A Cluster Mapping Methodology. Identifying critical mass for innovation

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Abstract: The boom of clusters is leading to an "explosion" of initiatives which often lack an integrated approach. There are some methodologies very strong technically, but they are expensive and often impossible to implement due to the shortage of basic information. This study seeks to answer the need for a methodology maintaining a high degree of robust analysis, while providing an application which is not too restrictive in terms of either the statistical information necessary or the intensive use of resources. The combination and use of two groups of variables (definition and characterization of clusters nature) is a significant shift in the strategic definition of cluster policy and the integration of different techniques. This methodology has been contrasted in several Spanish regions and the results have been in line with what the methodology proposed predicted.

Keywords: clusters, mapping, impact, identification.

1 Introduction: Clusters as a phenomenon that is spreading.

At present the cluster concept is experiencing increased diffusion and a repercussion without precedents. Nevertheless, this is not a new concept. The first references in Literature about the agglomeration of the economic activity, its causes and their implications date back to the early twentieth century in the work of Alfred Marshall[1] and the "industrial district".

Later, other authors such as Piore and Sabel[2] or Becattini[3] further developed the term around endogenous development and spatial economics.

In the early 90s, Michael Porter[4], added the business dimension and the notion of competitive advantage, relaunching the cluster concept as currently understood in the fields of business, politics and research:

> "Competitive economic agglomeration vertically deep, involving many stages of the vertical chain and industries providing machinery and other specialized inputs."
>
> M. Porter (1990)

> "Clusters are geographic concentrations of interconnected companies, specialized suppliers, service providers, and associated institutions in a particular field that compete but also cooperate."
>
> M. Porter (1998)

Both definitions include four elements which are frequently referred to in the literature of clusters. These are the high level of economic specialization (vertical depth), geographical proximity, relationships between actors and a higher level of competitiveness than is normally present.

While not all of these elements are found in every cluster; in the case where all are present, some are more obvious than others depending on the stage of development of the cluster.

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[1] Marshall, Alfred (1890). "Principles of Economics" London MacMillan.

[2] Piore, Michael J., and Sabel Charles F. (1984). "The second industrial divide. Possibilities for prosperity". Basic Books. New York

[3] Becattini, Giacomo (1987). "Mercato e forze locali: il distretto industriale". Il Mulino. Bologna.

[4] Porter, Michael E. (1990) "The competitive advantage of nations". Free Press

Porter, Michael E. (1998) "On Competition". Harvard Business School Press.

This apparent heterogeneity allows the classification of these four elements into two categories: cluster definition and cluster nature. The first category allows for the identification of the existence of a cluster in a specific location, based on the necessary conditions for a cluster. The second shows the nature of each cluster, enabling us to understand its operation and its ranking compared to other cases in different locations.

Therefore, the defining elements bring together the characteristics that an economic activity in a specific location has to have to be considered a cluster, namely a high degree of specialization and geographic concentration, and solid relationships that result in higher performance with synergies.

Furthermore, the nature of a cluster brings together aspects that permit one cluster to be differentiated form another, establishing a typology, particularly the levels of competitiveness, the degree of impact on the regional economy and the productive orientation of the activity.

2 Review of some clusters mapping techniques.

"Cluster Mapping" can be defined as the use of a set of instruments, tools and methodologies to determine the existence and position of clusters in a given territory.

The work of identification of clusters has been very common since the late 90s, in the United States through the work and reports from the Council on Competitiveness[1], and at European level through the reports of the European Commission[2].

Table 1 Detection of clusters in some European countries

Country	*Number of clusters identified*
Denmark	41 clusters
France	100 cluster
Finland	10 national cluster & important number of regional clusters
United Kingdom	154 cluster
Austria	45 cluster

Source: Final report of the expertise Group on Clusters and Networks. DG Enterprise. 2002. Brussels

[1] Council on Comeptitiveness (2001) "Clusters of Innovation Initiative. Regional foundations of US competitiveness". Report prepared by Monitor Group.

[2] European Commission (2002). "Regional Clusters in Europe". Observatory of European SMEs. Enterprise publications.
European Commission (2006). "2006 Innobarometer on clusters´role in facilitating innovation in Europe". Analytical Report. Brussels.
European Commission (2007). "Innovation Clusters in Europe: A statistical analysis and overview of current policy support". DG enterprise and industry report. Brussels.

In literature, the approach to cluster identification has been both quantitative and qualitative. Quantitatively, Porter[1] and other authors like Brenner[2] and Duranton & Overman[3], have developed methodologies to locate and identify geographic clusters from statistical information.

For the most part, qualitative methodology has focused on case studies (mostly interviews with the most relevant actors), analyzing economic agglomerations whose existence is assumed a priori. An example of this approach is Saxenian's[4] work for Silicon Valley and Route 128.

In both approaches, public policy analysis is usually used by governmental bodies as support in the stages of identification, design and implementation of regional clusters.

In this article we apply a quantitative methodology, close to the theoretical line of Porter and some elements of the vision of Duranton and Overman. In this regard it is of interest to review the main contents of both approaches.

Michael Porter and the Institute for Strategic Competitiveness at the Harvard Business School designed a model from which it was possible to translate the elements of the definition of the author himself through measures of spatial concentration of activity and intensity in relationships of different sectors. This method classifies the economic sectors into three groups depending on their commercial orientation and implementation of a series of filters using coefficients of localization[5]: local sectors, resource-dependent industries and commercial sectors.

After purging of the different sectors, and once established, the classification of potential clusters in a second stage looks at the various relationships between these sectors, through an analysis of correlations in terms of employment. Similarly using the commercial information contained in the input-output tables of the economy concerned.

Duranton and Overman have developed a method parallel to that of Porter. In it, the limits of the cluster are obtained endogenously, i.e., through the development of the model itself, not from a given political-administrative structure. The logic of this approach rests on the economic boundaries does not always correspond to administrative boundaries, and both are determined by very different factors and causes.

The method of interpoint distance distribution (as it is called) uses the zip code of each production plant, as well as information on the number of employees and the

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[1] Porter, Michael E. (2003) "The economic performance of regions" Regional Studies 37: 549-578

[2] Brenner, Thomas (2003). "An identification of local industrial clusters in Germany". Papers on Economics and Evolution 2003-04, Max Planck Institute of Economics

[3] Duranton, Gilles, and Overman, Henry G., (2005) "Testing for localization using micro-geographic data". Review of Economic Studies 72: 1077-2206

[4] Saxenian, Annalee (1994) "Regional advantage. Culture and competition in Silicon Valley and Route 128". Harvard University Press

[5] The coefficients of localization (LCs) represent the degree of similarity of the interregional distribution of a sector with respect to the distribution of a standard of comparison, typically the total economic activity.

industry, and is structured in two phases. The first focuses on the calculating distances for each pair of manufacturing plants in the subsequent probabilistic distribution.

In a second phase, building another distribution of distances, this time associated with a situation of randomness in the location of production plants. The breakdown "fictitious" is compared to the "real" initial, calculated from the density of the distances of the observed values. Of the differences, the existence or not of any type cluster agglomeration is extracted.

Table 2 Pros and cons of some models of cluster mapping

Model	*Positive*	*Negative*
Porter´s Model	Ease of application as to perform calculations	Insufficient robustness of the results
	Low requirements of statistical information	Too much subjectivity in the choice of criteria
	High comparability of results	High knowledge on local economic reality required
Modelo de distribución en distancias	Allows you to identify clusters beyond administrative boundaries.	Does not includes information about relationships between companies (does not include externalities)
	Discrimination of sectors based on an objective statistical criterion.	Complexity of implementation with regard to the calculations performed and the amount of statistical information available
	Possibility to compare two situations, with and without agglomeration	Weak comparability of results
	Possibility to discriminate Locations based on size of production plants	Physical distance as the sole indicator of agglomeration

Source: Own elaboration based on the work of Duranton y Overman (2005) & M. Porter (2003)

To sum up, the most appropriate method in each case does not depend on a clear methodological superiority, but it is directed more to considerations related to the aim and size of the study carried out.

Therefore, Porter's method is suitable for identification of cluster analysis in which the immediacy of results, simplicity and comparability with other cases is a given priority over more robustness intensive methodological information; statistics in many cases is not available.

By contrast, in a field of academic research, where priorities are focused more objectively at the expense of more complex methodologies and information-intensive, those of Duranton and Overman are best.

3 A proposed mapping of clusters for use in policies planning.

The methodology developed in this section has its roots in the previously mentioned work of Porter and Duranton and Overman. As a starting point we take the four points raised in the first chapter to establish a set of variables (5 in total) to include in the analysis of cluster mapping, namely, economic specialization and concentration, interrelationships within the cluster, levels of competition, economic impact and production guidance.

The first two variables refer to aspects that define a cluster (defining elements), while the rest refer to those that characterize and allow classification of equals (characteristic elements).

Economic specialization

Economic specialization is one of the most visible characteristics of a cluster and has to do with the progressive division of labor, according to products and processes becoming more complex and requiring further deepening of the value chain.

In this sense, we define the specialization of a location as a greater relative value for a particular variable with respect to the same measure in a superior geographical scope. In the work of Porter this has been called coefficient of localization. Mathematically the expression of Specialization Coefficient[1] for a sector "xij" would be:

$$\frac{CE(x_{ij})\left(\frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}}\right)}{\frac{\sum_{j=1}^{z} x_{ij}}{\sum_{i=1}^{n}\sum_{j=1}^{z} x_{ij}}}100$$

where " x_{ij} is the number of firms for the CNAE sector “i” and the region “j”,
“n” is the total number of sectors of activity classification (CNAE in Spain) and
“z” the total number of regions.

The result of applying the coefficient of specialization (EC) is a percentage value that can move in the following range:

- "CE" (X_{ij}) <1.10 The sector “x_{ij}” no specialization (lower relative weight than the average).
- "CE" (X_{ij}) =1.10 The sector “x_{ij}” no specialization (similar relative weight average).

[1] Ibid., 4

- "CE" (X_{ij}) >1.10 The sector "x_{ij}" presents specialization (relative weight greater than average).

The classification CNAE provides information on employment stratum so that you can also apply various filters can also be applied to take into account, the weight of employment in the identification[1]. Thus, together with the criterion of specialization more than 10% of the average, taking into account the different levels of employment (without employees, with employees and with +10 employees) can further detail the potential of the cluster.

Table 3 Characteristics of the concentration identified based on the criteria of employment and specialization

Filter 1	*Filter 2*				
Degree of specialization	*Criteria 1*	*Criteria 2*	*Criteria 3*	*Criteria 1+2+3*	*Characteristics of the concentration*
	X				Average (high EC without discrimination on the strata of employees)
(1.10;∞)		X			High (high EC in enterprises with employees)
			X		Very high (high EQ employees in firms +10)
				X	Consolidated Cluster (high EC in all sectors of employment)

Source: own elaboration

The interrelationships between agents

The importance of interrelationships has traditionally been conditioned by specialization, and especially the spatial concentration. However, the growing importance of innovation as a source of competitiveness has positioned itself to networking as a key explanatory element of the superior performance of economic agglomerations.

The input-output framework of financial accounting is the instrument that provides most information on the relationships between sectors. The measurement of their technical coefficients (commercial) gives the degree of dependence, or draw, of a sector on the rest of the economy. Those that exceed a certain criterion become part of either providers (if the sector is the applicant) or clients (if the sector is offeror). In this sense, the input-output analysis will allow us to identify through these coefficients, first suppliers to the nuclear activities of the cluster, and secondly, the customers that these sectors lead to a greater extent their production.

1 By measuring the degree of concentration based only on the number of incorporated companies rounded results can be obtained when considering the group of companies without employees.

The technical parameter (commercial) of each pair of sectors “i” and "j" is calculated as follows:

$$a_{ij} = \frac{x_{ij}}{X_j}$$

where “a_{ij}” is the technical coefficient for the sector "j", " x_{ij} " inputs in sector "j" for the sector "i" and " X_j " total production in sector "j". The value of “a_{ij}” is always in the interval (0.1) y $\sum_{i=1}^{n} a_{ij} < 1$

From the above expression calculating the different coefficients for the entire matrix, you can identify the value chain for a boundary value of "a". Mathematically the value chain is defined as:

$$\forall\, j, i \subset A_j \; si \; a_{ij} > a_{Fj}$$

Where “A_j” is the value chain for the sector “j”, “i” any other distinct sector “j” and “a_{Fj}” minimum border value must meet technical coefficients for each sector "j" to be considered part of the value chain.

From the above expression “$\forall$ j,i$\subset A_j$ si $a_{ij}>a_{Fj}$”, boundary value “a_{Fj}” is defined as:.

$$a_{Fj} = \frac{\Sigma a_{nn}}{n}$$

In other words, those sectors that provide intermediate inputs to a value higher than the average for that sector (boundary value) may be considered as part of its value chain.

In any event, even setting a filter across the border coefficient specification or “a_{Fj}”, not all sectors within the new value chain will have the same weight, or in other words, the same intensity of relationship. We thus need to specify different degrees of relationships within each chain, apart from the filtered sectors with a value a_{ij} > AFJ, the cutoff points for the 3 categories will be:

$$Rtng_{1j} = \left(\frac{\text{Max } a_{Fij} - \text{Min } a_{Fij}}{n}\right) + \text{Min } a_{ij}$$

$$Rtng_{2j} = T_{1j} + \left(\frac{\text{Max } a_{Fij} - \text{Min } a_{Fij}}{n}\right)_{\square}$$

$$Ring_{3j} = T_{3j} + \left(\frac{\text{Max } a_{F1j} - \text{Min } a_{F1j}}{n}\right)$$

Ring1 is the cutoff point for a low intensity level, ring 2 for average level and ring 3 for a high level (above all the extent of sector "j"). "Affix" They are the different values of coefficients resulting from the application of boundary value filter "A_{Fj}"

Levels of competitiveness

The elements that define the cluster-greater specialization, efficiency of the division of the production chain, economies of scale, location advantages, synergies of the interrelationships etc.- revert to higher levels of productivity and competitiveness. In fact clusters are attributed higher levels of competitiveness than other activities in their environment.

To reflect the competitive levels we take as reference the value of productivity. We understand productivity as unit labor requirements for obtaining a unit of output:

$$\textbf{Labour Productivity} = \frac{X_{ct}}{E_{ct}}$$

X_{ct} where is the total output of industries in the cluster at a given time t is total employment E_{ct} Industries of clusters for the same period.

Economic impact

The clusters are mostly strategic sectors for the economy of a region and its economic impact comes from both its direct bearing on the main macroeconomic variables (GDP, production, employment, etc.) And carryover effects on the rest of the economy. In this sense, the overall impact is the result of the sum of the direct impacts of the cluster itself as the induced effects on the rest of the economy.

The methodology we propose first calculates the direct economic impact of the cluster, i.e. the economic weight in terms of the variables of employment, GDP or if the value of production. Secondly, the calculation of the total impact on the economy will be done by obtaining the multipliers of GDP and employment.

The basic tool of this methodology is the input-output table (TIO). The inversion of the matrix gives us the GDP and employment multipliers:

- The multiplier of added value measures the increases of global GDP in the economy due to the increase in a unit of final demand in each industry (turnover in our case). The calculation of the multipliers of GVA derives from:

$$\text{GDP Multiplier} = GDP_i*(I-A)-1 = GDP_i*BR$$

Where GDP_i is the vector of coefficients of GDP at a basic price per unit of production, "I" is the identity matrix, "A" is the internal coefficient matrix, therefore "BR" is the interior inverse matrix.

- The design of an employment multiplier involves establishing a hypothesis about the existence of a linear relationship between employment in each sector and the value of their Production.

$$E_j = \frac{L_j}{X_j}$$

Where L_j is the number of employees by sector, and X_j is the actual production of the sector concerned, so E_j will be the multiplier of direct employment.

Employment Multiplier= Ej*BR

Where BR is, again, the interior inverse.

Applying the multiplier impact on the direct impact of production and with the help of the corresponding coefficients of income and employment, we obtain the induced impacts on income (GDP in our case) and employment, respectively.

Production orientation

As noted previously, the cluster can be classified into the category of local or commercial. This classification reflects the commercial orientation of the cluster, namely the export intensity of their businesses. For the analysis of the production orientation of the existing cluster, data on exports has been used.

4 Application of the methodology to reality. The case of Castile & Leon, Madrid and the Balearic Islands.

From conceptual developments presented in the previous chapter, the work involved the implementation of the proposed methodology in three regional cases in Spain: Castile and Leon, the Community of Madrid and the Balearic Islands. This chapter summarized the results from the calculations for each of the 5 variables considered in the methodology.

The three regions have very different traditional specialization patterns. The first region in the food industry and certain industrial activities associated with the manufacture of vehicles. The second, as the capital region mainly specializes in services. And finally, the last with a structure dominated by tourism and related activities.

Table 4 shows the sectors in each of the Autonomous Communities considered that meet the criteria to be considered as regional clusters (defining elements). Table 5-10 show the values of those clusters relating to the characterizing cluster variables.

Analysis of the conditions set for the first two dependent variables (cluster defining elements: specialization, concentration and relationships), in Castile and Leon have identified a total of 6 main cluster, 8 in Madrid[1] and 6 in the Balearic Islands (Table 3). All other sectors not reflected in each region did not meet the criteria defined for the coefficient of specialization and in turn, usually had a lower drag effect (number of total sectors).

Regarding the first group of variables, the clusters identified have a degree of specialization in the three criteria considered (without employees, with employees and with +10 employees) 10% above average. The value presented is the average of the values in each of the criteria.

The last column of Table 3 shows the number of sectors with which the cluster in question is interrelated (considering these as those that provide superior value inputs to the average for that sector). In the clusters identified, this figure is higher (usually) than observed in for other economic activities. The total number of sectors is broken also drawn according to the cutoffs proposed in the methodology (Ring 1, Ring 2 and Ring 3)[2].

Table 4 Satisfaction of the criteria for mapping in the three Autonomous Communities

Autonomous Community	*CNAE 2009 (Two digits)/ Sector*	*Coefficient of specialization (SC>110%) (average of the 3 criteria)*	*No sectors*			
			Ring1	*Ring2*	*Ring 3*	*TOTAL*
Castilla y Leon	Extraction of coal and lignite (05)	601.94	9	2	1	12
	Food industry (10)	201.17	10	1	2	13
	Manufacture of wood and cork (16)	140.92	9	1	1	11
	Manufacture of other non-metallic mineral products (23)	127.40	9	3	1	13
	Manufacture of motor vehicles (29)	136.60	8	0	1	9
	Care activities (86)	213.50	11	2	1	14
Community of Madrid	Health & Wellbeing (86)	118.64	1	1	2	4
	Security TIC (61-62-63)	202.98	5	4	4	13

[1] In the case of the Community of Madrid, the proposed methodology has identified only 8 of the 11 clusters that are currently operating in "Madrid Network". It was considered f interest to extend the analysis of elements characterized also the other 3.

2 The number of sectors is not fully comparable between regions and that the breakdowns of each input-output framework differ (Castile and Leon 58 sectors in the Madrid region 59 and in the Balearic Islands 62), as well as the types of economic activities.

	Audiovisual (59-60)	230.59	9	3	5	17
	Graphic Arts (18-58)	225.14	11	5	5	21
	Biotechnology (21)	174.36	1	1	4	6
	Financial services (64-65-66)	224.10	5	6	2	13
	Logistics (49-50-51-52)	295.40	15	7	4	26
	Aerospace (30-302)	166.36	5	3	5	13
	Automotive (29)	65.56	1	0	5	6
	Renewable Energies (35)	91.30	4	4	1	9
	Tourism	62.81	2	2	1	5
Balearic Islands	IT (61-62-63)	143.96	12	1	2	15
	Tourism (55-56-91-92-93)	328.30	23	3	6	32
	Nautical Industry (301-501-773)	260.61	18	4	6	28
	Aeronautics (511)	281.80	13	4	5	22
	Audiovisual activities (59-60)	119.71	10	1	1	12
	Music, Entertainment (90)	113.16	20	2	3	25

Source: INE, Cuentas económicas regionales y DIRCE. Económicas Regionales. Marco Input-Output de Castilla y León, Comunidad de Madrid, e Islas Baleares.

Below the Tables 5- 10 show the values obtained for the clusters identified in terms of the second group of variables (elements characterizing cluster):

Table 5 Clusters identified in Castile & Leon and their impact

CNAE 2009 (two digits)/ Sector	*% direct regional employment*	*% direct regional production*	*Total employment (direct + induced) regional*	*% GDP total (direct + induced) regional*
Extraction of coal and lignite (05)	0.60	0.73	1.29	1.48
Food industry (10)	3.63	8.70	10.03	12.54
Manufacture of wood and cork (16)	0.98	1.23	1.83	2.41
Manufacture of other non-metallic mineral products (23)	1.25	2.07	2.68	3.74
Manufacture of motor vehicles (29)	2.04	8.98	8.98	11.95
Care activities (86)	4.20	2.47	3.06	3.61
CLUSTERS CONSIDERED (% REGIONAL)	**12.70**	**24.18**	**-**	**-**

Source: INE, Cuentas económicas regionales y DIRCE. Dirección General de Estadística de Castilla y León. Cuentas Económicas Regionales. Marco Input-Output.

Table 6 Clusters identified in Castile & Leon and their measures of competitiveness

CNAE 2009 (two digits)/	*Productivity*	*EXPORTACIONES*

Sector	*(% Regional average)*	*% Regional exports*	*% Ave Spain*	*% Foreign*
Extraction of coal and lignite (05)	114.89	2.09	67.28	32.72
Food industry (10)	125.11	20.61	89.61	10.39
Manufacture of wood and cork (16)	75.95	2.37	96.95	3.05
Manufacture of other non-metallic mineral products (23)	134.34	3.12	85.11	14.79
Manufacture of motor vehicles (29)	132.87	26.49	27.73	72.27
Care activities (86)	118.00	-	-	-

Source: Own elaboration based on data of the INE, framework Input-Output in Castile & León & methodology of impact

Table 7 Clusters of Madrid & their impact

Clusters of Madrid Network	*% direct regional employment*	*% direct regional production*	*% Total employment (direct + induced) regional*	*% GDP total (direct + induced) regional*
Health & wellbeing	5.57	3.34	13.64	9.55
IT security	2.33	3.28	5.90	5.83
Audiovisual	2.86	6.91	7.41	13.16
Graphic Arts	2.60	2.72	7.22	7.92
Biotechnology	0.31	0.98	1.01	1.45
Financial services	3.71	6.58	7.86	18.07
Logistics	5.15	7.07	12.15	10.89
Aerospace	0.67	1.30	1.85	2.06
Automotive	0.97	2.55	3.56	3.65
Renewable Energies	0.62	1.74	1.73	5.96
Tourism	6.90	5.48	15.95	9.00
CLUSTERS CONSIDERED (% REGIONAL)	**31,69**	**41,95**	**-**	**-**

Source: INE, Cuentas económicas regionales y DIRCE. Instituto de Estadística de la Comunidad de Madrid. Cuentas Económicas Regionales. Marco Input-Output.

Table 8 Clusters of Madrid and their measures of competitiveness

Clusters of Madrid Network	*Productivity (% regional average)*
Health & wellbeing	53.33
IT security	125.20
Audiovisual	214.71
Graphic Arts	93.21
Biotechnology	278.56
Financial services	158.02

Logistics	122.16
Aerospace	171.21
Automotive	234.80
Renewable Energies	251.96
Tourism	74.64

Source: Own elaboration based on data of the INE, framework Input-Output in the community of Madrid & methodology of impact

Table 9 Clusters of the Balearic Islands and their impact

CNAE 2009 (two digits)/ Sector	*% direct regional employment*	*% direct regional production*	*% Total employment (direct + induced) regional*	*% GDP total (direct + induced) regional*
IT (61-62-63)	1.34	2.83	2.35	9.01
Tourism (55-56-91-92-93)	17.16	19.29	30.17	60.98
Nautical Industries (301-501-773)	2.29	1.82	8.35	4.76
Aeronautical (511)	1.22	1.57	1.09	3.35
Audiovisual activities (59)	1.04	2.52	1.88	8.26
Music, Entertainment(90)	1.44	2.29	2.44	6.46
CLUSTERS CONSIDERED (% REGIONAL)	**24.49**	**30.32**	**-**	**-**

Source: INE, Cuentas económicas regionales y DIRCE. Instituto Balear de Estadística. Cuentas Económicas Regionales. Marco Input-Output.

Table 10 Clusters of the Balearic Islands and measures of their competitiveness

CNAE 2009 (two digits)/ Sector	*Productivity (% regional average)*
IT (61-62-63)	211.59
Tourism (55-56-91-92-93)	112.62
Nautical Industries (301-501-773)	78.58
Aeronautical (511)	128.95
Audiovisual activities (59)	242.76
Music, Entertainment(90)	159.32

Source: Own elaboration based on data of the INE, framework Input-Output in the Balearic Islands & methodology of impact

As can be seen, the existence of a potential cluster is not always inked to the importance of activity for the regional economy but to the relative concentration that occurs in relation to the broader economy, where it inserts (in this case the economy Spanish).

Thus, in Castile and Leon we can observe traditional clusters in the fields of food and car manufacturing, along with other activities such as mining, timber, or care. In Madrid important service activities (audiovisual, finance, ICT, health, etc.) can be observed, as well as logistics, biotechnology and aerospace, the latter with a lower relative weight. Finally, in the Balearic Islands clusters identified revolve around tourism activities (mainly hotels), and related sectors (ICTs applied to tourism, marine industry, aeronautics, audiovisual activities and music).

All cluster concerned satisfy the criteria of expertise (10% above average considering the three criteria (without employees, with employees and with +10 jobs), and can be considered more concentrated than average. Moreover, as seen in tables, they show values of competitiveness and overall efficiency that can also be described as above average as predicted by theory.

In most cases we observe productivity values levels higher than the regional average in the cases of Castile and Leon, the Community of Madrid and the Balearic Islands.

For exports it has only been possible to compare existing data for Castile and Leon, although it appears that there are at least two different types in the line of the classification outlined by Porter[1]: those with a predominantly local orientation (largely by the nature of their services linked to the territory) and those with a significant export orientation (such as the cluster of car manufacturing).

The analysis through impact calculation also highlights the knock on effects on the value chain are significant and to be taken into account. Generally, the multiplier effect is twice or three times the direct effect, so that the positive externalities resulting from the operation of these clusters have a high potential to contribute to improving competitive levels and the development of the whole region.

In short, the work presented highlights the importance of clusters in the economic structure of regions, but also represents a starting point for identification, the understanding of its workings and design of specific measures to strengthen the positive externalities derived from its existence.

The comparative analysis conducted for the three cases shows how this approach largely identified, from the use of statistical information "objective" potential areas of clusters that coincide (largely) with the vision of regional clusters have, and which are supported by the Administration. This methodological tool can therefore contribute to more efficient framework for cluster policies at regional level.

[1] Ibid., p.4