to interaction in terms of people, goods, and capital. However, IP5 has eliminated the barrier to rapidly increase public expectation for development of the Viseu area. Generally, the area is in the infant stage of industrialization and partially contains rural areas (Level IV Zone), in place of industrialized zone (Level I Zone).

Level II Zone: Area having potential for industrialization

(1 municipality)

1) Viseu

Viseu is only one municipality classified into this level of industrialization. It has a land area of 507km², the largest in the Aveiro-Viseu region, most of which is flat land. It is located at higher elevations than the Aveiro area, but it is generally suitable for industrial use as it has no steep mountain slope. Viseu is located in a basin surrounded by mountains on its three sides, with one side opening to a river route. (Fig.5-1-4) Abundant water supply offers an advantage for industrial use.

Percentage distribution of manufacturing enterprises by industry subsector (Table 5-1-5) shows the pattern similar to that of industrialization level II in the Aveiro area (37% for food processing, 22.7% for machinery and metalworking, and 19.0% for woodworking), while the textile industry (CAE 3.2) shows relatively a high share (6.7%), although it is still far below the national average of 28.0%.

Level III Zone: Zone having a high percentage of non-manufacturing activities, or less industrialized area

(5 municipalities)

- 1) Carregal do Sal
- 2) Mangualde
- 3) Nelas
- 4) Santa Comba Dao
- 5) Tondela

These municipalities surround the southern part of Viseu in a direction of river flow. The zone has rich water resources and offers high development potential for resort based on forests and rivers.

Comparing percentage distribution of manufacturing enterprises by industry, the top three subsectors account for 86.9% of total (Table 5-1-5); the food processing industry (CAE 3.1) shows an outstanding 50.0% share, followed by 18.7% of the woodworking industry (CAE 3.3) and 18.2% of the machinery and metalworking industry (CAE 3.8). Geographically - in terms of road access in particular - this zone is expected to develop into a satellite city of Viseu, as it links to Aveiro via Viseu and cannot establish close linkage to the northern industrial area (around Porto). IP3 connects Tondela and Santa Comba Dao to Viseu on the north and Coimbra on the south. IP5 links Mangualde to Viseu on the west and a border with Spain on the east. Mangualde is closest to Spain among other municipalities in the Aveiro-Viseu region. On the other hand, Nelas has large uranium reserves and is expected to foster related industries. It has a 2,000m level mountain on the south, with a river in between, so that its linkage is limited to Viseu on the north. Finally, Carregal do Sal requires access to IP3.

Level IV Zone: Rural area

(9 municipalities)

- 1) Aguiar da Beira
- 2) Castro d' Aire
- 3) Mortagua
- 4) Oliveira de Frades
- 5) Penalva do Castelo
- 6) Satao

- 7) S.Pedro do Sul
- 8) Vila Nova de Paiva
- 9) Vouseia

In contrast to the Level III zone in the above, this zone is located on the north side of Viseu and is mountaineous on the west, north and east sides. Mortagua is located on the southwest side of Viseu far from other municipalities. The zone has lakes and rivers on its south side and mountains on the north. Thus there is a large difference in elevation in a north-south direction, making the area unsuitable for industrial use. IP5 running between Aveiro and Viseu, passes through Oliverira de Frades and Vouseia. IP3 runs through Castro d'Aire on the north side of Viseu, then a northeast edge of Mortagua on the south side of Viseu. Other municipalities are not directly served by IP3 nor IP5.

The area has population density of $57/\text{km}^2$, one half the national average, and its density of manufacturing enterprises is only $0.31/\text{km}^2$. In terms of percentage distribution of manufacturing enterprises by industry subsector, the top three subsectors are the same as other areas, the food processing industry (49.9%), the woodworking industry (20.8%), and the machinery and metalworking industry (19.1%), with a combined total of 89.8%.

5.1.4 Regional Development Policies of Local Government (Municipalities)

In planning and implementing an industrial development plan for the project region which has 29 municipalities, it is essential to reflect opinions of the municipalities. In this recognition, the study team visited 9 municipal governments and 2 district governments to interview with governors, mayors, secretaries, and development planners. At the same time, a questionnaire survey was conducted for 29 municipalities. The questionnaire survey was responded by 9 out of 14 municipalities in the Aveiro area and 13 out of 15 municipalities in the Viseu area, resulting in the total response rate of 76% (22 out of 29 municipalities). The results of the interview and questionnaire surveys are analyzed below and are considered to represent a majority of opinions (around 70%) of 29 municipalities if invalid answers involved in each question are excluded.

(1) Basic conditions for industrial development

All the respondents (municipalities) recognized the importance of industrial development, but 80% responded "under certain conditions". In this survey, these conditions were defined as "undesirable industries." 5 undesirable industries were listed and the respondents were asked to rank them in order of undesirableness. The responses were then quantified as weighted points by assigning 3 points to the most undesirable industry, 2 points to the second one, and 1 points to the third one, while no point was assigned to the fourth and fifth ranks. The results are shown in Table 5-1-6 and represent the ranking of negative factors related to industrial development.

The results indicate that such industries which have possibility to pollute environment are considered to have the highest negative factor, and agreeing with opinions heard from the interview survey. Then, industries adversely affect local traditional industries or small businesses ranked the second, followed by those using a large amount of utilities (electricity and water); those using a large land area; and those using a large number of workers. This order is basically the same in both the Aveiro and Viseu areas.

(2) Desirable industries

As a mirror image of the negative factors, the respondents were asked for preference in types of industry to be located in their municipalities. The respondents were asked to choose one from the two options. The figures in () represent the percentage in the Aveiro or Viseu area:

1) Labor-intensive or capital-intensive

Labor-intensive industry : 36% (Aveiro=33%, Viseu=38%)
Capital-intensive industry: 64% (Aveiro=67%, Viseu=62%)

2) Traditional or new industry

Traditional industry: 11% (Aveiro= 0%, Viseu=14%)
New industry : 89% (Aveiro=100%, Viseu=86%)

3) Heavy or light industry

Heavy industry: 10% (Aveiro= 0%, Viseu=15%)
Light industry: 90% (Aveiro=100%, Viseu=85%)

4) Large or small- and medium-sized enterprise

Large enterprise : 17% (Aveiro= 0%, Viseu=24%)
Small- and medium-sized
enterprise : 83% (Aveiro=100%, Viseu=76%)

5) Industry using locally available resources

Industry using locally
available resources : 31% (Aveiro=29%, Viseu=33%)
Not necessarily : 69% (Aveiro=71%, Viseu=67%)

6) Foreign investment

All the municipalities welcomed foreign companies, but 90% of which stated that they should not be types identified in (1) and meet requirements in (2).

(3) Preferred industry subsectors

The municipalities were asked to identify what subsectors of industries they wish to attract, by selecting 5 industry subsectors out of 9 under CAE classification and ranking them in order of preference. Responses were quantified by the weighing method, as described in previous section (2), and the results are summarized in Table 5-1-7.

The top three subsectors are "the woodworking industry", "the food processing industry", and "the machinery and metalworking industry", which are the same as the existing indus-

trial structure, but the woodworking industry ranked first, instead of the food processing industry, because of popularity in the Viscu area. "The other industries" ranked fourth, and some of respondents specified "the ceramic industry" or "the electric/electronic industry". Then "the non-metal mineral industry" and "the textile and leather industry" ranked fifth and sixth, respectively. On the other hand, the lowest three subsectors are "the chemical, plastic, and rubber industry", "the pulp and paper industry", and "the base metal industry".

(4) Overall evaluation

Overall evaluation of items (1) through (3) above indicates that the following types of industries are preferred by local governments for industrial development.

1) Industries not producing pollution

Environmental preservation is one of requirements for industrial development in Portugal. This is clearly reflected in the fact that heavy industries including "the chemical, rubber, plastic industry", "the pulp and paper industry", and "the base metal industry" are not preferred.

2) Light industries using advanced technology

In addition to environmental consideration, the local governments do not welcome heavy industries in many cases, as they consume a large amount of utilities (electricity and water) and use a large land area. On the other hand, many of them wish to attract hi-tech or modern technology based industries rather than traditional ones. "Hi-tech industries" were identified by most of municipalities as desirable industry types at the time of the interview survey.

3) Capital-intensive small- and medium-sized industries

64% of the municipalities preferred the capital-intensive industry, and 83% small- and medium-sized industries. These are not as high as industry types identified in 1) and 2), which are preferred by 90% or more of the respondents. In particular, these percentages further decrease in the Viscu area to 62% and 76% respectively. This can be interpreted that the Viscu area has room to accept labor-intensive large enterprises. However, since many municipalities stated a condition "not to adversely affect existing small- and medium-sized enterprises", it is safe to think that small- and medium-sized enterprises are more preferred.

4) **Modernization of traditional industries**

While the municipalities identified the traditional industries: "the food processing industry", "the woodworking industry", and "the machinery and metalworking industry" as industries preferred in their communities, they expressed preference for hi-tech products and "capital-intensive industries rather than labor-intensive industries". Analysis of these conflicting responses, together with the results of the interview survey, seems to point to "modernization of traditional industries or increase in value added."

Table 5-1-1 TERRITORIAL DIFFERENCES BETWEEN "AREA" AND "DISTRICT"

Items	Aveiro		Viseu	
	Area	District	Area	District
A. Territory by municipalities				
1) Number of municipalities in the territory	14	19	15	24
2) Remove of municipalities from "District" to other "Areas"	-	-7	-	-10
3) Common municipalities for both "area" & "District"	12	12	14	14
4) Addition of municipalities to the "Area" from other districts	+2	-	+1	-
B. Land area(km2)				
(Ratio to District)	2,331 (83)	2,811 (100)	3,504 (44)	8,002 (100)
C. Population(1988)				
(Ratio to District)	421,600 (63)	665,000 (100)	24,400 (77)	423,400 (100)

Source: Table 5-1-2, etc.

Table 5-1-2 STRUCTURAL POSITION OF THE PROJECT AREA IN THE COUNTRY

	Aveiro area	Viseu area	Aveiro-Viseu region	Country
A. Principal indicators				
A-1) Land area(Km2)	2,333(2.5%)	3,485(3.8%)	5,818(6.3%)	92,000(100%)
A-2) Population('000)-1990	424.2(4.1%)	296.3(2.8%)	720.5(6.9%)	10,400(100%)
A-3) Population density(Habit./Km2)	182 (1.61)	85 (0.75)	124 (1.10)	113(1.00)
A-4) Share of active population-1989	39.0%	36.0%	38.0%	47.0%
A-5) Unemployment rate-1989	5.4%	6.4%	5.8%	5.0%
A-6) Illiteracy rate-1989	15.0%	24.0%	18.9%	15.0%
B. Structure of economy				
B-1) GDP(Billion Escudos)-1988	233.7%(3.7%)	125.2(2.0%)	358.9(5.7%)	6,332.2(100%)
-Primary sector	6.0%	21.0%	11.0%	6.0%
-Secondary sector	59.0%	34.0%	51.0%	38.0%
-Tertiary sector	35.0%	45.0%	38.0%	56.0%
	100.0%	100.0%	100.0%	100.0%
B-2) Employment('000)-1988	164.4(3.8%)	116.8(2.7%)	281.2(6.5%)	4,299.0(100%)
-Primary sector	20.0%	51.0%	33.0%	21.0%
-Secondary sector	53.0%	23.0%	41.0%	35.0%
-Tertiary sector	27.0%	26.0%	26.0%	44.0%
	100.0%	100.0%	100.0%	100.0%

Source: JICA team's compilation

Table 5-1-3 STRUCTURE OF MANUFACTURING INDUSTRY IN THE PROJECT AREA AND THE COUNTRY

Subsectors	(unit:% of number of establishments)				
	CAB*) Aveiro area**	Viseu area**	Aveiro-Viseu region** Country(1988)		
Food processing, beverage, tobacco industry	3.1	39	46	42	12
Textile, garment, footwear industry	3.2	4	4	4	28
Wood and cork industry	3.3	16	20	17	19
Pulp & paper, printing industry	3.4	2	2	2	4
Basic chemicals, rubber, plastics industry**)	3.5	3	3	3	2
Non-metal minerals industry	3.6	7	5	6	6
Basic metal industry	3.7	1	1	1	1
Metal products, machinery, transport equipm. ind.	3.8	26	20	24	25
Other manufacturing industries	3.9	1	nil	1	3
MANUFACTURING INDUSTRIES	3	100	100	100	100

Note : *) Portugues abbreviation for "Classification of Economic Activities."
 **) for 1991

Source: Table 5-1-4 etc.

Table 5-1-4 SELECTED PARAMETERS OF THE PROJECT AREA MUNICIPALITY

Municipalities	Land area (km ²)	Population ('000)	Pop. density (Habit./km ²)	Establishments of Manufacturing Industries by C.A.E.(1991)										Total	Estab. density (Nos./km ²)
				3.1 (Food)	3.2 (Textile)	3.3 (Wood)	3.4 (Paper)	3.5 (Chem.)	3.6 (Miner.)	3.7 (Base M.)	3.8 (M. WORK)	3.9 (other)			
Aveiro area(BAIXO VOUÇA)															
1 Agueda	386	58.8	148	136	30	62	28	19	42	26	385	4	644	1.92	
2 Albergaria-a-Velha	156	24.0	154	54	10	39	3	5	8	5	61	8	186	1.19	
3 Anadia	212	32.6	156	216	5	62	11	7	32	1	74	2	410	1.93	
4 Aveiro	397	67.5	343	178	16	58	11	22	55	4	144	7	487	2.47	
5 Cantanhede	125	29.7	181	122*	5*	35*	3*	5*	8*	0*	25*	1*	204*	0.51	
6 Estarreja	125	29.7	238	188	6	23	1	11	5	9	44	1	191	1.53	
7 Ilhavo	75	33.8	448	91	6	33	3	4	14	33	41	0	191	2.55	
8 Mealhada	112	18.2	143	78	2	30	3	4	18	2	22	1	152	1.38	
9 Mira	122	16.5	121	68*	0*	38*	3*	2*	2*	0*	5*	1*	181*	0.83	
10 Murtosa	53	10.5	198	23	0	6	0	0	0	0	2	0	21	0.58	
11 Oliveira do Bairro	86	20.0	233	186	5	26	2	2	25	0	69	1	236	2.74	
12 Ovar	159	49.3	313	62	61	181	15	16	10	5	42	4	316	1.99	
13 Sever do Vouga	138	13.8	186	45	0	22	0	0	2	3	18	0	98	0.69	
14 Vagos	173	19.1	118	61	0	11	1	3	6	1	21	1	185	0.61	
sub-total	2,333	424.2	192	1,324 (39)	146 (4)	538 (16)	76 (2)	98 (3)	219 (7)	47 (1)	872 (26)	23 (1)	3,244 (100)	1.42	
Viseu area(DAO LAFÕES)															
1 Aguiar da Beira	199	7.8	5	15	0	8	0	0	1	0	7	0	31	0.16	
2 Carregal do Sal	120	10.7	89	39	3	19	2	1	2	1	19	0	86	0.72	
3 Castro d' Aite	283	22.5	62	42	1	23	0	2	3	0	17	0	88	0.23	
4 Mangualde	221	21.5	97	61	16	24	1	1	6	0	28	0	137	0.62	
5 Mortagua	249	10.6	42	22	2	24	1	0	3	0	20	0	73	0.29	
6 Nelas	124	14.6	118	49	3	21	1	10	3	1	18	0	186	0.85	
7 Oliveira de Frades	148	11.0	74	41	2	11	0	1	3	0	12	0	70	0.47	
8 Penalva do Castelo	140	10.0	71	20	2	11	0	0	2	0	0	1	28	0.20	
9 Santa Comba Dao	115	12.2	106	47	2	22	1	3	8	0	10	0	93	0.81	
10 Saraio	138	13.5	68	27	1	19	0	1	5	0	18	0	72	0.36	
11 S. Pedro do Sul	348	21.2	61	81	3	26	2	2	5	0	17	1	137	0.39	
12 Tondela	373	31.3	84	139	2	39	5	5	8	3	47	2	248	0.56	
13 Vila Nova Paiva	169	6.4	38	6	2	5	0	1	2	0	15	0	31	0.18	
14 Viseu	587	89.9	177	280	36	103	14	27	28	4	123	6	541	1.97	
15 Vouzela	191	12.8	67	55	5	9	1	2	4	1	12	0	89	0.47	
sub-total	3,485	296.3	85	844 (46)	88 (4)	357 (20)	28 (2)	56 (3)	84 (5)	10 (1)	363 (20)	8 (nil)	1,838 (100)	0.53	

Note : *) JICA team's estimate
 Source: Land area/Population-JICA team's compilation(1990)
 Establishment-Ministry of Energy & Industry, Coimbra(October,1991)

Table 5-1-5 ZONING OF THE PROJECT AREA BY LEVEL OF INDUSTRIALIZATION

	Pop. density (Habit/km ²)	Estab. density (Nos./km ²)	Share of Establishments by Subsector in CAE(%)							Total		
			3.1	3.2	3.3	3.4	3.5	3.6	3.7		3.8	3.9
<u>Aveiro area</u>												
Level I	237	2.08	35.6	5.2	14.7	2.5	3.2	7.4	1.5	29.1	0.8	100.0
Level II	154	1.22	39.0	3.6	20.4	1.8	3.0	5.3	2.1	24.5	0.3	100.0
Level III	114	0.61	58.6	0.9	19.6	1.3	1.5	3.4	0.7	13.4	0.6	100.0
<u>Aveiro area average</u>	182	1.43	39	4	16	2	3	7	1	26	1	100
<u>Viseu area</u>												
Level II	177	1.07	37.0	6.7	19.0	2.6	5.0	5.2	0.7	22.7	1.1	100.0
Level III	95	0.70	50.0	3.9	18.7	1.5	3.0	4.0	0.7	18.2	0.0	100.0
Level IV	57	0.31	49.9	2.9	20.8	0.6	1.5	4.7	0.2	19.1	0.3	100.0
<u>country average</u>	85	0.53	46	4	20	2	3	5	1	20	nil	100
	113	n.a.	12.1	28.0	19.1	3.8	2.3	5.9	0.8	24.5	3.4	100.0

Source: Table 5-1-3, Table 5-1-4

Table 5-1-6 TYPE OF INDUSTRIES UNDESIRABLE TO INVEST IN THE MUNICIPALITIES
(Questionnaire to 29 municipalities in the Aveiro-Viseu region)

Answers to be selected	Ranking by undesirability					Total	Weighted Points (*)
	1st	2nd	3rd	4th	5th		
Industries which:							
1. have potential to cause pollution.	20	1	0	0	0	21	61 (50)
2. may damage the existing, traditional, and small scale industries.	0	8	7	3	1	19	23 (19)
3. require large quantity of electricity and water.	0	5	7	5	3	20	17 (14)
4. require large number of employees.	0	3	2	4	9	18	8 (7)
5. require large area of land at a level of 50 Ha.	1	4	1	5	4	15	12 (10)
Total	21	21	17	17	17	93	121 (100)

Note : These are 3 municipalities who marked only 1st and 2nd ranking.

(*) Computed giving 3 points for 1st, 2 points for 2nd, 1 point for 1st and 0 point for 4th and 5th.

Source: Questionnaire survey made by JICA Team.

Table 5-1-7 SUBSECTORS PREFERABLE TO ATTRACT TO THE MUNICIPALITIES
(Questionnaire to 29 municipalities in the Aveiro-Viseu region)

CAE	SUB-SECTOR	Ranking by priority					Total	Weighted Points (*)
		1st	2nd	3rd	4th	5th		
3.1	Food processing & beverage industry	5	3	5	0	3	16	26 (23)
3.2	Textile, garment & footwear industry	1	2	1	6	2	12	8 (7)
3.3	Wood and cork industry	7	3	2	0	2	14	29 (25)
3.4	Pulp & paper, printing industry	0	1	0	2	4	7	2 (2)
3.5	Basic chemicals, rubber, plastics industry	0	0	1	0	0	1	1 (1)
3.6	Non-metal minerals industry	1	3	2	6	0	12	11 (10)
3.7	Basic metal industry	0	1	1	0	2	4	3 (3)
3.8	Metal products, machinery, transport equipm.ind.	3	4	5	3	0	15	22 (19)
3.9	Other manufacturing industries	2	2	2	2	6	14	12 (10)
Total		19	19	19	19	19	95	114 (100)

Note : (*) Computed giving 3 points for 1st, 2 points for 2nd, 1 point for 1st and 0 point for 4th and 5th.

Source : Questionnaire survey made by JICA Team.

Table 5-1-8 DISTANCE BETWEEN SEAT OF MUNICIPALITIES

Unit: Km

Agueda	
14	Albergaria-a-Velha
17	31 Anadia
13	25 10 Oliveira do Bairro
33	22 50 46 Sever do Vouga
23	20 30 21 42 Aveiro
32	15 49 31 34 20 Estarreja
29	26 32 27 48 6 26 Ilhavo
42	27 59 55 49 30 10 36 Murtosa
45	35 59 59 55 36 16 44 26 Ovar
24	32 25 21 54 11 32 6 42 51 Vagos
39	53 22 31 72 43 63 37 60 83 32 Cantanhede
24	39 8 16 58 37 57 39 67 74 33 14 Mealhada
41	55 27 37 69 27 47 21 57 67 16 16 30 Mira
77	92 96 65 105 90 107 87 117 127 80 67 53 83 Carregal do Sal
49	64 27 37 96 62 79 59 85 99 52 39 25 55 28 Mortagua
61	76 39 49 108 74 91 71 101 111 64 51 37 67 16 12 Santa Comba Dao
56	70 55 65 91 89 85 86 95 105 80 67 53 83 31 27 16 Tondela
53	38 69 67 29 59 53 64 83 73 69 106 92 122 76 61 58 42 Oliveira de Frades
67	53 84 78 40 73 68 79 78 88 84 106 92 122 60 45 56 41 15 S. Pedro do Sul
61	46 77 71 37 66 61 72 71 81 77 99 85 115 67 51 49 43 8 7 Vousela
120	118 119 129 108 138 133 144 143 153 144 131 117 147 79 92 80 65 79 63 70 Aguiar da Beira
96	81 116 110 72 102 96 107 106 99 112 128 114 144 76 89 79 62 43 28 35 79 Castro d'Aire
106	96 94 104 86 116 111 116 121 131 119 95 81 111 29 56 44 43 57 41 48 37 57 Mangualde
94	109 82 92 108 107 124 104 134 134 107 84 70 100 17 45 33 40 60 44 51 49 60 12 12 Nelas
118	108 106 116 98 128 123 134 133 143 131 107 93 123 41 79 53 55 69 53 60 25 69 12 24 Penalva do Castero
99	96 98 108 87 117 111 122 121 131 123 130 116 146 57 71 59 44 58 42 49 21 58 28 40 22 Satao
113	111 112 132 101 130 126 137 136 146 142 124 110 140 72 85 73 58 72 56 63 33 25 53 56 54 33 Villa Nova de Paiva
79	77 78 88 67 97 92 103 102 111 103 90 76 106 38 51 39 24 38 22 30 41 38 19 22 31 20 34 Viseu

Table 5-1-9 LISTING OF THE TOP 15 COMMODITY GROUPS BY NUMBER OF ESTABLISHMENTS IN THE AVEIRO AND VISEU AREAS
(STATUS AS OF OCTOBER 1981)

AVEIRO AREA		VISEU AREA			
RANK CAE-CODE*	NAME OF COMMODITY	NUMBER OF ESTABLISHMENTS **)	RANK CAE-CODE*	NAME OF COMMODITY	NUMBER OF ESTABLISHMENTS **)
1 3117.1.0	Bread & baker's wares	427	1 3131.2.0	Unfinished brandy	414
2 3811.3.0	Locksmiths' wares	392	2 3811.3.0	Locksmiths' wares	278
3 3116.1.0	Cereal breakfast food	278	3 3117.1.0	Bread & baker's wares	237
4 3131.2.0	Unfinished brandy	277	4 3311.2.0	Carpentry	154
5 3311.2.0	Carpentry	198	5 3311.1.0	Sawwood	126
6 3311.1.0	Sawwood	91	6 3116.1.0	Cereal breakfast food	101
7 3320.1.0	Wooden furniture	81	7 3699.3.0	Cement & marmorite products	68
8 3220.2.0	Serial clothes & garments	76	8 3320.1.0	Wooden furniture	63
9 3829.9.0	Non-electrical mach., nec	76	9 3220.2.0	Serial clothes & garments	54
9 3691.1.0	Clay bricks, tiles, roofing	66	10 3829.9.0	Non-electrical mach., nec	21
10 3844.0.0	Motorcycles & bicycles	63	11 3813.9.0	Other metal constr. materials	20
11 3610.1.0	Porcelain & ceramic ware	51	12 3420.1.0	Graphic art	18
12 3580.0.0	Plastic products	45	13 3551.2.0	Renovated tires & tubes	15
13 3699.3.0	Cement & marmorite products	43	14 3213.0.0	Yarn	8
14 3720.9.0	Basic non-ferrous prod., nec	33	15 3550.0.0	Plastic products	8
15 3420.1.0	Graphic art	29	15 3512.1.5	Organic fertilizer	6
			3691.1.0	Clay bricks, tiles, roofing	6
TOTAL TOP 15 COMMODITY GROUPS		2226	TOTAL TOP 15 COMMODITY GROUPS		1597
PERCENT OF TOP 15 COMMODITY GROUPS IN TOTAL MANUFACTURING ESTABLISHMENTS IN THE AREA		73.1	PERCENT OF TOP 15 COMMODITY GROUPS IN TOTAL MANUFACTURING ESTABLISHMENTS IN THE AREA		87.2

NOTES:

*) Portuguese abbreviation for 'Classification of Economic Activities', which follows, as regards industry, the ISIC classification system.

**) Covering all classes of establishments, from '0' employees to '>1000' employees.

The municipalities of Mira and Cantanheda are not included in the Aveiro area.

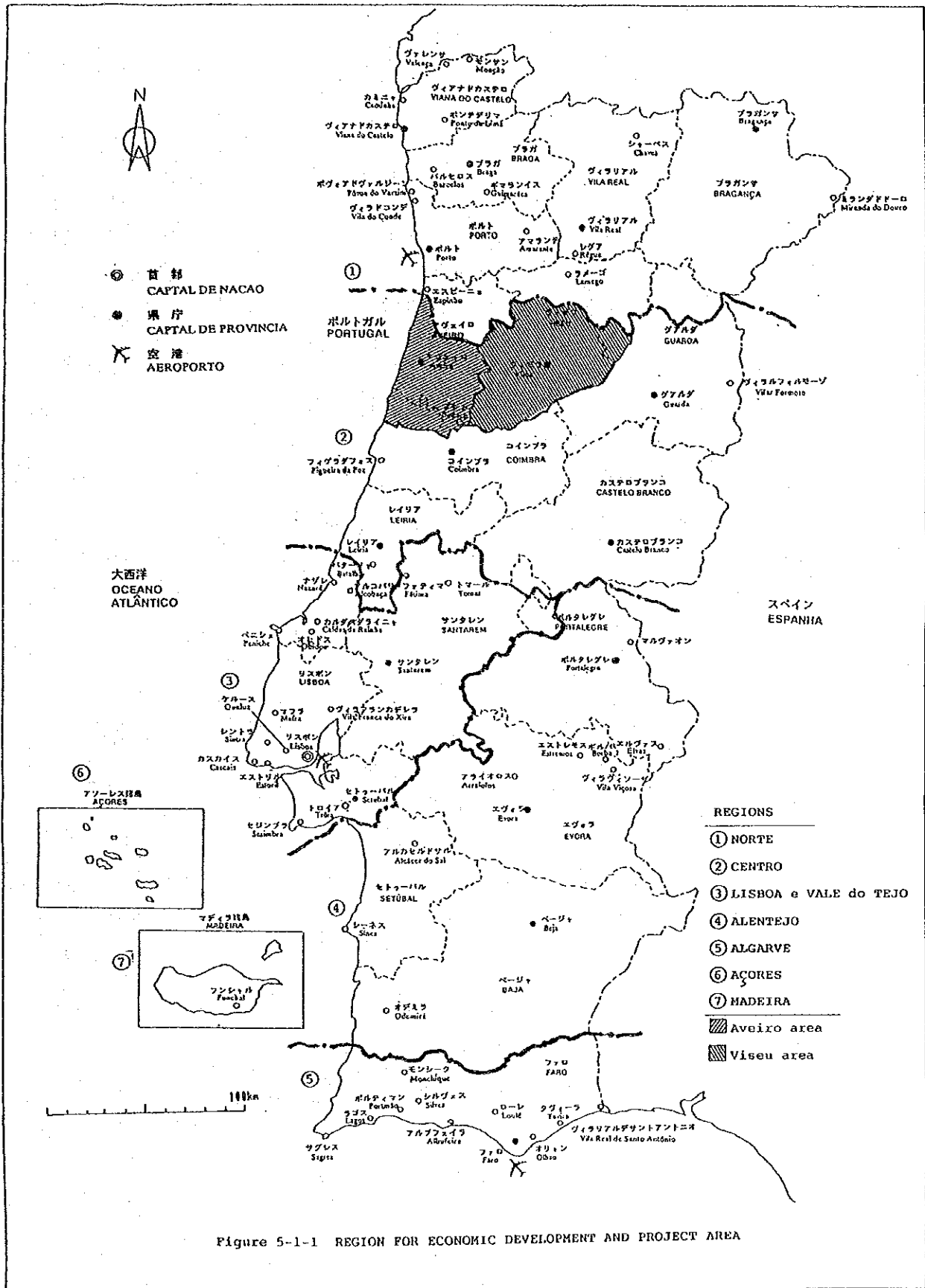
SOURCE:

JICA Study team compilation from data provided by the branch office of the 'Ministry of Industry and Energy' in Coimbra.

Table 5-1-10 NUMBER OF MANUFACTURING ESTABLISHMENTS IN THE AVEIRO AND VISEU AREAS
(STATUS AS OF OCTOBER 1991)

A V E I R O A R E A		V I S E U A R E A		(Unit: number of establishments; percent)			
RANK	CAE-CODE*NAME OF COMMODITY GROUP	NUMBER OF ESTABLISHMENTS**	PERCENT OF TOTAL	RANK	CAE-CODE*NAME OF COMMODITY GROUP	NUMBER OF ESTABLISHMENTS**	PERCENT OF TOTAL
	1 3117.1.0 Bread & baker's wares	427	37.3	1	3131.2.0 Unfinished brandy	414	48.9
	2 3115.1.0 Cereal breakfast food	278	24.3	2	3117.1.0 Bread & baker's wares	237	28.0
	3 3131.2.0 Unfinished brandy	277	24.2	3	3116.1.0 Cereal breakfast food	101	11.9
TOTAL	31 FOOD PROCESSING, BEVERAGE...	1145	100.0	TOTAL	31 FOOD PROCESSING, BEVERAGE...	847	100.0
	1 3220.2.0 Serial clothes & garments	76	51.4	1	3220.2.0 Serial clothes & garments	54	69.2
	2 3213.0.0 Yarn	19	12.8	2	3213.0.0 Yarn	8	10.3
	3 3214.1.0 Carpets, tapestry	16	10.8	3	3214.1.0 Carpets, tapestry	5	6.4
TOTAL	32 TEXTILES, GARMENTS, FOOTWEAR	148	100.0	TOTAL	32 TEXTILES, GARMENTS, FOOTWEAR	78	100.0
	1 3311.2.0 Carpentry	198	42.6	1	3311.2.0 Carpentry	154	43.1
	2 3311.1.0 Sawwood	91	19.6	2	3311.1.0 Sawwood	126	35.3
	3 3320.1.0 Wooden furniture	81	17.4	3	3320.1.0 Wooden furniture	63	17.6
TOTAL	33 WOOD & CORK	465	100.0	TOTAL	33 WOOD & CORK	357	100.0
	1 3420.1.0 Graphic art	29	41.4	1	3420.1.0 Graphic art	18	64.3
	2 3420.1.3 Book binding	17	24.3	2	3420.1.2 Printing	5	17.9
	3 3411.2.0 Paper & cardboard	11	15.7	3	3411.2.0 Paper & cardboard	3	10.7
TOTAL	34 PULP, PAPER, PRINTING	70	100.0	TOTAL	34 PULP, PAPER, PRINTING	28	100.0
	1 3560.0.0 Plastic products	45	47.9	1	3551.2.0 Renovated tires & tubes	15	26.8
	2 3551.2.0 Renovated tires & tubes	8	8.5	2	3560.0.0 Plastic products	8	14.3
	3 3521.0.0 Paints, varnishes, lacques	6	6.4	3	3512.1.5 Organic fertilizer	6	10.7
TOTAL	35 BASIC CHEM., RUBBER, PLAST.	94	100.0	TOTAL	35 BASIC CHEM., RUBBER, PLAST.	56	100.0
	1 3691.1.0 Clay bricks, tiles, roofing	66	31.4	1	3699.3.0 Cement & marmorite products	68	81.0
	2 3610.1.0 Porcelain & ceramic ware	51	24.3	2	3691.1.0 Clay bricks, tiles, roofing	6	7.1
	3 3699.3.0 Cement & marmorite products	43	20.5	3	3620.2.0 Complementary glass products	3	3.6
TOTAL	36 NON-METAL MINERALS	210	100.0	TOTAL	36 NON-METAL MINERALS	84	100.0
	1 3720.9.0 Basic non-ferrous prod., nec	33	70.2	1	3720.9.0 Basic non-ferrous prod., nec	6	60.0
	2 3710.2.0 Iron & steel billets	6	12.8	2	3710.2.0 Iron & steel billets	2	20.0
	3 3710.9.0 Basic iron & steel prod., nec	4	8.5	3	3710.9.0 Basic iron & steel prod., nec	1	10.0
TOTAL	37 BASIC METAL	47	100.0	TOTAL	37 BASIC METAL	10	100.0
	1 3811.3.0 Locksmiths' wares	392	46.3	1	3811.3.0 Locksmiths' wares	278	76.4
	2 3829.9.0 Non-electr. machinery, nec	76	9.0	2	3829.9.0 Non-electr. machinery, nec	21	5.8
	3 3844.0.0 Motorcycles & bicycles	63	7.4	3	3813.9.0 Other construction materials	20	5.5
TOTAL	38 MACHINERY, TRANSPORT EQMT.	846	100.0	TOTAL	38 MACHINERY, TRANSPORT EQMT.	364	100.0
	1 3909.9.0 Other manuf. products, nec	7	33.3	1	3909.9.0 Other manuf. products, nec	4	50.0
	2 3909.7.0 Calculat., office equipment	5	23.8	2	3901.3.0 Polished semi-prec. stones	1	25.0
	3 3903.0.0 Sport articles	4	19.0	3	3909.6.0 Sun & rain umbrellas	1	12.5
TOTAL	39 OTHER MANUFACT. PRODUCTS	21	100.0	TOTAL	39 OTHER MANUFACT. PRODUCTS	8	100.0
TOTAL NUMBER MANUFACTURING ENTERPRISES		3046		TOTAL NUMBER MANUFACTURING ENTERPRISES		1832	

NOTES: *) Portuguese abbreviation for 'Classification of Economic Activities', which follows, as regards industry, the ISIC classification system.
**) Covering all classes of establishments, from '0' employees to '>1000' employees. The municipalities of Mira and Cantanheda are not included in the Aveiro area.
SOURCE: JICA Study team compilation from data provided by the branch office of the 'Ministry of Industry and Energy' in Coimbra.



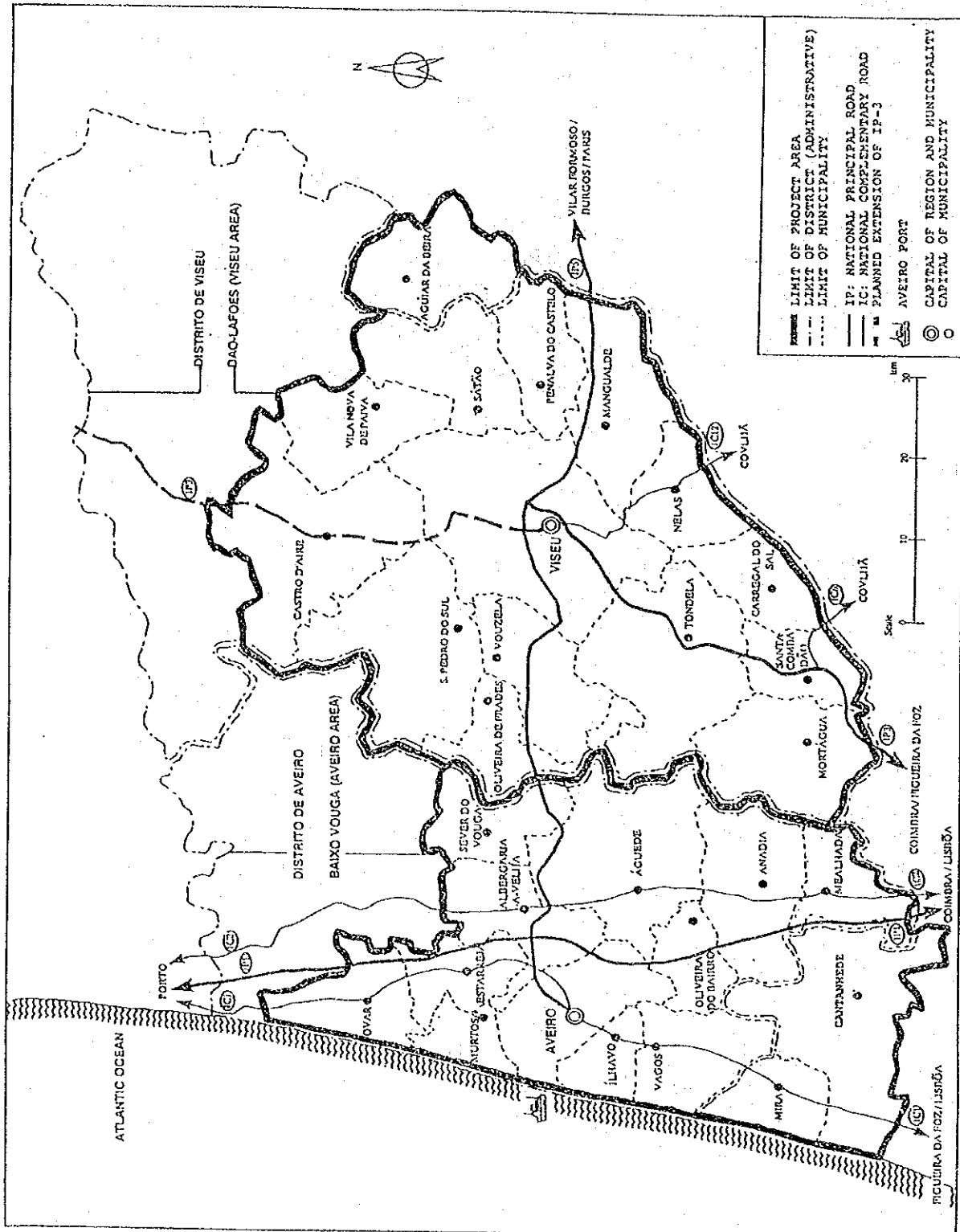


Figure 5-1-2 PROJECT AREA (AVEIRO-VISEU REGION)



Figure 5-1-4 TOPOGRAPHICAL MAP OF THE PROJECT REGION

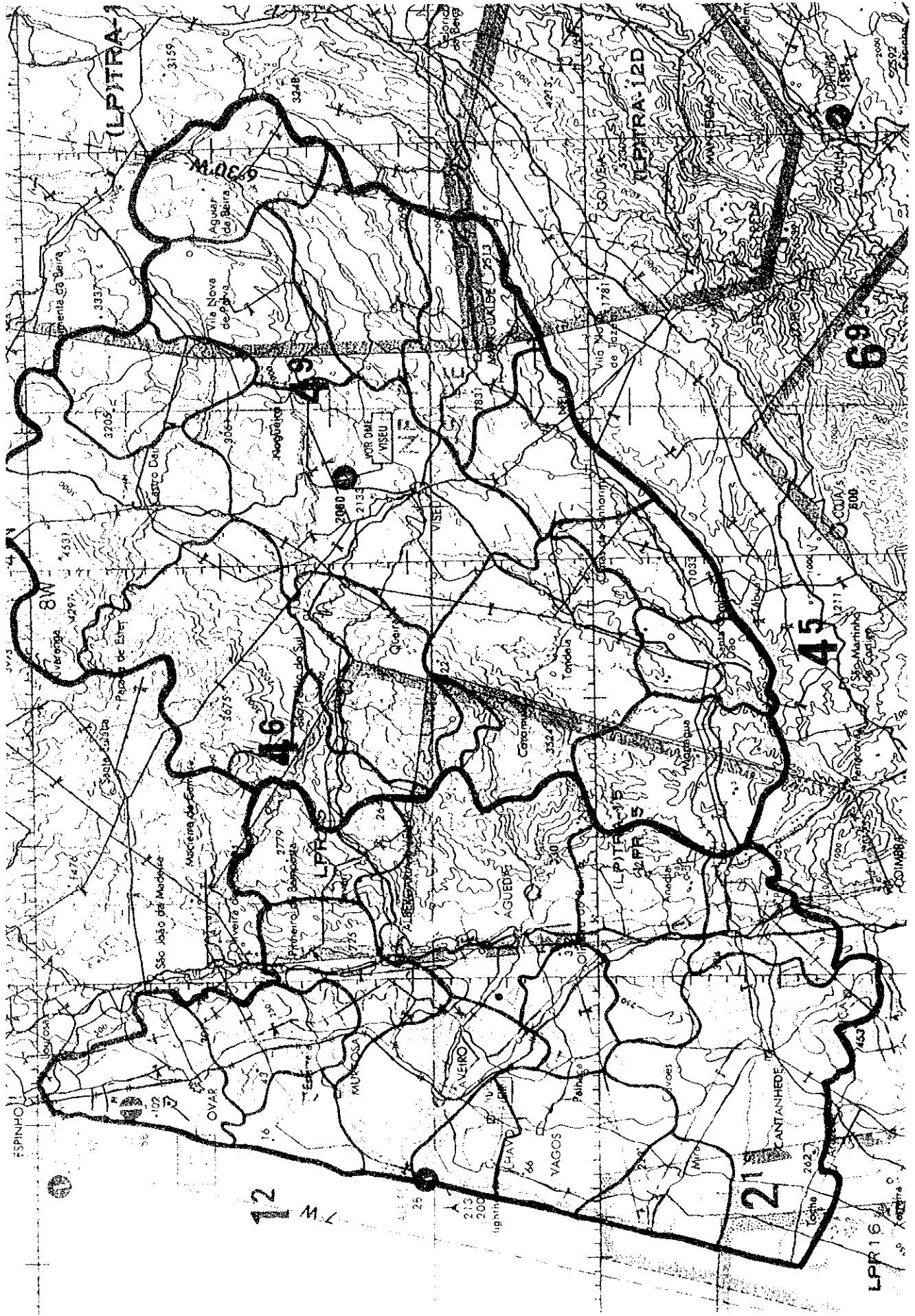


Figure 5-1-4 TOPOGRAPHICAL MAP OF THE PROJECT REGION

5.2 Natural Resources and Infrastructure (Project Area)

5.2.1 Natural Resources

In addition to geographical distribution of mineral resources in the country, this section summarizes mineral resources available in the Aveiro-Viscu region. However, as detailed data on their reserves were not available in this study, only occurrence of the resourced will be mentioned below.

(1) Geographical Distribution of Mineral Resources in Aveiro area

- 1) White clay: The northeastern part of Ovar, and southeast of Aveiro near Vouga River
- 2) Lead: The mid-way between Vouga and Velha, and the northern part of Agueda along Alfosqueira River
- 3) Manganese: The north-south strip on the east side of Anadia
- 4) Coal: Dotted in the mountain area on the east side of Mealhada
- 5) Iron ore: The east side of the coal deposits

(2) Geographical Distribution of Mineral Resources in Viseu area

- 1) Wolframite: The north side of highway IP5 on the northwest side of Viseu, the north side of Satao, da Arada area, and a wide area on the east side of Castro Daire
- 2) Tin: Coexisting with the above wolframite deposits, and the northern part of Satao, and vicinity of Viseu
- 3) Uranium: The east end of the Viseu area in the vicinity of Aguiar da Beira, and the west side of Nelas in the southern region
- 4) Emerald: Dotted along River Teijo on the north side of Penalva do Castelo

Geographical distribution of mineral resources in the area is illustrated in Figure 5-2-1.

5.2.2 Infrastructure in the Region

In addition to infrastructure in the entire country described in Chapter 3, this section describes major infrastructure in the Aveiro-Viseu region.

(1) Main Road System

Specification of three types of roads is based upon the possible passing speed of vehicles as follows:

IP (Principal highway):	100 km/hr
IC (Complemental highway):	80 km/hr
OE (Other roads):	70 km/hr

Main arterial highway "IP1", recently completed, connects Aveiro City, an urban center of Aveiro area, and Lisbon and Porto, and is mainly used by highway buses and passenger automobiles, and trucks - which carry more than 97% of freight transport on the mainland.

Compared to old highways IC1 and IC2, IP1 has helped improve the efficiency of transport service significantly and is expected to directly serve Aveiro Port currently under construction, thereby contributing to economic growth of the country. To date, IP1 has been completed for the Broga - Setubal section, and ultimately it will be extended to the Spanish border on the north and to Faro on the south.

On the other hand, IP5 (208km long) connecting Aveiro, passing Viseu, and Vilar Formoso in the eastern region and near the international border with Spain was completed in 1991. Today, it serves as a key element of regional development by providing access to Spain and France, while it directly crosses at Viseu with IP1 running to Lisbon and Porto.

Note that IP5 has 4 lanes between Aveiro and Albergaria-A-Velha, and the Albergaria-A-Velha to - Viseu section is still 2 or 3 lanes and is planned to be expanded to 4 lanes. Furthermore, construction of low-speed lanes (ordinary roads) parallel to IP5 is being considered.

Southern part of IP3, Viseu to Figueira da Foz, has been completed except some km between Vila Verde da Raiz and Figueira da Foz, while the southern part from Viseu is under planning towards completion in 1995.

Viséu, the center of the Viséu area, is located at the crosspoint of IP5 and IP3, so that the city is expected to grow to a gateway to the other EC countries. Albergaria-A-Velha in the Aveiro area is located at the crosspoint of IP1 and IP5.

Figure 5-2-2 shows IPs and ICs in the region, and Figure 5-2-3 shows the construction schedule of the completed IP5 for reference.

(2) Rail and airway systems

A major role of railways related to industrial development in the area is passenger transport service. As shown in Chapter 3, general freight transport is mostly handled by road transport which occupied 97.5% of general freight in land transportation in 1988 (MOPTC 1990 Sept. Statistics). While rail transport carries around 5.5 million tons of freight, and cement, iron ore and wood account for 60% of total. Most of rail freight is handled in Lisbon.

The railway network serving the area consists of an arterial line connecting Coimbra, Aveiro and Porto, which carries passengers, and a feeder line which runs along the north side of IP5 to connect Aveiro, Agueda, Oliveira de Frades, Vouzela, Pedro do Sul, and Viséu. Viséu is further connected to Tondela, Santa Comba Dao, and Coimbra. From Santa Comba Dao, a line extends eastward to Nelas, Mangualada, Guaruda, Vilar Formoso, then to Spain, and finally to Paris.

As for air transport, Viséu has only one airdrome for private use in the Aveiro-Viséu region, which handles chartered flights only. Aveiro has no commercial airport, while a military airport is on the opposite side of Aveiro seaport. For international flight, the Oporto Airport is the nearest one from the region.

Figure 5-2-4 shows the railway network and airports in the area.

(3) Marine Transportation

The marine transport system serving the entire country was described in Chapter 3. In the area, Aveiro has only one major port. In addition, there are two ports to support Aveiro Port; Porto and Figueira da Foz.

This section describes major facilities available at Aveiro and Figueira da Foz.

1) Major facilities at Aveiro Port (as of 1990)

Figure 5-2-5 shows locations of berths at Aveiro Port and city areas.

	<u>No. of berths</u>	<u>Effective length</u> (m)	<u>Water depth</u> (m)	<u>Total area</u> (1,000 m ²)
New commercial wharf	5	500	8	160
Industrial port	3	126	5-6	-
Old south commercial port	4	400	6	47
Fishing port	15	266	4.5	-

a) Cranes

There are 7 cranes on the new (north) commercial berth (12-ton: 6 units; and 39-ton: 1 unit) and 6 cranes on the south commercial berth (6-ton: 4 units; and 12-ton: 2 units). In addition, there are additional 17 cranes at the port, which hosting capacities are as follows:

<u>Number of units</u>	<u>Hoisting capacity</u>
2	3 tons
6	7 tons
7	16 tons
1	50 tons
1	100 tons (hoisting height 7.3m)
1	70 tons (hoisting height 10m)
1	25 tons (hoisting height 22m)

b) Tractors

There are 3 terminal tractors used for roll-on/roll-off operations, equipped with 42CV engine.

c) Lifts

There are a total of 10 lifts, which capacities are as follows:

<u>Number of units</u>	<u>Hoisting capacity</u>
3	3 tons (hoisting height: 3.66m)
1	4 tons (hoisting height: 4.32m)
1	7 tons (hoisting height: 4.00m)
1	8 tons (hoisting height: 4.93m)
1	13 tons (hoisting height: 4.60m)
3	25 tons (hoisting height: 6.35m)

2) Major facilities at Figueira da Foz Port (1990)

	<u>No. of berths</u>	<u>Effective length</u> (m)	<u>Water depth</u> (m)	<u>Total area</u> (1,000 m ²)
General Cargo Port	5	462	6	35

a) Cranes

There are 8 rail cranes and 1 automatic crane, which capacities are as follows:

Rail type (motor-operated)

1 unit	1.5-ton with hoisting height of 24m or 3 ton with hoisting height 16m
3 units	3 ton with hoisting height of 24m or 6 ton with hoisting height 20m
1 unit	6 ton with hoisting height of 24m or 12 ton with hoisting height 20m

Automatic type

1 unit	16-ton with hoisting height of 3m/2.3-ton with hoisting height of 16m
--------	---

b) Tractors

There are 2 tractors; 1 equipped with 43CV engine and 1 with 42CV engine.

c) Lifts

There are 8 lifts, which capacities are as follows:

4 units	3-ton with hoisting height of 4.5m
1 unit	3-ton with hoisting height of 3.3m
1 unit	3-ton with hoisting height of 4.0m
1 unit	6.5-ton with hoisting height of 4.9m
1 unit	7-ton with hoisting height of 4.0m

3) Tonnage and types of cargoes handled by Aveiro Port

Yearly changes in cargo tonnage handled by Aveiro Port (a total of loaded and unloaded volumes) are shown below. Cargo tonnage has been increasing rapidly after 1986 when the country joined the EC, reaching 1,444,021 tons in 1990.

<u>Year</u>	<u>Cargo handled (tons)</u>
1983	488,389
1984	615,183
1855	711,949
1986	1,009,144
1987	1,168,934
1988	1,212,649
1989	1,300,216
1990	1,444,021

Source: 1990 Annual Report of Aveiro Port Authority

(Note) Volumes of cargo handled by Figueira da Foz Port is around one half that handled by Aveiro Port and have been on the decline in recent years; 695,000 tons in 1988, 685,000 tons in 1989, and 678,000 tons in 1990. This is attributable to the decrease in volumes of pulp and paper manufacturing, which account for 78% of total handled by Foz Port.

Types of cargoes handled by Aveiro Port, loaded and unloaded, are summarized below:

a) Breakdown of cargoes unloaded at Aveiro Port (tons)

<u>Types of cargo</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
LP gas	27,598	23,191	35,426
Liquid cargo	143,108	167,615	142,860
Solid cargo	153,784	140,337	213,198
Container cargo	171	3,625	3,995
<u>General cargo</u>	<u>246,101</u>	<u>290,763</u>	<u>265,627</u>
Total	570,762	625,763	661,106

- Liquid cargo includes vinyl chloride, methanol, and caustic soda.
- Solid cargo includes rice, bean grounds, salt, and potassium chloride
- Container cargo includes potatoes, iron and steel, frozen cod
- General cargo includes aluminum, iron and steel, salted cod, and dried cod.

b) Breakdown of cargoes loaded at Aveiro Port (tons)

<u>Types of cargo</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>
Liquid cargo	55,926	72,038	63,751
Solid cargo	55,595	43,341	41,562
Container cargo	2,147	1,210	1,810
<u>General cargo</u>	<u>537,217</u>	<u>557,864</u>	<u>675,792</u>
Total	651,886	674,453	782,915

- Liquid cargo includes isocyanate and naphtha
- Solid cargo includes wood chips.
- Container cargo includes tiles, industrial furnaces, textile products, and wine
- General cargo includes laminated wood, sawn wood, pulp, compressed wood, and craft paper

c) Handling volume by region

71% of cargo handled by Aveiro Port are exported to or imported from North Europe.

<u>Region/area</u>	<u>1990</u>	<u>(%)</u>
Domestic	84,826	5.9
North Europe	1,036,171	71.8
West Mediterranean, Morocco	211,866	14.7
East Mediterranean, Black Sea	<u>93,163</u>	<u>6.4</u>
	1,426,026	98.8
Northwest Africa	4,119	0.3
North Africa	4,594	0.3
Central Africa	3,104	0.2
<u>South America</u>	<u>6,179</u>	<u>0.4</u>
Total	1,444,021	100

Source: Annual Report of Aveiro Port Authority

4) Capacity shortage and expansion plan

a) Aveiro Port

Aveiro Port is slightly congested to cause the waiting of ships off the port, albeit a few hours at most mainly due to redirection of cargo from the Leixas Port. The redirection has been caused by the reasons; that is insufficient space of warehouse, expensive port charges and frequent labor disputes of port workers at Leixas Port.

At the present, Aveiro Port plans to extend its wharf by more than 100m, but construction will be commenced after 1993 due to budgetary restraint. Land transportation from Aveiro Port to Spain has been improved by the new highway, IP5.

Currently, Aveiro Port receives tramps only, and it plans to handle liners in the future.

While the port handles only bulk cargo, it plans to construct a container terminal. Land for the terminal site has been acquired. The term of reference has been prepared, and the project is now in the stage of selecting contractors.

Some of roads within the port are being connected to IP5 at two points, and extension of the existing railway is also being planned. There is a plan to build large railway and road terminals at the midpoint between Ovar and Aveiro. Together with expansion plans for various facilities, Aveiro is expected to grow into one of the most prosperous commercial ports in the

future. In addition to the commercial port, comprehensive development projects are underway in Aveiro, including a fishing port, a marina, a container terminal, and a roll-on/roll-off terminal.

b) Figueira da Foz Port

The port mainly handles pulp, paper and wood, accounting for 80 to 90% of total cargo handled. Recently the port's handling volume has declined due to sluggish pulp and paper markets. The port handles few imported cargoes. It has a 400m long wharf which handles as many as 700,000 tons of cargo annually. However, the port receives high wave to prevent stable berthing of ships and to cause the closure of the port during the winter. To improve availability of the port, extension of the existing breakwater is being planned. Also, construction of a wharf is planned on the opposite side where an industrial zone is located. At the same time, extension of a railway to the port and the handling of general cargo are considered to take advantage of proximity to the railway.

(4) Communication System and Electricity

1) Telecommunications

According to CTT's 1989 Annual Report, Portugal is divided into 3 service areas; DRTN responsible for the northern region, DRTC for the central region, and DRTS for the southern region, which do not coincide with administrative districts. The map of showing these service areas is shown in Figure 5-2-6.

The study area appears to be mostly served by Aveiro and Viseu telephone offices.

The numbers of telephone applications filed at Aveiro and Viseu stations and telephones installed in 1989 are as follows (public telephone not included):

	<u>No. of applications</u>	<u>Installed</u>
Aveiro office	8,070	7,500
Viseu office	14,337	12,184

At present, it takes average 10 months to install a new telephone, and 30 days in some areas.

At Aveiro, CET (the Telecommunications Studies Center) - a research unit of CTT, is conducting research projects on digital communication and electronics systems by 100 staff. Its research is highly valued and CTT is expected to become a core of future regional development.

2) Electricity

The area is divided into the following four distribution districts.

a) Aveiro Distribution Center

Service areas: Ovar, Mortosa, Estarreja, Aveiro, Albergaria-a-Velha, Vouga, Agueda, Oliveira do Barro, Ilhavo, Vagos

b) Coimbra Distribution Center

Service areas: Mira, Cantanheda, Mealhada, and Anadia

c) Seia Distribution Center

Service areas: Nelas, Mangualda, and Penalva do Castelo

d) Viseu Distribution Center

Service areas: Mortagua, Santa Comba Dao, Carregal do Sal, Tondela, Viseu, Oliveira de Drades, Vouzela, Satao, Aguiar da Beira, Vila Nova, Depaiva, Castro D'Aire, S.Pedro do Sul

Electric charges, informed by Viseu municipal government, are summarized as follows:

Escudos per kWh

a) Standard rate	11.89 (12.5 hrs/day)
b) Midnight rate(discount) 22:30-8:00	9.49 (9.5 hrs/day)
c) Peak rate (extra) 12:30-13:00, 19:30-20:30	20.46 (2.0 hrs/day)

(5) Water Supply

Water supply is controlled by each municipality having jurisdiction. Generally, industrial water is pumped up from wells, but some municipalities accept the use of tap water. When a plant using a large amount of water is newly constructed, an approval from the municipality is required after studying possible sources, both river water and ground water.

In Aveiro area, the Ministry of Planning and Territorial Administration is planning water resource development projects including dams and reservoirs. Between 1987 and 1989, around 30 waterwork projects were approved. The tap water system serving Aveiro City supplied 2,896,000 tons of water in 1990. Unserved areas use wells.

Viseu area obtains water from both rivers and wells. The water supply project is managed under a 3-year budget by using 1 billion ESC of the EC grant. Industrial water charges, informed by two municipal governments, are summarized as follows:

Industrial water rates in Viseu (monthly)

0 - 10m³: ESC 118/m³
over 10m³: ESC 179/m³

Industrial water rates in Ilhavo (monthly)

0 - 10m³: ESC 70/m³
0 - 50m³: ESC 100/m³
over 50m³: ESC 150/m³

The industry water supply system is being planned in many municipalities under their industrial development plans.

(6) Land Use Plans

There are in following projects or regulations concerning land use planning which regulate site selection for factory construction. The Portuguese government has been adopting environmental protection in its policies in accordance with the EC regulations after 1986 when the country joined the EC.

Corine/Biotopos Project

This is the project initiated by EC's law, designed to protect wild life under the same standards applicable to all the EC member countries. In the study area, 4 locations are designated as mountain protection districts; Treita, Caramulo, Lap, and Montemuro-Bigorne. Along the coast of Aveiro, 24 locations including coasts, islands and fauna protection districts are designated in July 1991.

RAN (National Agriculture Reservation)

RAN is an area designated for farmland preservation under Decree 196/89 (dated June 14, 1989) of the Ministry of Agriculture. Within the study area, two municipalities - Mealhada (Aveiro area) and Nelas (Viseu area) - are designated as RAN. This decree is published in the Notice of the Ministry of Agriculture on October 25, 1991. Actual locations are still to be designated. Under RAN, all farmlands are divided into 5 classes from A to D; "class A" designates the most fertile land, and "classes D and E" represent infertile land. The law recognizes classes A, B and C as suitable farmland and designates classes A and B as compulsory conservation farmland.

REN (National Ecological Reservation)

This is the ecological protection district designated under Decree 316/90 (dated October 13, 1990) of the Ministry of Planning and Territorial Administration). Major criteria to designate REN are as follows:

- 1) An area within 200m from the seashore
- 2) An area within 100m from the lake shore
- 3) An area within 100m from the river sides
- 4) Rain catchement area
- 5) Mountain area with 30-degree slops

In addition to RAN, REN, and EC's CORINE project, natural parks and national parks are designated.

Above decrees are considered to take precedence over other laws.

5.2.3 Education, Training and R&D Institutions

- (1) In terms of technological infrastructure, the Aveiro/Viseu area is enjoying environment accessible to a variety of technical support, including the proximity to major cities of Porto and Coimbra. In particular, Porto is an industrial center in the northern region and has a number of professional training institutes. Also, universities and research institutes are located in Porto, Coimbra and Aveiro. Table 5-2-1 lists technical support organizations situated in the Aveiro-Viseu region and its vicinity.
- (2) At present, the Aveiro area has only one professional training center in Agueda. A new center is being planned in Aveiro. On the other hand, there is no professional training center in the Viseu area, while an employment center is operated (see Figure 5-2-7). In the central region as a whole, however, there are 15 employment centers and 5 professional training centers. In addition 8 professional training centers are at the planning stage. Also, professional training centers jointly operated by the government and the private sectors are operated in the adjacent Porto/Coimbra district, so that as much as 10 professional training centers are accessible to residents in the Aveiro-Viseu region. The Central Region plans to provide professional training for as much as 2,500 persons.
- (3) The professional training center in Agueda was established in 1988 and is operated by a general manager, and managers in charge of economic management, professional orientation, and social service. The faculty consists of 5 full-time instructors and 30 to 40 part-time instructors assigned from companies and schools.

Major training courses offered at the center and their enrollment capacities are as follows:

Continuous course (3 years)	:	190 persons
Beginner course (less than 1 year)	:	150 persons
Night course (less than 1 year)	:	150 persons

Nevertheless, only 60% of new students reportedly complete the courses, and actual enrollment is around 120 annually. The latest enrollment in the courses as well as graduates are summarized as follows:

	<u>Current enrollment</u>	<u>Accumulated Graduates</u>
Continuous course	62	284
Beginner course	96	104
<u>Night course</u>	<u>85</u>	<u>87</u>
Total	243	475

Source: IIEP, Delegacao Regional do Centro, 1991

The training center covers the following areas:

- Electricity/electronics
- Metalworking
- Administrative techniques
- Computer
- Superintendent and staff
- Trainer training

Major facilities available at the center are as follows:

- Ceramic/plaster mold laboratory
- Design calculation/drafting laboratory
- Lecture rooms on foreign languages, industrial planning, quality planning, cost calculation, and marketing
- Computer laboratory
- Lecture rooms on business management, accounting, and production management
- Metalworking laboratory (including CNC and EDM)
- Measurement and inspection laboratory (including hardness gauge, projectors, universal tension testers)
- Welding laboratory (MIG, TIG, gas)
- Power distribution laboratory
- Automatic control laboratory

- (4) Professional education is conducted at 10 schools in the Aveiro area, 5 in the Viseu area, and together with those in the adjacent Porto and Coimbra areas, there are around 50 schools in total. These schools offer basic education in specific areas with elective courses, sending graduates to schools of higher grade and the business community. Professional education is offered in 36 courses of 5 fields, in different combinations according to local characteristics peculiar to each area, for the purpose of training

medium-level engineers and technicians. In addition, there are 27 professional schools in the central region to provide professional education.

- (5) There is no technological center in the Aveiro-Viseu region, while CATIM (metalmechanics), CTIC (footwear), CITEVE (textile), CTCOR (cork), and CTIMM (wood) are operated in Porto, and CTCV (ceramics) in Coimbra. The technological centers provide industries with technical assistance and support in areas or jobs which cannot be handled by a single company due to facility and other constraints. They are equipped with advanced testing equipment, analyzers, and highly accurate measuring instruments, conduct research projects, system diagnosis and quality tests upon request from companies, and develop quality improvement plans. At the same time, they provide practical training for outside researchers and perform calibration of measuring instruments.
- (6) As for universities and R&D institution, the region accommodates University of Aveiro which receives high reputation from industries, and INESC which was jointly established by the university and industries to primarily conduct research on information technology.

- 1) University of Aveiro was established in 1973 and has 7 departments and 6 sections, offering 31 courses. (see Table 5-2-2) Table 5-2-3 lists courses offered at the university, enrollment and graduates for 1990. Among technology courses, the electronics and telecommunications course has the largest number of students, followed by mathematics, ceramics, production management, regional planning, and environmental engineering, reflecting characteristics of the region. Each department offers credits and degrees for specific courses. The faculty members in the technology courses are listed in Table 5-2-4.

The departments mainly conduct research projects jointly with companies, which consist of services such as application research and testing. At the same time, they conduct theoretical and basic research projects on their own. The university produces relatively a small number of graduates each year, and most of them enter Master's or Doctor's course, or to other universities - those in the U.K. in particular - resulting in few graduates to find employment. The university plans to offer the mechanical engineering courses after testing facilities and equipment are procured.

- 2) INESC is a research institute jointly established by universities and private enterprises in 1980. It is specialized in research and development in areas of communication and information technology, under financial assistance from the government and the EC. Its major objectives are to develop advanced technology in these areas and to improve levels of industrial technology, while serving as an

interface between the university and communication and information industries.

INESC's founding members are as follows:

- Correios e telecomunicacoes de Portugal (CTT)
- Telefones de Lisboa e Porto (TLP)
- Instituto Superior Tecnico (IST)
- Universidade Tecnica de Lisboa (UTL)
- Portuguesa de Radio Marconi (CPRM)
- Universidade do Porto (UP)
- Universidade de Aveiro (UA)

The following universities have concluded joint research agreements with INESC:

- Universidade de Coimbra (UC)
- Instituto Politecnico de Setubal (IPS)
- Universidade do Minho (UM)

In addition, as the educational patronage fund working with INESC to provide financial assistance for higher education as well as professional education, FUNDETEC (Fundo Para o Desenvolvimento e Ensino de Telecomunicacoes, Electricidade e Computadores) was established in 1984 under financial contribution from 50 company groups and assistance from the government and the EC. FUNDETEC contributes greatly to training of engineers with high levels of knowledge, development of industrial technology, and improvement of technological capabilities. It plans to train 10 million engineers and technicians with advanced knowledge by 2000. INESC has 860 staff, and 95% of them are directly involved in research projects, as show below:

Doctors	60 persons
Masters/Doctor candidates	300
University students	420
Staff	70

The annual research budget is around US\$10 million, which major sources are:

	<u>US\$ million</u>
Basic research projects on telecommunications	2.0
Revenues from educational service	3.5
Assistance from the EC Fund	3.0
Research projects entrusted by private industries (including foreign-affiliated companies)	1.5

Salaries and other labor costs are borne by the universities.

In the areas in and around Aveiro, many R&D projects on advanced technology - telecommunications in particular - are conducted; at present, there are 15 projects underway related to development of domestic communication networks, digital systems, computer systems, and automation systems. Thus, although industries as well as research institutes appear to remain at relatively low technical levels, there are some of the institutes which conduct research projects at high levels.

Table 5-2-1(1) PRESENT SITUATION OF TELECOMMUNICATION FACILITIES IN AVEIRO-VISEU

1. CAPACITY OF PRESENT NETWORKS (1991)

	SWITCHING CAPACITY		LOCAL NETWORK CAPACITY	REGIONAL TRANSMISSION CAPACITY	
	TOTAL	% DIGITAL		TOTAL	% DIGITAL
AVEIRO	72620	74	99780	6159	91
VISEU	112040	35	157558	10688	73
CTT	1707628	48	2374922	146823	83

2. TIMELINE BETWEEN APPLICATION AND INSTALLATION OF THE EQUIPMENT FOR PRIVATE/COMPANY USE(1991)

DAYS

	TELEPHONE	TELEX	FAX
AVEIRO	12	5	5
VISEU	135	5	12
CTT	126	87	9

Table 5-2-1(2)

3. OUTLOOK OF INCREASE ON DEMAND

TELEPHONE

	1987	1988	1989	1990	1991	1992	1993	1994
AVEIRO	5755	6598	8071	8559	9362	9863	10905	12102
WISEU	9063	10877	14337	14962	16568	16886	18888	20164
C T T	134951	154663	195251	212951	233336	236800	250000	258000

TELEX

	1987	1988	1989	1990	1991	1992	1993	1994
AVEIRO	117	109	69	23	12	10	10	10
WISEU	100	90	41	23	11	10	10	10
C T T	4533	3912	2569	1172	622	600	500	500

FAX

	1987	1988	1989	1990	1991	1992	1993	1994
AVEIRO	n.a	n.a	n.a	439	498	400	410	400
WISEU	n.a	n.a	n.a	334	383	570	580	550
C T T	n.a	n.a	n.a	5642	6846	8700	11700	10900

Table 5-2-1(3)

4. NETWORK EVOLUTION FOR 1992-1994

SWITCHING CAPACITY

	1 9 9 2		1 9 9 3		1 9 9 4	
	T O T A L	% D I G I T A L	T O T A L	% D I G I T A L	T O T A L	% D I G I T A L
AVEIRO	80764	79	91786	82	100346	83
WISEU	129656	51	144104	60	159649	64
TELECOM PORT.*	1801017	54	1996882	63	2199313	68

LOCAL NETWORK CAPACITY

	1992	1993	1994
AVEIRO	115270	132860	144120
WISEU	193260	216330	234460
TELECOM PORT.*	2560502	2914188	3231388

REGIONAL TRANSMISSION CAPACITY

	1 9 9 2		1 9 9 3		1 9 9 4	
	T O T A L	% D I G I T A L	T O T A L	% D I G I T A L	T O T A L	% D I G I T A L
AVEIRO	7832	98	9242	98	10142	98
WISEU	18992	79	21032	81	22592	83
TELECOM PORT.*	171650	91	193543	93	210879	93

* Azores and Madeira not included.

Source : CTT

Table 5-2-2 TECHNICAL INFRASTRUCTURES IN AVEIRO-VISEU REGION
AND IN ITS VICINITY (PORTO, COIMBRA)

1) Professional Training Center

- Public Professional Training Center
 - AVEIRO Area: -
AGUEDA (CASTELO BRANCO, COIMBRA, GUARDA, SEIA, PORTO, RIO-MEAO)
Under Planning: AVEIRO
 - VISEU Area : - None
- Semi-public Professional Training Center
 - AVEIRO Area: - None
(CEFPI, CINCORK, CINFU, CINDOR, CITEX, CFPIMM, CESAI, CICCOPN,
CENFIM, CEPRA, CINTERBEI, CEARTE)
 - VISEU Area : - None

2) Techno-Professional Education

- AVEIRO Area: -
E.S. MARAUES CASTILHO-AGUEDA
E.S. ALBERGARIA-A-VELHA
E.S. ANADIA
E.S. JOSE ESTEVAO-AVEIRO
E.S. NO.1-AVEIRO
E.S. ESTARREJA
E.S. NO.1 OVAR
E.S. VAGOS
E.S. ALDEIA DO SOUTO
E.S. CANTANHEDE
Under planning: MEALHADA
(COIMBRA Area: 10 Schools) (PORTO Area: 22 Schools)
- VISEU Area: -
E.S. CANAS DE SENHORIM
E.S. MANGUALDE
E.S. SANTA COMBA DAO
E.S. TONDELA
E.S. EMIDIO NAVARRO-VISEU
Under Planning: TORREDEITA, MORTAGUA, SAO PEDRO DO SUL, VOUZELA
(The vicinity, BELMONTE, OLIVEIRA DO HOSPITAL, SEIA: 3 schools)

3) Professional School: -

27 Schools in the Central Region

4) Technological Center

- AVEIRO Area: - None
(CATIM, CTCV, CTIC, CITEVE, CTCOR and CTIMM are available in
Porto and Coimbra)
- VISEU Area : - None

5) University and Laboratory

- AVEIRO Area: -
AVEIRO UNIVERSITY (PORTO UNIVERSITY, COIMBRA UNIVERSITY)
INESC (INEGI)
- VISEU Area : - None

Source: I.E.F.P.
MINISTERIO DA EDUCACAO

Table 5-2-3 DEPARTMENT/SECTION OF AVEIRO UNIVERSITY

DEPARTMENT/SECTION
. DEPARTAMENTO DE AMBIENTE E ORDENAMENTO (ENVIRONMENT AND ARRANGEMENT)
. DEPARTAMENTO DE BOILOGA (BIOLOGY)
. DEPARTAMENTO DE ELECTRONICA E TELECOMUNICACOES (ELECTRONICS AND TELECOMMUNICATION)
. DEPARTAMENTO DE CERAMICA E DO VIDRO (CERAMICS AND GLASS)
. DEPARTAMENTO DE FISICA (PHYSICS)
. DEPARTAMENTO DE GEOCIENCIAS (GEO-SCIENCES)
. DEPARTAMENTO DE QUIMICA (CHEMISTRY)
. SECCAO AUTONOMA DE LINGUAS E CULTURAS MODEMAS (LANGUAGE AND CULTURE)
. SECCAO AUTONOMA DE MATEMATICA (MATHEMATICS)
. SECCAO AUTONOMA DE CIENCIAS FUNDAMENTAIS DA EDUCACAO (FUNDAMENTAL THEORY OF EDUCATION)
. SECCAO AUTONOMA DE DIDACTICA E TECHNOLOGIA EDUCATIVA (INSTRUCTING METHOD)
. SECCAO AUTONOMA DE CIENCIAS DE GESTAO (ADMINISTRATION THEORY)
. SECCAO AUTONOMA DE COMUNICACAO E ARTE (COMMUNICATION AND ART)

Source: UNIVERSIDADE DE AVEIRO, 1991/92

Table 5-2-4 COURSES, STUDENTS, AND GRADUATES OF AVEIRO UNIVERSITY

a) COURSES TO STUDY AND STUDENTS

CODE	COURSE	STUDENTS
7001	PROFESSORES DO ENSINO PRIMARIO	108
7002	EDUCADORES DE INFANCIA	91
8000	BIOLOGIA	111
8001	BIOLOGIA E GEOLOGIA (ENSINO DE)	145
8002	PLANEAMENTO REGIONAL E URBANO	166
8003	ENGENHARIA DO AMBIENTE	154
8004	ENGENHARIA ELECTRONICA E TELECOMUNICACOES	662
8005	ENGENHARIA CERAMICA E DO VIDRO	212
8006	ENGENHARIA GEOLOGICA	142
8007	FISICA E QUIMICA (ENSINO DE)	139
8009	MATEMATICA	152
8010	FISICA - ATMOSFERA	54
8011	QUIMICA - ALIMENTAR	82
8012	PORTUGUES E FRANCES (ENSINO DE)	283
8013	PORTUGUES E INGLES (ENSINO DE)	192
8014	PORTUGUES, LATIM E GREGO (ENSINO DE)	109
8015	INGLES E ALEMAO (ENSINO DE)	144
8016	FISICA - MATERIAIS	44
8017	QUIMICA - ANALITICA	140
8018	MUSICA (ENSINO DE)	20
8019	ENGENHARIA FISICA	30
8020	MATEMATICA (ENSINO DE)	240
8021	ENGENHARIA DE MATERIAIS	31
8023	ENGENHARIA E GESTAO INDUSTRIAL	185
8024	GESTAO E PLANEAMENTO EM TURISMO	105
8027	ELECTRONICA (ENSINO DE)	55
9002	MESTRADO EM CIENCIAS DE EDUCACAO -- ACTIVACAO DO DESENV. PSICOLOGICO	14
9003	MESTRADO EM CIENCIAS DA EDUCACAO -- SUPERVISAO	20
	MESTRADO EM CIENCIAS DAS ZONAS COSTEIRAS	16
	MESTRADO EM GEOQUIMICA	10
	MESTRADO EM ENGENHARIA DOS MATERIAIS	18
TOTAL		3,874

(..continued) Table 5-2-4 COURSES, STUDENTS, AND GRADUATES OF AVEIRO UNIVERSITY

b) GRADUATE OF AVEIRO UNIVERSITY

MASTER: GEOQUIMICA	10
CIENCIAS DA EDUCACAO	33
ENGENHARIA DE MATERIAIS	1
<hr/>	
TOTAL	44
LICENCIATURAS:	
BIOLOGA	47
ENSINO DE BIOLOGIA E GEOLOGIA	142
ENGENHARIA DO AMBIENTE	80
ENGENHARIA CERAMICA E D VIDRO	74
ENGENHARIA ELECTRONICA E TELECOMUNICACOES	341
ENGENHARIA GEOLOGICA	51
FISICA	18
ENSINO DE FISICA E QUIMICA	65
ENSINO DE FRANCES E PORTUGUES	118
ENSINO DE INGLES E ALEMAO	63
ENSINO DE INGLES E PORTUGUES	68
MATEMATICA	45
ENSINO DE MATEMATICA E DESENHO	57
PLANEAMENTO REGIONALE URBANO	28
ENSINO DE PORTUGUES E FRANCES	268
ENSINO DE PORTUGUES E INGLES	126
ENSINO DE PORTUGUES, LATIM E GREGO	11
QUIMICA	27
PROFESSORES DO 10 CICLO DO ENSINO BASICO	34
EDUCADORES DE INFANCIA	27
<hr/>	
TOTAL	1,690

Source: UNIVERSIDADE DE AVEIRO 1990/1991

Table 5-2-5 PROFESSIONAL STAFF OF THE AVEIRO UNIVERSITY

DEPARTMENT	PROFESSOR	ASSOCIATE PROFESSOR	ASSISTANT	TOTAL
AMBIENTE E ORDENAMENTO	5	2	10	17
BIOLOGIA	3	8	11	22
ELECTRONICA E TELECOMUNICACOES	13	6	20	39
ENGENHARIA CERAMICA E DO VIDRO	4	7	7	18
FISICA	8	5	12	25
GEOCIENCIAS	8	3	16	27
MATEMATICA	3	1	8	12
QUINICA	6	5	13	24
TOTAL	50	37	97	184

Source: UNIVERSIDADE DE AVEIRO, 1991/92

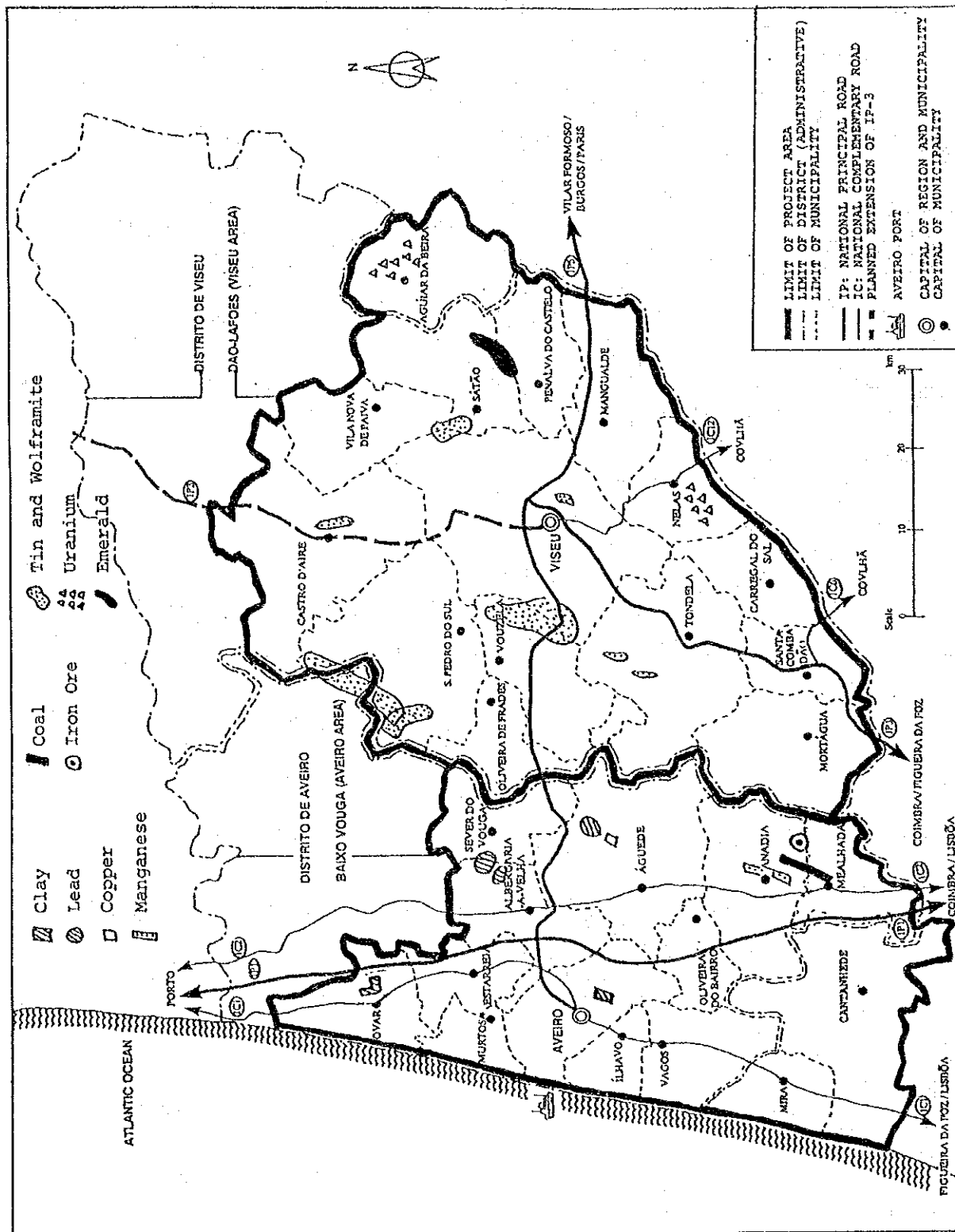


Figure 5-2-1 NATURAL RESOURCES MAP

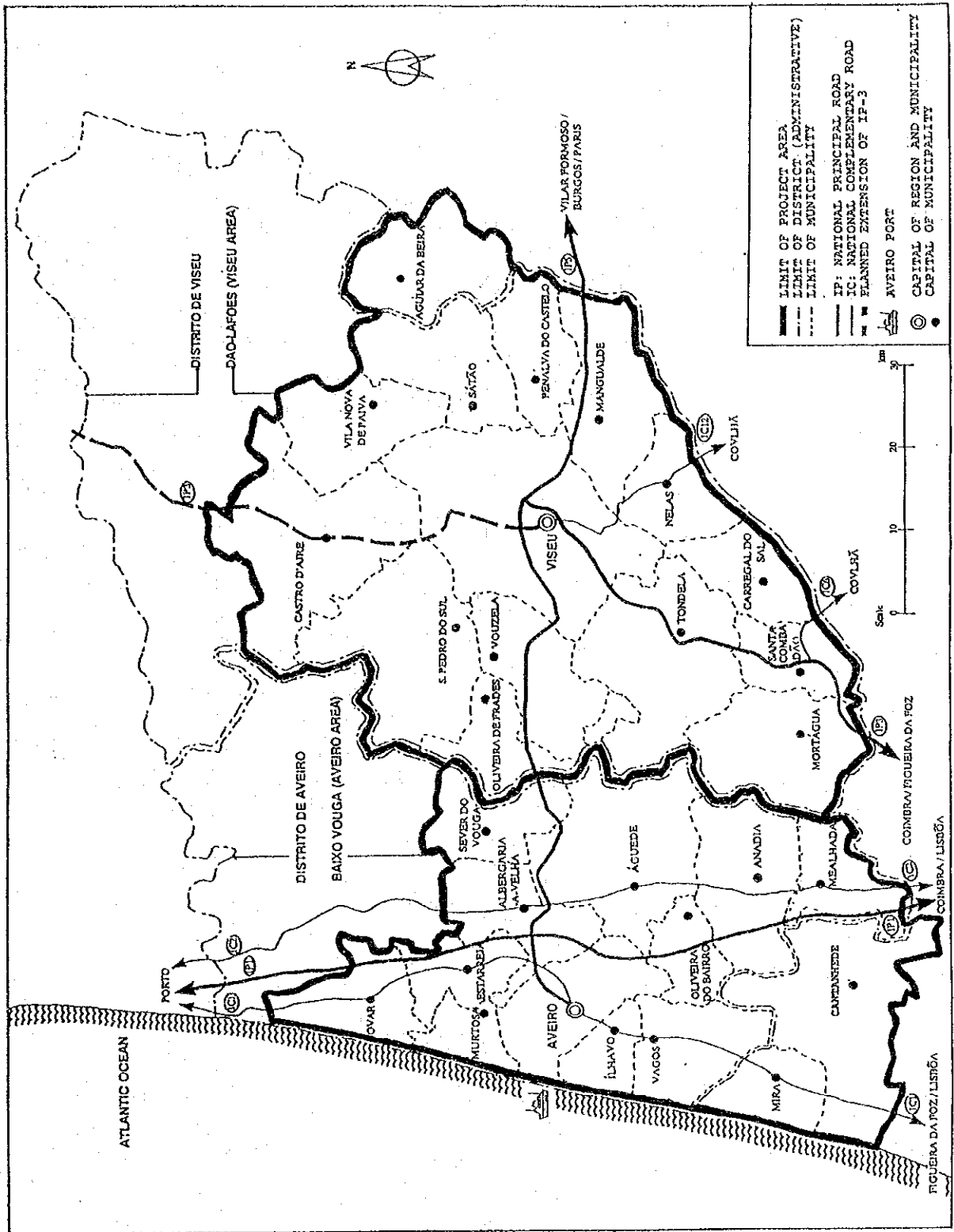
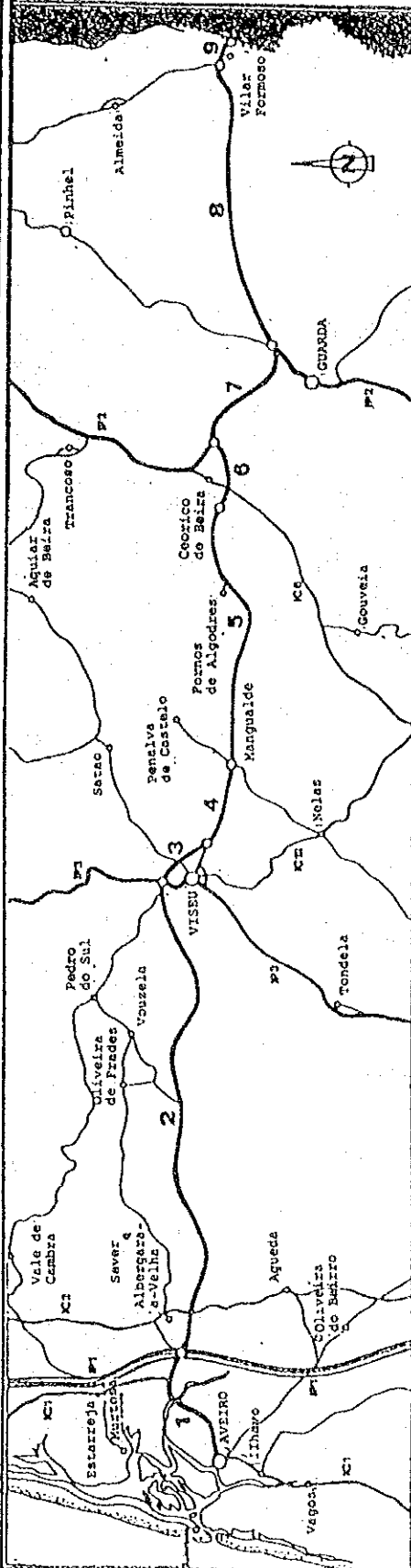


Figure 5-2-2 IP1-IP3-IP5 ROAD SYSTEM

MOPIC
SEOP
JAE

IP5
con-struction schedule for AVEIRO-VILAR FORMOSO



COD	Localização	EXT (km)	CUSTO PREVISTO (10^6 ESC)	1990												1991												1992												1993												1994												OBSERVAÇÕES
				1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	
1	AVEIRO-ALBERGARIA	23	4 300	com-pletion																																																												
2	ALBERGARIA-VISEU	57		CONCLUÍDO																																																												
3	VARIANTE DE VISEU	19		CONCLUÍDO																																																												
4	PRIME-MANGUALDE	10		CONCLUÍDO																																																												
5	MANGUALDE-FORNOS-CELORICO DA BEIRA 33	33		com-pletion																																																												
6	VARIANTE DE CELORICO DA BEIRA	6		CONCLUÍDO																																																												
7	CELORICO DA BEIRA-GUARDA	21		CONCLUÍDO																																																												
8	GUARDA-VILAR FORMOSO	36		CONCLUÍDO																																																												
9	LIGAÇÃO À FRONTEIRA	3	650	com-pletion																																																												

Figure 5-2-3 IP5 CONSTRUCTION SCHEDULE FOR AVEIRO-VILAR FORMOSO

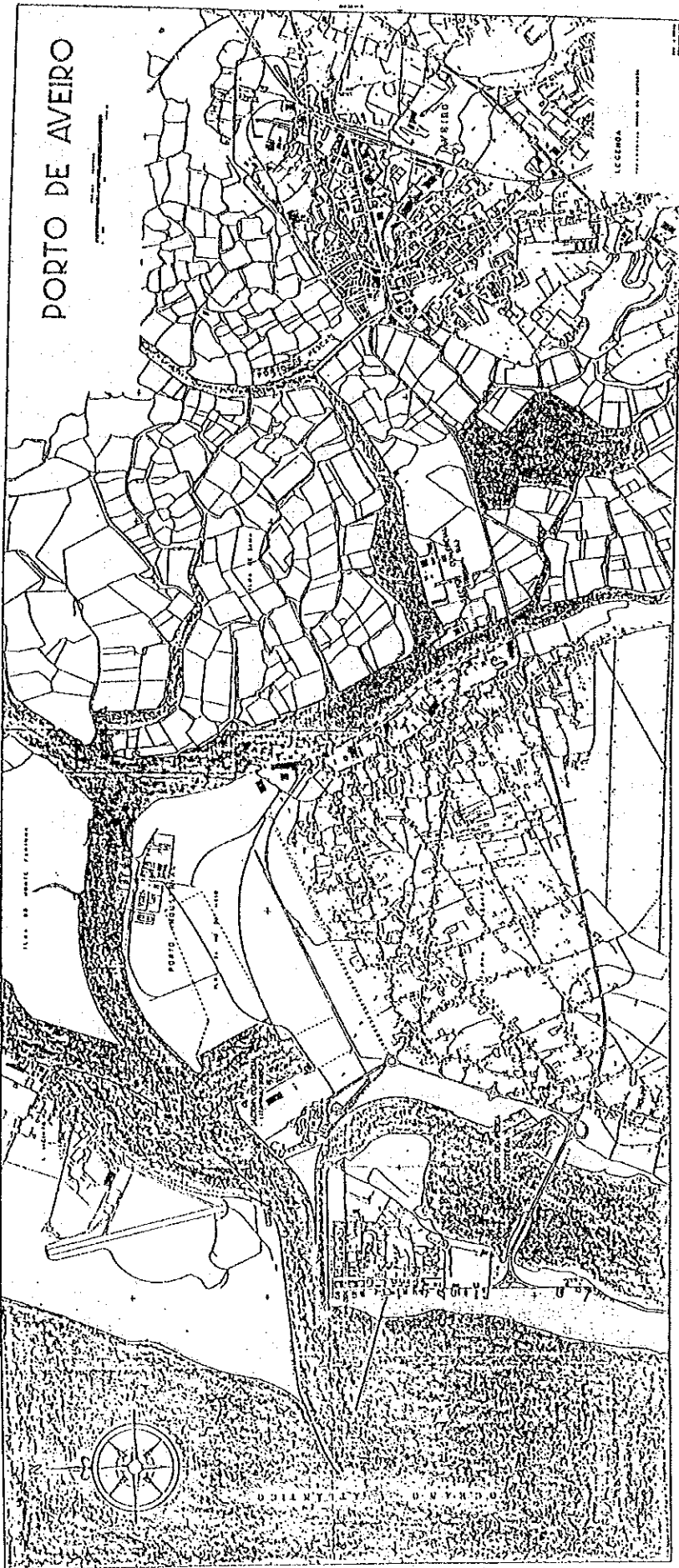


Figure 5-2-5 AVEIRO PORT

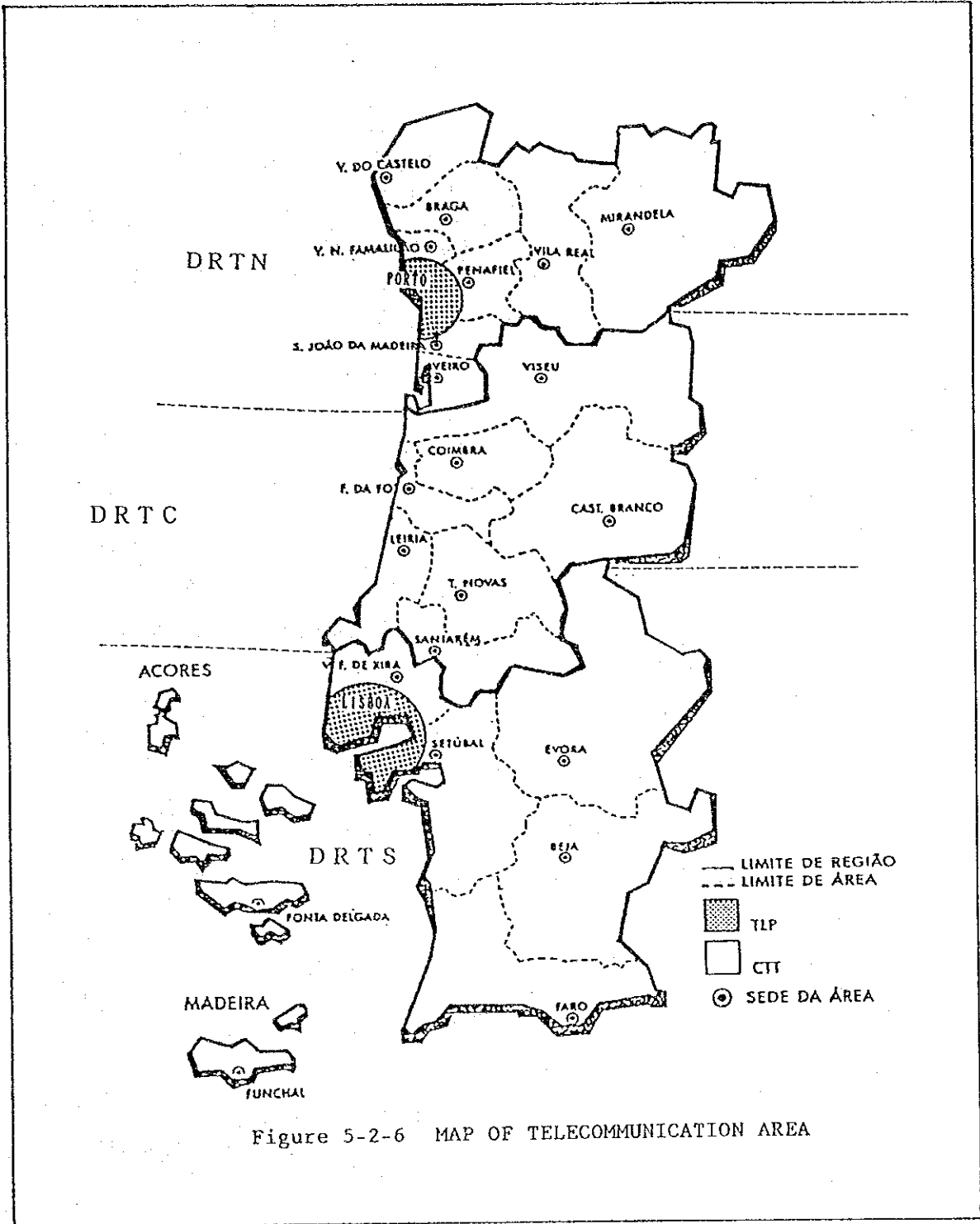


Figure 5-2-6 MAP OF TELECOMMUNICATION AREA

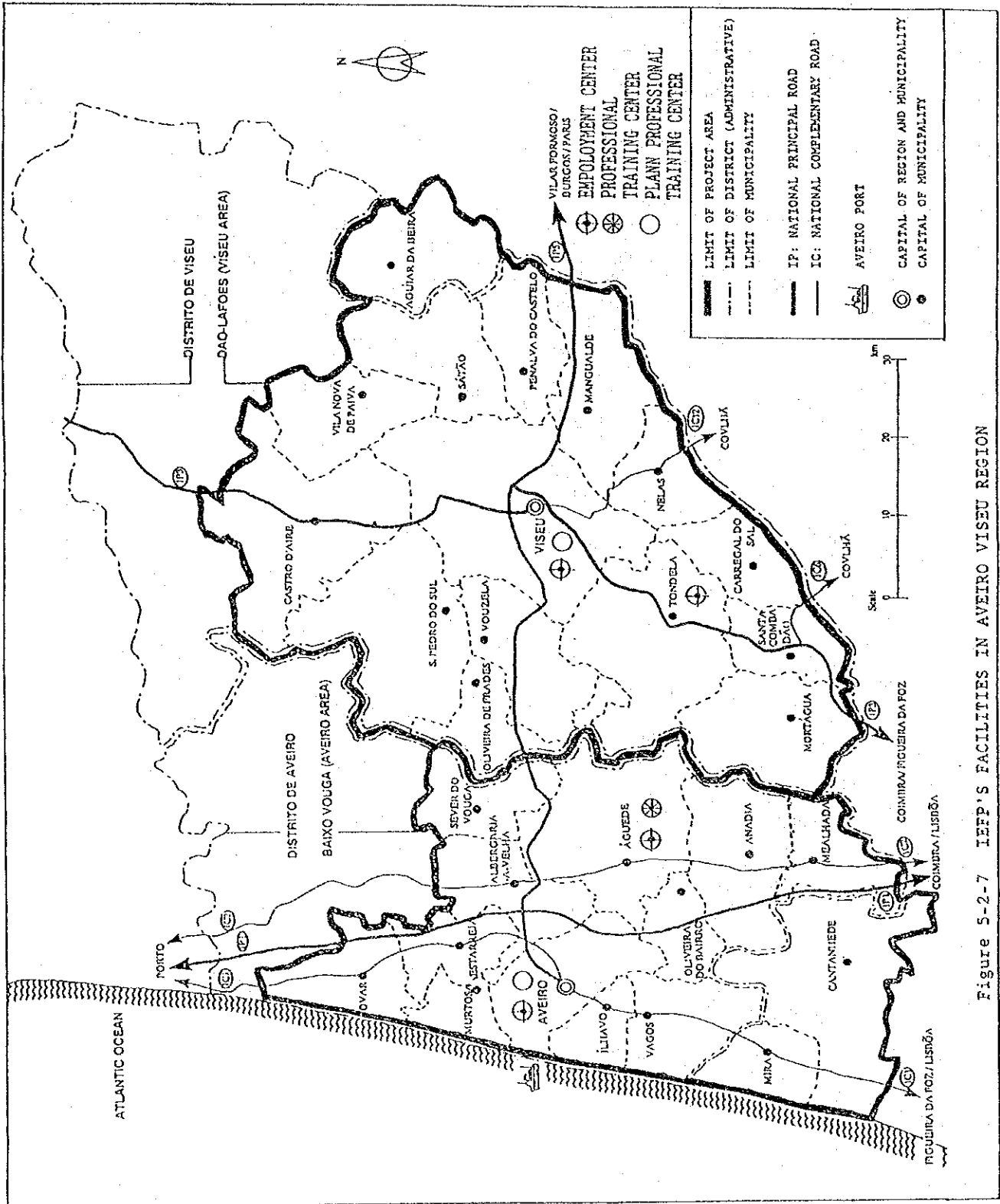


Figure 5-2-7 IEEP'S FACILITIES IN AVEIRO VISEU REGION

5.3 Fact-Finding of Regional Private Companies

5.3.1 Results of Questionnaire Survey on Local Industry

In order to ascertain the present situation of industry in the Aveiro-Viscu region, two to three companies in each sub-sector were chosen and a survey carried out by interview and questionnaire. Criteria for selecting companies were based on following conditions a) to extend the target sub-sector, b) companies has their head office in the target region. 22 companies were visited for the purpose of interview (of which 20 were sent questionnaires with a 50% recovery rate) while survey was conducted by questionnaire only in the case of two companies. The following is an analysis of the questionnaire results, but given the limited scope of the survey we have confined our examination to a general review.

(1) Number of Companies Concerned by the Survey

	Aveiro Area		Viscu Area		TOTAL
	Total Share(*) (%)	No. (**)	Total Share(*) (%)	No. (**)	
Non-metal minerals	112 (11.2)	3	18 (1.8)	1	4
Machine Ass'y and Metal Working	232 (15.9)	10	20 (1.3)	-	10
Chemical Products	98 (10.0)	1	24 (2.5)	-	1
Textiles	360 (16.9)	-	19 (0.9)	2	2
Foodstuffs	263 (8.7)	3	115 (5.8)	-	3
Wood Products	398 (16.6)	-	102 (4.3)	1	1
Pulp and Paper	115 (10.6)	1	29 (2.7)	1	2
Other Industries	8 (15.3)	1	1 (1.9)	-	1
TOTAL	1586 (13.1)	19	328 (2.7)	5	24

Note: *) Share of the areas to national-total in terms of
number of companies

***) No. of companies enquired.

(2) Legal Status of Companies Enquired in the Survey

SA (Joint stock company)	11 companies
Lda (Ltd Private. co.)	10
Cooperative	1
Not determined	<u>2</u>
	24

(3) Years in Operation

Over 30 years	: 5 companies
More than 20 years:	4
More than 10 years:	6
Less than 10 years:	3
Not determined:	<u>6</u>
	24

(4) Current Details of Companies

1) Number of Personnel

Over 500:	2 companies
Over 400:	1
Over 300:	3
Over 200:	2
Over 100:	6
Over 50;	1
Under 50:	6
Not identified:	<u>2</u>
	24

2) Average age of personnel: 27-35 year old

Average wage of personnel:
50,000-100,000 ESC/month

3) Operating rates for factories are high (70-90%), and in many cases the demand for products shows a trend to increase. However, an excess supply position has developed for part of the paper manufacturing and ceramic sectors aggravating market conditions.

- 4) At present, few companies are considering reinforcement or addition of personnel, though complaints about the lack of qualified personnel (engineers, managers) were made.
- 5) The main market for output is domestic, but there is also a strong orientation in many companies with the actual volume of output directed to exports varying by company within a 20 to 70% range. A large part of export is to destinations in the EC. Competition is regarded as severe by many companies in the case of both domestic and export markets.
- 6) There is a considerable dependence on imports for raw materials used with the exception of a certain number of local products and natural resources. Since most of these imports originate from EC countries they are readily available.
- 7) Summarising the opinions expressed regarding utility costs it was found that 73% of the companies returning questionnaires felt that the costs of electricity and fuels were expensive, while 40% said that telephone communications were high.
- 8) A large number of companies (6 out of 9 companies questioned) did not face any particular environmental or pollution problems, but the paper mills and chemical works were implementing measures to prevent pollution and are submitted to regular inspections by an independent third body.
- 9) While 45% of the companies replied that they found infrastructures sufficient, 55% of the companies expressed dissatisfaction. The main complaints related to roads, electricity, railways and communications. Desire for better services and improvements in airports, educational institutions, and technical centers were also expressed.
- 10) With regard to the government's program for regional development, 30% of the companies said this was sufficient while 70% expressed dissatisfaction. Main complaints related to the appropriateness of the financial, development and industrial policies adopted.
- 11) When asked how they defined the position of their own company only a very few companies saw their company activities as limited in Portugal, and 90% of the companies defined their company as an EC company or a global company. The latter companies take an active stance on the updating and expansion of production facilities and on market acquisition integrated in a long term strategy.

They showed interest in strengthening their industrial position by cooperation with overseas partners and market expansion. With regard to the particular form of cooperation with overseas partners which they considered most desirable the following answers were received.

<u>Form of cooperation</u>	<u>Priority</u>			<u>TOTAL</u>
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	
Joint venture	3	5	2	10
Licensing	0	1	0	1
Joint marketing	5	3	0	8
Sub-contracting	4	1	1	6
Technical Cooperation	0	2	2	4
<u>Advisory management</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>
Total	12	12	6	30

However, only 30% of the companies said that to date they had actually attempted to set up some form of cooperation with other companies, either domestic or foreign, and in any case the attempts had not been realised.

From the above it is clear that a major objective for partnerships and cooperation is market expansion. When asked which market they aimed to reinforce or expand through cooperation with other companies the following answers were given.

<u>Target market</u>	<u>Priority</u>			<u>Total</u>
	<u>1st</u>	<u>2nd</u>	<u>3rd</u>	
Domestic	1	2	0	3
European	10	0	0	10
U.S.A.	1	1	0	2
<u>Japan</u>	<u>1</u>	<u>4</u>	<u>1</u>	<u>6</u>
Total	13	7	1	21

It is quite natural that the top priority target should be the European market. The above replies also show that there is considerable interest in the Japanese market. However, this may reflect the fact that the survey was carried out by Japanese, so that companies visited perhaps expected some element of introduction to the Japanese market.

- 12) The breakdown of production cost obviously differs according to the industrial sector considered but the following overall patterns was observed within the scope of the survey.

cost of materials:	40-60%
cost of labor:	10-20%
expenses:	20-30%
profit:	8-15%

- 13) The major part of factory facilities has been introduced from overseas and there is a large proportion of general purpose equipment and a small amount of specialist machinery, but facilities are generally outdated. Gradual introduction of large equipment, the latest facilities, precision processing equipment, precision measurement devices, etc. is being carried out, and such equipment is mostly either of European (Italy, Germany, Switzerland, Spain, etc.) or Japanese make.
- 14) In general, the capacity for technical development has been developed autonomously and design and production functions have been built up independently, however there has also been a transfer of such capacities from Germany, Switzerland, Spain, etc. in some cases. Technology and market information is sourced from a large number of industrial and governmental organizations such as the AIDA, ICEP and IAPMEI, etc. together with newspapers, journals, fairs, etc.
- 15) The general evaluation of the workforce is relatively good but some companies pointed to the need for in house training for new employees. Only a few companies said that manpower was plentiful, while many other companies showed concern about future availability of labor in terms of quantity.

Companies found present wage levels reasonable but very few companies were satisfied with the educational levels achieved.

- 16) Regarding specifications and standards to be observed in the production of finished goods, companies were divided about equally between those applying foreign standards and those applying domestic standards. Only a very small number of companies applied their own in-house standards or trade association standards. Some companies were uninterested in the question of industrial standards.
- 17) A large number of companies complained of difficulty in capital provision. Capital provision was envisaged in terms of company capital followed by bank

loans(at 25% interest). The IRC tax (Corporate Revenue Tax) is said to amount to 36.5%.

Many companies said that they looked to have incentive systems such as the PEDIP, FSE, SIBR applied in their case, but that larger-size companies showed their appreciation to the incentives more than smaller ones, and small scale companies complained that the procedures for application involved are both complicated and time consuming.

- 18) With regard to future company plans, the main managerial policies of all companies were focused on expanding production capacity, reinforcing and expanding facilities, introducing modern technology, and improving productivity, and in some cases the introduction of foreign capital was also being considered.

With regard to their view on the overall prospects for domestic industry, companies expressed interest in industries with high value added and evaluated the future of the electrical and electronic parts, auto parts, ceramics, foodstuffs, and paper pulp industries (including exports in these sectors) to be very strong.

5.3.2 Results of Interviews with Local Companies

- (1) Two or three companies for each sub-sector were chosen and 22 companies in all visited. The companies visited were generally of middle size with factories employing around 100 personnel, except in the case of a few large companies. In general raw materials were imported and a part of output exported to neighboring countries, and it appeared that management was proceeding satisfactorily. However, there were supply surpluses due to over production or over import in a few isolated sectors (paper manufacturers and ceramics,etc.).
- (2) Gradual implementations have been carried out since 1986 to integrate companies with EC unification and no particular problems were mentioned in this respect. There was a certain apprehension expressed about a possible increase in labor costs and the inflow of foreign capital resulting from a freer and more vigorous movement of people and goods resulting from after European unification.
- (3) Most of the managing executives interviewed had a sense of the importance of product quality and design, recognized that modernisation of facilities tended to be belated and pointed to insufficient capital supply and shortage of manpower as the most pressing, immediate problems.

Because of the high levels of bank interest the main sources for capital supply are either through an increase of in-house capital resources or through reinvestment of profits. Therefore, large scale investment is rendered difficult and so modernisation tends to be delayed. Despite the fact that some companies have introduced the latest equipment, in general modernisation of machinery tends to be limited to certain sections of the overall process flow and overall modernisation of production has not been effected. As a result overall productivity remains unimproved and operating efficiency cannot be raised so that the benefits of investment are poor.

The executive management of companies interviewed tended to hope for capital rather than technical cooperation in the case of joint ventures. Of course, they felt that if new technology could also be introduced through joint ventures this would be desirable but emphasised that it would be necessary to have the introduction of production technology together with capital to improve capital efficiency rates.

- (4) Management was divided in its opinions regarding an evaluation of the PEDIP and other governmental assistance policies. Complaints included the view that procedures were too time consuming or that foreign investment was given priority. It would seem that companies consider the procedures to be over bureaucratic. This resulted in the feeling that such assistance could not be relied on, and this was especially marked among the small size companies.
- (5) A certain expectation was voiced with regard to the vocational training centres but it was said to be too early to make an adequate evaluation since these had only been in operation a few years. Companies undertake in-house training and OJT programmes and receive financial incentives for this from the government. In particular, with the situation of near full employment reached in the Aveiro area there has been a raising of local standards of living and this has caused a certain dulling of enthusiasm for training. Also the inadequacies in accommodation make it difficult to get first class skilled workmen to settle in the area. The average wage is around 70,000-80,000 ESC per month and stay of workers in a company is comparatively long.

Since technical colleges were done away with by the educational reform undertaken in Portugal in 1975, vocational training centres play an important role in the training of middle class engineers, and the demand for strict educational standards and technical training was often heard. In addition to clarification of the aims of the training centres and training of operators, there is a strong necessity to educate middle class engineers.

- (6) The modernisation of management is belated especially in small and middle size companies of the same industrial sectors. If joint ventures are especially desired for the

participation of foreign capital then it is vital that a modernisation of managerial aspects be undertaken, and it is necessary to undertake a separation of the roles of ownership (capital) and management functions to realise this.

- (7) The metalworking sector is proceeding with a gradual introduction of new facilities but production management generally is concerned with factories where old machinery and new machinery is mixed together and badly balanced. There are a large number of factories whose layout is on a Job Shop basis often as a result the production volume concerned, but this hampers productive efficiency and operating rates and involves considerable storage between processes. There is not sufficient recognition of the need to increase productivity. Also, it will be necessary to introduce and develop production management technology in conjunction with the introduction of modernised facilities, if factories are to be fully updated. There is not sufficient awareness of this need.
- (8) There are companies which have installed a physics laboratory equipped with standard equipment to undertake quality control work, but inspections are generally done on a sample inspection basis and doubts remain as to how thorough the quality control of processing and finished products is. In interviews it was reported that the defect rate is low but it is necessary to establish inspection standards, inspection methods, to provide and install inspection devices and machinery, and determine counter measures to defective production as part of an overall quality control system. In this respect there are also the governmental incentive measures to be applied.
- (9) There are a large number of companies which have introduced automatic facilities for minerals (granite), ceramics, foodstuffs, chemical products, paper, etc. but with the exception of such equipment intensive industries the process of automation tends to be belated. As a countermeasure to the labour shortages envisaged hereafter a further process of automation and rationalisation of production needs to be carried out through the introduction of modern production technology in order to promote improvements in productivity.
- (10) There are a large number of companies which endeavour to realise in-house development of product design, commodity planning, and design using their own staff resources. However, the staff and facility resources for these functions are considered to be too small to effect the product improvements and development of new products needed to open new markets and meet consumer needs.
- (11) In interview, companies stated that overall market situations were good and the future prospects were favourable. However some sectors suffered from excess production because of over production or excessive importing.

Further, the general opinion in textile industry was that the market situation was not favourable but that the market for the garment sector was good, while the woven textile sector was suffering from a lull. This is because the woven textile sector is unable to cater to the needs of the garment sector and so cannot compete with imported articles.

- (12) With the unification of the EC market, barriers to export and import will be dismantled and the market expand but as goods and people will move more freely and rapidly it is likely that Portugal will lose the advantage it enjoys at present in terms of the superiority of labour costs. In order to maintain its competing power in the bigger market it will of course be necessary to improve product quality and increase productivity, but it will also be important to further develop functions for improving products, product development, and product design.
- (13) With the exception of some special cases, most companies have adopted a fully autonomous system for complete processing so that there is little cooperation or linkage on sub-contracting lines between the regional companies of a petty, small or middle size. This is partly due to the fact that the technical levels of these petty, small and middle size regional companies is low and so reliability a problem. It is necessary for the middle and large companies to provide assistance to undertake a rationalisation of management in these petty, small and middle size regional companies which will make possible the raising of technical levels and so of credibility of this sector.
- (14) In general the competing power of a product will depend on its product quality, cost, design, etc. In order to produce good quality, comparatively inexpensive products meeting the consumers' demands, in addition to technologies for planning, production, quality and design, comprehensive managerial functions embracing information collection as well as functions for product improvement and new product development need to be developed. Since the current trend is for an increase in the demand for goods the most pressing task is to improve productivity by in-house development of modern production technology or by its introduction from outside. Once productivity is raised and production efficiency increased it will be possible to assure a stable supply of high quality products at a comparatively inexpensive price and so assure market shares. By diversification of products a further expansion of markets can be achieved and management stability ensured. The efficient realisation of the above phases is an immediate task.
- (15) The specialisation of output for the production of precision made high value added products and high quality products with sophisticated functions rather than the development of mass production and mass sale products through massive investment seems

the surest way to secure competing power on the domestic, EC and overseas markets. Therefore it is necessary to promote research and development, encourage related research institutes and introduce foreign capital in order to raise the level of regional industries.

5.3.3 Development Challenges in the Target Region and Possible Improvement Measures

(1) Infrastructure development

- 1) Arterial highways, IP1 and IP5, which have been completed to run through the central part respectively in north-south and east-west directions, and IP3 to connect IP1 and IP5 crossing the area diagonally is under construction. Compared to construction of arterial highways, existing roads are in poor condition to require betterment. In particular, city streets are extensively dilapidated may present a serious problem for physical distribution in the future. To redevelop these cities while keeping historical buildings and urban landscape, the upgrading of existing streets and construction of bypass roads in the outer margin seem to be the best solution. To accommodate the future traffic demand, main arterial roads need to be expanded to at least four lanes, and sub-arterial roads will have two or more lanes including pedestrian walk.
- 2) Improvement of living environment is particularly important in rural area in the target region, because many of migrants from other regions tend to settle in Aveiro, Porto, Coimbra, and Viseu, as the smaller cities in the rural area do not have adequate living environment to accommodate new residents. As uneven distribution of population within a region would work as an unfavorable factor for regional development, the development of infrastructure to create attractive living environment is urgently needed; including residential land, detached houses, apartments, and markets, as well as improvement of electricity supply, waterworks, sewers, communication service, transportation, recreational facilities, and other amenities.
- 3) The most effective strategy for regional development, industrial promotion and economic development in particular, is to improve living environment in existing small- and medium-sized cities and to induce economic activities within the 10km radius around newly developed cities as the development core by constructing a road network to serve them, while ensuring functional linkage and interdependence with surrounding cities. This way, movement of people and goods is accelerated to unleash development potential existing in the target region. Fortunately, the region has a locational advantage to link the EC countries and North Africa, and is endowed with natural resources suitable for agriculture, fishery and forestry. It offers vast land suitable for industrial development. Furthermore, the region is situated in a mild climate zone with distinguished seasons, and geographic features including a beautiful and long

coast, hills, forests, rivers, hot springs, offer natural amenities. If infrastructure - roads, railroad, airport, port and harbor, communication, working environment, and communities - added to existing resources, the coastal area can be developed into R&D and other industries with high value added as well as educational centers, while the inland area has potential to be developed into strong bases of primary and secondary industries. What the region needs is a well-coordinated development plan and its implementation plan including the establishment of implementation bodies and promotion of investment through effective advertising. In this connection, it is important to use the EC Fund for development of infrastructure.

(2) Rationalization and modernization of business enterprises

- 1) According to a survey conducted by AIP in 1987, business enterprises in Portugal are dominated by small entities. In particular, small enterprises having five or less employees accounted for the majority of all enterprises, those with 10 or less employees 70%, those with 20 or less 85%, and those with 100 or less 97%. On the other hand, medium-sized enterprises with 100 - 500 employees accounted for 2.5% of total, and large enterprises with 500 or more are said to hold 0.5% share. Large enterprises are mainly government-owned or foreign-affiliated corporations. Due to dominance of small- and medium-sized enterprises, together with relatively small domestic markets, Portuguese industries can be characterized as follows:

- Weak financing and marketing capabilities;
- Insufficient R&D capability and weak technological base;
- Dominance of family businesses; and
- Self-contained industries without outside subcontracting.

As a result, most of enterprises lag behind in modernization to meet changing market needs through the development of new products and the upgrading of production equipment. Also, they do not have human resources to lead modernization of management and technology, and lack of coordination or competition has contributed to persistence of traditional management systems and styles.

After joining the EC in 1986, expansion of the Portuguese economy due to inflow of foreign capitals has led to increasing recognition of the need for the improvement of the technological base and facility modernization, with increasing concern about intensifying competition in international markets. In response, the

government has been actively promoting industrial development by improving educational facilities and offering a variety of incentives for investment. To make most use of such resources, however, rationalization and modernization of business enterprises are essential. Reliable management and sound financial position are determinant factors in inducing foreign investment and technology. Thus, rationalization and modernization should be placed of priority.

2) Our survey indicates that major evaluation criteria for foreign investment to select a location are as follows:

- Locational advantages related to physical distribution
- Availability of infrastructure
- Supply of low-cost and competent labor force
- Potential to enhance business opportunities
- Industrial base including support industries such as suppliers
- Stability and reliability of business enterprises in terms of financial position and management capability.

Obviously, these requirements point to the need for adoption of a modern management system to establish separation of capital and management, accountable management organizations and functions, measurement of corporate management, and collection and analysis of information and data, all of which form a basis of building management resources including financing, manpower, technology, and marketing. At the same time, modern production management and technology systems need to be introduced for rationalization and modernization of production, inventory control, procurement, quality assurance, cost management, energy saving, and manpower saving systems. Finally, efforts should be made to create environment where support industries including parts suppliers can be fostered through the upgrading of technical capability and the building of cooperative relationship between local small- and medium sized enterprises.

3) Modern manufacturing industries need subcontractors to supply components and parts. It is important to foster specialized manufacturers and to establish complementary relationship based on mutual cooperation for expansion of subcontracting business. This enables the manufacturers to dedicate their resources to quality improvement and cost reduction, thereby to maintain competitiveness of products. If local small- and medium-sized enterprises are equipped with special capabilities and maintain equal and mutually beneficial relations with each other, they will be able to accomplish rationalization and

modernization much easier than individual efforts, while improving their technological base. A primary example of such development is found in the Japanese electronics industry which has established its position through cooperative efforts of many small- and medium-sized enterprises; there are more than 500 companies who are involved in development of leading-edge semiconductor chips. Obviously, presence of support industries which have reliable technology and willingness to joint development efforts is the key to competitiveness.

(3) Development of human resource

- 1) The number of full-time workers in the primary industry is recently on the rapid decline in Aveiro-Viseu region, replaced with part-time farmers who enjoy relatively a high standard of living from relatively large income from farming as well as employment in the secondary or tertiary industry. Overall, it is still difficult to secure manpower in the region despite the fact that migrants from other regions are on the rise.
- 2) Under these circumstances, the government and industries have been working on education and human resource development, particularly in the areas of technology and management. With reforms of the educational system after the 1975 revolution, they have been jointly establishing vocational training centers and technical support organizations. As a result, the number of persons who complete courses in vocational training centers has grown at an annual 50% in recent years, and the number of persons enrolled in higher education has increased by 10% annually. Nevertheless, enrollment in these educational systems is still at relatively a low level and does not meet the need for the improvement of national educational levels.
- 3) Compared to Porto in the north and Lisbon in the south, the Aveiro-Viseu region does not have much technical support organizations, but it has good access to those in Porto and Coimbra. Thus, the region does not present a problem in availability of technical support. At the same time, the region has 15 professional schools to train engineers, which are expected to contribute greatly to supply of highly skilled labor force.

It should be noted, however, that the very low unemployment rate and improved standards of living are seemingly discouraging young people from vocational training. Thus, some positive incentives for enrollment are needed.

4) Development of managers (engineering and management)

In Portugal, the percentage of students who go to universities and colleges is 5%, and of 10,000 college students who graduate annually, 2,000 are engineering students. (1985 data) Most of college graduates go on to master or doctoral programs of domestic or foreign universities or colleges. Therefore, it is very difficult for business enterprises, even foreign-affiliated companies, to employ college graduates who have potential to become managers. This is a serious setback for Portuguese industries as the middle management is known to serve as the core of modern business activities and their ability determine the success or failure of business enterprises. At present, a majority of courses offered at vocational training centers emphasizes basic engineering knowledge and field work to develop general skills required to start manufacturing operations. Efforts should be made to conduct more advanced courses to develop middle management skills.

Such courses should be designed to develop abilities to identify and analyze problems and find solutions, on the basis of knowledge on theory and practice which is to be learned through application of basic theories and laboratory work. This type of education enables managers to supervise and manage production and other field operations by understanding the current situation and by devising and effecting improvement measures, thereby to empower labor force and its potential. In this connection, professional schools are expected to become a powerful medium in developing the middle management. At the same time, reasonable compensation and position for employees with advanced skills are essential in motivating their self-development efforts, thereby to foster a high level of technological capability for business enterprises.

5) Establishment of the productivity research center

Technical support organizations currently operating in Portugal, such as universities and colleges, research institutes, and technical centers, are mainly engaged in joint research projects with business enterprises, corporate sponsored research projects, and product tests, which cannot be conducted by business enterprises due to limitation in facilities and equipment. On the other hand, there are few cases of R&D projects initiated by these organizations.

Such situation is rather unavoidable at this moment, considering resource constraints facing most of manufacturing industries in the country. While this presents technological challenges for manufacturing enterprises, including (1)

modernization of production facilities, methods, and management as well as quality control practices, and (2) the increase in levels of production technology and productivity, many of them - relatively small in scale - lack resources in the areas of financing, technological development, and manpower. One solution is that technical support organizations, other than universities and colleges, focus on technological innovation conducive to solution of technical issues present in production environment, and transfer of technology developed to manufacturing enterprises under collaboration with financial assistance organizations. Corporations having strong competitive edges consistently work on improvement of production technology to keep abreast of technological progress and maintain competitiveness via a R&D department specialized in the field. As Portuguese industries are seemingly lacking capabilities to support such efforts, it is proposed to establish the productivity research center in the Aveiro-Viseu region, which will conduct research projects related to production technology and management, jointly with companies or for them on a contract basis. Possible research topics at the research center, among other things, are the analysis of production process, selection of production equipment, automation and manpower saving in production lines, improvement of materials transfer between processes, quality control systems, inventory control and production management systems, and development of education and training systems. The important thing is to consider production environment as a source of technological innovation and application research. Also, the research center can be positioned as a technical service organization to develop and transfer new production technologies to the private sector.

6) Introduction of production technology

Production technology is a wide range of technical knowledge and knowhow required to manufacture a product at a particular cost and in a specific quantity, with a specific level of quality and within a specific period of time. At the same time, it is the means of controlling production activities in an efficient manner and allowing production with high quality and productivity, by optimizing means of production from raw materials to final products. The means of production include production plants, machinery and equipment, jig and tools, and measuring instruments and devices, as well as transportation and material handling facilities and equipment. To ensure high quality and productivity, these means of production need to be combined in an optimum balance in terms of quality and quantity. The means of production reflects technological levels of each factory, particularly in terms of layout and operating conditions. Thus, modernization of production equipment should be carried out in an attempt to keep the entire

production system in good operating condition, rather than merely introducing the state-of-the-art equipment. This naturally entails the introduction of knowhow related to the latest production technology. Finally, production technology needs to be progressed consistently to keep up with technological advancement, market competition, labor shortage, and other changing factors. This is accomplished through day-to-day innovative efforts of production engineers, which often lead to the development of a new production system, cost reduction, automation, and manpower saving. Clearly, introduction of production technology is a process of continuous improvement which has to be backed up by adequate means of production and human resources.

7) Use of expatriate experts and overseas training

Thus, modernization of production can only be achieved by building up a total production system which is capable of manufacturing competitive products, rather than introducing expensive equipment using the latest technology. The production system includes a modern management system, production control system, production technology and knowhow related to improvement of productivity, all of which are often learned and refined through field experience. The process starts from diagnosis and analysis of problems, discussion on possible means of modernization and rationalization suitable for a particular production line, and the planning and implementation of a modernization project. And such experience can be learned most effectively by working with experienced production engineers in a field environment. Also, it is useful to take a field tour in foreign-affiliated companies (such as Renault) which are known to be operated with high productivity, or to send production engineers to industrialized nations in order to learn about field-proven methods for productivity improvement. At present, local industries in Portugal do not have serious concern about the production system, and few research efforts have been made. This means, they have to rely on wage difference when competing in international markets. Improvement of the production system as a whole is the most urgent task for Portuguese industries to prosper in the increasingly competitive EC market and outside. The productivity research center should serve as the core of concerted efforts by the government, industries, and universities, toward effective application of technological resources to local industries.

8) Financing

With an eye to the imminent unification of the EC and control of inflation, the government has been maintaining interest rates at relatively a high level, resulting

in very tight money supply and shortage of funds available from the financial markets. Meanwhile, the government has developed programs, such as PEDIP and SIBR, under assistance from the EC Fund to provide financial and other incentives for promotion of investment, technical development, education and training, and facility modernization. These programs are designed to be accessible by small- and medium-sized enterprises. However, they face some criticism and do not solve the shortage of funds. As a result, most of business enterprises have to rely on their own reserves and cash flow for investment, prohibiting them from full-scale modernization. Obviously, modernization of the management system, as proposed earlier, will lead to the increase in financial demand for equipment modernization, productivity improvement, and the strengthening of international competitiveness, and there must be a institutional vehicle to provide low-cost funds as an exception to the current policy guidelines and regulations, which would respond to willingness of managers and business owners.

One way to do this is the supplemental loan program for business enterprises which have adequate equipment modernization plans under their own financial source; if the total cost less the grant exceeds a limit set forth previously according to the company size or the salvage price after depreciation, the excess amount will be financed from a special fund (the existing or newly established one) as a special loan with low interest rates, which will be repaid or amortized. Meanwhile, the modernized plant or equipment is kept as a government property required to be maintained by the enterprise on an agreeable basis. Once the loan is fully repaid, the property is transferred to the enterprise.

This is one example of reducing financial burden on private enterprises related to equipment modernization, while encouraging them to operate and maintain new equipment in good condition. Financial incentives such as this should work side by side with other improvement measures as a driving force for modernization and other private initiatives.

Chapter 6
PRESENT STATE OF MANUFACTURING INDUSTRY IN
PORTUGAL AND ITS FUTURE OUTLOOK

Chapter 6 Present State of Manufacturing Industry in Portugal and Its Future Outlook

6.1 Portuguese Manufacturing Industry

6.1.1 Statistical Analysis of the Portuguese Manufacturing Industry

(1) Trends in growth rate and share in GDP

General performance of the manufacturing sector in Portugal between 1980 and 1990 is summarized in Table 6-2-3. During the 11-year period, the manufacturing sector recorded an annual average growth rate of 2.3%, below 3.1% of GDP growth rate. Thus, the manufacturing sector failed to serve as a driving force for the Portuguese economy. This is because manufacturing industries lost their vitality between 1981 and 1986 due to the nationalization policy after the revolution, and their average growth rate plummeted to less than 1.0%. Then, the country's joining in the EC in 1986 took its effect in 1987, and the manufacturing sector recorded an annual 4.0% growth between 1987 and 1990. Nevertheless, GDP growth rate was 4.9% during the same period.

The manufacturing sector accounted for average 25.2% of GDP between 1980 and 1990. Its share was at relatively a high level in the early 1980s and showed no significant increase even after the country joined the EC, remaining at slightly over 24%.

(2) Analysis of gross value of production, gross value added, and gross fixed capital formation by sub-sectors

Tables 6-1-1 presents changes in gross value of production (GVP), gross value added (GVA), and gross fixed capital formation (GFCF) of 9 manufacturing sub-sectors (based on CAE classification) between 1979 and 1988, on a current price basis. Table 6-1-2 shows a summary of the three indicators for all the subsectors. (Note: No data in 1989 and afterward is available.)

Major findings from recent trends in GVP and GVA/GVP, as shown in Table 6-1-2, are as follows:

- 1) Basic chemicals, rubber, and plastics industry, including oil refining, accounted for the largest share (26.7%) in GVP, but its share in GVA/GVP was lowest at 15.3%.
- 2) Similarly, food processing industry recorded the second highest share in GVP (19.6%), but the second lowest in GVA/GVP (23.3%).

- 3) Textile, garment, and footwear industry ranked third (18.6%) in GVP and fifth (35.5%) in GVA/GVP.
- 4) Top three industries in GVA/GVP were other manufacturing industries (49.1%), pulp & paper and printing industry (44.4%), and non-metal minerals industry (44.0%), but a combined share of these three sub-sectors amounted to only 12.3%.

The above data indicate that, in the Portuguese manufacturing sector, major sub-sectors with large production (traditional industries) contribute smaller value added.

(3) Number and size of manufacturing enterprises

As of 1988, there were 115,231 manufacturing enterprises in Portugal, which accounted for 13.1% of 855,851 business enterprises. Of total, textile, garment and footwear industry was largest in number (28.0%), followed by metal products, machinery and transport equipment industry (24.5%) and wood and cork industry (19.1%), as shown in Table 6-1-3.

From Table 6-1-4, breakdown of manufacturing enterprises by size, as measured by employment, is shown below.

Percentage Distribution of Manufacturing Enterprises by Employment (1988)

<u>Employment</u>	<u>%</u>	<u>Accumulated %</u>
0	55.63	55.63
1 - 9	30.87	86.50
10 - 49	10.26	96.76
50 - 199	2.55	99.31
200 - 499	0.51	99.82
500 - 999	0.13	99.95
Over 1,000	0.05	100.00

Manufacturing enterprises with no employee - operated as a private business - accounted for 55.6% of total, and those with 0 to 9 employees, classified as microenterprises, hold a dominant 86.5% share. Furthermore, enterprises with less than 200 employees accounted for over 99%.

Then, the average number of employees per company in each of major subsectors is shown below. Note that manufacturing enterprises with no employee are not included.

Average Number of Employees Per Company in Major Subsectors
(Not Including Enterprises Without Employee)

<u>Subsector</u>	<u>Average number of employees/enterprise</u>
1) Food processing, beverage, tobacco	11.7
2) Textile, garment, footwear	17.8
3) Wood and cork	4.6
4) Pulp & paper, printing	15.3
5) Basic chemicals, rubber, plastics	30.4
6) Non-metal minerals	13.8
7) Basic metal	31.4
8) Metal products, machinery, transport equipment	10.5
9) Others	1.5

Notably, process industries, such as basic metal and basic chemicals, rubber, and plastics, show the largest number of employees, 31.4 and 30.4 respectively. On the other hand, it is clearly indicated that food processing, beverage, and tobacco in 1), wood and cork in 3), and metal products, machinery, and transport equipment in 8), and others in 9) are mostly made up of microenterprises.

(4) Exports and imports by the manufacturing sector

Table 6-1-5 summarizes exports and imports by manufacturing subsectors on an accumulated basis (in terms of percentage share) between 1981 and 1987.

Three subsectors showing the highest ratio of imports (in terms of imports/consumption ratio) are as follows:

1) Metal products, machinery, transport equipment	44%
2) Basic chemicals, rubber, plastics	29%
3) Basic metal	28%

On the other hand, four subsectors showing the highest ratio of exports (in terms of exports/production ratio) are as follows:

1)	Textile, garment, footwear	60%
2)	Wood and cork	52%
3)	Pulp & paper, printing	32%
4)	Metal products, machinery, transport equipment	14%

Metal products, machinery, and transport equipment industry is included in both categories, because they export high-grade products and capital goods, while importing low-grade products and consumer goods.

6.1.2 Current State of Major Manufacturing Subsectors

The current state of major manufacturing subsectors, including their potential and limitation, is discussed as follows.

(1) Metal products, machinery, transport equipment industry

According to 1987/88 data, electric machinery accounts for approximately 5.2% of the manufacturing sector in production, and transport equipment represents 5.6%; 6.6% and 7.3% in exports, respectively; and 10.6% and 18.3% in imports. Both subsectors account for 18% of the manufacturing sector in employment and 24% in the number of enterprises. The subsector is dominated by small enterprises with 50 or less employees, which account for around 95%. The electric machinery industry mainly supplies industrial machinery for electricity, communication, and construction industries, and household appliances which are produced by joint venture companies with foreign manufactures.

The metal products/machinery industry recorded rapid growth after the 1960s. Increase in investment by foreign corporations accelerated modernization, spurring emergence of automobile assembly, automotive parts, and metal mold industries. With development of assembly industries, Portugal is being positioned as a major production/supply base to the EC. This is particularly true in the automobile assembly industry. Ford and Volkswagen project will invest US\$3 billion to build assembly plants, which will employ 5,000 workers and produce 170,000 units annually, with 90% to be exported. At the same time, 40% of assembly parts will be locally procured in the initial year, and 45% in the third

year under the localization scheme, bringing sizable benefits to domestic suppliers.

The metal mold industry has successfully established a technological base for plastic injection molding on the foundation of the traditional glass craftwork industry, and is ranked as one of metal mold producing countries in the world. In the future, development of new materials and further increase in demand are expected.

The export/import ratios (value of export/value of imports) for electric machinery and metal products/machinery industries in 1988 are summarized as follows.

<u>Electric Machinery</u>		<u>Metal Products/Machinery</u>	
Electric machinery/ equipment	abt.0.3	Shipbuilding and repair	0.94
Radio, TV, communication equipment	abt.0.43	Automotive	0.28
Household appliances	abt.0.22	Other	0.36
Wire and cable	abt.1.63		
Other	abt.0.48		

The high level of investment is observed in radio, TV, communication equipment, and automotive parts.

Industries showing a high export/import ratio are likely to survive in the unified EC market. Those showing relatively a low export/import ratio have opportunities to substitute present imports through technological innovation and improvement of productivity.

At present, competitiveness of the industries in the EC market mainly comes from their low labor cost, and it is likely to be eroded gradually by imminent equalization of wage levels among the EC countries after unification. Thus, it is the time to start modernization and productivity improvement. The following sections review the current state of major segments in the machinery industry.

1) Automobile industry

Automobile assembly operations in Portugal were started in 1962 when the Automobile Assembly Law was enacted to encourage domestic assembly, while limiting imports of assembled cars. As a result, several foreign automakers started knockdown assembly operations, and production grew rapidly to reach an annual 100,000 unit level in the subsequent decade. This production level was maintained until 1986. In 1988, the country liberalized imports of automobiles produced within the EC. Annual sales increased to 280,000 units, as imports jumped to a level twice the number of locally assembled cars. Figures 6-1-1 and 6-1-2 summarize these trends. Up to the 1970s, passenger automobiles accounted for 80% of cars assembled in the country, and commercial vehicles remaining 20%. Then, production of commercial vehicles showed strong growth between late 1970s and early 1980s, while that of passenger automobiles declined or leveled off, resulting in a 50/50 ratio. Then, commercial vehicles production declined in the middle of the 1980s and increased again to the 50/50 level in late 1980s. In 1990, 140,000 units were assembled.

In assembly of passenger automobiles, French makers (Renault and Citroen) accounted for around 85% of total, and remaining 15% by GM (Opel) and other makers. Regarding small commercial vehicles, Japanese makers (Toyota, Nissan, Mitsubishi, and Matsuda) hold a 29% share, French makers (Renault, Peugeot, and Citroen) accounted for 25%, a UK maker (Ford) 24% and GM (Bedford and Opel) 23%. Large commercial vehicles are dominated by Japanese makers (Mitsubishi, Toyota, Matsuda, and Nissan), with a 79% share, followed by GM (Bedford) (15%), and a Swedish maker (Volvo) (5%). Table 6-1-6 lists assembly makers and their production trends. All cars assembled in Portugal are less than 2000cc; 30% are less than 1000cc, and 60% are 1000 - 1500cc. Gasoline-fueled automobiles accounted for 95% of total. Regarding commercial vehicles, 96% are small vehicles of less than 3,500kg in total weight, which production is still on the rise. 93% use diesel engines.

Export trends of assembled automobiles, by type, are shown in Figures 6-1-3 through 6-1-5, with the summary table in Fig. 6-1-6. Exports of passenger automobiles, accounting for 23% of total in early 1980s, increased steadily after 1986 to a 60% level in 1990. Exports of commercial vehicles also grew significantly after 1986, from 11% to 54% in 1990. Exports of large commercial vehicles are at a 100-unit level. Overall, exports of automobiles assembled in the country increased their share in total production from 15% to 56% during the decade.

With the increase in domestic production as well as imports after 1985, domestic car sales grew rapidly to 210,000 passenger automobiles, 60,000 small commercial vehicles, and 10,000 large commercial vehicles annually. The number of automobiles owned is estimated to have reached 1.6 million passenger cars and 590,000 commercial vehicles. Automobiles of less than 5 years old are 54% of all passenger cars and 48% of commercial vehicles, while those of more than 10 years old are 20% and 26% respectively. In terms of country of origin (based on models, whether imported or locally produced), French cars accounts for 39% of all passenger cars, German cars 26%, Italian cars 16%, and Japanese cars 10%; Japanese cars account for 39% of small commercial vehicles, British cars 29%, and French cars 19%; and Japanese cars represent 29% of large commercial vehicles, British cars 20%, Swedish cars 19%, and German cars 10%. (Table 6-1-7)

Import quota is imposed on assembled cars, excepting those produced within the EC. In 1990, import quotas are set at 20,000 units, with breakdown to 12,000 units as the standard quota and 8,000 units as the additional quota. Knockdown assembly production is not subject to import quota. Import duties on assembled cars and assembly parts are as follows:

· Passenger cars		CIF x 10.9%
· Commercial vehicles	Less than 2.5 tons	CIF x 11%
	Exceeding 2.5 tons	CIF x 16%
· Knockdown assembly parts		CIF x 6.9%

No local content requirements are imposed at present.

2) Motorcycles

As shown in Fig.6-1-7, the number of motorcycle registration increased by four-fold over 10 years. In terms of country of origin, Japanese motorcycles accounted for 78% of total in 1990, followed by Italy (13%), Germany (3%), Czechoslovakia (3%), and Portugal (0.7%). The number of motorcycles owned as of the end of 1990 is estimated to be around 45,000 units. 60% are Japanese made, 20% Italian, and 11% Portuguese. Motorcycles of less than 5 years old represent 68% of total, and those of more than 10 years old 16%.

(Table 6-1-8)

3) Agricultural machinery and construction equipment

Registration trends in farm tractors and construction equipment are shown in Table 6-1-9. Annual tractor demand is stable at 1,500 units for small vehicles and 7,000 units for large vehicles. The number of tractors owned is estimated to be 120,000 units as of 1990, with small vehicles being around 20,000 units and large vehicles 100,000 units. Tractors of less than 5 years old account for 36% of total, and those of more than 10 years old 38%. Annual demand for agricultural machinery (e.g., combines, harvesting machines, and seed drill), construction equipment (loaders, excavators), and material handling equipment (cranes, stackers) ranges between 2,000 and 5,000 units.

4) Current state of the automotive parts industry

The automotive parts industry emerged in 1963, parallel to the growth of assembly operations in the country. By the end of 1970, it consisted of 170 companies employing 15,000 workers. In 1979, the Portuguese government initiated the restructuring of the industry to meet the domestic automobile market which was predicted to reach 200,000 units in 1990 and 350,000 by the end of this century. As a trade organization representing the interest of the industry, AFIA (Associação de Fabricantes Para a Indústria Automóvel) was established in 1979. AFIA is also a member of CLEPA (Comité de Liaison de la Construction D'Equipments et de Pièces D'automobiles: Federation of the Industries of Car parts and Accessories) covering the EC, and represents the industry at a national level in relation to the automotive parts industry in the EC. In 1990, the industry consisted of 73 member companies and 126 non-member companies. It manufactured 107 types of products, with the total value of production - including OEM supply and after-sales markets - reaching at 226 billion escudos (US\$1.6 billion), 71% (US\$1.1 billion) were exported. In terms of share by major components, engines, transmissions, and brake related parts/electrical parts accounted for 25% of export, interior parts, tires, and body work represented 15%, and raw materials, jig, and mold 5%. 90% of exports are shipped to the EC. (Table 6-1-10)

5) Current state of the metal mold industry

As mentioned earlier, the metal mold industry has strength in plastic injection molding developed on the basis of the traditional glass craftwork technology, highly competitive in international markets. According to the U.S. Department of Commerce's data for early 1985, exports of metal molds by Portugal to the U.S. ranked second, next to Canada, on a value basis (\$18 million), and ranked first on