# PAPERS 45 INDUSTRIAL ESTATES: LOCATION TRENDS AND ACCESSIBILITY

## PRESENTATION

From an academic perspective, as well as from the point of view of professionals, governments and economic agents involved, there is a general consensus regarding structure and location of economic activities as the objects of great changes in recent years. The so-called *industrial estates*, seen as areas of functional specialization, have been and still are the ones in which these territorial changes of the economic-productive system arise most clearly. Understanding them and thinking on their characteristics, on the activities that settle in them in an intensive manner, and on how to plan, design and manage them, becomes essential to develop urban and territorial planning policies and economic strategies.

The publication of the four articles included in this 45th issue of the PAPERS magazine can be regarded as an attempt to contribute to this necessary reflection focusing on the 1.750 industrial estates located in Catalonia (according to the *Census of Industrial Estates in Catalonia 2005-2006*, developed by the Institut d'Estudis Regionals i Metropolitans de Barcelona).

The location of these economic areas, the variety of situations resulting from their size, site and land availability, as well as the prospect of floor demand, are the subjects analyzed by Carme Miralles-Guasch and Carles Donat at the opening of this monograph. This first article unravels the results obtained by two quantitative sources created in order to overcome the lack of information about local industrial estates: the aforementioned Census (which includes location, delimitation, size and occupation data) and the *Sample of Industrial Estates in Catalonia 2005-2006*, which informs of the activities that can be found at those estates. The analysis of offer/demand dialectics here is based both on these quantitative data and systematic, qualitative information gathered in in-depth interviews to relevant experts in the field.

The second article, by Àngel Cebollada, is about the unresolved matter of the accessibility to industrial estates. Given the acknowledgement that the relocation of industries to the urban periphery has occurred without taking into account the workers' accessibility needs, a resulting situation characterized by a severe shortage of collective transport offer, in which the car appears as the most effective mean, is outlined. As a way to correct or straighten it, the author points out the implementation of the Catalan Mobility Law instruments, particularly the Mobility Plans for industrial estates and the figure of the Mobility Manager.

In the third article, Margarida Castañer and Antoni Ferran review the conclusions of the 3rd Conference on Territorial and Urban Planning Environmental Assessment. The Conference goals were to come up with effective ways to apply the European Union Directive 2001/1452/EC to the conception of new areas of economic activity, to establish environmental and landscaping criterion to guide the selection and design of their site and, lastly, to launch the challenge of collaboration between different Administration levels in order to enable the development of supramunicipal economic areas.

The issue is closed by a fourth article in which Juli Esteban reflects about the capacity, the tools and the ways in which physical planning can influence the dynamics of location of industrial estates. Starting with the definition of a set of guiding principles that seek to promote coexistence with other activities and to rationalize their settlement, the author refers the spatial and temporal difficulties that arise when a range of territorial plans attempt to establish guidelines for the choice of sites, sizes and mixed-used patterns, as well as to impose an urban model of concentration and proximity. In order to go beyond these difficulties he proposes some *planning techniques*, such as the regulation of the spatial distribution of both already-known processes and unexpected opportunities for the siting of new activities.

## INDUSTRIAL ESTATES IN CATALONIA: AN ANALYSIS OF SUPPLY AND DEMAND

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### Introduction

With the passing of time, the location of economic activities has been governed by various lines of reasoning and circumstances. At present, and for quite some time now, town and city councils have been trying to situate these businesses in industrial estates in suburban areas, often isolated from the traditional urban fabric and set aside for exclusive uses. Nevertheless, and despite the fact that this has been a general trend, to date we have little information about where these industrial estates are located, how many there are, the area they cover in hectares and how much of this land area is available. Similarly, there has been little in-depth research into what we know about the kinds of businesses located in these areas beyond merely classifying them along with industry.

The following article is an attempt to reflect the current situation concerning the deficit of information on these issues from the analytical perspective of supply and demand of industrial estates in Catalonia[1]. This study starts from the basis of three hypotheses shared by the academic world, institutions and social representatives. The first hypothesis is that these spaces can no longer simply be identified as industrial areas because they also include logistics and commercial enterprises and services in general. Therefore, throughout this article we will use the term industrial estate in its broadest sense, that is as an area where business enterprises are located on land classified as industrial, tertiary or mixed. The second hypothesis, which follows from the first, refers to the fact that the characteristics of these economic activities are no longer incompatible with residential uses; in consequence, the ideal situation of locating them in industrial estates segregated from urban fabrics has to be re-thought, above all taking into account that this location increases competition for land use and may make difficult the siting of other businesses that do need to be located in these areas. Finally, the third hypothesis states that the distribution of industrial estates in Catalonia is, generally speaking, overly dispersed and fragmented, the outcome of a lack of coordination between municipalities, which poses difficulties when it comes to siting businesses that require a large areas of land.

When it comes to studying industrial estates, there is a lack of homogeneous and detailed information for Catalonia as a whole. In an attempt to address this, three sources of information have been devised: two of them quantitative, a census and a sample of industrial estates; and one qualitative, a corpus of in-depth interviews. The *Cens de polígons d'activitat de Catalunya 2005-2006 (Census of industrial and tertiary estates in Catalonia 2005-2006)* began with sending out a questionnaire with a map to those local councils with industrial, tertiary or mixed land, so that they could identify and define their industrial estates. This approach provided satisfactory responses from 102 local councils. This data source was complemented and contrasted with others, the most important being the data base generated by the Pacte Industrial de la Regió Metropolitana de Barcelona, which was used for 104 municipalities. In other territorial areas where no second source was available, we made use of layouts of municipalities, databases from other local authorities (regional and local councils), institutions (Chambers of Commerce), and from the Institut Català del Sòl (*Catalan Land Institute*) -being the most important sources consulted. Taken as a whole, this group of data sources from local administrations and institutions was used for 367 municipalities, 78.9% of the total of the municipalities covered by the census. Urban planning ones were used for those areas not covered by these sources; this was the case for 81 municipalities, 17.4% of the total of the municipalities covered by the census. From these sources, those that were consulted most, in order of priority, were: planning sectors (46 municipalities), followed by general municipal planning (25 municipalities), and finally the Sistema d'Informació Territorial del Planejament Urbanístic (*Urban Planning Territorial Information System*) (10 municipalities). The information obtained from the planning sectors was contrasted against orthophotomaps. In cases where sectors are an extension of an already existing area of economic activity, the two areas have been grouped together to make one industrial estate. Finally, in the municipalities where none of the aforementioned sources were available, a morphological criterion was applied. Thus, industrial estates were located by means of applying visual photointerpretation techniques based on the 1:25.000 orthophotomaps by the Institut Cartogràfic de Catalunya (*Cartographic Institute of Catalonia*)[2]. This criterion was used for a total of 17 municipalities, 3.7% of the total of the municipalities covered by the census.

The second quantitative source, la *Mostra de polígons d'activitat de Catalunya 2005-2006* (*Sample of industrial estates in Catalonia*), allowed for gathering information about the different types of businesses found in industrial estates. Information was collected from the questionnaire sent to local councils in which they were asked to specify the percentage of land taken up by each of the following branches of business: industry, transport and warehousing, retailers, wholesalers, services for people, services provided for companies, and others.

In order to obtain a clearer idea of the supply of and demand for industrial estates in Catalonia, we deemed it appropriate to carry out in-depth interviews to provide a qualitative analysis based on the opinions of various qualified experts. These experts come from a variety of areas ranging from municipal management to the academic world, and including various institutions that study manufacturing sector dynamics in general and industry in particular. An in-depth interview is a qualitative social research technique that allows one to develop an in-depth dialogue with individuals who are an integral part of the population being studied. An interview is understood as a "communicative process" though which one can "extract" information from someone (in this case an expert on the topic under study). The aim is to generate a discourse on a specific line of argument (high degree of fluency and not pre-coded, as opposed to questionnaires), which allows the person being interviewed to give their opinions about the topic one wishes to analyse. As regards this study, the interview began from an initial minimal script on predefined topic areas with no pre-established order, through which the focus of this research was broached based on the personal experiences, opinions and expectations of the person being interviewed. These interviews were carried out between February and April 2006 and totalled 14 hours of recorded conversations. The transcriptions of these interviews have allowed us to analyse the most important issues related to the supply of and demand for industrial estates.

This article is divided into three sections and is a response to the information and analysis carried out for each of the three aforementioned sources, which are summarised and contrasted in the conclusions. In the first section, based on the data from the census, we analyse some of the principal factors associated with the supply side of industrial estates in Catalonia: location, dimensions, siting with respect to population centres and to the rest of the industrial estates, and finally, the degree of land availability. In the second, based on the information collected in the sample, we analyse what constitutes demand, placing particular emphasis on the consequences of changes in the structure of the economy *vis-à-vis* demand for space in industrial estates, and also on territorial differences. Finally, in the third section we present an analysis based on the in-depth interviews, which provides a complementary perspective to the previous two sections detailing pertinent factors according to the perceptions and opinions of the experts themselves.

## 1. Industrial estates in the territory: location, site and land availability

According to the data obtained in the census carried out during 2006, there are approximately 1,750 industrial estates in Catalonia. In this section their characteristics are analysed according to a breakdown of the place where they are found by territorial area[3], and also according to size and the surface area they cover. At the same time, for each area we explain the relationship between industrial estates and the territory based on three factors: location according to size, their site in relation to urban centres and other industrial estates and the level of land taken up. The relationship between the industrial estates and urban centres has lead us to consider a threshold of 200 metres distance between them so as to be able to differentiate between those which are segregated and those which, in contrast, are closer or could even be considered appended to or an integral part of an urban centre. Also the relationship between the industrial estates themselves has led us to consider them as territorial phenomena with a physical continuity and which can make up "business areas" or, alternatively, classify them as isolated if they are distributed in a fragmented manner. According to these characteristics one can speak of segregated, integrated, concentrated or isolated sites.

In 2006 there were 1,748 industrial estates with an area greater than 0.5 hectares covering 32,240 hectares, which corresponds to approximately 18% of the urban and development land[4]. The metropolitan area of Barcelona is the territorial area where the largest number of industrial estates is concentrated, 712 (40.7%). In second place we have Comarques Centrals and Comarques Gironines with 329 and 287 industrial estates (18.8% and 16.4%, respectively). Next in order we have Camp de Tarragona and Àmbit de Ponent, with 176 and 159 industrial estates (10.1% and 9.1%, respectively). Then finally, we have Terres de l'Ebre and Alt Pirineu i Aran, with 61 and 24 industrial estates (3.5% and 1.4%, respectively – see figure 1). However, this order changes seen from the perspective of the total gross surface area taken up by the industrial estates. While the Metropolitan Area remains in first place with 15,623 hectares (48.5%), second place in order of total gross surface area in Catalonia is Camp de Tarragona (5,030 hectares - 15.6%) with Comarques Centrals (3,666 hectares - 11.4%) and Comarques Gironines (3,669 hectares - 11.4%) rating third. Àmbit de Ponent (2,717 hectares - 8.4%) remains in fifth place although the gross surface area here is closer to that of Comarques Gironines and Comarques Centrals. Finally, Terres de l'Ebre (1,376 hectares - 4.3%) and Alt Pirineu i Aran (158 hectares - 0.5%) remain in sixth and seventh place respectively.

These differences between the number of industrial estates and the total gross surface area they cover can be explained by looking at them according to their size and comparing the distribution between each of the areas. As figure 2 illustrates, in Comarques Gironines and Comarques Centrals there is a very high percentage of small and medium sized industrial estates, 67% and 68% respectively. In contrast, the percentage figures for medium-large industrial estates are lower (35% and

32%). In the Barcelona metropolitan area and Camp de Tarragona, the percentage distribution of industrial estates according to size is almost identical. Around 80% of the industrial estates are situated in the medium-size range (with and equal breakdown, 40% and 40%, between the medium to small and medium to large industrial estates) and a little over 10% for the extremes (small or large). As regards percentage figures for small industrial estates, these are well below those for Comarques Gironines and Comarques Centrals, particularly in the latter case, where they account for almost 20%. In Àmbit de Ponent, almost half the industrial estates are medium-large (48%), and this is the second area where the medium-large industrial estates are in the majority. In contrast, there are very few large industrial estates and account for only 5%, one of the lowest figures. Finally, the medium-small industrial estates make up 36%, a figure that is slightly lower than those for the rest of the areas. A characteristic feature of Terres de l'Ebre is a significant level of medium-large sized industrial estates - this is the area where they are more predominant, 53%. In addition, the figure for large industrial estates is 12%, in contrast to the figure for small industrial, 5%. In Alt Pirineu i Aran, where the total number of industrial estates is significantly lower than the rest of the areas, the characteristic features here are the figures for medium-large sized industrial estates (67%) and the absence of large industrial estates. The result of this distribution is that in the Camp de Tarragona, Terres de l'Ebre and the metropolitan area of Barcelona, industrial estates cover a higher average surface area (28.6 hectares, 22.6 hectares and 21.9 hectares, respectively) as opposed to Àmbit de Ponent (17.1 hectares), and particularly Comarques Gironines and Comarques Centrals (12.8 hectares and 11.1 hectares, respectively). In last place we have Alt Pirineu i Aran where the average surface area taken up by industrial estates is 6.6 hectares.

Whether one considers the number of industrial estates or the total gross surface area, the result is that in all the areas there is land available. As can be seen in figure 3, in the metropolitan area of Barcelona, there are many industrial estates with a high level of land taken up, although it is the area which has most land availability. Accordingly, on the one hand there are 250 industrial estates with more than 90% take up and around 125 with take up levels which are also quite high, 76%-90%. On the other hand, however, there are more than 150 industrial estates take up levels below 25%, and among these, all the land is available for 40. The availability of land in the metropolitan area of Barcelona is even more visible when we look at the graph showing the total gross surface area; we can see that there are almost 3,800 hectares with take up levels lower than 25% (2,500 with take up levels 1%-25% and 1,300 unoccupied). Further reading of this graph reveals a second level of land availability in Camp de Tarragona, where there are 2,300 hectares with take up levels below 25%, and among these, more than 500 hectares are unoccupied. Next in order, we have Comarques Centrals, Comarques Gironines and Àmbit de Ponent, with approximately 1,300 hectares with take up levels below 25%. Finally we have Terres de l'Ebre with some 600 hectares with take up levels below 25%. In Alt Pirineu i Aran, where there are few industrial estates, there are approximately 65 hectares with take up levels below 25%.

The differences in the intensity of urban and metropolitan development in each of these territorial areas explain the differences in terms of distribution and the take up levels in industrial estates in Catalonia seen in the tables given earlier. Similarly, if we take a closer look at each area we can see that the questions of location and site of the industrial estates have their own distinct characteristics.

### 1.1. The metropolitan area of Barcelona

The 712 industrial estates in the metropolitan area of Barcelona cover 15,623 hectares, which means approximately 20% of urban and development land for this area. As can be seen in map 1, the vast majority are located in Vallès Occidental, Baix Llobregat and Vallès Oriental regions, following the main corridors between Barcelona and the Pre-littoral Depression. If we take a closer look at the site and analyse the spatial relationships between them, we can see two opposing phenomena. On the one hand, in the major corridors, where a majority of the industrial estates are located (Llobregat corridor, Besòs-Mogent-Congost corridor, and the C-58 corridor, Riera de Caldes, Riera de Rubí), there is a configuration of as many as 17 major "business areas". On the other hand, one can also see an opposing tendency of fragmentation, the outcome of the industrial estates being isolated from each other. Generally speaking, these are small and medium sized industrial estates and the majority are located in the more peripheral spaces of the metropolitan area of Barcelona: to the north of the AP-7 in Alt Penedès region, on the Serralada Pre-littoral slopes in Vallès Occidental and particularly in Vallès Oriental and in some of the Maresme municipalities.

If one looks carefully at the site, from the perspective of the distance between industrial estates and population centres, one can see how 70% of the industrial estates in the metropolitan area of Barcelona are an appendage to, or integrated into, the urban fabric. The rest are segregated, that is, they are at a distance of more than 200 metres from urban centres. In the aforementioned major "business areas", and in general in the Pla General Metropolità (PGM – *General Metropolitan Plan*) area, the majority of the industrial estates are an appendage to, or integrated into, the urban stretches. In contrast, in the more peripheral parts, as we have already seen, the industrial estates are located in a more disperse and fragmented manner, and in addition they tend to be segregated from urban centres.

Analysis of the site of the industrial estates in the metropolitan area of Barcelona allows for concluding that in the PGM area a specific global view in the form of supra-municipal level planning, has led to a configuration of the territory where the industrial estates are generally grouped into "business areas" that are contiguous to the urban fabric. In contrast, for the rest of the area, the development of land for businesses has led to a distribution of industrial estates which are fragmented and/or segregated from the urban networks. Exceptions to this are the traditionally industrial cities (Sabadell, Terrassa, Mataró, Vilafranca and Vilanova) and other locations where, because of land development dynamics, they have ended up configuring industrial estate and urban centre continuums (C-17 corridor to Vallès Oriental).

If one looks at the availability of land, in the metropolitan area of Barcelona, there is a high percentage of industrial estates with a high take up levels: more than half, 394, have take up levels above 75% (figure 4). Nevertheless, this is the area in Catalonia with the most land available, as there are 156 industrial estates (a quarter), that add up to 3,787 hectares, with a take up level below 25%. Among these, the predominant feature is medium-small and medium-large industrial estates. In map 1 one can see that large industrial estates with available land are located within the PGM area: Delta del Llobregat, Centre Direccional del Vallès and the Polígon Can Sant Joan. From among the largest industrial estates in the rest of the metropolitan area of Barcelona one should also note the "business areas" to the south of Terrassa, and the Vilafranca del Penedès industrial estates. Medium-large industrial estates with land availability are, in the majority, located in the second ring of the metropolitan area, while the majority of the smaller industrial estates are found in the medium and small sized municipalities of the second ring, above all in Alt Penedès and the Vallès Oriental regions.

### 1.2. Comarques Gironines

In Comarques Gironines there are 287 industrial estates with a gross surface area of 3,669 hectares, which means approximately 13% of the urban and development land. Generally speaking, they are located following the structure of the urban system. Thus, the most important ones are found around Girona (map 2) and Figueres, followed by the rest of the region capitals: Olot, Banyoles, la Bisbal d'Empordà, Ripoll, and Santa Coloma de Farners. The concentrations of industrial estates in la Jonquera, Blanes and Palafrugell should also be stressed. In the small population centres there are concentrations of small and medium sized industrial estates which provide support to local businesses.

When analysing the site, it should be noted that there are 202 industrial estates (comprising 70% of the total) that are more than 200 metres from one or other population centre. The phenomenon of segregated industrial estates, as is the case here, is quite widespread throughout the entire area and is found as much around the major cities as well as the rest of the municipalities. One can also see that, generally speaking, they are isolated from each other. So, a characteristic feature of site of industrial estates in Comarques Gironines is segregation and fragmentation.

Figure 5 illustrates that in Comarques Gironines there is a significant level of land availability in their industrial estates, since almost half have take up levels below 50% and, furthermore, among these there is a significant number of industrial estates with take up levels ranging between 1% and 25%. Availability of land is a particular feature of medium sized industrial estates and is illustrated by the large number of medium-small and medium-large industrial estates with take up levels in the 1%-25% range. It is the small industrial estates which show the highest levels of saturation, since 42 of the 51 existing industrial estates have take up levels greater than 50%. Another feature that should be noted is the availability of land in the large industrial estates. Even though they are fewer in number in this area, 8 of the 15 located there have take levels below 25%. In Girona (map 2) and Figueres, the two principal urban networks where the largest industrial estates are concentrated, there is land available in industrial estates of all sizes. In the remaining regional capitals and in the coastal municipalities, the industrial estates with available land in the medium-sized range. In Santa Coloma de Farners and la Bisbal d'Empordà, the predominant feature is medium-large sized industrial estates with take up levels ranging from 26% to 50%. One will find these same take up levels in the medium-small sized industrial estates in the Olot and Ripoll urban networks, and in the medium sized ones in Banyoles and the coastal municipalities.

### 1.3. Camp de Tarragona

The 176 industrial estates located in Camp de Tarragona cover 5,030 hectares, which corresponds approximately to 19% of the area's urban and development land. If one looks at the location, one noteworthy feature is the major concentration in the Tarragona-Reus metropolitan area. In the rest of the territory the main locations are in the municipalities of Valls, Montblanc and to the east of the Baix Penedès region, from el Vendrell to the Barcelona metropolitan area limits, following the N-340 and AP-7 road corridors.

If one analyses the site in greater detail, taking into account the spatial relationships between the industrial estates, one can see that there are a considerable number of concentrations that make up "business areas" in the metropolitan area of Tarragona-Reus (map 3). This phenomenon can be found as much around the port of Tarragona and the large petro-chemical complex as well as along the principal road network infrastructure (T-11, AP-7), and around the urban centre of Reus. Another noteworthy feature, given its size, is the petro-chemical area between the municipalities of Constantí, Perafort and el Morell; and the Constantí industrial estate.

A particular feature of Camp de Tarragona, more so than in any other area in Catalonia, is the large number of industrial estates segregated from the rest of the urban fabric. This is the case for 128 industrial estates, comprising 73% of the total. The great majority of these industrial estates are located outside the municipal limits of Tarragona and Reus, where the urban development has not been as intense. The distance from population centres is particularly important in the case of some Baix Camp municipalities and the Constantí industrial estate (the latter in the metropolitan area of Tarragona-Reus). In Montblanc and to the east of the Baix Penedès region, from Vendrell to the Barcelona metropolitan area limits, the existence of segregated industrial estates is due to their site along the road corridors (N-240, N-340 and the AP-7, respectively), which are found at a certain distance form the population centres.

In Camp de Tarragona almost two thirds of the 176 industrial estates have take up levels below 50%, which corresponds to more than 70% of the total gross surface area. As can be seen in figure 6, land availability is apparent for industrial estates of all sizes. A particularly noteworthy feature is the large number of medium-large sized industrial estates that are unoccupied or with take up levels within the 1%-25% range. There is also a considerable number (22) of medium-small sized industrial estates with take up levels below 25%. From among the large industrial estates, it should be noted that more than half (12 of the 23) have take up levels below 25%. Small industrial estates, the smallest in number for this area, are those with the highest level of saturation of land use, since 16 of the 21 existing small industrial estates have take up levels above 75%. In general, available land is located throughout the area, as much in the metropolitan area of Reus-Tarragona (map 3) as well as the rest of the territory.

### 1.4. Terres de l'Ebre

In Terres de l'Ebre there are 61 industrial estates, the majority of which are located in the triangle comprising the municipalities of Tortosa-Roquetes, Amposta-Sant Carles de la Ràpita, and l'Aldea-Camarles (map 4). The remaining areas with noteworthy concentrations are located in the southern and northern extremes of this area: to the south, the municipalities of Ulldecona, Alcanar and la Sènia; and to the north in Ascó, Flix, Gandesa and Móra d'Ebre. Taken as a whole, the industrial estates in Terres de l'Ebre cover 1,376 hectares, which corresponds approximately to 17% of the urban and development land for the area.

If one looks closely at their site, one can see that of the 61 industrial estates in Terres de l'Ebre, 38 (accounting for 62% of the total) and 71% of the total gross surface area, are at a distance of more than 200 metres from one or other population centre. As can be seen in map 4 (the triangle comprising Tortosa-Roquetes, Amposta-Sant Carles and l'Aldea-Camarles), the industrial estates, generally speaking, are segregated from the urban networks and quite fragmented, with the exception of the two concentrations closest to the urban centres of Tortosa and Roquetes. In general, all the industrial estates are located at a very short distance from the main road network infrastructures (AP-7, N-340, N-235, C-42 and C-12). A diverse set of circumstances can be seen in the rest of the territory. Accordingly, some industrial estates are grouped together forming small "business areas", mainly at a short distance from the population centres (Ascó, Mora d'Ebre, Perelló). However, in other areas where there is more than one industrial estate they are located in an isolated manner (Ulldecona, Sènia). Finally, in other municipalities, where there is only one industrial estate, it is located at a significant distance from the population centre (Gandesa, l'Ametlla de Mar).

In Terres de l'Ebre industrial estates there is more land available than taken up. Almost two thirds of the industrial estates have take up levels below 50%, which corresponds to almost three quarters of the total gross surface area. As can be seen in figure 7, land availability is a feature for industrial estates of all sizes, and particularly prevalent in the large number of medium-large sized industrial estates with take up levels below 25%. Bearing in mind the generally high degree of land availability, the small industrial estates have the highest level of saturation, since 15 of the 21 in the area have take up levels above 75%. Available land can be found throughout almost the entire territory, both in the triangle comprised by Tortosa-Roquetes, Amposta-Sant Carles and l'Aldea-Camarles (map 4), as well as the remaining regional capitals. Móra d'Ebre and Móra la Nova are the only exceptions: the land take up level for these municipalities in all the industrial estates is above 50%.

### 1.5. Comarques Centrals

The 329 industrial estates in Comarques Centrals cover 3,666 hectares, which corresponds approximately to 19% of the urban and development land for the area. The industrial estates in Comarques Centrals are mainly located on the three major plains in the areas (Pla de Bages, Plana de Vic and Conca d'Òdena), generally speaking following the structure of the urban system.

A characteristic feature of the site of the industrial estates in Comarques Centrals is that it has the second lowest percentage of industrial estates segregated from the urban networks (after the metropolitan area). In total there are 186 industrial estates, 57%, at a distance greater than 200 metres from one or other population centre. It can also be seen that, generally speaking, they can be found close to the main transport network infrastructures. In some cases, this site is due to relief factors, particularly in the regions of Solsonès, Berguedà, to the north and to the south of Bages and to the southeast of Anoia. That is, the parts of the territory which are not situated on the major plains of the area. Accordingly, the industrial estates (and also the main transport infrastructures) are located in the river-beds of the principal river networks (Llobregat, Anoia, Cardener).

On the Pla de Bages and Conca d'Òdena, the site of industrial estates reveal some similar characteristics (maps 5 and 6): within the municipal limits of the two capitals, Manresa and Igualada, the industrial estates are located in a concentric manner around the population centres, in the spaces closest to the access infrastructures to municipalities (radial) or in a circumvolutory manner (concentric). In the rest of the municipalities which make up part of the urban systems of Manresa and Igualada, the industrial estates are located very close to the main road network (the Llobregat motorway intersection with the Eix Transversal at Manresa and the A-2 at Igualada), but as opposed to what has happened in the two capitals, they are at quite a distance from the population centres. The industrial estates of Sant Fruitós de Bages, Santpedor and Sallent in the Manresa urban system, and the industrial estates of Jorba and Castellolí in the Igualada urban system, illustrate the segregation of industrial estates from population centres.

On the Plana de Vic, the municipality of Vic is of particular importance both in terms of the number of industrial estates as well as the total gross surface area they cover. Here the location of the industrial estates follows the model for Manresa and Igualada, that is, set up in a concentric manner around the population centre, in the spaces closest to the access infrastructures and by pass routes. In the rest of the municipalities of the Vic urban system, and the Osona region in general, the industrial estates, are generally appended to the population centres, despite there being a significant degree of fragmentation of small and medium sized industrial estates (see map 7).

In Comarques Centrals there is a great deal of land availability in the industrial estates. Even though the number of industrial estates with less than 50% take up account for 38% of the total number, the total gross surface areas is equivalent to 46%, almost half of the area total. As can be seen in figure 8, there is land available, above all in intermediary-sized industrial estates. Particularly noteworthy is that there are 41 medium-large sized industrial estates and 38 medium-small sized industrial estates with take up levels below 25%. If we single out the medium-small sized industrial estates as a whole, the most numerous in the area, there is a very significant number with high levels of saturation: 83 with take up levels above 75%. It should also be notes that the small industrial estates are those with the highest take up levels. Finally, in the few large industrial estates located in this area, one can find a wide range of circumstances, from industrial estates with high levels of land availability (4 with a take up level lower than 25%), to others with high levels of saturation (4 with take up levels above 75%). If we look closely at land available according to the location and the size of the industrial estate, one can see differences. As can be seen in maps 5, 6 and 7, in the main urban systems (Manresa, Vic, Igualada) land availability is particularly prevalent in medium and large sized industrial estates. In the two other region capitals (Solsona and Berga), land availability is prevalent in medium-large industrial estates. In the rest of the territory the situation varies considerably, and there is land available: at the two extremes, Sant Vicenç de Castellet-Castellgalí and in Avinyó, there is a wide variety of industrial estates with available land; in Balsareny the predominant feature is medium-large sized industrial estates; in Jorba large industrial estates and in Torelló medium-sized industrial estates. Finally, it should be noted that the polarities with less land availability are Manlleu, Calaf and Prats de Lluçanès.

## 1.6. Àmbit de Ponent

The 159 industrial estates located in Àmbit de Ponent cover 2,717 hectares, which corresponds to around 22% of the urban and development land for the area. The industrial estates in Àmbit de Ponent are mainly located following the urban system structure, very close to the main road transport network infrastructures, particularly the A-2 intersection and the Lleida urban system ring road network (LL-11, N-240, N-230, C-12, C-13, N-IIa). There is a major concentration of industrial estates in the Lleida urban system (map 8), both in terms of number and total gross surfaces area. Moving out, the Mollerussa and Tàrrega urban systems are located at a second level. At a third level we have the remaining regional capital urban systems: Cervera, Balaguer and Borges Blanques. At a fourth level we find the sub-regional polarities: Bellpuig, Agramunt and Guissona. Finally, there is a group of small-population municipalities: Ponts, Artesa de Segre, Maials, l'Albí, Vinaixa and Sant Guim de Freixenet.

When analysing the site of the industrial estates, it should be noted that there is a particularly high percentage of industrial estates segregated from urban fabrics. This is the case for 114 industrial estates, which account for 72% of the 159 located in this area and this high figure is attributable to a variety of factors: in general, at the planning stage, the industrial estates have been located at a considerable distance from residential development land, and in many cases these plans have still to be put into effect. One should bear in mind that municipal areas in Àmbit de Ponent, are larger in size that in the rest of Catalonia, and generally speaking the relatively flat. These features, combined with the trend to locate industrial estates at a distance from population centres, has meant that in many cases they have been located on the extreme limits of the municipality, with the paradoxical situation that, in some parts of the territory, they border on population centres of neighbouring municipalities. One also needs to bear in mind that many of the business enterprises located in these industrial estates are related to the agro-industry and highly incompatible with residential uses, hence the situation where the industrial estates which house these businesses have to be located a long way from population centres. In other cases, the proximity of the farming exploitation has become a determining factor when it comes to their site.

As regards the spatial relationship between industrial estates, one can see two opposing phenomena. On the one hand there are large "business areas", a feature which is found in the three major concentrations of industrial estates to the east of the municipality of Lleida and the two areas around the Alcarràs-Torres de Segre intersection on the N-IIa. This is also characteristic of urban development in Tàrrega, where find the areas' fourth most important of "business areas", and in Cervera, Agramunt and Bellpuig, among the remaining polarities at a regional and sub-regional level. On the other hand, along with the development of "business areas", one finds the opposite state of affairs, that is, fragmentation. Good examples of this would be the urban system of Mollerussa, Balaguer, and Bell-lloc d'Urgell (the latter being part of the Lleida urban system).

In Àmbit de Ponent more than half of the industrial estates have take up levels below 50%, which illustrates that there is a considerable amount of land available in the industrial estates. As can be seen in figure 9, the availability of land is particularly prevalent in medium-sized industrial estates highlighted particularly by 36 medium-large industrial estates with take up levels ranging from 1%-25%. Looking at medium-small industrial estates one finds both extremes: there is a substantial amount of available land (36 with less than 25%) as well as others with high levels of saturation (30 with take up levels above 75%). Small industrial estates have very high take up levels - almost all of them have land take up levels above 75%. From among the few large industrial estates in this area, it should be noted that 5 of the 8 found here have take up levels below 50%. The distribution of industrial estates and availability of land in this area varies from one extreme to another. As can be seen in map 8, in the main "business area", to the east of the municipality of Lleida, the take up levels are the highest, although there are some industrial estates with less than 25% take up. In the second and third "business area" for this area, at the Alcarràs intersection on the N-IIa, one can see that there is a substantial amount of land availability in medium-sized industrial estates. Land is also available in Tàrrega, however, here in the case of large industrial estates. In Mollerussa there is land available in industrial estates of all sizes, while in the rest of the municipalities of the Lleida urban system one can see a strong presence of medium and large industrial estates with take up levels ranging from 26% to 50%.

### 1.7. Alt Pirineu and Aran

The 24 industrial estates in Alt Pirineu i Aran cover 158 hectares. They are located mainly following the urban system of the area. So, the major industrial estates are in la Seu d'Urgell, Puigcerdà and Tremp. At a second level we have Vielha e Mijaran. At a third level we have the other two region capitals (Sort and el Pont de Suert), and other sub-regional polarities (Pobla de Segur, Oliana, and Bellver de Cerdanya). Finally, we have two industrial estates, one in Prats i Sansor, in la Cerdanya, and another in Les, in the Val d'Aran. If we take a closer look at the site one can see that there are 18 industrial estates, 75%, located at a distance of more than 200 metres from one or other population centre. As regards the availability of land, as can be see in figure 10, more than half have take up levels below 50%, with a predominance of industrial estates with take up level within the 1%-25% range. If one looks at the data for the entire area, availability of land can be seen in small industrial estates (0.6-1.9 hectares), small-medium (2-4.9 hectares), and medium (5-9.9 hectares, and 10-19.9 hectares). In all the municipalities with industrial estates there are some with take up levels below 50%; the only exceptions being Vielha e Mijaran and Oliana.

## 2. Demand for space perspectives in industrial estates

The data given below provide us with information about the business enterprises located in industrial estates in Catalonia. These have been obtained from a questionnaire sent to the local councils where there is land classified for industrial use, tertiary or mixed. The resulting data obtained have been distilled and systematised by the IERMB team, from which a sample of industrial estates has been obtained. This sample allows for analysing data by territorial area[5] and, from these, for mapping out cross variables in some cases.

The first idea that should be noted from these results is that the traditional operations functions of industrial estates are undergoing a transformation. As can be seen in figure 11, in Catalonia industry occupies a little less than half of the land in industrial estates, while businesses dedicated to transport and warehousing are becoming more and more prevalent and even the predominant type of business in some of the more recent industrial estates. Both industry and transport/warehousing take up approximately three quarters of the land in industrial estates throughout Catalonia. The third branch of business enterprises in terms of percentage take up is wholesale commerce, accounting for almost 8%. Next in order are services provided for companies and people, which add up to approximately another 8%. Retail businesses account for 1.5% of the land.

This land take up is the result of changes taking place in recent decades in the internal structure and organisation of business enterprises, which have led to an increase in the presence of tertiary sector enterprise (in terms of production and take up) and with a resulting loss of the secondary sector. This, however, continues to be a key element to guarantee economic growth and competitivity. This transformation of the economy has been accompanied by territorial dynamics of decentralisation and dispersion of production throughout Catalonia combined with the relocation of business operations at a world scale.

Industrial estates, as spaces for specialised business enterprises, are the areas where these changes are most clearly visible. The location of retail and wholesale businesses, services enterprises for companies and people, the increase in demand for spaces for logistic businesses, the "pushing out" of "light" manufacturing companies from the centres of cities, the transformation of old industrial spaces for mixed use with residential functions in mind, have transferred competition for land use to industrial estates. In some cases, however, this has made it difficult to consider traditional manufacturing businesses as the main candidates for these spaces. All things considered, we are witnessing a process of relocation of business activities and an increase in logistics and tertiary businesses, facts which are determining demand for space in industrial estates.

The relocation of manufacturing began in the 1980s in Barcelona and in other cities with an industrial tradition in the metropolitan area of Barcelona. This process is dealt with in 1994, volume 18 of the journal *Papers*[6]. In this volume various contributors analysed the principal relocation dynamics of manufacturing enterprises ranging Barcelona out towards the rest of the metropolitan area of Barcelona. The general consensus in these articles underlined how manufacturing was relocated or "pushed out" from the centre of the city to industrial estates on the periphery of Barcelona and the other consolidated Metropolitan cities.

These relocation dynamics of manufacturing companies, as is illustrated by the data collected during 2006, have continued in the metropolitan area of Barcelona with a parallel pattern that has extended to the major cities in Catalonia. Illustrative examples of this are the transformations in the urban areas of Gran Via-L'Hospitalet, Badalona and Cornellà (being the most important), part of the urban spread of Barcelona. But this has also been the case for Lleida, Reus, Olot and other cities that have put into practice policy changes regarding the urban fabric and urban uses, substituting traditional industrial spaces for residential or mixed use spaces.

Also, during recent years there has been a heavy increase in demand for land for logistics use in industrial estates, although this has not happened in the same way throughout the territory of Catalonia. As can be seen in figure 12, the main concentrations of logistics enterprises has taken place in Àmbit de Ponent, where 40% of the land is taken up with these kinds of companies, and in Àmbit Metropolità with a 25% take up of land. In addition, there are noteworthy concentrations, albeit to a lesser degree, in Comarques Gironines (15%), Terres de l'Ebre (12%) and in Comarques Centrals (11%), not forgetting Alt Pirineu i Aran where there is also a considerable concentration (above 40%). Despite the fact that quantification has not been possible, it has also been possible to verify the presence of transport and warehousing businesses linked to port transit in the Tarragona-Reus metropolitan area based on the in-depth interviews.

In Àmbit de Ponent, such high levels of land take up by logistics enterprises need to be seen in the light of warehouses and agro-food stuffs haulage businesses. With recent improvements to the Ebre corridor road and rail network and its trajectory through Àmbit de Ponent, it is expected that land demand for logistics businesses will continue to increase.

Generally speaking, as we have already seen for the metropolitan area of Barcelona, transport and warehousing businesses occupy one quarter of the land. Nevertheless, this percentage changes in relation to the year the industrial estate came into operation. As can be seen in figure 13, the more recent the industrial estate the greater the percentage land take up for logistics businesses and the lower the percentage for industry. For industrial estates coming into operation prior to 1960, the percentage of transport and warehousing businesses does not even reach 10% of the total, however, this percentage increases to 15% for those industrial estates that opened between the 1960s and 1980s, and reaches almost 20% for those that started to operate in the 1980s. In Industrial estates that have been set up and running more recently (between 1994 and 2006), transport and warehousing companies account for almost 50% of industrial estate land use, which indicates that the space demand for these businesses has increased in recent years. The main reason behind this lies in the increase in cargo transit at the Port of Barcelona. Given the growth perspectives of the Port, one can expect that, in the future, demand for logistics businesses will continue to grow, both in the metropolitan area as well as in the bordering regions: Baix Penedès, Anoia, Bages, and la Selva.

Tertiary businesses occupy one fourth of the industrial estates' land in Catalonia. As has taken place in this sector in general, there is a diverse range of tertiary businesses operating in industrial estates. However, one has to take into account that the presence of these businesses is one of the main factors that have contributed to increasing competition for land use. This fact, as mentioned earlier, has caused difficulties in some cases regarding location manufacturing businesses. In an attempt to analyse this competition for land use, a classification has been made of tertiary businesses based on the kinds of manufacturing operations they carry out in industrial estates and location alternatives. Accordingly, three basic different groups of businesses have been defined: those that need to be located in the industrial estates, those which provide a direct service to companies or persons that work there; and those located in industrial estates that do no fit into the two previous categories.

A clear example of tertiary businesses that need to be located in industrial estates, are wholesale businesses. As can be seen in figure 11, they take up 8% of the land in industrial estates in Catalonia. These companies need large surface areas to be able to store merchandise and require good accessibility and access. Furthermore, they are incompatible, in the majority of cases, with residential use, since they generate quite significant flows of heavy goods vehicles to meet their transportation needs. These are businesses which are likely to grow in the future and, consequently, so will their demand for space in industrial estates.

The second group includes those businesses which provide services to companies and workers in industrial estates. These are catering businesses, banking facilities, petrol stations, some hotels and others. At present there are many industrial estates lacking in these services, as can be seen in figure 14: approximately 60% of industrial estates do not have restaurants, almost 90% do not have banking facilities, and another 90% are not provided with other types of services for companies in industrial estates. In addition, one can appreciate differences depending on the territorial area, particularly in the case of banking facilities: there is a sharp contrast between the metropolitan area of Barcelona, where these services are provided in one in four industrial estates, and the rest of Catalonia, where they are practically non-existent. It should also be pointed out that there is a serious shortage of services for industrial estates in Comarques Centrals .

As can be seen in figure 15, the presence of these kinds of services is closely related to the size of the industrial estates. Accordingly, the largest industrial estates have more services than the medium size industrial estates, and these, in turn, have more than the small industrial estates. One can conclude that the demand for space for these services will be determined by the size of the industrial estate under development. Whatever the case, one has to consider that these businesses contribute characteristics to the industrial estate which improve the competitivity of the companies located there, not to mention the quality of life for the people who work there.

As stated earlier, there is a third group among tertiary industry businesses located in industrial estates. These are those businesses which do not provide a direct service either to companies or individuals that work there, and that, furthermore, do not have characteristics that are incompatible with residential uses. As can be seen in figure 16, these businesses occupy approximately 8% of the land in industrial estates in Catalonia. On closer analysis of the data by territorial area, one can see that in the remaining areas the percentages are quite similar and vary between 7% in the metropolitan area of Barcelona and 12% in Comarques Gironines. The exception here is Alt Pirineu i Aran, where these businesses occupy 35% of industrial estates' land space. The location of these kinds of companies in industrial estates, from a global perspective, has to be seen in the light of a need for land space for buildings at a lower price, bearing in mind that, as opposed to other services businesses, these kinds of companies could be located in urban centres.

## 3. Qualitative analysis: in-depth interviews

As stated in the introduction to this article, the quantitative analysis given in the preceding sections have been complemented with a qualitative analysis. The objective here is to gather the opinions and perceptions of people linked to industrial estates, either because they are responsible for managing them from one or other local government area, or because they are experts on this topic.

This qualitative analysis was carried out using in-depth interviews and, after analysis, four main topic areas have been determined based on the opinions of those interviewed and, in addition, some proposals for improvements which are also given below[7]. The four major topics are the: economic and territorial dynamics of businesses, supply, characteristics and functions of industrial estates, and demand for industrial estates.

Economic and territorial dynamics of businesses follow, according to those interviewed, two tendencies in Catalonia. The first, which began some decades ago, is a process moving away from the urban centres to the periphery of the cities, a phenomenon which is known as relocation. The second tendency, which is more recent and complementary to the first, is the phenomenon known as outsourcing, which is the process of re-siting activities outside Catalonia, in benefit to other autonomous regions or even other counties.

Relocation is well-known and common to all urban areas. This is related to the need to move "bothersome" businesses away residential areas and to consolidate urban land space for other uses. This process consists of relocating these businesses out towards a city's peripheral urban areas or else towards smaller population centres in the surrounding areas. What is interesting here are the nuances that those interviewed give when assessing the rate of this process. City dynamics move at a slow pace and even though it may have begun some decades ago there are now still many medium and small industries occupying land space areas within urban limits. This situation invites one to believe that this will maintain demand for land space in peripheral urban areas for some time to come, because slowly but surely small and medium-small sized companies are moving away from the consolidated urban areas of cities.

Outsourcing is a dynamics of relocating companies outside Catalonia, which those interviewed attribute to different factors such as the price of land, the need for more space, supply of services, communications and infrastructures. The target land implies thinking at different territorial levels, even though the most common case is moving abroad - when companies decide to move to another country where production costs are much lower. Nevertheless, the destination for the new locations is not the only or most important consideration. According to those interviewed, the territories most in competition with Catalonia are bordering autonomous communities: Aragón —and the city of Zaragoza, where there is a substantial offer of industrial land and a dry port—, and the Comunidad Valenciana —with the city of Valencia, where large companies linked to exporting can take advantage of the seaport. The same can be said, although not to the same degree, for Castile-La Mancha, the coast of Andalusia and Murcia. Outsourcing manifests itself in different ways according to the size of the company: in the case of large companies this takes the form of a division of operations (production is moved away while management stays here), while in the case of small companies the move means the entire production unit. Despite the fact that these dynamics show all the signs of continuing, some of those interviewed warned that outsourcing a company is a very complex operation and so this phenomenon may not be as widespread as one might predict.

The metropolitan area of Barcelona and Àmbit de Ponent are, according to those interviewed, the only territorial areas with predominant businesses sectors. In the case of the metropolitan area of Barcelona, the most significant current business sector is the metal products industry, seconded by textiles, although textiles is a sector that is clearly in decline. The tertiary and quinary sectors, which have come forward as a replacements for companies with little added value or sectors in clear decline do not appear to be able to compensate for the loss of companies and jobs. In Àmbit de Ponent the most important businesses are linked to the agro-food stuffs industry derived from livestock (abattoirs, the meat industry, freeze storage, etc) and handling fruit and vegetables. All of these take up a large amount of land space with the backing of a significant logistics sector.

Opinions regarding the supply of industrial estates focused on areas of major growth potential and land availability, both (as one might expect) closely related. The supply of industrial land is not seen as monolithic issue at a global level for Catalonia, but rather that its analysis by obligation has to start from its location. The view of those interviewed not only made mention of the quantity of land but also of to the value of its relative location in the territory.

All those interviewed concur in the fact that in the metropolitan area of Barcelona those zones with the greatest degree of land availability and growth potential are located in Alt Penedès, Vallès Occidental, Vallès Oriental and Baix Llobregat, albeit with a few peculiar features. Vallès Occidental appears to be one of the regions that offers most attractive to the business world, while great emphasis and value is placed on the presence of "clusters" (the result of help from the European Union). The experience in this region could well extend to Bages and Osona, provided that infrastructures are improved. Baix Llobregat, in contrast, is attributed with positive characteristics which are the result of the mixture of uses between industrial and residential functions.

As for Baix Penedès, region as a hinge between Camp de Tarragona and the metropolitan area of Barcelona, the advantages seen here are related to the AP-7 motorway as a connector between spaces outside Catalonia (Aragon and País Valencià), to flat orographic conditions and that they have not reached the saturation levels of the metropolitan area of Barcelona. A little to the south, Camp de Tarragona is seen as one of the growing areas with comparable advantages such as major infrastructures (port, airport, motorway) and a network of cities consolidated by mixed land uses and availability. Concerning Àmbit de Ponent, the opinion is that there is a generation of new industrial land which will be set aside for logistics, particularly at some 25 kilometres from area of the capital Lleida. Reasons given are based on the comparative advantages regarding land availability, price and infrastructures, etc. Within these parameters, the industrial land in the western areas is seen in relation to all the development that is going on in Saragossa. This city is not seen as a competitor but rather as a complementary element to all that could happen in Lleida. Finally, and located more to the north, there was mention of potential growth in Alt Empordà.

The people we interviewed see availability of land in terms of its location related to the metropolitan area of Barcelona: the further away the greater the availability of land. Taking this factor as a basis, there are two variables that impose restrictions on its use: the short supply of sizeable parcels of land appropriate for companies with large land space requirements, and changes in land classification –land programmed for industrial use being re-classified for residential use. This re-classification is being carried out by a number of local councils. The price of land, however, does not appear to be a decisive factor, although there has been a lobby against those who are holding on to land expecting land prices to increase.

Another of the key ideas expressed by those interviewed is that in recent years business profiles in industrial estates have been changing at the same time that functional aspects have been added derived from the secondary sector and linked to services. These changes have been accompanied by new accessibility needs, both regarding workers and goods. One of the most relevant facts, and at the same time seen as a positive factor, is the increase in the diversity of businesses in industrial estates, which is related to changes in the economy in general and changes in the production structures. For these reasons, more now than ever, industrial estates are no longer associated with industry, particularly those that have been created more recently.

Turning to more atypical businesses which can now be found in industrial estates, we would like to point out two: the science and technology parks and logistics businesses. Concerning the former it was stated that, despite having grown very quickly and apparently spread all over the territory (linked to universities), their relative use in terms of percentage of industrial land is very low and therefore they do not represent a threat to more traditional industrial land use by the secondary sector. However, it was pointed out that the supply of land set aside for these uses is growing fast. Logistics is one of the very recent elements introduced into industrial estates, a significant growing trend resulting from global dynamics, such as the fragmentation and specialisation of production processes, but also from dynamics at a more local level. All of this is influenced by the strategic position of Catalonia situated between the Mediterranean and the rest of Europe. Concerning logistics, they also point out some conflicts deriving from the perception this kind of business requires a lot of land but generates few jobs, although everyone agrees that this is strategic.

Of all these transformations and the actual ageing of industrial estates, some problems are appearing particularly in those built before the 1980s. The oldest, at the time of writing, are already in need of remodelling and modernising which requires the active involvement of the local governments and the companies themselves. The main focus of remodelling is to improve access both in terms of accessibility within and outside as a necessary requirement for industrial estates to be competitive and efficient. On this particular point those interviewed underlined the needs of workers to be able to get to the workplace in industrial estates by public or collective transports means.

According to those interviewed, the change in demand for industrial estates, lies in the type and order of land holding option for industrial estate premises and the infrastructures, while at the same time they attribute this change to transformations in manufacturing businesses and companies relocating.

In this context one can see a diversification of the types of land tenure since, somewhat tentatively, renting seems to be gaining ground (as in the rest of Europe) as an alternative, albeit for a minority, to land ownership. The main advantage of renting is related to reduced requirements for tied-up capital. It is in this context that formulations are in the early states, to apply pressure to local authorities to intervene and promote and offer industrial estate premises for rent. This needs to be protected through official legislation or through some involvement by local authorities, so that certain manufacturing sectors can have access to this option.

They also explain that the trend in the profile of industrial estate premises, throughout Catalonia, is moving more and more towards small buildings, around 500 m$^2$ or even smaller and of a modular nature. However, this tendency in no way suggests that the demand for large spaces is disappearing.

The opinions and perceptions concerning demand not only refer to land or the industrial estate premises but also to the infrastructures that industrial estates have or should have. Following on from this, the main deficits referred to by those interviewed are generally centre on the road and energy networks, and they underline the lack of connections with the Barcelona port and airport. Growth needs are not only related to the availability of land but also to the quality of the infrastructures that can give added value to the territory that goes far beyond the price factor, given that prices have increased everywhere. Finally, it should be pointed out, even though this is not a topic that came out in all the interviews, the quality of the environment around the industrial estates is perceived as being a factor that is becoming more and more important.

Finally, our interviewees pointed out a series of proposals that revolve around two basic ideas: supra-municipal planning of industrial estates and shared management of them. The first attempts to resolve current atomising in the site of industrial estates in the territory. This is due far too often to planning formulated at a local level, and has serious implications for the environment, not forgetting accessibility problems and does not allow for sufficient critical mass. Generally speaking, those who were interviewed coincide in pointing out that the Generalitat (the autonomous Catalan government and local supra-municipal government with jurisdiction over urban planning), would need to make strategic land reserves so as to be able to develop them from a more large and less local level. They also point out the importance of coordination with local governments. The second proposal refers to shared industrial estate management, with the creation of a figure who could manage topics that are common to this public space: infrastructures and services provided for the industrial estates, and complexities common to the companies. This position of industrial estate manager would be adequate both for the businesses of the industrial estate and for the Administration, which would have a unique speaker.

## 4. Conclusions

In this article an analysis has been made of some of the principle elements that have a bearing on the supply and demand of industrial estates in Catalonia. This study begins from the premise that there is a lack of information resulting from the lack of a specific official institution that would facilitate identifying and defining what are known as industrial estates. These are identified in urban planning legislation according to use (industrial, tertiary and/or mixed) for the purpose of classifying land, but in many cases, within these areas there is more than one industrial estate. As a rule, it has been the governments, particularly local governments and some institutions, that have delimited the industrial estates in the territory under their jurisdiction basing their delimitation on the criteria of continuity between the urban fabrics or from the development of urban planning. The result, however, is that in Catalonia the study of industrial estates has been based on sources that are neither homogenous nor exhaustive.

This situation is the starting point of this article which attempts to compensate for the aforementioned deficiencies. Three different sources have been drawn on which are mutually complementary, both in terms of methodology used as well as the information gathered. The first source, cartographic, has allowed for carrying out a *Cens de polígons d'activitat de Catalunya, 2005-2006*, which with the application of GIS techniques has provided spatial data related to location, dimensions, site and land take up in industrial estates. The second source provides statistical data based on questionnaires answered by local governments in Catalonia who have jurisdiction over land assigned for industrial, tertiary or mixed use. This resulted in the *Mostra de polígons d'activitat de Catalunya, 2005-2006*, with quantitative information about the businesses located throughout Catalonia. Finally, by way of a further complementary source, it was felt necessary to carry out in-depth interviews with experts and people with knowledge in this area, which provided qualitative information concerning the reasons and arguments behind the current situation of the industrial estates in Catalonia.

Once all the data was collected and organised, the next step was to analyse supply of and demand for industrial estates which is presented in this concluding section, combining quantitative data for Catalonia as a whole (to date non-existent) with feedback from the various agents mentioned. Supply has been considered in terms of location and surface area, availability of land in the industrial estates, and their site in relation to the rest of the industrial estates and to urban centres. The basis for analysing demand has been the businesses located in industrial estates, relating them with the main tendencies in economic and territorial dynamics.

The first supply factor analysed was location and surface area of industrial estates. According to data from the census, in Catalonia there are 1,750 industrial estates that cover an area of 32,000 hectares. Generally speaking, it can be seen that although there is a concentration of industrial estates in the metropolitan area of Barcelona, there is also a substantial park of industrial estates in the rest of the territory. To be more specific, half of the industrial estates in surface area are located in the metropolitan area of Barcelona, 15% in the Camp de Tarragona, 11% each for Comarques Gironines and Comarques Centrals, 8% in Àmbit de Ponent, 4.3% in Terres de l'Ebre and 0.5% in Alt Pirineu i Aran.

The second supply factor analysed was the availability of land. According to the data from the census, from the 32,000 hectares of industrial estates in Catalonia, 10,000 hectares (one third) have take up levels lower than 25%, and from these approximately 2,700 hectares are unoccupied –most of this space corresponds to industrial estates in the phase of being set up and running or at the project stage. The following is a break down by area of land availability given in hectares where take up levels are lower than 25%. First in order is the metropolitan area of Barcelona which has 3,789 hectares with take up levels below 25% (35.9% of the total land in Catalonia with these take up levels). Second, we have the Camp de Tarragona which has 2,300 hectares (21.4% of the total for Catalonia). Third, we have Comarques Gironines, Comarques Centrals and Àmbit de Ponent, each having approximately 1,300 hectares (each corresponding to 12% of the total for Catalonia). These regions are followed by Terres de l'Ebre where there are approximately 600 hectares (5.9% of the total for Catalonia) and, finally, Alt Pirineu i Aran with 65 hectares (0.6% of the total for Catalonia). The views of those interviewed concerning land availability in industrial estates in Catalonia centred on their location with respect to the metropolitan area of Barcelona. In their opinion the further from the capital (Barcelona) the greater the availability of land. Nevertheless, as has been seen, the data obtained from the census do not appear to corroborate this view entirely. Almost certainly these differences derive from two interpretations: for the metropolitan area of Barcelona, land presently being developed as industrial estates (e.g. the "Parc empresarial de Viladecans") or at the project stage (e.g. the "Centre Direccional in Cerdanyola del Vallès") are not seen as a supply component; secondly, the fact that there are many industrial estates with high take up levels adds to the perception of saturation (9,000 hectares, more than half, have take up levels above 75%). In short, one can conclude that there is a substantial amount of land available in all the territorial areas and the metropolitan area of Barcelona is the area where most is located.

As has been seen, the availability of land and its distribution throughout Catalonia are factors that need to be highlighted when considering the supply of industrial estates. Therefore, given the current situation, one cannot consider supply to be an impediment to developing economic activities. However, from among the other elements related to supply that have been analysed here, it should be stressed that dimensions, in most cases very small, and excessive fragmentation and dispersion of industrial estates throughout Catalonia, are perceived by those interviewed as factors that have a negative impact, not only on the territory but also on the competitivity of the economy. This view is held by the majority of those interviewed who, in addition, point out that large industrial estates or concentrations of industrial estates that make up "business areas" are a feature of rational land use and the only way to promote collective transport. From the census it has been possible to diagnose the current state of affairs concerning these issues. The first thing that should be underlined are the differences in the size of industrial estates between different territorial areas. Accordingly, in Camp de Tarragona, Terres de l'Ebre and the metropolitan area of Barcelona, the average figures for land space occupied by an industrial estate are higher (28.6 ha., 22.6 ha. and 21.9 ha., respectively), as opposed to Àmbit de Ponent (17.1 ha.), and particularly in Comarques Gironines and Comarques Centrals (12.8 ha. and 11.1 ha., respectively). As this study has shown, these differences between areas are also reproduced within each one. Generally speaking, in those parts of the territory where urban development has been more intense one can see concentrations of industrial estates that make up "business areas". This is the case for the area covered by the Pla General Metropolità (PGM – *Barcelona Metropolitan Planning*), the traditional industrial cities in the metropolitan area of Barcelona, the metropolitan area of Reus-Tarragona, and some of the other major urban systems in Catalonia (Lleida, Girona and Manresa). From these areas one needs to differentiate between PGM area, where the "business areas" are mapped out in the majority of cases from a supra-municipal perspective, and the rest, where planning is limited by an individual municipal view. In the other parts of the territory the characteristic features of site of the industrial estates are a high degree of fragmentation and being either medium sized (between 2 and 10 ha.) or small (from 0.5 to 2 ha.). In short, as regards dimensions and site of industrial estates, one can talk of supply in terms of a diverse range and spread out across Catalonia, both across different areas and, especially, within each area. With the exception of the PGM area, this due to the lack of a supra-municipal perspective.

An analysis has also been made of the site of the industrial estates in relation to urban centres. With the exception of areas where urban development has been most intense (the PGM area) or where the development land is seen as limited due to relief conditions, based on the census one can see a sharp degree of segregation with respect to the rest of the urban fabric. In total in Catalonia, of the 1,750 industrial estates, half are at a distance of more than 200 metres from one or other urban centre. Breaking this down by areas, the metropolitan area of Barcelona (the area with the highest level of urban development) shows the lowest percentage for segregated industrial estates (30.2% over the total industrial estates for this area), however since there is a very large park of industrial estates the number is very significant (215 segregated industrial estates). Second in order, we have Comarques Centrals (with 56.5%, 186 industrial estates) and Terres de l'Ebre (62.3%, 38 industrial estates). Finally, we have the areas with the highest percentage of segregated industrial estates: Comarques Gironines (70.4%, 202 industrial estates), Àmbit de Ponent (71.7%, 114 industrial estates) and Camp de Tarragona (72.7%, 128 industrial estates). These high percentages are generally due to a combination of two factors. First, in the general plans, the industrial estates have been located at quite a distance from the urban centres, leaving space in between to allow residential areas to grow, and in most cases these provisions have not been put into effect. The second most common factor has to do with the location of many industrial estates close to main road network infrastructures at a certain distance from urban fabrics. Given this, the majority of those interviewed, when referring to the issue of site of industrial estates in relation to urban centres, begin from one premise: the functions of industrial estates have changed and many of the businesses located in industrial estates are not incompatible with residential uses.

Turning to the perspective of demand for space in industrial estates, the change in the functions of industrial estates turns out to be a particularly important factor. First of all, one needs to bear in mind that these changes are determined by the main economic and territorial dynamics. At present, they are characterised by the shift towards tertiary enterprises in the economy, the fragmentation of production, the relocation of businesses inside Catalonia and the outsourcing of business enterprises outside Catalonia. The latter process was one of the most predominant issues referred to by those interviewed. In general, this is seen as being linked more to production costs rather than the consequence of land shortage or land prices. In contrast to the production costs issue, the quality of the environment around the industrial estates is considered by those interviewed to be an important factor for competitivity in order to attract and keep companies there.

Industrial estates, as specialised spaces of economic activity, are the areas where these processes are most apparent, and, as stated earlier, they have led to changes in the kinds of businesses that can be found in industrial estates. Accordingly, industry occupies a little less than half of the industrial estates' land, and one can predict that the demand for space by this sector will not increase appreciably. New demands will be determined by the relocation of manufacturing businesses (from the centres of cities to the periphery) and attracting new companies. With this in mind, the main future challenges appear to be: remodelling the oldest industrial spaces, adapting them to the new demands for industrial estate premises (smaller format, modular, with spaces for offices, and also introducing the option to rent) and the profile of industrial estates (services for companies and workers, development quality and facilities, good access routes).

These opinions are backed up by the data from the sample, where one can see that transport and warehousing businesses account for one fourth of the land, and are even more predominant in some of the more recent industrial estates. Statistical evidence for the presence of logistics companies in industrial estates provide us with a break down of the most important areas where they are concentrated: 40% in Àmbit de Ponent, 25% for the metropolitan area of Barcelona, and Camp de Tarragona (although the sample did not allow for empirical quantification, we were able to verify the case for this area from the in-depth interviews). In the first case, the strong presence of logistics businesses is associated with local agroindustrial companies, while in the other cases this is due, above all, to the proximity of two of the principal Mediterranean ports. In all three areas it is expected that the demand for space by these businesses will continue to grow, in one case due to the agroindustrial businesses and in the other two because of expected growth of the ports. One can expect that logistics enterprises will continue demanding space in industrial estates throughout Catalonia since, as pointed out by those interviewed, with the fragmentation and specialisation processes of production the commercial exchange of goods is becoming more and more commonplace. In general, the logistics sector is seen by those interviewed as a kind of undesired type of activity, especially as one moves further away from the ports of Tarragona and Barcelona. So, although everyone considers this to be a strategic matter, they also point out certain conflicts resulting from the belief that logistics enterprises require large areas of land but generate few jobs.

Finally, tertiary activities account for one fourth of the land of the industrial estates in Catalonia. One has to take into account that the presence of these businesses is one of the principal elements that have caused an increase in competition for land use, which in some cases has posed difficulties for locating manufacturing businesses. As it is happening in the sector in general, there is also a wide range of tertiary businesses in industrial estates. To facilitate analysis of this competition, tertiary businesses have been classified based on the operations they carry out in the industrial estates and location alternatives. Accordingly, one needs to distinguish three business groups: in the first group there are those which have to be located in industrial estates, such as wholesale businesses which, due to the volume flow of goods, would make them incompatible with residential uses. These activities account for 8% of the land in industrial estates in Catalonia and it is forecast that demand will continue to increase. The second group is comprised of businesses that offer services to companies or workers in industrial estates. These are catering businesses, banking facilities, petrol stations, some hotels and others. At the moment there are many industrial estates where there is a shortage of these services, particularly in the smallest industrial estates. So, one can predict that demand for space by these services will be determined by the size of the industrial estates under development. However, one has to bear in mind that they improve competitivity of the companies located there and the quality of life for those people who work there also. The third group is comprised of those businesses which do not provide a direct service either to companies or people, and furthermore are not incompatible with residential uses. These businesses account for 8% of the land in industrial estates in Catalonia and, generally speaking, their location has to be related to the possibility of access to more ground space at a lower price. However, one should bear in mind that these businesses add to competition for land use in industrial estates which can pose difficulties regarding the locating of other branches of business.

1 This article brings together the major contributions from the study entitled "Anàlisi de l'oferta i la demanda de polígons industrials i terciaris a Catalunya" ("*An analysis of supply and demand for industrial and tertiary industrial estates in Catalonia*") by the IERMB team commissioned by the Departament de Política Territorial i Obres Públiques (*Department for Territorial Policy and Public Works*).The authors would like to especially thank Maria Costa's work in the development of the *Census*.

2 Ortofotomapes 1:25.000 de l'ICC, versió 4. Any dels vols 2000-2003.

3 In this article we have used the seven functional areas for the purpose of our study as given in the Pla Territorial General de Catalunya (*General Territorial Plan for Catalonia*): the Àmbit Metropolità (*Metropolitan Area*), Comarques Gironines (*Girona Regions*), Camp de Tarragona (*Tarragona Area*), Terres de l'Ebre (*Ebre Lands*), Comarques Centrals (*Central Regions*), Àmbit de Ponent (*Western Area*) and the Alt Pirineu i Aran (*High Pyrenees and Aran*). We also use "metropolitan area of Barcelona" when referring to the Metropolitan Area.

4 Data source for urban and development land: Direcció General d'Urbanisme. www.gencat.net/ptop

5 The data for Camp de Tarragona (*Tarragona Area*) have not been included as they proved to be of slight significance.

6 See the article entitled "La ciutat i la indústria" ("The City and Industry").

7 For a complete list of interviewed, please see footnote 6 on the Catalan text.

# ACCESS TO INDUSTRIAL ESTATES: UNFINISHED BUSINESS

Àngel Cebollada

## Introduction

Industry has been re-located to industrial estates on the urban periphery without considering how accessible they are for workers. There is a severe deficiency of collective transport systems linking these industrial estates, and so the car is effectively the means of transport which best guarantees access. This situation has serious social and environmental repercussions. To address this situation, the "Llei de mobilitat de Catalunya" ("*Mobility Law for Catalonia*") provides for executing mobility plans for its industrial estates and creating mobility managers. These two provisions have just begun to be put into practice throughout Catalonia.

## 1. Inaccessible industrial estates

In recent decades Catalonia has witnessed a process of re-location of economic activities, characterised, to a certain degree, by focusing services (especially advanced services) in urban centres and relocating commercial enterprises that require large land areas, such as industry, to the peripheral urban areas. This is also part of a larger picture, a gradual process of specialised land use according to the purpose for which it is used, and which generates unique and physically separate specialised zones. This is precisely the case for the industrial estates which now form part of our daily urban landscape (López de Lucio, 1993).

The creation of these industrial estates coincides with the increased use of privately-owned vehicles and with the gradual downsizing of various collective transport means. As a result, areas have been specifically designed to house industry in suburban spaces located at varying distances from traditional urban stretches without allowing for means of transport other than a privately-owned car (Cebollada i Miralles, 2005).

The outcome of this process is a situation where there are numerous and fragmented industrial areas where accessibility is a serious problem unless one gets there by car. This is illustrated in the study by the Metropolitan Region of Barcelona's Comissió de Mobilitat del Pacte Industrial[1] (see table 1): 19% of industrial estates within the Metropolitan Area of Barcelona and 20% of the land area where industry is located are particularly difficult to get to if public transport is used. By this I mean that the closest inter-urban bus stops or train stations are 1.5 kilometres from the centre of an industrial estate as the bird flies. In contrast, 23% of industrial estates and 26% of the land area where industry is located are accessible through regular public transport services (PIRMB, 2003). However, these figures are somewhat optimistic when we take into account that the transport services themselves have not been evaluated adequately. By this I mean that while an industrial estate could be 500 metres from a train station, the trains may only run once every two hours, or there may be a bus that runs once an hour to an industrial estate where five thousand workers are employed. Furthermore, what has not been taken into consideration are physical, natural or urban obstacles that separate the train station or bus stop from the industrial estate.

Another issue is the minor role played by company-operated transport. In the beginning (at the end of the 1960s and the beginning of the 1970s), the first companies to set up business in these industrial estates provided transport for their employees, but with the passing of time this means of transport has been progressively withdrawn. This fact is explained by increased car ownership among the population, residential dispersion, inflexibility of available services and the gradual externalisation of transport costs. At the moment, according to data from the survey, *Mostra de polígons d'activitat de Catalunya, 2005-06*[2] carried out by the Institut d'Estudis Regionals i Metropolitans de Barcelona[3], only 10.3% of the industrial estates in the Metropolitan Area of Barcelona and 7.4% of industrial estates in Catalonia as a whole have at least one company that relies on company-operated transport services.

In the light of these statistics concerning collective transport, the breakdown of transport means used by people who work in industrial estates comes as no surprise. The following table illustrates the breakdown by mode of the different industrial estates in the Metropolitan Area of Barcelona. Here you can see a group of industrial estates, all located in periphery municipalities, where the use of a privately-owned car to get to work is above 90%. This percentage drops dramatically in industrial estates where some of the major firms provide company transport (i.e. the case for the Montornès del Vallès group of industrial estates), or those industrial estates located close to metropolitan centres where there is a relatively wide offer of public transport services (for example, Granvia Sud de l'Hospitalet de Llobregat).