

The new industry: The core sector of the Catalan economy

Ezequiel Baró Tomàs
Cinthy Villafaña Muñoz

The new industry: The core sector of the Catalan economy

BIBLIOTECA DE CATALUNYA. DADES CIP:

Baró i Tomàs, Ezequiel

The New industry : the core sector of the Catalan economy

Tít. orig.: La nova indústria : el sector central de l'economia catalana. –
Bibliografia

ISBN 9788439380344

I. Villafaña Muñoz, Cinthya, 1976- II. Catalunya. Departament d'Innovació,
Universitats i Empresa III. Observatori de Prospectiva Industrial IV. Títol

1. Estructura industrial – Catalunya 2. Sector terciari – Catalunya 3.
Economia del coneixement – Catalunya 4. Catalunya – Condicions
econòmiques

338.45/.46(467.1)

Published by:

Generalitat de Catalunya

Ministry of Innovation, Universities and Enterprise

Industry and Enterprise Secretariat

Observatory for Industrial Foresight

This study has been drafted in collaboration with the Centre d'Economia Industrial (*Industrial Economy Centre*), which is formed by the Ministry of Innovation, Universities and Enterprise, the Official Chamber of Commerce, Industry and Navigation of Barcelona and the Autonomous University of Barcelona

First published in: Barcelona, May 2009

Circulation: 500 copies

Editorial Board:

Joan Miquel Hernández Gascón

Jordi Fontrodona Francolí

Alexandrina Petrova Stoyanova

Publication coordination:

Neus Bassi i Farrés

Translation

Traducciones Técnicas Metzger, S.L.

<http://www.gencat.cat/diue/ambits/empresa/opi>

Design, layout and printing:

www.cege.es

D. Leg.: B-23731-09

ISBN: 978-84-393-8034-4

The Ministry of Innovation, Universities and Enterprise does not necessarily share the opinions expressed in this document. The opinions expressed therein remain the sole responsibility of the authors.

The new industry: The core sector of the Catalan economy

Ezequiel Baró Tomàs
Cinthy Villafaña Muñoz



Generalitat de Catalunya
Departament d'Innovació,
Universitats i Empresa



OBSERVATORI
DE PROSPECTIVA
INDUSTRIAL

1 From industrial economies to knowledge-based economies

During the past three decades, the industrial economies and societies, which have been at the forefront of international economic development during the past two centuries, have been converted into economies based fundamentally on knowledge, societies that depend more or less directly on production, diffusion and the massive use of knowledge and information.

1.1 Nature of the process of transition towards knowledge-based economies: a technical revolution and the three basic trends

The existing knowledge-based economies are the result of the historic coincidence between certain long-term trends that were incubated in industrial societies – and were evident in the gradual expansion of the activities and investments related to knowledge (scientific, technological and organisational) – and a large-scale technical revolution –the digital revolution –, that is radically transforming the conditions for processing, replicating and transmitting information and knowledge (coded).

The transition from industrial (the traditional ones) to new knowledge-based societies is by no means a sudden process. On the contrary, it is a complex process, conditioned by inertias (institutional, organisational and above all, mental), in which elements belonging to the classic industrial production mode co-exist –often in contradiction– alongside other elements of this new mode of economic development.

We might think that this technical (digital) revolution has contributed to accelerate some basic movements that were already established in the foundations of industrial economies. These movements are basically three:

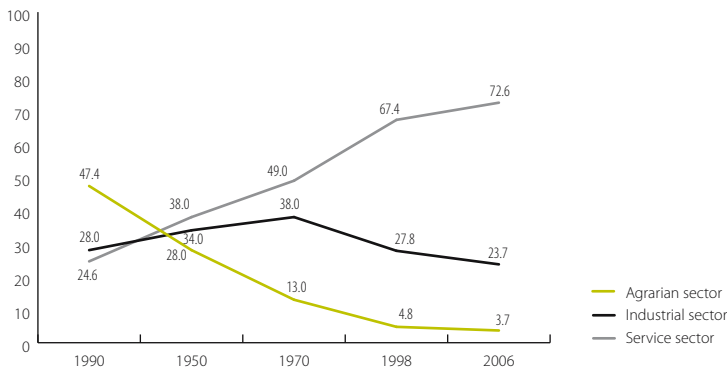
- the gradual *structural change* that has characterised the evolution of these economies for more than one century is expressed in the reassignment of the relative weight of agricultural, industrial and service activities;
- the increase (that has been taking place for several decades) in the part of the *intangible capital* in the stock of the real capital of these economies;

- lastly, the increasing *centrality of the processes of change (innovation) in these societies as one of the decisive factors in long-term growth.*

1.2 The gradual structural change in industrialised economies

There is no doubt that the 20th century was marked by important changes in the economic foundations of industrialised countries. During this century, the pattern of structural change in these economies was characterised by the (continual) growth of service activities, to the detriment of agricultural activities and since the decade of the 1960s and 1970s, of what are usually termed industrial activities –see *figure 1* and *table 1*.

Figure 1. Evolution of the composition of civil employment by core sectors of activity during the 20th century: OECD countries
Percentages



Sources: Feinstein (1999); OECD (2005).

This process of structural change in industrialised economies has not been uniform over time. Thus, the growth of manufacturing activities remained stable until the end of the nineteen sixties. In most countries studied, the manufacturing employment figures –as compared to total employment– reach their historic peak between 1955 and 1982.

In parallel to this pace, which many experts refer to as a “de-industrialisation” process, it could be said that since the end of the Second World War, the best-developed economy (that of the US), is largely a service-based economy. Since the decade of the 1960s, the main economies in the centre and north of what is now the European Union (EU) and since the end of the 1970s, the economies in the south of this economic region (including Spain and Catalonia) are also mainly, tertiary economies. Since the start of the nineteen-eighties, a process of acceleration is observed (and, to a certain extent, a change in the nature) of the tertiarisation of these economies.

Table 1. Transformations in employment in the principal sectors of activity in industrialised countries: 1870-2006

Percentage over total employment

	1870	1950	1973	1987	1995	2000	2006 (**)
Agriculture (*)							
United States	50.0	13.0	4.1	3.0	2.9	2.5	1.5
United Kingdom	22.7	5.1	2.9	2.4	2.7	2.2	1.3
France/Germany	49.4	25.3	9.0	6.0	4.9	4.1	3.3
Japan	70.1	48.3	13.4	8.3	7.2	6.7	4.1
Canada	53.0	21.8	6.5	4.8	4.1	3.3	2.6
Industry (*)							
United States	24.4	33.3	32.3	26.6	23.3	22.2	19.9
United Kingdom	42.3	46.5	41.7	29.8	26.1	23.7	21.5
France/Germany	28.3	39.0	42.6	34.9	30.1	27.6	25.5
Japan	–	22.6	37.2	33.8	34.8	33.6	27.1
Canada	28.0	36.0	30.4	25.2	21.1	21.8	20.4
Services (*)							
United States	25.6	53.7	63.6	70.4	73.8	75.2	78.5
United Kingdom	35.0	48.4	55.4	67.8	71.2	74.1	77.2
France/Germany	22.4	35.8	48.5	59.1	65.0	68.2	71.7
Japan	–	29.1	49.4	57.9	58.0	64.3	68.8
Canada	19.0	42.2	63.1	70.0	74.8	74.9	76.6

(*) Agriculture includes livestock farming, forestry and fisheries; industry includes energy and construction; services refers to market and non market services (including military services).

(**) The data for 2006 refer to civil employment.

Source: Conference Board (2004).

1.3 The role played by industry in this structural change

Likewise, despite this (systematic) trend in the loss of relative weight of industrial activities –particularly in terms of employment– in more advanced economies, the manufacturing sector continues to occupy an important place. It should be said that the “Triad” (European Union, United States and Japan), with 11% of the world population, still produced more than 40% of the world’s wealth in 2006 (expressed in PPP). This circumstance is explained in great measure by the fact that the more industrialised countries (in the OECD area, of which those three economic areas form a part) continue to have a strong presence in the international manufacturing sector: during recent years, these countries contributed around 80% of the total production of manufactured goods. This shows the high level of productivity of these activities in those areas. In terms of manufacturing production nine of the top ten countries belong to the OECD area, with China being the only one that does not. In 2002, this country accounted for 7.8% of global manufacturing production, with a percentage similar to that of Germany.

The growth in manufacturing production has been accompanied, during recent years, by an even faster increase in external flows of manufactured goods. For the past four years (2004-2007), the volume of international flows of industrial goods has advanced at an average rate of 7% a year (opposed an international economic growth –in terms of volume– of 3.4% a year). We should mention, in particular, the progress made by international trade flows from high tech industries (this type of foreign trade now represents one quarter of all foreign trade).

In this context of internationalisation of the more advanced economies, and in particular, of certain sectors (such as the manufacturing sectors), industry continues to be the motor of these economies, especially in terms of the level and evolution of productivity (and workforce remuneration), and in the effort on innovation and the generation and diffusion of new technologies.

1.4 The new tertiarisation of advanced economies

Nevertheless, the tertiarisation process of industrial economies appears to have been speeded up during the past three decades, both in terms of the increase in the employment in the service sector and in the contribution made by this sector to the gross value added of the economies.

Apart from the acceleration in the tertiarisation process, its nature seems to have changed, too.

In the first place, service activities have played, and still play, a predominant role in the transition of advanced industrial economies to knowledge-based economies. In this context, the evidence that the service sector is nowadays the major source of knowledge-intensive job creation should be considered.

Likewise, the expansion of certain service activities has been a decisive factor in the deployment of the two most important moments in the globalisation of contemporary economies. It should be said that the most important international economic areas (the United States and the European Union) were service economies before the start of the recent process of globalisation. This latest phenomenon of internationalisation of economies is more than just a globalisation process; it is a process that globalises the markets of financial, professional, technical, knowledge (R+D, in knowledge-intensive enterprises) and tourist services.

1.5 The delay in the theoretical consideration on service activities

In addition, although the overwhelming evidence about the importance of service activities in modern economies is quite clear, even today, there is still a considerable delay in theoretical and political thinking about the tertiary sector, especially in comparison with the industrial sector. This deficit is particularly evident when attempting to explain the dynamics of this sector and, also, in determining the role that service activities play with respect to the

economy as a whole and in particular, the interaction (and complementary nature) of a large part of tertiary activities –producer services– with manufacturing industries.

There is also a lack of theoretical consideration on services, as can be seen in the lack of high quality and accurate of statistics and other sources of information about these activities.

In part, the delay in theoretical consideration with respect to tertiary activities has been the cause (and to a certain extent, the consequence) of an intellectual anxiety among many economists with respect to analysing the role of services in the development processes of modern societies.

Since the dawning of industrial societies, three myths have sprung up around service activities. In general, economists (and also politicians) have always considered services to be intrinsically “non-productive” and retardative, with a low *productivity growth*. Tertiary sectors, too, have been classified as the least innovative in the economy. Lastly, it has also been emphasised that the degree to which these activities open up to external markets falls far short of that of industrial activities (and even of agrarian activities).

There is no doubt that for many years, there was a great deal of truth in these observations, but at the present time (and it is likely that this will increase in the future) the outlook is changing considerably, particularly in the case of service activities that are more closely linked to industrial production.

1.6 The main reasons for the de-industrialisation process and growth in the service sector in modern economies

Economists only began to realise the quantitative importance of tertiary activities in industrial economies during the decade of the nineteen-thirties. However, it was necessary for another three decades to pass before this “revolution in the employment structure” became a topic of more careful and ongoing analysis.

The process that is known as de-industrialisation (and the acceleration of the tertiarisation process) which, as we have already said, characterised most developed economies during the nineteen-sixties, was considered by most economists to be an internal process of these economies, but also a phenomenon that was reinforced during the nineteen-nineties, by globalisation and the increasingly important role played by the emerging countries in world markets.

The different traditional reasons suggested, since that time, to explain the continual growth of the services share in value added and in particular, in the employment of all industrialised economies can be divided into groups depending on the factors intervening in that growth act with respect to demand or with respect to supply.

Among the first, we should mention the greater income elasticity attributed to the demand for services (final use) as opposed to the income elasticity attributed to the demand for

most of the tangible goods. This means that for a determined relative price structure, the volume of services absorbed by the economy grows more than the volume of goods when the per capita income increases (as is the case in most industrialised countries).

With respect to supply, the main argument of the increase in the relative weight of service activities in the whole economy is the lower growth rate in labour productivity in those activities compared to the growth rate of productivity in the manufacturing sector.

More recently, a growing number of experts have attributed the structural transformations in industrialised societies over the past three decades to a large-scale change in the growth pattern of these economies.

In general, the principal factors that determine structural change in an economy can be summarised as the following two: changes in the composition of the final demand (for goods and services) that increase the level of the per capita income, and the impact of the technological and organisational *transformations that have taken place in most economic activities* (and which affect the composition of intermediate demand for these services).

It does not seem that the effects of the changes in final demand (with respect to their level and in particular, their composition) arising from sustained increases in the per capita income in industrialised countries have had a significant effect in explaining the growth that has taken place in the service sector, at least since the nineteen-eighties (above all in the producer services sector).

On the contrary, the increase in the specific weight of producer services in intermediate consumption in most of the branches of activity of modern economies is, without doubt, the most important factor in explaining the structural growth of this sector in industrialised countries.

These changes in the composition of intermediate consumption, with the increased presence –as intermediate inputs– of producer services in practically all economic sectors, are due to different circumstances:

- firstly, to the intermediate demand for new –and more specialised– services as a result of technological and organisational changes at the enterprise level;
- secondly, to the increase in outsourcing processes, which has given rise to the emergence and consolidation of new segments of demand in that sector of activity;
- and thirdly, to institutional changes, in particular, the modifications taking place within the regulatory framework of many service sectors that have also contributed to increase the demand for those activities.

However, the emergence of new countries in world markets most certainly strengthens this “de-industrialisation” process, through at least two channels. The first of these is the increasing specialisation of economic activity. The growing importance of emerging countries is also promoting specialisation in more industrialised countries, particularly with regard to their industrial activities: from labour-intensive, poorly-qualified production to

production obtained with more highly-qualified labour. Also, the commercial specialisation of industrialised countries with respect to products that in addition, have an increasing amount of producer services, has given rise to a tendency to reduce their trade balance in manufactured goods. This leads to a reduction in part of the manufacturing industry in the production volume and the employment figures in these countries.

The second channel is comprised of an increase in competitive pressure on the part of emerging countries (which produce goods using cost structures that are quite different from those of companies from the north). In this context, companies from more industrialised countries must react to survive, by engaging in strategies that will allow them to significantly increase their gains in productivity and efficiency, and in particular, with greater labour capital intensity in their production processes and by concentrating their activities on the more productive segments of value chains and reorganising their production processes in general on a global scale, in which the relocation of production units are the (minor) expression of a more complex and massive phenomenon.

1.7 Some effects of structural changes on modern economies

The profitable complementary nature of knowledge-intensive activities (scientific, technological and organisational) in both industrial sectors and many tertiary sectors, and new technologies (especially information and communication technologies) has led to many diverse and significant effects on these economies. Three of these, at least, are worth mentioning:

- The *internationalisation of production processes* and its impact on company organisation.
- The significant *changes in the nature and dynamics of markets, and in company strategies*.
- The characteristics of *the growing interrelation between manufacturing and service activities* both within the scope of the company and the value chain of its products, and within the scope of their technological and economic interdependences.

1.8 Characteristics of the growing interrelation between manufacturing and service activities

To a large extent, the qualitative changes taking place in the production processes of the sectors that are considered as industrial sectors underlie the growing synergies between manufacturing functions and service functions, and the new channels of production, exchange, and consumption of goods and services in modern economies.

Similarly, these interactions between manufacturing and service functions are certainly not new. The production of goods has always been linked to certain service activities (transportation, commercial distribution...). The service sector is truly the “facilitating agent” that guarantees the feasibility of all the other activities.

The new aspect is probably that service functions currently assume a more central role in production processes. This is to a large extent the result of the continual increase in the complexity of the labour division. Similarly, on a different level, the profitability of many companies depends not only on the manufacturing side of the production process, but also on the aspects of incorporating knowledge and service functions used as a “wrapping” for the products (invention, R+D, design, branding, publicity, finance and others).

The synergies between the manufacturing and service functions are often shown in a kaleidoscopic way, and have a relevant effect on:

- the characteristics and nature of the “product”
- the composition and level of expertise of the people who intervene in the production process
- the company strategies themselves.

In general, manufacturing is considered basically as a “product”, and not as the creation, the production and the distribution and sale, of a product. At the present time, the traditional distinction made between goods and services is often archaic and irrelevant as it does not allow the gradual integration of the different types of products to be shown and in that way, conceals the fundamental changes that are currently taking place based on new technologies, in new forms of production, consumption and social behaviour. It is becoming more and more difficult to find manufactured goods that are not the outcome of service activities or that do not form part of service-based relations. In addition, the services provided by many service companies require the support of manufactured goods. Therefore, “products” are hybrid entities and often extremely complicated combinations of what we usually refer to as goods and services.

In sum, “new manufacturing” (with high value added) includes among its products a much higher and more diversified share of inputs and service functions than traditional manufacturing.

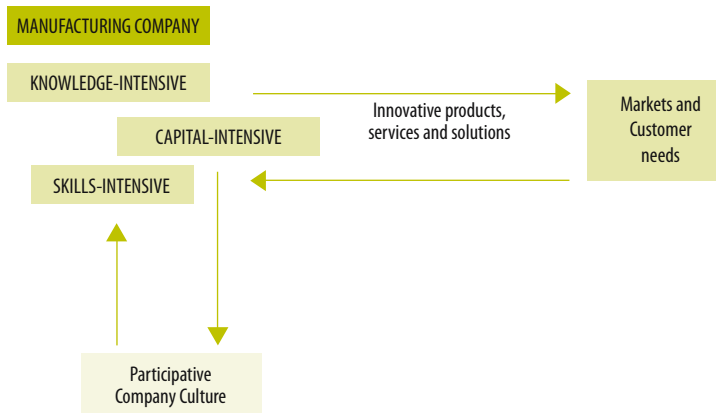
It is likely that one of the main reasons for the difficulty in discerning exactly where a manufacturing process stops and where a service process starts, based on traditional categories, is the lack of a clear analytical distinction between service “activities” and service “sectors” (or branches of activity).

Service activities are service functions carried out in companies that are classified as service companies, and also in firms belonging to non-service sectors (especially manufacturing companies). It should be said that no matter whether they are carried out by the companies themselves or subcontracted to third parties, these service functions are extremely important and (based on certain estimates), could account for between 60% and 75% of the input costs of industries with the highest value added.

Company strategies in “new manufacturing” have been diversified over the past two decades, with the objective of generating greater value and adapting more to the needs of consumers and markets. These “new manufacturing” companies are oriented towards

producing innovative products, as well as services and solutions for their clients. They are capital-intensive companies and also knowledge- and *skills*-intensive, and often based on a more horizontal and flexible organizational structure that traditional industrial companies and on a more participative business philosophy – see *figure 2*.

Figure 2. New manufacturing companies



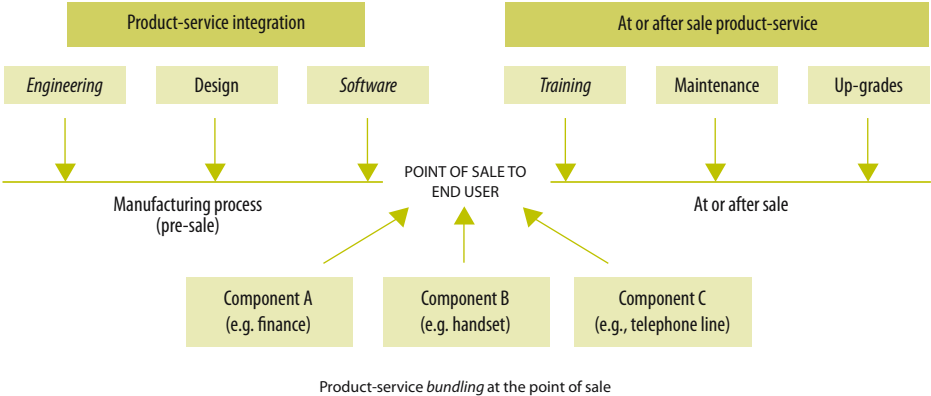
Source: High Level Group on Manufacturing (2008).

Three different types of company strategies can be discerned that are becoming more and more common in the most advanced industrial (and service) sectors.

- *Product-service integration* in the different initial phases of the value chain. This integration occurs when certain specific service components are added during the production process and this has a notable influence on the characteristics and/or the composition of the product itself. These service components involve extra input of R&D, design, or engineering or other technical services.
- The process of *product-service packaging* tends to be a strategy adopted by producers of goods for final consumers. Many companies from different manufacturing sectors try to widen and differentiate their product ranges by incorporating a series of complementary services into their offer (maintenance, technical assistance, finance, handset, etc.). In this case, these services are offered at the time of selling the product or after the sale. Adding a series of services to the product enables the company to benefit from certain advantages in differentiating its offer (and in some cases, these complementary services may also bring autonomous sources of income to that company).
- Lastly, the strategy of *product-service bundling*, which is carried out in some sectors that are classified as service sectors. In this case, the linkage between the products and services is “dominated” (in the perception that is understood by the consumers) by the services, whereas tangible products are considered as supports for the appropriate provision of

those services. The clearest example of how this type of strategy is channelled is in the telecommunications sector –see *figure 3*.

Figure 3. Three kinds of linkage between products and services



Source: Australian Expert Group in Industry Studies (2002).

1.9 A review of the industry perimeter

All these new emerging forms of manufacturing activity (and in particular, their implication in many service activities) makes it necessary to readjust the analytical tools for obtaining a clear understanding of existing economies, and in particular, a review of the traditional frontiers of what has until relatively recently been termed “industry”.

As we have already mentioned, the industrial purpose has changed dramatically during the past two decades at least, from both the technological and the organisational standpoint. Today this change in industry is evident in terms of an increase in the internal heterogeneity of these activities, and also in the evolution of its perimeter (to the extent that part of its activities has been outsourced and shifted to service activities).

It should be borne in mind that the nomenclatures of economic activities (especially industrial activities) have changed over time, and greater cohesion has been sought in keeping with the events taking place in the productive structure of nations.

There is no doubt that the first and second process of industrialisation had an enormous repercussion on delimiting the concept of *industry* and on the growing interest for this type of activity. The very name “industry”, as historically established, is not so much a statistical division, but owes much to the model of civilisation existing during the western industrial revolution, founded on technical and organisational innovation in production, in new products and also in social tensions and struggles.

The successive changes (already taking place in the 20th century) have led statisticians and economists to divide the economy into the primary sector, which is characterised by the direct exploitation of natural resources, the secondary sector, which is industrial, and the tertiary or service sector. This division has made it possible to analyse not only diverging evolutions of the relative weight of these important sectors, but also the different nature of its inputs, outputs or its production processes.

The changes we have referred to in the economic foundation of advanced modern societies make this division into three large, relatively watertight sectors too rigid and not at all operative for the purpose of analysing the current evolution of economic activities and of industrial activities in particular.

Many economists complain that the existing nomenclatures for economic activities are not at all relevant to successfully analyse the question of the de-industrialisation of developed economies (and the evidence, as supported by statistics based on those nomenclatures, that the industrial sector is fast losing value added and jobs). An in-depth review of the existing *perimeter* of industry is called for in order to take into account the organisational changes and the changes taking place in the very nature of industrial production. A nomenclature must be established and adapted to the purpose of studying current industrial dynamics in greater depth and in a more appropriate manner; for example, the phenomena of outsourcing services or the integration of these activities into industrial products.

Taking into account these restrictions, some economists have come up with proposals for reviewing the industrial perimeter using the existing information, based on the nomenclature of the economic activities that continue to be valid at present.

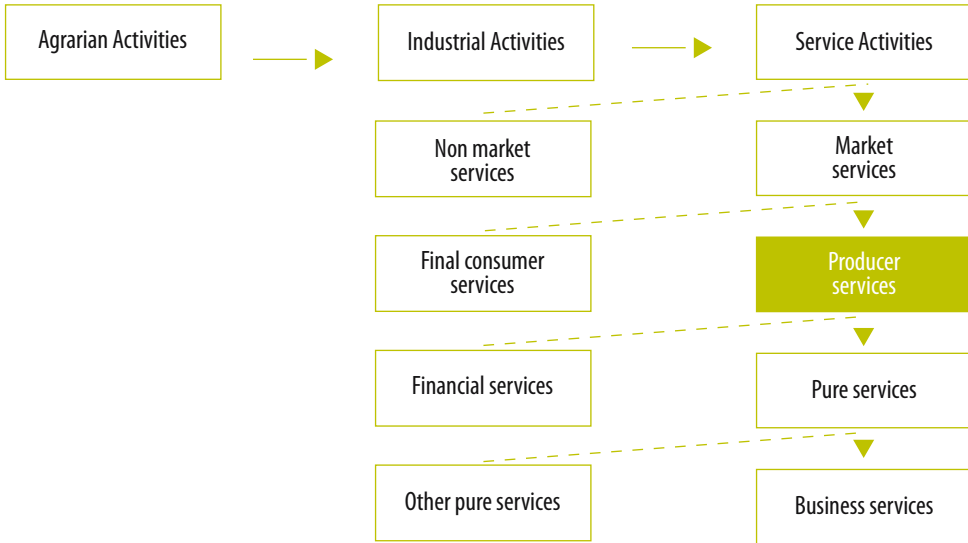
A quite suggestive proposal is the one which considers that the industrial sector perimeter should be established by including *producer services*, which are, to a large extent, complementary to and interdependent on manufacturing activities. As a result, we could speak of an “*integrated*” *manufacturing industry –producer services sector*, which when analysed in terms of dimensions and dynamics, changes many of the considerations made to date on the phenomenon of the loss of specific weight of the industrial sector.

In the second part of the present study, this criterion of jointly considering manufacturing and production service activities is used for the purpose of conducting a more detailed analysis of the evolution of the structural change taking place in the Catalan economy over the past two decades.

The economic activities that are included in the tertiary sector are quite heterogeneous. Among these, we should mention producer service activities, due to their repercussion on the performance of the economy as a whole. These services form part of market services and are characterised by the fact that the provision thereof has, during the last few decades, been more and more often included among the intermediate inputs of companies operating in most branches of activity – and in particular, manufacturing companies. These include activities that involve the provision of pure services (as is the

case of corporate services, transport and communication services and trading services) and activities that provide financial services –see *figure 4*.

Figure 4. Producer services for all economic activities



Source: Own elaboration.

There is no unanimous opinion among experts about which economic activities should be included in the production service category.

Recently, the European Commission has issued its opinion that producer services cover the following four groups of activities:

- Corporate services (NACE 70 - 74);
- Trade services (NACE 50 - 52);
- Electricity, gas and water services (NACE 40, 41) and transport and communications services (NACE 60 - 64);
- Financial services (NACE 65 - 67).

In the rest of the study, this same definition has been adopted for the producer services sector. All other tertiary sector activities are included in the consumer services group.

2 Catalonia: a region with an important industrial basis

2.1 Industrialisation in Catalonia: some historic facts

From the middle of the 19th century to the present day, Spain has followed a path in terms of industrialisation that is, generally speaking, in line with that of other European countries. Over a period of 150 years, the Spanish industrial product has been multiplied by 174, growing at an annual cumulative rate of 3.5% –see *table 2*.

Table 2. Basic data on Spanish industry, 1850-2000

Years	Real industrial GNP rate (1930 = 100)	Annual growth rate (%)	Share of industry in GNP (%)	Share of industry in employment (%)	Relative employment productivity ratio (GNP per occupied person = 1)	Relative prices of industry (1995 = 100)
1850	11.1	–	13.61	13.05	1.04	255.73
1860	16.7	4.1	15.48	13.50	1.15	233.99
1870	18.9	1.3	18.43	13.08	1.41	248.45
1880	33.0	5.7	22.31	13.29	1.68	244.23
1890	39.5	1.8	25.49	14.52	1.76	241.81
1900	48.6	2.1	27.23	14.56	1.87	241.51
1910	52.4	0.8	27.29	15.55	1.75	255.05
1920	63.8	2.0	27.71	19.26	1.44	261.31
1930	100.0	4.6	27.90	21.31	1.31	222.93
1940	74.8	–2.9	21.03	16.97	1.24	196.15
1950	99.5	2.9	22.95	19.90	1.15	184.26
1960	199.4	7.2	30.93	20.86	1.48	189.84
1970	575.4	11.2	30.88	23.68	1.30	149.41
1980	1,173.5	7.4	28.47	25.28	1.13	108.89
1990	1,492.7	2.4	25.70	21.98	1.17	106.25
2000	1,933.2	2.6	21.67	19.92	1.09	91.88

Source: Prados de la Escosura (2003).

Catalonia has played an important role in this process. During the past one hundred and fifty years, Catalan industry has been of fundamental importance in terms of the gross value added of Spain overall. This proportion has increased from 21.5% in 1850 to 30.6% in 1900; the percentage fell in 1950 to 23.6% and then increased again at the end of the 19th century to 26.1% –see *table 3*.

The conditions, whose consequences were the emergence of modern manufacturing industries, first developed in Catalonia in the beginning of the 18th century, until around 1840, when the foundations of the textile industry were laid. For more than one century, this sector became the cornerstone of industrial activity in the Principality. Different factors contributed to creating the appropriate context for the emergence (and consolidation) of this activity: the efficiency and competitiveness of agrarian production, which led to the creation of enough surpluses to finance the development of new manufacturing activities, and a

progressive institutional change that, by banishing what remained of the pre-capitalist feudal regime, established the conditions for creating and extending an interior market for the new products being manufactured and for the extension of a salaried workforce that could be employed in new industries. The new industrial middle class were extremely attentive to the technical innovations developing in more dynamic European economies. In addition, this Catalan middle class gradually become more actively involved in the process of setting up a wider national market.

Table 3. Structure of Spanish industrialisation by autonomous regions: importance in the Spanish industrial gross value added, 1850-2000

Percentages

	1850	1900	1950	2000
Andalusia	17.91 (2)	17.24 (2)	10.24 (4)	8.23 (5)
Aragon	4.51 (8)	2.68 (9)	3.86 (9)	4.07 (8)
Principality of Asturias	2.83 (11)	2.86 (8)	4.96 (7)	2.52 (11)
Balearic Islands	1.78 (13)	0.79 (16)	1.85 (12)	1.02 (16)
Canary Islands	0.38 (17)	0.26 (17)	1.18 (16)	1.76 (13)
Cantabria	2.98 (10)	1.31 (13)	2.46 (11)	1.36 (14)
Castilla Leon	14.19 (3)	5.46 (5)	6.34 (6)	6.27 (6)
Castilla-La Mancha	6.98 (4)	4.11 (7)	2.93 (10)	3.39 (9)
Catalonia	21.5 (1)	30.62 (1)	23.64 (1)	26.14 (1)
Region of Valencia	6.49 (6)	7.28 (4)	10.97 (3)	10.36 (3)
Extremadura	4.52 (7)	2.01 (11)	1.51 (15)	0.79 (17)
Galicia	6.82 (5)	2.48 (10)	4.26 (8)	5.45 (7)
Region of Madrid	3.01 (9)	4.33 (6)	8.86 (5)	13.55 (2)
Region of Murcia	2.97 (12)	1.58 (12)	1.61 (13)	2.01 (12)
Region of Navarre	0.81 (16)	1.30 (14)	1.51 (14)	2.74 (10)
Basque Country	0.97 (15)	14.93 (3)	13.08 (2)	9.12 (4)
La Rioja	1.35 (14)	0.86 (15)	1.00 (17)	1.1 (15)
Spain	100.00	100.00	100.00	100.00

Note: The figures in brackets refer to the position occupied in each observation by the respective autonomous region.

Source: Parejo (2004).

Thus, by the middle of the 19th century, Catalan industry pivoted mostly around the textile industry (which at that time represented 61.3% of the Principality's total manufacturing production). During that time, Catalonia was responsible for generating two-thirds of the entire textile production of Spain (far above the 25.6% generated by the Principality for the whole Spanish manufacturing industry).

During the period 1856-1900, Catalonia consolidated its leadership in Spain, and became one of the most advanced manufacturing regions. The expansion of the interior Catalan market helped to achieve this, through a strong increase in the demand for manufactured products. However, the decisive factor in the expansion of the Catalan manufacturing industry was its access to the rest of the Spanish market, which had become more and more united and now

had an institutional framework (promoted by the new Liberal State) that was more appropriate for the free flow of goods, services and production factors. In addition, we should not forget the importance of the exports of specialised products from the Catalan agrarian sector, which made it possible to mobilise the necessary resources to finance strategic imports, for the development of Catalan industry (machinery, energy products and raw materials).

By the end of the 19th century, Catalonia had become the true “factory of Spain” (at least in terms of household product consumption). In 1900, the Catalan textile industry represented 56.8% of total Catalan manufacturing production and 82% of total manufacturing production in Spain.

Although the cotton and wool industry was the flagship of Catalan industrial activity at that time, the beginning of a new process of diversification in the basis of Catalan industry was already starting to be perceived.

Generally speaking, the 1900 - 1930 period was a period of expansion for the Catalan economy: the GNP increased significantly in constant pesetas, and also in per capita terms; aggregate demand also grew significantly, as a result of the sharp increase in the population (resulting from the first important wave of immigration from the rest of Spain), and the important increase in real salaries and the disposable family income. During those years, Barcelona became consolidated as a true industrial metropolis on a European scale.

In addition, the Catalan manufacturing industry increased its diversification: the metallurgical and chemical industries became increasingly important other industries also gained relevance, such as the cement industry and other materials for construction, the mining sector (coal and potassium salts) and the electrical energy sector.

During those decades, the Spanish market continued to be the main market for the products of the Catalan industry; even more so after the export potential of manufacturing companies started to decline as the peseta increased in value (since the start of the First World War) and following the proliferation of the protectionist policies that took place in many European countries.

The situation changed drastically between the years 1930 and 1955. During that period, the growth rate of the Catalan economy (and of the Spanish economy) fell rapidly; the negative effects of the Great Depression until the middle of the nineteen-thirties, the Spanish civil war –the end of which coincided with the start of the Second World War– and the autarchic policy that characterised the first fifteen years of the post-war period led to a sharp decline in the progress of Catalan industry. Spain, and of course, Catalonia, became isolated from other economies (in particular, those of Western Europe) and was not able to take advantage of the long and important period of economic expansion in this area that lasted from 1945 to 1975, – at least not until the nineteen-sixties.

During this phase, Catalan industry remained static and developed serious technological backwardness, in addition to not being well sized and without access to international energy sources, raw materials and capital assets.

Industrial production in 1955 only just exceeded the level of 1930. In addition, the relative weight of the Catalan manufacturing industry in the Spanish economy as a whole was considerably reduced: in 1955, the industrial value added of Catalonia accounted for 28.6% of the gross value added of Spanish industry as a whole.

The period 1955-1975 was one of exceptional economic and industrial growth in Catalonia (and in Spain). The gradual liberalisation of domestic and foreign trade, the new and more liberal regulations governing foreign investment, together with the progressive expansion in the exporting of tourist services led to the Spanish economy being in a position to normalise and finance the provision of new energy needs (in particular, oil), raw materials, semi-elaborated products and capital assets during the decade of the nineteen-sixties. This elimination of the restrictions that had conditioned industrial development during the previous two decades and the revitalising of growth in both domestic and foreign markets (now in full expansion) enabled the country to enjoy a period of strong, self-sustained industrial growth, which, naturally, was of great benefit to Catalonia.

The last quarter of the 20th century was clearly a period of strong economic growth in Catalonia, and also in Spain and most of Western Europe.

During the late nineteen-seventies Catalonia underwent significant institutional changes, namely the democratic transition and the restoration of the Catalan Government. These coincided with the start of a long period of economic crisis, which, since the beginning of the nineteen-eighties, particularly affected the industrial sector.

The economic recovery, from the middle of the nineteen-eighties, was accompanied, in the case of Spain, by its entry into the European Community. This circumstance had a considerable impact on the evolution of industrial activities, which were forced to face and adapt to a context of greater foreign competition. The growing globalisation of economies and the entry of Spain into the European Monetary Union at the end of the nineteen-nineties completed the change taking place in the scenario in which the economy, and in particular, the Catalan industry, operated from then on.

During those years, a succession of important changes took place in the industrial structure and in other complementary activities, for instance, producer services. In the first place, there was an increase in the relative weight of intermediate goods productive activities in the Catalan industry, which had always been orientated towards the production of final goods. Secondly, foreign markets gradually started to absorb more and more Catalan manufacturing production, beyond that of the rest of Spain, which, as we have already mentioned, had until then been the principal market for that production. Thirdly, partly as a result of the reorganisation process of industrial companies and the greater specialisation of productive activities (both in Catalonia and on an international scale), there was an important increase in many service activities, in quantitative and qualitative terms (especially in producer services which were starting to be used more and more often in manufacturing processes).

2.2 Evolution of the labour market in Catalonia

Between 1985 and 2006, two different periods can be established: the period from 1985 to 1995, characterised by a stage of economic recovery –from 1985 to 1992– following the long crisis of the second half of the nineteen-seventies and the first half of the decade of the nineteen-eighties, and a short period of economic recession, between the years 1992 and 1994; and the period 1995-2006, which was characterised by continual economic expansion – see *table 4*.

Table 4. Growth in employment in Catalonia and in Spain, 1985-2006

Thousands of employed and growth, expressed as a percentage

	1985	1995	2006	Average annual growth (units)			Annual growth (in percentages)		
				1985-95	1995-06	1985-06	1985-95	1995-06	1985-06
Catalonia									
Agrarian	116	66	85	-5	1.7	-1.5	-5.5	2.3	-1.5
Industry (1)	659	623	790	-4	15.2	6.2	-0.6	2.2	0.9
Construction	113	187	401	8	19.5	13.7	5.2	7.2	6.2
Services	874	1,277	2,105	40	75.3	58.6	3.9	4.6	4.3
Total (2)	1,761	2,153	3,381	39	111.6	77.1	2.0	4.2	3.2
Spain									
Agrarian	1,930	1,123	928	-81	-18	-48	-5.3	-1.7	-3.4
Industry (1)	2,706	2,576	3,274	-13	63	27	-0.5	2.2	0.9
Construction	813	1,198	2,512	38	119	81	3.9	7.0	5.5
Services	5,485	7,598	12,822	211	475	349	3.3	4.9	4.1
Total (2)	10,949	12,495	19,537	155	640	409	1.3	4.1	2.8

(1) In this case, industry includes the mining and energy sectors.

(2) From 2005 on, there was a change in the method for calculating the Active Population for all employed persons.

Source: Caixa Catalunya (2007).

During the first period, the number of employed persons in Catalonia increased by 392,000; in the services sector, that figure grew by 403,000 and in the construction sector, by 74,000. On the contrary, during that period, the agrarian sector lost 50,000 employees and the industrial sector, approximately 36,000.

During the second period, from 1995 to 2006, the number of employed persons in Catalonia increased by more than 1.2 million (representing an average annual growth rate of 4.2%, double that of the previous period). During these years, employment figures for all the main economic sectors increased, with the services sector experiencing an increase of 828,000, the construction sector, an increase of 214,000 and the industrial, an increase of 167,000.

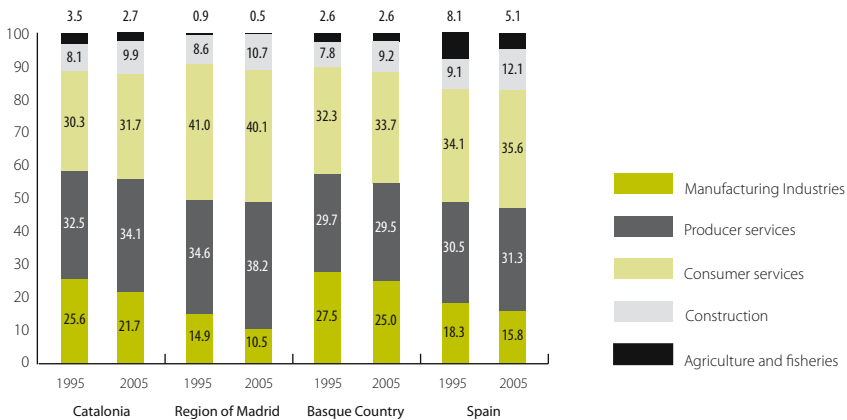
If we focus our attention on the most recent period of economic expansion, 1995-2006, there are certain important facts regarding the dynamics of Catalan employment that should be emphasised.

If we consider the evolution of manufacturing industries and producer services activities as a whole, as has been argued above, we can see that the path it follows is quite different to what is usually used to describe the de-industrialisation phenomenon. Indeed, if the dynamics of manufacturing and producer services activities are analysed jointly, we can obtain a more accurate idea of the structural change that has taken place in industrialised economies over the past two decades, and in particular, with respect to production.

During the 1995-2005 in Catalonia –based on Spanish Regional Accounting data– this macrosector generated some 607,000 jobs (see *figure 5* and *table 5*), contributing to an increase of 51% in total employment for the period (which amounted to about 1.2 million jobs). Similar figures are obtained in the case of Spain, in which this macrosector generated almost 2.8 million jobs (43.8% of net jobs created); in the case of the Region of Madrid this figure was 592,000 units (47.5% of all new jobs created in this autonomous region), and in the case of the Basque Country, new jobs generated by the sector being studied amounted to 158,000 (48.2% of all new jobs created during the period).

In terms of employment the “integrated” sector (composed of manufacturing and producer services) represented 55.7% of the total in Catalonia, in 2005. This percentage was 54.5% for the Basque Country, and on the contrary, in the region of Madrid and Spain, this percentage was much lower: 48.7% and 47.2%, respectively.

Figure 5. Evolution of employment by main economic sectors: Catalonia, Region of Madrid, Basque Country and Spain 1995-2005
Distribution as a percentage



Sources: INE: Contabilidad Regional de España (2008) and own elaboration.

The analysis of this macrosector can be completed by a study of the evolution of the gross value added (at current and constant prices) during the 1995-2005 period.

It should be noted that the contribution of the “integrated” manufacturing industry-producer services sector to the total gross value added of the economy is considerably higher than its contribution to total employment (both when the value added is calculated at current and at constant prices). This result demonstrates two things:

- In the first place, this series of activities occupies a fundamental place in the economies: in the specific case of Catalonia, it contributes almost two-thirds of the total value added of the Catalan economy. Likewise, it can be seen that the percentage that this macrosector contributes to value added in Catalonia is much higher than that of the other two autonomous regions being studied and than that of the Spanish state as a whole. In particular, at constant prices, this contribution in Catalonia was 66.7% in 2005, whereas it was 7.6% lower for the whole of Spain (59.1%), 3% lower for the Region of Madrid (63.7%) and 2 tenths lower for the Basque Country (66.5%).
- In the second place, it is interesting that the contribution of the integrated manufacturing industry-producer services sector to gross value added is higher than its contribution to total employment which demonstrates that this is a set of activities with higher productivity than the average for the economies being studied. This result is expected in the case of manufacturing activities, but it is not considered as likely in the case of producer services –see *table 6*.

Table 6. Evolution of gross value added by main economic sectors

Percentages

(a) At current prices

	Catalonia		Region of Madrid		Basque Country		Spain	
	1995	2005	1995	2005	1995	2005	1995	2005
Manufacturing & mining industries	27.94	21.85	15.70	11.57	29.73	27.23	20.11	16.46
Producer services	38.07	42.11	45.93	50.66	34.30	35.89	38.01	40.44
Corporate services	13.77	17.06	18.22	20.06	12.40	13.32	13.73	16.26
Financial mediation	1.50	4.85	3.87	6.80	1.48	4.41	1.08	4.62
Commerce & repairs	11.73	11.68	10.96	11.05	10.43	9.42	11.95	10.71
Transport & telecommunications	8.12	7.06	9.80	10.69	6.84	6.07	8.28	6.88
Electricity, gas & water	2.94	1.46	3.08	2.06	3.15	2.67	2.97	1.97
Consumer services	25.18	24.58	30.57	27.19	27.39	25.94	29.37	28.35
Construction	6.95	9.84	7.55	10.40	6.43	9.61	7.90	11.56
Agriculture & fisheries	1.85	1.63	0.25	0.19	2.15	1.33	4.62	3.18
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Manufacturing ind + Production S	66.01	63.95	61.63	62.22	64.03	63.12	58.12	56.90

(b) At constant 2005 prices

	Catalonia		Region of Madrid		Basque Country		Spain	
	1995	2005	1995	2005	1995	2005	1995	2005
Manufacturing industries	27.94	29.39	15.70	16.15	29.73	35.30	20.11	22.49
Producer services	38.07	37.30	45.93	47.53	34.30	31.17	38.01	36.58
Corporate services	13.77	15.11	18.22	18.83	12.40	11.57	13.73	14.71
Financial mediation	1.50	4.30	3.87	6.38	1.48	3.83	1.08	4.18
Commerce & repairs	11.73	10.34	10.96	10.37	10.43	8.18	11.95	9.69
Transport & telecommunications	8.12	6.26	9.80	10.03	6.84	5.27	8.28	6.22
Electricity, gas & water	2.94	1.30	3.08	1.93	3.15	2.32	2.97	1.78
Consumer services	25.18	21.77	30.57	25.51	27.39	22.53	29.37	25.65
Construction	6.95	9.88	7.55	10.59	6.43	9.47	7.90	11.57
Agriculture & fisheries	1.85	1.67	0.25	0.21	2.15	1.53	4.62	3.71
TOTAL	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Manufacturing ind + Production S	66.01	66.70	61.63	63.69	64.03	66.47	58.12	59.07

Source: INE: Contabilidad Regional de España (2008).

2.3 Composition of the workforce in Catalonia compared to the European Union

The *Statistical Office of the European Communities* (Eurostat), based on the figures of the *European Union Labour Force Survey* provides information on the evolution of employment in each sector of activity at regional level, depending on their technological intensity and knowledge content (see table 7).

It can be seen that between 1996 and 2006, the number of employed persons in the Catalan manufacturing industry grew by 184,000 (reaching a percentage of 30.9% during this period, well below the increase in employment recorded for the economy as a whole, which was 51.1%). On the contrary, the number of employed in the service sector increased by 806,000 (58.8% higher than the average for the economy as a whole). Employment in knowledge-intensive services increased during these years by 81.4%, whereas the number of employed in non knowledge-intensive service sectors increased by a lower proportion (44.1%).

In the Catalan manufacturing sector, employment in high tech sectors grew by 60.7%, well above the employment in low tech sectors, which increased by only 12%. Likewise, in absolute terms, employment increased the most in the medium to high technological sectors (approximately 77,000) and medium to low technological sectors (some 59,000). On the whole, the number of jobs created in these two sectors accounted for 74.1% of all new jobs created in the manufacturing sector. The distribution of jobs in the manufacturing industry expressed as a percentage shows that the number of employed in low tech sectors is even higher: in 2006 there were some 322,000 (41.5% of all manufacturing employment in the Catalan economy). In spite of this strong relative growth during this period, in 2006 the number of jobs in high tech sectors represented less than 4.5% of total employment in the manufacturing industry (and just over 1% of total employment). The remaining 420,000 correspond to people employment in the medium-high and medium-low technological sectors (54.1% of total employment in the manufacturing sector).

In the service sector, as we have already seen, knowledge-intensive employment is the one with the highest growth. Within this group, the highest growth rate between 1996 and 2006 corresponds to the knowledge-intensive and technology service sector (with a rate of 175.7%), followed by that of market knowledge-intensive service sector (with a rate of 107.3%).

We should mention that an important part of the knowledge-intensive services is included in the producer services group. In this group of activities, for the period under study, it is estimated that some 358,000 jobs have been created (58.7% of all knowledge-intensive jobs and 22.4% of all jobs generated in the Catalan economy).

Over the past few years, employment in knowledge-intensive service sectors have changed from representing 23.9% of total employment in Catalonia, to representing 28.7% (and this is therefore the group of activities that has undergone the greatest increase in employment – in absolute and relative terms –).

In this case, if we add the number of employed in the manufacturing sector and in the knowledge-intensive service activities that form part of services, we obtain that in 2006, they amounted to almost 1.3 million persons employed (37.8% of total employment in Catalonia). During the 1996-2006 period, this group of activities as a whole was responsible for creating some 442,000 jobs (38.3% of all net jobs created during that period).

New jobs created in non knowledge-intensive service sectors have stabilised at almost 367,000, of which 253,000 correspond to non market-intensive service activities and some 114,000 of other non knowledge-intensive service activities. In terms of employment, the non knowledge-intensive service sector is still the major component of the Catalan tertiary sector (35.1% of total employment). Never the less, in recent years, employment in non knowledge-intensive service sector has lost 1.7 percentage points in the Catalan employment structure, while employment in knowledge-intensive services has increased by 4.8%.

Table 7. Evolution of employment in manufacturing and service activities, 1996-2006

Catalonia	Number of employed (x1.000)			Growth rate	Percentage structure		
	1996	2006	Net Change		1996	2006	Net Change
Manufacturing	593.9	777.6	183.7	30.9	26.3	22.8	-3.5
High tech	21.6	34.7	13.1	60.7	1.0	1.0	0.1
Medium-high tech	172.0	249.2	77.2	44.9	7.6	7.3	-0.3
Medium-low tech	112.3	171.2	58.9	52.4	5.0	5.0	0.0
Low tech	287.9	322.4	34.5	12.0	12.7	9.4	-3.3
Services	1,371.2	2,177.4	806.3	58.8	60.7	63.8	3.1
Knowledge-intensive	540.2	979.8	439.6	81.4	23.9	28.7	4.8
Knowledge & techn-intensive	40.9	112.8	71.9	175.7	1.8	3.3	1.5
Market	149.9	310.7	160.8	107.3	6.6	9.1	2.5
Financial	64.9	90.5	25.6	39.4	2.9	2.6	-0.2
Other	284.5	465.9	181.4	63.8	12.6	13.6	1.1
Non knowledge-intensive	831.0	1,197.6	366.6	44.1	36.8	35.1	-1.7
Market	623.0	876.2	253.2	40.6	27.6	25.7	-1.9
Other	208.0	321.5	113.5	54.5	9.2	9.4	0.2
Total branches NACE	2,259.8	3,415.2	1,155.4	51.1	100.0	100.0	0.0

Source: Eurostat: Regions (2008).

A comparison between the employment structure in the manufacturing and service sectors in Catalonia vs. the whole of the European Union-15 (EU-15) allows us to discern two main differences (see *tables 7 and 8*).

The first difference is in the relative weight of employment in the different activities: in the EU-15, the proportion of employed in the manufacturing industry is lower than in Catalonia: 17.2%, as compared to 22.8%, respectively. Thus, Catalonia has an industrial profile that is within the framework of European regions. Naturally, this also means that service activities (in terms of employment) have greater weight in the whole of the EU-15 (with 69.9% of total employment) than in Catalonia (with 63.8%). Likewise, high and medium to high tech manufacturing activities in the EU-15 account for 6.7% of total employment (1.6 points below Catalonia). On the contrary, the relative weight of employment in knowledge-intensive service activities is much higher in the EU-15 –35.3% of the total–

than in Catalonia –which is 28.7%. However, the estimated percentage of employed persons in knowledge-intensive service activities that belong to the producer services group is very similar for both the EU-15 and Catalonia (15.6% and 15.1%, respectively). This means that the proportion between people employed in the manufacturing sector and production services sector (knowledge-intensive) is 5.2 points higher in Catalonia than in the whole of the EU-15 (37.9% as opposed to 32.7%, respectively).

The second difference is in the variation in job growth rates by sector in both regions studied. Whereas the (relative) employment growth between 1996 and 2006 was only 16.6% in the EU-15, while in Catalonia, it was 51.1%. This lower growth is patent in all sectors of activity: thus, the EU-15 manufacturing sector lost 982 jobs (3.2%), while as has already been seen, almost 184,000 jobs were created in Catalonia (30.9% more). The losses in jobs in the whole of the EU-15 were concentrated, in absolute terms, especially in the low tech sectors (the number of employed fell by almost 1.2 million, i.e., 9.8% less); in addition, there was also a reduction in employment in the high tech sectors (by some 161,000, i.e., 7.8% less). This behaviour is in contrast with the increase in the number of people employed in all manufacturing activities in Catalonia (in particular in the high and medium to high tech sectors). Furthermore, the employment growth in the service sectors was lower in the EU-15 than in Catalonia; however, in this case, the EU-15 underwent an increase in employment in all the service segments of activity studied.

In the whole of the EU-15 employment in knowledge-intensive service activities increased by 34.9%, which is considerably lower than in Catalonia (where the increase was 81.4%). This enormous increase is particularly strong in the case of employment in knowledge and technology-intensive service activities (which increased by 44% in the EU-15, while the same figure increased by 175.7% in Catalonia) and in market-intensive service activities (with growth rates of 58.6% and 107.3%, respectively). These differences are also observed in the growth of employment in non knowledge-intensive service activities which in the EU-15, increased by 17.3% and in Catalonia, by 44.1%. Consequently, it appears that although in Catalonia the number of people employed in its manufacturing industrial basis has undergone an increase (in relative terms, with respect to the EU-15), the occupational structure continues to be dominated by a larger proportion of people employed in the service sector (in particular with a more knowledge-intensive profile).

Table 8. Evolution of employment in manufacturing and service activities, 1996-2006

UE-15	Number of employed (x 1.000)			Growth rate	Percentage structure		
	1996	2006	Net Change		1996	2006	Net Change
Manufacturing	30,425.2	29,441.7	-983.5	-3.2	20.8	17.2	-3.5
High tech	2,073.3	1,912.2	-161.1	-7.8	1.4	1.1	-0.3
Medium-high tech	9,294.7	9,542.4	247.7	2.7	6.3	5.6	-0.8
Medium-low tech	7,049.8	7,152.8	103.0	1.5	4.8	4.2	-0.6
Low tech	12,007.3	10,833.8	-1,173.6	-9.8	8.2	6.3	-1.9
Services	95,023.5	119,317.8	24,294.2	25.6	64.9	69.9	5.0
Knowledge-intensive	44,634.9	60,206.7	15,571.8	34.9	30.5	35.3	4.8
Knowledge & tech-int	4,203.4	6,053.4	1,849.9	44.0	2.9	3.5	0.7
Market	9,497.0	15,066.0	5,569.1	58.6	6.5	8.8	2.3
Financial	5,040.4	5,506.3	465.9	9.2	3.4	3.2	-0.2
Other	25,894.2	33,581.1	7,686.9	29.7	17.7	19.7	2.0
Non knowledge int	50,388.6	59,111.1	8,722.5	17.3	34.4	34.6	0.2
Market	33,185.4	39,110.4	5,925.0	17.9	22.7	22.9	0.2
Other	17,203.2	20,000.7	2,797.5	16.3	11.7	11.7	0.0
Total branches NACE	146,445.4	170,784.3	24,338.9	16.6	100.0	100.0	0.0

Source: Eurostat: Regions (2008).

3 Analysis of the interdependences between the manufacturing and producer services sectors in Catalonia

In the last section of this study, we will analyse the interdependences between the manufacturing and producer services sectors in Catalonia. To conduct the analysis, we will use basically the input-output tables of the Catalan economy for the years 1987 and 2001.

The study of these interrelations between different economic sectors has been carried out using three complementary methods:

- The first of these attempts to show the similarities and also the structural differences between the manufacturing and producer services sectors and among the different activities included in both sectors. To do this, we have used an extremely diverse series of structural indicators regarding the Catalan economy.
- The second analyses the evolution of the employment and gross value added figures of the economic sectors in Catalonia between 1987 and 2001, from the “subsystems” perspective but considering it in relation to an analysis of the branches of activity from a more traditional (horizontal) perspective.
- The third approach is intended to determine, in quantitative terms, the degree of direct and total tertiarisation that has taken place in industrial sectors in Catalonia and the degree of “industrialisation” of the tertiary sector during the period under study. In addition, the degree of integration of service activities into all non-tertiary sectors of the Catalan economy is measured.

3.1 Structural indicators of the core sectors of the Catalan economy

Some of the structural indicators in the Catalan economy used in the analysis refer to the vertical composition of the production inputs of the core sectors of activity and the distribution of the total output by use. Others are conceived for the purpose of demonstrating the manner in which the different sectors of activity are integrated into the economy as a whole. Lastly, a third group of indicators aims to show the uneven degree of opening-up to foreign markets of the different branches of activity of the Catalan economy.

These indicators certainly confirm that the “integrated” industry-producer services sector is the principal core of the Catalan economy (see *table 9*); a macrosector that in 2001 contributed 73.9% of interior production, 68.1% of gross value added, 79.3% of intermediate inputs, and 58.5% of all jobs in the Catalan economy. In addition, this “integrated” sector had the highest productivity level (45,000 euros, which is considerably higher than the average of the Catalan economy, which is 38,600) in all the core sectors of the economy, and also the highest remuneration per job (21,900 euros, which is also above the average for Catalonia, 20,600).

Table 9. Catalan economy indicators

Thousands of euros

(a) 1987

	Agrarian sector	Industry & Mining	Construction	Prod. Services	Consumer Services	TOTAL	Industry + Prod. Services
Intermediate Consumption	1,662,045	22,757,474	2,341,609	9,730,326	3,985,750	40,477,204	32,487,800
%	4.1	56.2	5.8	24	9.8	100	80.2
Salaries paid	181,734	7,540,568	1,437,399	5,483,592	5,394,979	20,038,272	13,024,160
%	0.9	37.6	7.2	27.4	26.9	100	65
GVA at basic prices	975,431	15,364,592	2,333,045	13,679,985	7,198,653	39,551,705	29,044,577
%	2.5	38.8	5.9	34.6	18.2	100	73.4
Production at basic prices	2,637,476	38,122,066	4,674,654	23,410,311	11,184,403	80,028,909	61,532,377
%	3.3	47.6	5.8	29.3	14	100	76.9
Number of employed	103,184	686,715	147,478	625,565	540,741	2,103,683	1,312,280
%	4.9	32.6	7	29.7	25.7	100	62.3
GVA / employed	9.45	22.37	15.82	21.87	13.31	18.8	22.1
Wage / employed	1.76	10.98	9.75	8.77	9.98	9.53	9.9

(b) 2001

	Agrarian sector	Industry & Mining	Construction	Prod. Services	Consumer Services	TOTAL	Industry + Prod. Services
Intermediate Consumption	1,942,846	76,100,776	13,017,538	38,208,777	14,949,228	144,219,165	114,309,553
%	1.3	52.8	9.0	26.5	10.4	100.0	79.3
Salaries paid	441,627	19,152,422	5,530,624	21,980,663	18,945,673	66,051,009	41,133,085
%	0.7	29.0	8.4	33.3	28.7	100.0	62.3
GVA at basic prices	2,282,900	31,965,871	9,637,967	52,442,425	27,511,546	123,840,709	84,408,296
%	1.8	25.8	7.8	42.3	22.2	100.0	68.1
Production at basic prices	4,169,886	107,949,159	22,705,497	91,461,380	43,324,513	269,610,435	199,410,539
%	1.5	40.0	8.4	33.9	16.1	100.0	73.9
Number of employed	77,101	818,035	303,463	1,057,856	951,871	3,208,325	1,875,891
%	2.4	25.5	9.5	33.0	29.7	100.0	58.5
GVA / employed	29.61	39.08	31.76	49.57	28.90	38.60	45.0
Wage / employed	5.73	23.41	18.23	20.78	19.90	20.59	21.9

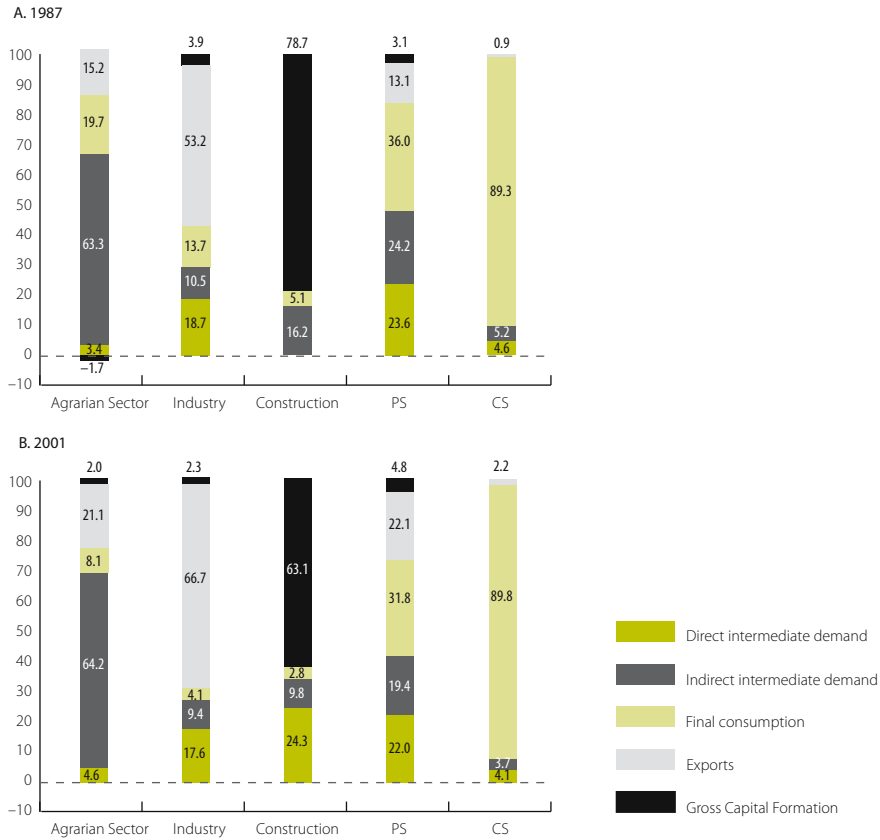
Sources: Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992); Institut d'Estadística de Catalunya (2006); own elaboration.

The most important changes in distribution by use for the total output of the industrial sector and producer services sector in Catalonia during the years 1987 and 2001 are concentrated in the following three aspects (see *figure 6*): firstly, there is an important increase in production in both sectors, which takes place in foreign markets: in the case of industry the proportion of sales to overseas countries increases from 53.2% to 66.7% and in the case of producer service activities it increases from 13.1% to 22.1%; secondly, the portion of industrial output intended for final consumption falls considerably from 13.7%

to 4.1% and the producer services figure also falls from 36.0% to 31.8%; thirdly, the industry output figure remaining as intermediate consumption is reduced from 29.2% to 27.0% and this percentage also fell from 47.8% to 41.47% in the case of producer service activities.

Figure 6. Output destinations of the core sectors of the Catalan economy

Distribution as a percentage



Sources: Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992); Institut d'Estadística de Catalunya (2006); own elaboration.

The other indicators studied allow us to affirm that the industrial sector includes activities with rather heterogeneous behaviours in terms of both their position and integration into the production system as a whole and in relation to the flows of foreign purchases and sales. Furthermore in global terms the manufacturing sector has greater capacity for articulation and activation than the economy as a whole and also greater ability to open up to foreign markets than the producer services activities as a whole. However from a dynamic perspective it is seen that in many respects the behaviour of the producer services sector is quite similar to that of manufacturing activities. Despite the differences that exist

between both types of activity, it can be confirmed that they tend to complement and integrate better with each other – *table 10*.

Table 10. Indicators of foreign transitions of the core sectors of the Catalan economy: 1987-2001

	Import propensity					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	0.299	0.492	0.409	0.643	0.708	1.135
Industry & mining	0.240	0.406	0.243	0.250	0.483	0.656
Construction	0.000	0.000	0.000	0.000	0.000	0.000
Producer services	0.011	0.048	0.102	0.081	0.113	0.130
Consumer services	0.000	0.013	0.000	0.026	0.000	0.039
Total	0.124	0.183	0.156	0.139	0.280	0.323

	Export propensity					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	0.063	0.115	0.090	0.096	0.152	0.211
Industry & mining	0.139	0.303	0.395	0.363	0.534	0.667
Construction	0.000	0.000	0.000	0.000	0.000	0.000
Producer services	0.021	0.079	0.107	0.142	0.128	0.221
Consumer services	0.000	0.004	0.009	0.018	0.009	0.022
Total	0.072	0.148	0.219	0.195	0.291	0.343

	Coverage rate (Export/Import)					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	20.958	23.429	21.932	14.882	21.521	18.587
Industry & mining	57.840	74.704	162.269	145.325	110.441	101.632
Construction	–	–	–	–	–	–
Producer services	191.909	164.503	105.362	173.811	113.868	170.348
Consumer services	–	32.183	–	67.856	–	55.824
Total	58.544	80.609	140.049	139.771	104.011	106.190

	Degree of openness					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	0.211	0.284	0.292	0.346	0.504	0.630
Industry & mining	0.255	0.428	0.431	0.370	0.686	0.799
Construction	0.000	0.000	0.000	0.000	0.000	0.000
Producer services	0.029	0.113	0.187	0.197	0.216	0.310
Consumer services	0.000	0.017	0.009	0.042	0.009	0.059
Total	0.153	0.250	0.293	0.253	0.446	0.503

Table 10. (cont.) Indicators of foreign transactions in the core sectors of the Catalan economy: 1987-2001

	Relative trade balance					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	-0.653	-0.620	-0.640	-0.741	-0.646	-0.687
Industry & mining	-0.267	-0.145	0.237	0.185	0.050	0.008
Construction	-	-	-	-	-	-
Producer services	0.315	0.244	0.026	0.270	0.065	0.260
Consumer services	-	-0.513	1.000	-0.191	1.000	-0.283
Total	-0.261	-0.107	0.167	0.166	0.020	0.030

	Dependence on production					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	0.095	0.078	0.187	0.072	0.282	0.150
Industry & mining	0.138	0.261	0.128	0.144	0.266	0.404
Construction	0.049	0.037	0.092	0.109	0.141	0.146
Producer services	0.035	0.050	0.035	0.069	0.070	0.119
Consumer services	0.028	0.034	0.047	0.057	0.075	0.090
Total	0.086	0.131	0.089	0.100	0.175	0.231

	Apparent consumption to resources ratio					
	Rest of the world		Rest of Spain		Total	
	1987	2001	1987	2001	1987	2001
Agrarian sector	0.952	0.923	0.936	0.942	0.911	0.901
Industry & mining	0.888	0.784	0.682	0.709	0.640	0.597
Construction	1.000	1.000	1.000	1.000	1.000	1.000
Producer services	0.979	0.924	0.903	0.869	0.885	0.804
Consumer services	1.000	0.996	0.991	0.983	0.991	0.979
Total	0.935	0.875	0.811	0.829	0.772	0.741

Sources: Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992); Institut d'Estadística de Catalunya (2006); own elaboration.

3.2 Structural analysis of the Catalan economy from the perspective of branches of activity and “subsystems”

Assuming the “subsystems” perspective implies changing the unit of analysis that is normally used in studying sectorial interdependences. Most inputs that are aimed at analysing change and the structural dynamics of production systems are previously obtained from separating this system horizontally into branches of activity.

However as has already been mentioned above this type of separation requires the conventional establishing of certain “artificial frontiers”: in this way the fact that certain units (companies or establishments) belong to a determined branch and not to another is due to criteria of similarity either with respect to their technology and/or in the production inputs used or with respect to their products.

The logic of dividing the production system into “subsystems” is different. The classification criterion is not homogeneity (of their technology or products) but the final destination of the different productive activities. Strictly speaking each “subsystem”, which is comprised of activities or parts of the activities of the branches, represents a *self-replacing productive system*. The net product of each “subsystem” is only one of the final goods produced within the system that is being studied. This type of definition of the “subsystems” thus depends on the set of structural interdependences of the production system (on the mode and intensity of integration between the economic sectors) and does not require the establishing of any artificial frontier.

In employment terms it is observed that the number of employed persons in the industrial “subsystem” is much higher than the number of employed persons in the horizontal industrial sector (see *table 11*): 938,715 as compared to 818,035 units (14.8% more), respectively for the year 2001. This indicates that in 2001 the vertically-integrated sector responsible for the net production of industrial goods in the Catalan economy contributed 120,680 jobs more than the traditional industrial sector.

The evolution of the employment figures is obviously not the same from the standpoint of the branches of activity as from the “subsystems” perspective. These differences show the growing presence (direct and indirect) of the output of producer service activities in intermediate consumptions in all the productive sectors.

The difference between the number of employed people for each branch of activity and the number of employed people for each “subsystem” shows whether an activity is a “net provider of employment” (in the case that the difference is positive) or a “net receiver of employment” (in the case that the difference is negative). The first group includes basically the economic sectors whose output consists of products that are mostly used by other activities as intermediate inputs. The second group includes economic sectors whose output is destined mainly for final consumption.

If we apply this classification criterion to the main economic sectors of the Catalan economy we see that the industrial sector is a “net receiver of employment” (from the traditional perspective and, as we have already seen, industrial employment is lower by 120,680 units compared to the subsystems employment figure). On the contrary the producer services sector is a “net provider of employment” (in this case the number of employed by the traditional industrial sector is 175,258 higher).

As a result in 2001 the employment created by the “integrated” sector of industry and producer services amounted to 1,875,890 units from the standpoint of branches of activity (58.5% of the total economy) and 1,821,312 units from the “subsystems” perspective (56.8% of the total economy) meaning that it is a net provider of employment.

Table 11. Difference between employment by branches of activity and employment by subsystems: 1987 and 2001

	1987				2001			
	(a) Employment by Branches	(b) Employment by Subsystems	(c) = (a) – (b) Difference		(a) Employment by Branches	(b) Employment by Subsystems	(c) = (a) – (b) Difference	
Agriculture livestock hunting forestry and fisheries	103,184	43,972	59,212	P	77,101	30,403	46,698	P
Extraction of energy products	7,066	6,274	792	P	4,271	5,857	-1,586	R
Food beverages & tobacco industries	69,328	151,756	-82,428	R	94,210	156,689	-62,479	R
Textile dressmaking leather & footwear	161,990	174,291	-12,301	R	122,505	131,356	-8,851	R
Wood and cork industries	24,945	18,435	6,510	P	23,722	16,227	7,495	P
Paper publishing & printing industries	47,908	48,684	-776	R	69,808	60,875	8,933	P
Chemical industries	62,815	82,068	-19,253	R	71,582	97,591	-26,009	R
Rubber and plastics industry	31,074	29,472	1,602	P	40,730	33,945	6,784	P
Non-metallic mineral products	22,382	13,617	8,765	P	32,059	27,304	4,754	P
Metallurgy and metal products	99,573	80,038	19,535	P	109,820	90,887	18,933	P
Machinery & mechanical equipment	28,725	29,770	-1,045	R	66,998	68,710	-1,712	R
Electrical electronic and optical equipment	59,959	70,052	-10,093	R	59,957	80,506	-20,549	R
Manufacture of transport material	50,457	68,640	-18,183	R	76,457	118,184	-41,726	R
Diverse manufacturing Industries	20,493	26,168	-5,675	R	45,915	50,582	-4,668	R
Electrical energy	10,689	2,054	8,635	P	5,086	7,230	-2,145	R
Gas and related services	2,572	1,127	1,445	P	1,636	1,407	230	P
Water and related services	3,790	1,758	2,032	P	4,659	5,268	-609	R
Construction	147,478	174,942	-27,464	R	303,463	321,668	-18,205	R
Commerce and repairs	370,171	297,191	72,980	P	515,093	461,995	53,098	P
Hostelry and catering	93,271	128,745	-35,474	R	180,974	238,613	-57,639	R
Road and pipe transport	78,133	51,656	26,477	P	91,683	68,033	23,650	P
Sea and air transport	1,701	2,466	-765	R	7,050	10,609	-3,558	R
Transport-related services	18,835	15,305	3,530	P	37,612	38,712	-1,100	R
Postal and telecom. services	17,015	7,124	9,891	P	33,618	20,194	13,424	P
Financial mediation	61,047	45,966	15,081	P	75,682	49,741	25,941	P
Real estate and corporate services	61,612	76,661	-15,049	R	285,735	219,409	66,326	P
PA defence and compulsory SS	125,580	140,725	-15,145	R	120,205	138,404	-18,198	R
Education	96,447	100,590	-4,143	R	147,043	145,924	1,118	P
Medical and veterinary activities social services	54,305	71,398	-17,093	R	172,437	184,418	-11,981	R
Other social services and activities; personnel services	171,138	142,736	28,402	P	331,213	327,582	3,630	P
Total	2,103,683	2,103,683			3,208,325	3,208,325		
Agrarian sector	103,184	43,972	59,212	P	77,101	30,403	46,698	P
Industry and mining	686,715	799,265	-112,550	R	818,035	938,715	-120,680	R
Construction	147,478	174,942	-27,464	R	303,463	321,668	-18,205	R
Producer services	625,565	501,309	124,256	P	1,057,855	882,598	175,258	P
Consumer services	540,741	584,195	-43,454	R	951,871	1,034,942	-83,070	R
Total	2,103,683	2,103,683			3,208,325	3,208,325		
Industry + Producer services	1,312,280	1,300,575	11,705	P	1,875,890	1,821,312	54,578	P

Note: R = Net employment "receiver" sector; P = Net employment "provider" sector.

Sources: Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992); Institut d'Estadística de Catalunya (2006); own elaboration.

A similar exercise can be carried out in terms of gross value added. In this case, as with employment, if we compare the relative figures of contribution to gross value added of the “integrated” industry and producer services sector we can see that the relative weight of this macrosector is also higher in terms of branches of activity (68.2% in 2001) than in terms of “subsystems” (64.3%). In addition, the change in this relative weight between 1987 and 2001 is greater from the “subsystems” perspective than from the branches of activity standpoint; in both cases there is a reduction in weight in the first case of 5.9% whereas in the second case this reduction is 5.1%.

3.3 Measuring the degree of tertiarisation of industrial activities, “industrialisation” of tertiary activities and integration of services in the Catalan economy

As already mentioned on several occasions during the last twenty-five years important changes have taken place in production system structures in industrialised countries. Within this broad framework the relations between industry and service activities (and in particular producer service activities) have been intensified in two aspects:

- firstly, there has been an increase in the extent of integration of productive systems as a consequence of the growing specialisation of the different economic activities;
- secondly, there has been an important restructuring of production processes. This is characterised by a disintegration of vertical production processes, which has stimulated the outsourcing of certain functions (especially service functions), carried out until now by the companies themselves in all economic sectors, but has also promoted the acquisition of new service inputs by those companies.

In the final section of this study we present the results of an analysis (based on an input-output model) that makes it possible to measure the interactions between industrial and service sectors from two perspectives:

- The perspective of the tertiarisation of industrial activities and the “industrialisation” of service activities.
- The perspective of integrating tertiary activities into the economy as a whole or, more precisely into the industrial sector of this economy:

During the period studied (1987-2001 see *table 12*) the extent of tertiarisation of the industrial sector increased by 14.4%. Although this direct tertiarisation process is not uniform among the different manufacturing activities this indicator increased in most sectors (and in some cases quite considerably).

Table 12. Direct and total tertiarisation index of the Catalan industrial sector 1987-2001

Of total production (matrix A)	Index of direct tertiarisation (of industrial branches)			Index of total tertiarisation (of industrial branches)			Direct tertiarisation / total tertiarisation ratio		
	1987	2001	Change (%)	1987	2001	Change (%)	1987	2001	2001/1987
Coal oil and natural gas	0.0560	0.2499	346.0	0.1153	0.4760	312.8	0.486	0.525	8.0
Oil refining	0.1049	0.0743	-29.2	0.2663	0.5085	91.0	0.394	0.146	-62.9
Metallic minerals & iron & steel non-ferrous metals & non-metallic or non-energy minerals	0.2516	0.1022	-59.4	0.5367	0.4552	-15.2	0.469	0.225	-52.1
Baked earth products for construction	0.2121	0.2141	0.9	0.4133	0.4782	15.7	0.513	0.448	-12.8
Cement lime & gypsum	0.2406	0.2037	-15.3	0.3874	0.4695	21.2	0.621	0.434	-30.1
Construction materials natural stone & abrasives	0.1832	0.2098	14.5	0.4431	0.5784	30.5	0.413	0.363	-12.3
Glass	0.2033	0.1610	-20.8	0.3933	0.4357	10.8	0.517	0.369	-28.5
Basic chemicals	0.1574	0.1521	-3.3	0.3912	0.5691	45.5	0.402	0.267	-33.6
Chemicals for agriculture industry & other	0.1362	0.2148	57.6	0.4023	0.5934	47.5	0.339	0.362	6.9
Pharmaceuticals	0.1349	0.2271	68.3	0.3941	0.5850	48.4	0.342	0.388	13.4
Foundries pressing and stamping of metals	0.1750	0.1098	-37.2	0.4021	0.3968	-1.3	0.435	0.277	-36.4
Structural metallic products and boilers and other metallic products	0.1294	0.1396	7.9	0.3652	0.4399	20.4	0.354	0.317	-10.5
Machinery and mechanical equipment	0.1160	0.1426	23.0	0.3358	0.4218	25.6	0.345	0.338	-2.1
Office machinery computers precision and optical instruments	0.1049	0.1308	24.7	0.2904	0.4954	70.6	0.361	0.264	-26.9
Electrical machinery and material	0.1248	0.1129	-9.6	0.3442	0.4262	23.8	0.363	0.265	-27.0
Electronic material	0.1128	0.1368	21.3	0.3925	0.5386	37.2	0.287	0.254	-11.6
Motor vehicles and accessories	0.1816	0.1021	-43.8	0.5024	0.4625	-7.9	0.361	0.221	-38.9
Naval construction and other transport material	0.0837	0.1774	112.0	0.2637	0.5536	110.0	0.317	0.321	1.0
Slaughtering of livestock and canned meat	0.0869	0.0849	-2.3	0.3757	0.4162	10.8	0.231	0.204	-11.9
Dairy industry	0.0885	0.2367	167.5	0.3393	0.5792	70.7	0.261	0.409	56.8
Tobacco and other food industries	0.1334	0.1841	38.0	0.3950	0.5573	41.1	0.338	0.330	-2.2
Wine & beer industry	0.1931	0.2167	12.2	0.4361	0.5903	35.4	0.443	0.367	-17.1
Mineral water	0.1692	0.2123	25.5	0.3996	0.6079	52.1	0.423	0.349	-17.5
Cotton & mixes; wool & mixes: nat silk & mixes	0.0722	0.1310	81.3	0.2345	0.4579	95.3	0.308	0.286	-7.1
Knitwear	0.0611	0.1347	120.4	0.2240	0.5382	140.3	0.273	0.250	-8.3
Other textile industries and other textile industries	0.1076	0.1530	42.1	0.2863	0.4784	67.1	0.376	0.320	-14.9
Clothing and accessories; leather & footwear	0.0721	0.1218	69.0	0.2627	0.4587	74.6	0.274	0.266	-3.2
Semi-elaborated wood cork reed and cane prods	0.0834	0.0883	5.9	0.2796	0.3573	27.8	0.298	0.247	-17.2
Wooden furniture	0.0869	0.1559	79.4	0.2738	0.4807	75.6	0.317	0.324	2.2
Paper paste	0.3067	0.1580	-48.5	0.5739	0.4818	-16.0	0.534	0.328	-38.7
Paper printing and publishing	0.0738	0.1512	105.0	0.3392	0.4785	41.1	0.218	0.316	45.3
Rubber and plastics	0.1086	0.1497	37.8	0.3328	0.4928	48.1	0.326	0.304	-6.9
Other manuf industries	0.1285	0.2194	70.7	0.3471	0.5741	65.4	0.370	0.382	3.2
MEAN INDUSTRIAL /TOTAL INDUSTRIAL	0.1282	0.1466	14.4	0.3506	0.4833	37.9	0.366	0.303	-17.0
Standard deviation	0.060	0.048	-	0.092	0.1	-			
Agrarian sector	0.1122	0.1057	-5.8	0.3444	0.3214	-6.7	0.326	0.329	0.9
Construction	0.1603	0.1009	-37.1	0.3525	0.3478	-1.3	0.455	0.290	-36.2

Sources: Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992); Institut d'Estadística de Catalunya (2006); own elaboration.

Nevertheless, it should be said that during those years there was an increase in *indirect* tertiarisation of industrial sectors. Indeed, between 1987 and 2001, the degree of total tertiarisation (both direct and indirect) increased by 37.9%. This means that Catalan industrial sectors have shown a greater tendency to integrate tertiary inputs into the production process through the inputs (not necessarily service inputs) coming from other branches, which already employed certain service inputs, than through the direct acquisition of this type of tertiary inputs.

Like wise, in the (aggregate) sector of producer services there was an increase in both the direct tertiarisation and total tertiarisation indexes during the years studied (9.2% and 4.2%, respectively).

It was observed that direct “industrialisation” indexes fell during the 1987-2001 period in the producer services (aggregated) sector by -14.2%. On the contrary, the total “industrialisation” index rose slightly in the producer services sector (3.3%). This means that direct “industrialisation” (through the intermediate consumption of products with a high content of industrial inputs) was more important than direct “industrialisation” (through the acquisition of industrial inputs directly by the service sectors) in the tertiary Catalan sector.

An analysis of the “industrialisation” of the same industrial sectors allows us to see that both the direct “industrialisation” index and total “industrialisation” index increased (by 27.9% and 19.9%, respectively) during the period under study.

Lastly, during the 1987-2001 period the degree of direct integration of the aggregate producer services sector fell by 26.9%, whereas its total degree of integration was reduced by 31.1%. This negative path in the direct and total integration process of the services sector may be explained by, among other things, the strong tertiarisation (or specialisation) of the services activities themselves during the period studied, and by a considerable increase in the degree of openness of services industries and especially of producer service activities.

Table 13. Direct and total tertiarisation indexes for the services sector in Catalonia 1987-2001

Of total production (matrix A)	Direct tertiarisation index (of service branches)			Total tertiarisation index (of service branches)			Direct tertiarisation / total tertiarisation ratio		
	1987	2001	Change (%)	1987	2001	Change (%)	1987	2001	2001/1987
Electrical energy	0.191	0.273	43.1	1.270	1.613	27.0	0.150	0.169	12.6
Gas steam and hot water	0.129	0.163	25.7	1.304	1.493	14.5	0.099	0.109	9.8
Water	0.226	0.366	61.7	1.363	1.648	20.9	0.166	0.222	33.7
Trade	0.146	0.306	110.4	1.272	1.548	21.6	0.114	0.198	72.9
Recycling & repairs	0.209	0.277	32.7	1.501	1.436	-4.4	0.139	0.193	38.7
Rail transport	0.444	0.180	-59.4	1.638	1.373	-16.2	0.271	0.131	-51.6
Urban road transport of passengers & goods	0.286	0.452	58.1	1.431	1.915	33.9	0.200	0.236	18.1
Sea and air transport	0.443	0.382	-13.8	1.630	1.751	7.5	0.272	0.218	-19.8
Transport-related activities	0.164	0.572	247.6	1.290	2.070	60.5	0.127	0.276	116.6
Postal and telecom services	0.081	0.379	367.0	1.155	1.623	40.5	0.070	0.233	232.4
Corporate services	0.620	0.298	-52.0	2.363	1.480	-37.4	0.262	0.201	-23.3
Lease of property	0.011	0.165	1,379.6	1.084	1.257	16.0	0.010	0.131	1,175.9
MEAN Producer Services	0.286	0.313	9.2	1.460	1.521	4.2	0.196	0.205	4.8
Standard deviation	0.175	0.122	-	0.336	0.228	-			

Sources: Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992); Institut d'Estadística de Catalunya (2006); own elaboration.

References



Australian Expert Graphics Industry Studies (2002): *Selling Solutions Engaging patterns of Product-Service Linkage in the Australian Economy*, February.

Caixa Catalunya (2007): Informe sobre la situació i les perspectives de l'economia catalana. Canvi demogràfic i reestructuració del mercat de treball a Catalunya: les transformacions 1995-2006, semestral. Retrieved from: www.caixacatalunya.es.

Cambra Oficial de Comerç, Indústria i Navegació; Generalitat de Catalunya, Departament de Comerç, Consum i Turisme (1992): Taula Input-Output de Catalunya 1987.

Conference Board (2004): "Can Manufacturing Survive in advanced countries", *Executive Action*, nº93, March, New York.

EUROSTAT (2008): *Regions*. Retrieved from: <http://epp.europa.eu/estat.ec.europa.eu/>.

Feinstein, C. (1999): "Structural Change in the Developed Countries during the Twentieth Century", *Oxford Review of Economic Policy*, 15 (4), pp. 35-55.

High Level Group on Manufacturing (2008): The Report of the High Level Group on Manufacturing, March. Retrieved from: http://www.forfas.ie/media/forfas080402_manufacturing_report.pdf.

Instituto Nacional de Estadística (2008): *Contabilidad Regional de España. Base 2000*. Retrieved from: www.ine.es.

Institut d'Estadística de Catalunya (2006): Marc Input-Output de l'economia catalana, 2001. Retrieved from: www.idescat.cat.

OECD (2005): *Services Statistics Coordination and Strategy*, Final Draft Report. Direcció d'Estadístiques. Full Report by OECD Statistics Directorate to UN Statistics Commission 2005. Retrieved from: <http://www.oecd.org/dataoecd/10/60/34429262.pdf>.

Parejo, A. (2004): "Andalucía en la industrialización de las regiones españolas", en M. González de Molina y A. Parejo (eds.). *La historia de Andalucía a debate. III industrialización y desindustrialización de Andalucía*, Anthropos, Barcelona/Diputació provincial de Granada, pp. 37-58.

Prados de la Escosura, L. (2003): *El progreso económico de España, 1850-2000*, Fundación BBVA.

Ezequiel-Francesc Baró i Tomàs (Barcelona, 1946)

Holds a PhD in Economics and Business Administration and a BSc in Philosophy (specialised in History of Philosophy) from the University of Barcelona.

He works as a Professor of Applied Economics at the University of Barcelona since 1976. Currently, he teaches a course on Spanish Economics to undergraduate students of Economics and Business Administration. He is a member of the Barcelona Institute of Economics (IEB). He has been consultant for the *Centre d'Estudis de Planificació*, and he currently is a partner of BCF Consultors.

He is a member of the Réseau Espaces et Services (RESER) since its foundation in 1991, and of the Services World Forum since 1993.

He has done more than a hundred studies on service economy (especially on business services and tourism), innovation economics, cultural economics and educational economics. E. Baró is also an expert in quantitative techniques, such as macroeconomic accounting (he was a member of the team that developed the 1987 Catalan input-output table; and, more recently, has participated as a consultant in the elaboration of the 2001 Input-Output table of the Catalan economy; and he has developed the Culture Satellite Account and the Housing Satellite Account for Catalonia) and evaluation of public policies.

Cintha Villafaña Muñoz (Puebla, Mexico, 1976)

Holds a degree in Industrial Engineering from the University of the Americas Puebla and is a PhD candidate in Sociology at the University of Barcelona. For the Diploma of Advanced Studies she has done research regarding the citizenship concept and the democratic participation in Mexico. In Mexico she worked as a consultant in Pricewaterhouse Coopers, where she did research on transfer pricing of multinational companies. She has participated in the elaboration of the 2001 Input-Output table of the Catalan economy. She has taken part in the development of the Culture Satellite Account and the Housing Satellite Account for Catalonia and has collaborated on several studies about the economic impact of tourism in Catalonia. She has also worked for the Idescat elaborating historical series of macroeconomic indicators for Catalonia. Currently, she works as a project-technician in BCF Consultors and participates in projects on the composition of the Catalan industry.

