

INDUSTRIAL DYNAMICS, INNOVATION AND THE URBAN SYSTEM IN SPAIN: TRAJECTORIES OF MEDIUM-SIZED CITIES

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1. INTRODUCTION

The article endeavours to provide an approach to the recent industrial dynamics of medium-sized Spanish cities by attempting to identify the cities that are the most dynamic and have the most innovation capacity and to interpret the internal keys that can explain this behaviour.¹ The goal thus sought is to offer a broad overall picture that will serve as the general framework for case studies, to be conducted in the second phase of research. Three concrete lines of research converge in the study:

- Within the framework of the processes of globalisation and regional EU integration, with growing inter-territorial competence, territorial contrasts are becoming stronger, thus increasing the protagonism of cities and regions. To cities and regions' demand for greater powers and financial resources is added a *new territorial culture* that is committed to constructing polycentric urban systems and contributing to sustainability and territorial cohesion, an area where medium-sized cities play a leading role.
- That line of research is compared to another line of research concerning the spatial redistribution of business sectors. It is confirmed that industry still remains attractive because of its contribution to economic diversification and its abil looks into what are termed "territorial innovation models" (Moulaert and Sekia, 2003).

To sum up, first, medium-sized cities and their generic comparative advantages for attracting and maintaining business are identified; next, the explanation of why cities have transformed these generic advantages into specific competitive advantages is addressed.

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From there, information from the General Social Security Treasury on business and workers affiliated as of 31 December 2000 and 2006 is analysed from the perspective of industrial dynamism and sector-specific specialisation at the different strata of the urban system. Lastly, the possible spatial correlations are sought between volume and industrial dynamism, type of specialisation and the innovative capacity of medium-sized Spanish cities.

2. MEDIUM-SIZED CITIES: DEFINITION, DELIMITATION AND SIGNIFICANCE FOR THE ECONOMIC DEVELOPMENT OF TERRITORIES

As the European Commission states, “In a polycentric urban system the small and medium-sized towns and their inter-dependencies form important hubs and links, especially for rural regions” (2000: 17). The Commission highlights small and medium-sized towns’ ability to act as the backbone of their territory, as already discussed in *European Territorial Strategy* (1999) and the *Territorial Agenda of EU* (2007), because of their ability to generate jobs and to permit the dissemination of certain urban functions (provision of equipment, supplying of specialised goods and services, political and administrative centres...).

Our proposal to delimit the medium-sized cities of Spain, which includes all municipalities having between 20,000 and 250,000 inhabitants in 2006, is justified by two reasons. First, using the administrative and management unit of the municipality facilitates comparison with other research and diachronic study, while permitting observation of the effect local stakeholders have on the municipality’s development. Second, these thresholds rule out more-eminent cities that might have some continental influence, as well as towns with more than 10,000 inhabitants that do not thoroughly perform some typically urban functions (such towns are especially numerous in the southern half of the country).

Current interest stems from the recent demographic and economic dynamism of these nuclei. The economic facet may be related with certain *generic comparative advantages* stemming from the present technological, production-related and regulatory framework:

- Constant improvements in accessibility and flexibility thanks to new information and communication technologies.
- Opportunities vis-à-vis the segmentation of tasks and their selective dislocation by territories on the part of businesses; flexible production models based on specialised production systems and constituted primarily by SMEs.
- As opposed to big cities, with their diseconomies and “post-industrial” culture, some medium-sized cities constitute wide, diversified, growing markets of consumption and employment for industrial and service enterprises.
- Improvement of services and equipment, especially advanced services, centres of higher education and technological centres. Better conditions associated with the environment and quality of life.
- Political decentralisation and the growing protagonism of regional governments, local governments and middle-rank institutions in land-use planning and promotion policies. *Culture of governance*, which favours coalition between public and private stakeholders.

The opportunities of the current competitive environment, however, are activated only in those cities that exhibit the response capacity to take advantage of their resources in this new situation; specific factors or internal keys that enable some medium-sized cities to use their opportunities better and thus to benefit from *dynamic competitive advantages*.

3. KEYS TO INDUSTRIAL DYNAMISM AND INNOVATION LOCATED IN MEDIUM-SIZED CITIES

A survey of the international bibliography furnishes important keys for interpreting the unequal recent industrial dynamism and the innovation capacity of medium-sized Spanish cities. A synthesis of the explanatory factors begins with what are here considered “*conventional economic theories*” on localised industrial growth:

- *Static efficiency* factors related with the allotment of production resources; hard factors identified with the classic factors of production (land and natural resources, labour, infrastructure and equipment) and soft factors, such as human capital, the social and institutional environment, the quality of life, etc.
- The sector theory of growth and product life cycle link the industrial mix with the productivity and competitiveness of local and regional economies. The ability to create new companies and innovation have recently been related with the size and amount of cities’ economic diversification (Duranton and Puga, 2001).
- *Dynamic efficiency* factors related with external features associated with location and urbanization economies (broad, diversified consumer and job markets, accumulation of infrastructure and equipment, human capital, business and institutional density, etc.). Theories such as the industrial district theory have made clear the importance of these external economies in smaller cities (Becattini *et al.*, 2003).
- Medium-sized cities’ proximity or accessibility to the main metropolitan agglomerations, which facilitates processes of industrial spreading, and their proximity or accessibility to other, similar-sized cities with which they can build complementary or synergistic horizontal networks.

Notwithstanding the above, internal keys specific to each city are increasingly envisaged, as posed by the so-called relational shift in economic geography. As the numerous case studies done in recent years in Spain under this focus suggest, it could be hypothesised that a good part of the medium-sized cities that exhibit superior industrial behaviour are those that have production systems capable of activating virtuous circles of innovation on the basis of available endogenous resources. The virtuous circle would start with the spatial agglomeration of companies around specialised production clusters, followed by the appearance of an entire series of competitive advantages (outside agglomeration economies, proximity dynamics, spreading of information and knowledge...), with effects on innovation (collective learning processes, higher rates of local innovation...), and individual and collective competitiveness, with an increase in territorial capital that favours the accumulative reproduction of the process. The phenomenon would tend to be accentuated in those cities where business innovation is joined by social and institutional innovation.

In connection with *specific resources* (as opposed to *generic resources*), there is the substratum of social relationships and cultural patterns that go beyond simple economic logic and criteria of individual rationality, ultimately forming the fundament of business decisions. In the process of the economy's embeddedness in society (Granovetter, 1985), the highlight would be on the accumulation of social capital, which permits the construction of an adequate institutional framework for production activity; likewise the role of cooperation networks, network externalities and trust-based relationships, as the basis for the transmission of tacit, non-formalised knowledge (*shared intelligence*), which fosters greater *collective efficiency*.

4. INDUSTRY'S TENDENCIES IN THE SPANISH URBAN SYSTEM: SIGNIFICANCE OF MEDIUM-SIZED CITIES

Social Security figures on workers affiliated with industry confirm the steadiness of the trends toward deconcentration that began three decades ago and have been reinforced by the decline of some sectors of longstanding tradition in the big cities, the total or partial delocalisation of companies and the emergence of specialised production systems in some small cities and rural nuclei. The phenomenon is visible at the scale of Spanish provinces as well as municipalities; in this latter case, in addition to the processes of spatial spreading according to criteria of contiguity and accessibility, there is accentuated hierarchical spreading inside the urban system.

Within the Spanish urban system, there is a counterpoise between the populational and economic weight still held by the big cities with over 250,000 inhabitants but poor relative behaviour in industrial employment (not necessarily the GVA) and the nuclei with less than 20,000 inhabitants, with a greater weight of population and a similar weight of businesses and workers, but above all an industrial dynamism and weight quite above average.

The industrial evolution of medium-sized cities lies between those two extremes, resembling that of the Spanish industrial system as a whole. Medium-sized cities account for 43.61% of the population, 42.26% of the companies and 41.92% of the workers, their position being slightly weaker in the case of industry (39.72% and 39.26%, respectively). "Medium-sized" also describes the sector's weight in medium-sized cities' local job markets (13.09% of total employment) and its recent evolution (-1.47%), which nevertheless conceals sharp contrasts: 211 cities registered upward evolution and 137 downward. In this sense, analysis confirms the existence of an inverse correlation between city size and recent trends in industrial employment.

Information on territorial units highlights the protagonism of the Mediterranean Corridor, which is more important by far than the Atlantic Corridor, the Madrid Region and the Inland Regions of the South, the Ebro Corridor and the Inland Regions of the North, leaving the Archipelagos, Ceuta and Melilla at the bottom levels of industrialisation. Negative evolution since the year 2000 is confirmed in the three major corridors that structure a good part of the peninsular territory, as opposed to the positive behaviour of the inland regions (especially the South inland regions) and the metropolitan region of Madrid.

Despite the shifting of industrial dynamism, the greater volume of companies and workers is still to be found in the regions that have a longer history of industrialisation; seven of the 25 cities with the largest workforces are still located in Cataluña, six in the rest of the

Mediterranean Corridor and five in Madrid. The highest growth rates are concentrated mostly in cities of the Mediterranean Corridor and Andalucía, coinciding in a good number of cases with innovative local production systems and industrial districts already studied, ahead of Madrid and the Atlantic Corridor. Amongst the municipalities that register the greatest losses, the vast majority are the municipalities in Cataluña and those located in the Atlantic Corridor. As a counterpoint, the majority of cities situated in inland regions maintained a certain stability.

5. CONTRASTS IN THE SECTOR SPECIALISATION OF CITIES

The data analysed confirm a specialisation profile that reveals increasing contrast between the different strata of the urban system, which means the spatial division of work is becoming stronger from the hierarchical perspective, a factor that adds to the division existing on other planes.

Put briefly, the big cities stand out for their specialisation in the sectors that have more innovation content and higher wage/qualification levels, such as chemistry/pharmaceuticals, electronics and information science, printing and graphic arts and vehicle manufacturing (in addition to power and water, industries whose main companies have got their head offices in big cities). In contrast, rural nuclei and small cities only stand out about the national average in certain natural resource-intensive businesses (food and beverages, wood and cork, paper...) or businesses using unskilled labour (textiles, rubber and plastics, metallurgy, furniture...), which generally have lower wage costs.

For their part, medium-sized cities may be said to have a greater amount of diversification as the main trait of their industrial structure. In addition, even in the more-significant branches, such as agro-food industries and metal product manufacturing, the figures always hover around the Spanish average; nor can a characteristic profile be identified in terms of technological intensity or with regard to worker wage and qualification levels. It is here where the crossover is suggested between the location of medium-sized cities in regions/territorial units and the degree of specialisation of the branches of industry (Nelson index), grouped by technological intensity level (OECD).

Industries of high technological intensity display a high spatial concentration at the three traditional foci of Spanish industrialisation; between Cataluña (16), the region of Madrid (14) and País Vasco (6), they make up nearly two thirds of all the specialised nuclei. The industries of medium technological intensity are thick in the Atlantic Corridor, with 20 cities with a high or very high specialisation, in addition to the Mediterranean Corridor, where another 22 such cities are listed, in connection with one-off concentrations of the ceramics, marble or metal industries. The industries of low technological intensity are those that display a more scattered location, with a total of 62 specialised medium-sized cities distributed between the Mediterranean Corridor, southern inland regions and even the archipelagos. Many of them are for production systems specialising in textiles and garment making, footwear, wood and furniture, which in quite a number of cases are facing growing competition; or concerning agro-food products such as wine, oil, tinned foods, etc., which have been showing better recent behaviour in general.

6. INDUSTRIAL DYNAMICS AND INNOVATIVE EFFORT IN MEDIUM-SIZED CITIES: AN APPROACH

Having assessed the methodological difficulties of this type of analysis, the paper ends with an initial approach to the innovative potential of medium-sized cities, considering in the first phase the distribution of three complementary indicators of economic and business innovation: a) from the standpoint of production structure, on the basis of the location of the sectors of high technological intensity (TI); ii) with respect to the input contributed, on the basis of investment in projects financed by the Centre for Industrial Technological Development (CDTI) between 2000 and 2005; and iii) with respect to the results obtained, on the basis of the presence of exporting firms in cities, according to the SABI database.

The big cities still concentrate over one third of the high-TI companies, although in quite a number of cases it is a matter only of their head offices or distribution centres, for which reason their contribution to the other two indicators barely accounts for 15% of the total. The municipalities with less than 20,000 inhabitants have very few representatives of the high-TI sectors, although these municipalities host 47% of the total investment in innovation projects and a similar proportion of exporting firms, suggesting that innovating effort corresponds above all to medium- and even low-TI sectors.

In contrast to this, the medium-sized cities display a marked hegemony in the attraction of high-TI sectors (55.75%), the relative weight of the other parameters working out at around 37 to 38%. As in the rest of the analysis, the observation according to territorial units reveals substantial differences; the Mediterranean Corridor stands out in all innovation indicators, in front of the Atlantic Corridor, the Madrid Region and the Ebro Corridor, which are partly significant in some indicators. In the rest of the country this type of innovation indicator is clearly weak.

In the second phase, associations are sought linking the spatial distribution of these direct indicators of innovation with other, indirect indicators of innovation, and, in turn, with the volume of employment and industrial density (per thousand inhabitants) of each city, their recent evolution or the relative weight of the different sectors according to technological intensity. The most significant correlation coefficients permit some conclusions to be drawn, which are related directly with the objectives set for the paper:

- Employment volume and industrial density have a positive correlation with the GDP/inhabitant of cities, because industry's average productivity is higher than that of other activities; there is also a positive correlation with the volume of investment in CDTI projects, exporting firms and business services, confirming the concentration of innovation in the more-industrialised medium-sized cities.
- The set of direct and indirect indicators of innovation maintains a spatial correlation that is positive, although it does have some nuances; for example, the presence of holders of advanced degrees seems to be more closely associated with business services than with industry itself, where another kind of technical education is more important.
- Neither the recent evolution of employment nor sector specialisation have a significant correlation with the amount of industrialisation or innovative capacity. In the first case,

that seems to point toward the existence of labour adjustment processes in innovating environments, while in the second the *sector determinism* that usually presupposes better innovative behaviour from high-tech sectors is questioned.

This last section is posed as a tentative rough sketch from which there arise numerous questions on which work is now being done. In that respect, in the section of final considerations, allusion is made to future research oriented toward incorporating fresh statistical indicators of innovation (companies with quality certificates, registry of patents and models of utility...) and the performance of case studies in selected cities on the basis of a typology established by means of criteria well defined in advance.

