Building the big, keeping the small. Business structure in the Spanish papermaking industry (1840-1936)*

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The long-term analysis of an industrial sector is a good approach to evaluate the decision-making process of the firms. This paper analyses the Spanish papermaking industry. The present Spanish papermaking sector has four different chronological origins: the first one is directly linked with the eighteenth century development, the second has its roots in the mechanisation process of the nineteenth century, the third one is a result of the Francoist industrial policy and the last one is the outcome of the investments made during the last three decades. This structure has changed very rapidly, with the disappearance of the less efficient factories and the opening of big factories. Both characteristics are part of a process of rationalization[1] in a context of a very rapid increase of paper demand, converging to developed countries patterns[2]. Surprisingly, in this process firms and factories have disappeared but not just the oldest ones. On the contrary some of the most dynamic firms in present times had its origins in the eighteenth century while some others, which led the mechanisation process, have now completely disappeared. In some ways the business structure of the Spanish industry and its location patterns have more common points with the eighteenth century than with the mid-nineteenth century situation. The reason is the continuous innovative spirit of the leading firms of the "traditional" side of Spanish papermaking. This paper wants to explore the roots of this process, which has a strong link with present days because nowdays urban mills and SMEs have gained presence in the sector[3]. Besides this happens in a moment of important challenges in the papermaking industry. One challenge comes from the environmental area (water, raw materials, energy). The one has its origin in the new international landscape of international production (with the fast growth of far East countries)[4]. Which kind of firm will be able to face these challenges? The big firms will indeed have some tools to do it, but also the SMEs are capable to do it, even with some advantages because of the niche markets where they can compete and their versatility. The only common territory to achieve success in both kinds of firms is the innovative spirit.

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[1] In Spain there were 200 factories in 1982, 121 in 1998 and 132 in 2002. The crisis affected mainly factories with low productive capacity and low quality producers. The consequence has been the improvement of productivity per factory indicators, which have increased from the 13.419 tons in 1982 to the 40.644 tons in 2002. Nevertheless, Spain is the member of the CEPI («Confederation of European Paper Industries») with more factories with less than 10.000 tons of capacity.

[2] The yearly p*er capita* consumption in 1965 was 24,2 kg., in 1981 69,4 kg. and 170 kg. in 2002.

[3] Nicholas V. Beare has pointed out how SMEs in papermaking could have a promising future with a correct decision-making strategy and a good financial support. The most important decision is to choose in which "niche market" to compete (Beare (2003)).

[4] Abramovitz; Mattoon (1999)

The identification of the entrepreneur as an innovation agent and as a factor of economic growth has focused business theory since Schumpeter. The Schumpeterian innovation concept is very useful to analyse the variety of ways that could help to characterise a firm as innovative[5]. Schumpeter distinguished four kinds of innovation: process innovation (generally linked with technological change), product innovation[6], changes in the entrepreneurial functions (to open new markets; to introduce new raw materials and semi-manufactured products) and new firm organization (at firm level and globally).

Business history since Alfred Chandler has focused on the big firm. Chandler's and Lazonick's works show that big firms need to have both economies of scale and vertical integration[7]. But Lazonick underlines that the innovation may vary depending on the time period and across institutional frameworks[8]. Lately other explanations have appeared as an alternative to the Chandlerian view[9]. Among them it is necessary to underline the recovery of concepts like the industrial district and networks, in the current context of the importance of industrial location matters. This literature stressed SMEs as innovative agents[10]. Also, there is a strong tendency to defend that there is a geography of innovation[11]. The Marshallian concept of industrial district has three main characteristics: a shared labour market for the firms (especially important for skilled workers), the availability of raw materials and intermediate goods (specialised inputs and services) and easy transmission of new ideas and improvements (technological spillovers). In this framework the dynamics of the district allows SMEs to cut down its transaction and production costs, allowing them to reach an important level of competitiveness. One of the ways to get these objectives in industrials districts is the building and development of networks[12]. Networks have become a model of industrial

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[5] Schumpeter (1955).
[6] Gordon; McCann (2005). For a vindication of product innovation see Parsons; Rose (2004).
[7] Chandler (1977), Chandler (1990) and Lazonick (1991).
[8] Lazonick (2002), Lazonick (2003) and Lazonick (2004).
[9] Richard N. Langlois said *«the Chandlerian firm no longer dominates the landscape»* (Langlois (2004), p. 2). Steven Toms and John F. Wilson completed the idea *«the Chandler view offers an approach that only partially accommodates the history of international business»* (Toms; Wilson (2003), p. 1).
[10] In this recovery of the industrial district concept different fields have coincided: the *new economic geography* (see Krugman (1991); Fujita; Thisse (2002)), business studies (Porter (1990)) or works by Becattini (1979)). In this sense the book by Michael J. Piore and Charles F. Sabel was very important (Piore; Sabel (1984)). For an approach to recent literature on technical innovation and the transmission of knowledge in clusters see Breschi; Malerba (2001). For a critical view to *localized knowledge spillovers* see Breschi; Lissoni (2001).
[11] There is a very interesting survey of innovation and space in Simmie (2005).
[12] Mark Casson defined as *"a set of high-trust relationships which either directly or indirectly link together everyone in a social group"* (Casson (1997), p. 813).

organization located between market and hierarchies[13]. These organizations, with a different degree of formalization and hierarchy, have its origin in a common system of values and the trust among its members. Consequently this approach stresses the cooperative side of the firms instead of the competitive one[14]. However this other side of the firm could not lead to forget that its main aim is to maximize profits. The network is only a tool to get this final goal. In this conceptual frame some exaggerations have been done such as to always identify the small and medium firms with innovation. The reality is much more complex than this, because the conditions that affect innovation are different according to industrial sectors, institutional framework and periods[15]. The innovative firm often seeks to change the technological and market framework. Completely different is the behaviour of the optimising firm, which takes technological and market conditions as "given" constraints.

This paper deals with the evolution of business structure of the Spanish papermaking sector from 1840 to 1936[16]. This industrial sector is used to show the diversity of ways to achieve innovation. Big firms and SMEs can be both innovative and they can enrich each other. To have a satisfactory understanding of the innovation and the business structure in the papermaking industry the analysis considerrs that paper is not a homogeneous product. It is more correct to speak about paper markets instead of a single paper market[17]. Among the characteristics of paper demand there is one which is particularly important: the functionality. This means that the consumer buys one kind of paper to make some use of it because this paper has some characteristics. The modern paper production is a continuous process with high economies of scale. This characteristic has nourished the tendency to develop big firms, especially in the more standardized products like newsprint. In other products the optimum plant size can be smaller. In contrast, supply, even after the deep specialization, is not functional, because the same machine can make different kinds of paper addressed to different markets without any

[13] Timothy J. Sturgeon proposed that the model of industrial organization based *"in external economies created by the ongoing interactions between firms"* could be called *"production network paradigm"* (Sturgeon (2002), p. 452).
[14] Casson; Cox (1993); Casson (1997); Casson, Della Giusta (2004).
[15] Mark Casson pointed out the diversity of ways to efficiency (Casson (1997)). Paul L. Robertson and Richard N. Langlois said *"Each experience occurs within its own context"* (Robertson; Langlois (1995), p. 546). Philip Scranton applied this diversity approach to US history: *"Each format, I will suggest, involves distinctive technical consideration, labor requirements, and marketing stances, hence different managerial challenges. Achievements in each format can generate productive complementarities, as well as antagonisms, with firms that adopt other approaches"* (Scranton (1991), p. 28).
[16] See Gutiérrez (1994).
[17] Martin Pesendorfer said, *"we [...] assume that individual paper categories constitute independent markets"* (Pesendorfer (2003), p. 500).

change (*grade shifting*). Other point that is necessary to take into account is that the paper demand in Spain during the studied period was lower[18] and had a different structure comparing to that of the surrounding countries[19].

The paper has four parts. The first one deals with the business structure until 1880. The second one is focused in the dynamics that led to the creation of "the" Spanish big firm in papermaking industry (from 1880 to 1901). The third explains the appearance of this big firm and the continuity of small and medium firms. The fourth part presents the main conclusions.

1. The genesis of the business structure in the Spanish papermaking sector: 1840-1880

The papermaking sector that had to face the mechanisation process in Spain was the result of the second half of the eighteenth century development[20]. The diffusion of the Fourdrinier machine (or continuous machine) generated the appearance of a productive structure with two different technological models: the continuous (or modern) and the handmade (or traditional). This duality was result of the peculiar structure of the demand of Spain. Actually, they were two different business cultures.

1.1 The continuity of handmade paper

The nineteenth century Spanish papermaking industry had among its main characteristics, in an international framework, the higher degree of maintenance of handmade paper[21]. In Spain in 1845 there were 280-300 paper mills (with around 400

[18] In Spain the per capita consumption grew from the 0,75 kg. in 1873 to the 11kg. in 1935. This means a yearly increase of 4,8%. An international comparison shows that the Spanish increase was very low. The cases of the United Kingdom (from 4,6 to 37 kg per capita) and France (from 3,74 to 20) are useful for contrast purposes (1873: Lacroix (1873), p. 460; 1935: Müller-Clemm (1937), p. 830).

[19] There is no estimate of the structure of Spanish paper consumption, but its low literacy levels and its economic backwardness were indirect ways to approach it. The result was a lower relative weight of printing paper and wrapping paper. Meanwhile the consumption of handmade paper made (for official uses and for cigarettes) was very high. According to world data the total output of newsprint in 1929 was 6,03 millions of tons. This was the 26,1% of the total production (1948 *Statistical Yearbook of United Nations*). An estimate to 1937 increased the percentage to 39% (Clapperton; Henderson (1947), p. 254).

[20] Spain passed from 200 mills in the 1760s to 400 at the end of the century. This growth was the answer to an import substitution policy and the growing demand of paper from the State. The papermaking expansion was parallel to the progressive concentration of the manufacture in Catalonia and in the Region of Valencia. The mills of both regions focused their production in the kinds of paper with a more dynamic demand (high quality writing and printing paper; cigarette paper) bought mainly by the State.

[21] The decline of handmade paper had two different patterns: the first, of drastic and very early reduction, and the second one with slow and late fall. Examples of the first case were the United Kingdom, Belgium and United States. The second fits with France, Italy and Spain. In an intermediate pattern could be

vats[22]), in 1856 the vat number grew to 531, to 648 in 1863 and to 757 in 1879. This growth was parallel to a progressive concentration in different levels: regional (in Catalonia and, mainly in the Region of Valencia)[23], local (in the areas which had led the eighteenth century growth: Capellades[24], La Riba, Sant Pere de Riudebitlles and Sant Joan les Fonts in Catalonia; Alcoy in the Region of Valencia)[25], firm (fewer firms owned more capacity) and mill (some mills were closed but the remaining ones got more vats). In spite of this concentration process, the handmade paper capacity in Spain was more scattered and had less capacity than in other countries[26].

The Spanish handmade paper industry had two productive typologies in mid-nineteenth century: the mill with a declining life without a professional management structure, and the firm with a much more complex management structure where innovation was the basic feature. The first one was doomed to disappear or to subordinate its productive life to the second. Usually, the superiority and the competitive advantage of the second model came from its inclusion in industrial districts. Inside these areas with a high density in papermaking there was a clear hierarchy where the top was hold by only a very reduced number of families. This hierarchy had its origin back to the eighteenth century expansion and it had a full development during the nineteenth century. These families dominated the networks of raw materials supply and of paper commercialisation. The success of these firms was based on a correct identification of competitive advantages (productive flexibility, good knowledge of the market and the quality of its products), exclusive access of handmade paper in certain markets (it was forbidden to use continuous paper in State administration, the main client) and an innovative spirit. This spirit was even bigger among these entrepreneurs than among some of the owners of the continuous factories. The contrast was very clear in the World's Exhibitions where the "modern"

Germany. Generally the first vats to close were from the printing and wrapping paper producers because of the continuous paper competition.

[22] The vat was the productive centre of the mill. It was the place where the skilled workers made the paper sheet by sheet. Usually the number of vats is used as a direct way to estimate the productive capacity.

[23] The most dynamic region was the Region of Valencia that increased is relative weight from the 26,9% in 1856 to 41,2% of the total number of vats. Catalonia kept during all the period a percentage over the 30%.

[24] For a long-term analysis of this papermaking district see Gutiérrez (1999).

[25] Actually these villages were the centres of papermaking districts: Capellades (the Anoia river area); La Riba (the Francolí-Brugent river area); Sant Pere de Riudebitlles (Riudebitlles area) and Sant Joan les Fonts (the Fluvià-Terri area). These Catalan districts used to have links among them. Also Alcoy was the centre of a papermaking area in the Alicante province.

[26] In other countries the declining quantity of vats was concentrated territorially (in Italy in the Veneto, Lombardy, Tuscany and the province of Ancona; the Gelderland in the Netherlands; the Auvergne in France; in England in Kent). Also the vats had the tendency to be concentrated at the firm level (examples of this were the Dutch "Van Gelder Zonen", the Italian "Miliani" or the English "U & R Balston Springfield").

papermakers who went there were very few, while the “old fashion” firms even had awards[27].

The handmade paper entrepreneurs had among their main innovative arguments the building of an organizational structure for productive and commercial purposes. Actually, the entrepreneur became the intersection of two networks: one focused on production, other focused on commercialisation. The papermaker could create himself the network nodes or to help somebody to build them. These networks had tentacles not only in the entrepreneur’s area of origin, but also in the rest of Spain (and even in foreign markets). Usually different papermakers shared these structures. The productive network consisted in a decentralised system where the entrepreneur had given up the direct management of the paper fabrication. This productive model was very close to the framework of flexible specialization. The origin of this organizational model was the technology used, which restricted productivity increases. As a consequence, the output growth could be possible only by multiplying the vats (even in quite far away areas). There were two formulas of decentralisation: the delegation of mill management to a person in charge (in Catalonia was called the *balaire*)[28] and subcontracting[29]. Both formulas needed a high proportion of trust (based frequently in kinship). The close links of origin and kinship did not avoid the existence of periodical controls. In both cases the entrepreneur kept to himself the role of controller and, mainly, of sales agent.

The entrepreneur kept to himself the control of commercialisation process. The handmade paper commercial network began to be important and dense from the 1840s onwards, although it has its roots at the end of the eighteenth century. This network was the answer of Catalan and Valencian papermaking districts to the loss of the American colonies and the growing difficulties of controlling directly the official paper contracts. The networks were the way to control a national market quite disarticulated that time.

These warehouses could be owned directly by the entrepreneur or by other people. Usually the papermaking entrepreneur owned the central warehouse. It was in Barcelona

[27] Also the handmade papermakers use the exhibitions to know about the changes that happened in its sector. A good example is that of the papermakers from Alcoy, who paid a scholarship to a local chemist trained in Paris, in order to attend the 1862 London Exhibition.

[28] The b*alaire* was paid for the paper he made. He had complete autonomy if he followed the productive orders from the firm headquarters (quality, deadlines, etc.). The owner of the mill sent him the raw materials and the money to pay and to feed the workers.

[29] The papermakers used the subcontracting occasionally (to cover demand peaks and to have a cushion downswing), but always they could keep some subcontracted capacity. The entrepreneur hired the productive capacity of mills which were not his own property or even rented. He used them to produce his own paper and brands. Subcontracting allowed versatility and agility to answer to demand changes.

(for Catalan manufacturers) or in Valencia and Madrid (for Valencian papermakers). In other parts of Spain these papermakers tried to create some warehouses but not directly. They could help financially or in organizational matters, members of their families or from the embedded environment. In both cases the warehouses were exogenous realities to the firm although they had very close links to it. The Catalan district of Capellades had the denser commercial network of Spain. The network was frequently shared by different firms (even from different areas). The strongest point of this structure was its versatility because it had two uses: to commercialise the paper, and to collect raw materials -mainly rags-. The network covered all the Spanish territory but it took special attention to Andalusia and Galicia. The reason was that both regions were at the same time important markets and raw material suppliers. But the field of activity of the network went beyond national borders because Spanish papermakers tried to build a commercial network overseas (in Cuba especially)[30]. These warehouses had a very direct contact with consumers ant they knew very well market requirements. Consequently its knowledge was essential to productive policy. This information was central to increase or decrease productive capacity. Good commercial news had as a consequence to put in work more vats (in the papermaker own mills or in subcontracted other mills), and the contrary. Also, this market knowledge determined the kind of paper produced, and its characteristics, or the introduction of a new product following warehouse requirements.

In consequence, the biggest handmade paper firms had a reality that exceeded its official assets[31], because they had outsourced a very important part of its productive capacity and its commercialisation network. Likewise, its territorial concentration allowed sharing the use of some specialized services (like raw materials suppliers, engineering workshops, etc.). The mills located in areas with less papermaking activity had to internalise these services with the logical growing costs.

Even more important than organizational and commercial innovation were process innovation and product innovation. With regard to the process innovation there were two different typologies: those with easy codification (the fewer examples) and those with a strong tacit component. Among the first one the generalisation of the use of

[30] It is important to underline that writing and printing paper of high quality made by hand and cigarette paper were the only specialities that had a continuous presence in international markets. Even the Spanish cigarette paper had a dominant presence in some Latin-American markets during all the nineteenth century.

[31] According to Giménez Guited in 1861 every Catalan brown paper vat amounted a capital of 21.300 reales. Meanwhile those of white paper reached the 40.300 (Giménez Guited (1862)).

the Hollander (an alternative technology to the traditional stampers)[32] and the production of vellum paper (a king of paper imitation of parchment) were worth mentioning. To introduce them in the district of Capellades was a clear cooperative frame because a group of papermakers of this area signed an agreement with those from the neighbouring district of Sant Pere de Riudebitlles. The aim was to contract French skilled workers (mainly from Annonay) in order to use them as instructors[33]. These technical changes were fully embedded into the local collective knowledge around mid-nineteenth century. However, the best example of cooperation in technical matters was the introduction of a cylinder-mould machine called *picardo*. The introduction of the new engine sought to cut the labour problems, which had increased from 1870[34]. The *picardo* was invented in Italy and it mechanised the sheet production maintaining without any significant change the rest of the process. This machine was imported in 1877 with a privilege by four firms from native or very close links to the Capellades district. The firms shared the news about the technology they looked for, the results of the prototype and the expenses. The workshop that developed the engine was outside the district[35]. When the patent was finished the diffusion of the *picardo* was very fast. To achieve success in this process it began to establish a continuous exchange of information in order to build the machine in workshops located in the same district. The interchange of news originated the improvement of the machine. The local workshops began to sale the *picardo* to other Spanish papermakers and it became its most important specialization.

Tacit knowledge was part of a cultural tradition created and accumulated during generations. This knowledge was shared by the members of the district and was socially embedded. The stock of shared knowledge helped to use a decentralised production system. Also it was necessary a stable network of technical information interchange to obtain a homogenous paper made by different mills when subcontracting was necessary. This socially shared knowledge had to have a very creative side, because every mill had

[32] The Hollander in Alcoy was used during the last decades of the eighteenth century. But the most important Catalan papermaking districts were very backward in its use. The Hollander began to have a general use in these Catalan papermaking areas only during the first third of the nineteenth century. This was the case of Capellades, Sant Joan les Fonts, etc. The new beating technology coexisted during a period, at least until the 1860s, with the traditional stampers.

[33] AHCI, ANI, Capellades (13), F. Pujol i Bordas, f. 100).

[34] The main Catalan papermakers had a very fluent communication on the trajectory of labour conflict. Even they coordinated the answer to the strike and to pressure workers to come back to the mills.

[35] The first machines were built in a workshop located close to Barcelona (“Lerme and Cia.”). Among its customers there were Catalan, Valencian, Andalusian and even Latin-American papermakers. The Catalan workshop improved the Italian machine changing wood for iron in its fabrication.

different characteristics that highly conditioned the productive process[36]. In consequence the skilled workers should have capacity to adopt their knowledge into very concrete and changing realities.

Other innovative side of the business culture of the handmade papermakers was related with the creation and fabrication of new products (regarding qualities, sizing methods, colours, etc.). This differentiation product policy allowed them to fully exploit the flexibility of the prevailing technology, and supply different markets. In this strategy there was a different pattern between Catalan and Valencian mills. Catalans made indistinctly writing paper, high quality printing paper, cigarette paper, etc. and Valencian vats produced mainly low grammage papers. Branding was one step more in this policy (especially from 1860 and in cigarette paper)[37]. Brands became an essential tool for a successful commercial policy. Usually these entrepreneurs had different brands to cover different markets (and with paper with different characteristics too). They had two kind of brands: the permanent ones and the changing ones. The first group became something like the firm symbol. The second were linked with fashionable names or facts. The papermaking entrepreneurs had very clear the life cycle of the product. When the name or the fact left its commercial appeal it was replaced. Even in some areas, such as in the Capellades district, succeeded to adopt its geographical origin as a reference of quality and a "mark of origin". The papermakers of the district cooperated to avoid the incorrect use of this "brand".

1.2 The mechanisation: two organizational realities

When the Fourdrinier machine arrived to Spain, around 1840, this technology was quite mature and well consolidated in developed countries[38]. Even in countries like

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[36] In a patent dispute about a kind of cigarette paper with white ashes, one of the contenders said that the procedure to make it was of *"general knowledge from years ago"* (*Industria y Invenciones*, XI, 1889, p. 111). The general knowledge technology covered a lot of matters of very difficult codification: drying time related with weather, degree of rag beating depending on the kind of paper to be made, etc.

[37] The watermarks are one of the origins of branding in papermaking. Even in the eighteenth century there were some fights for prestigious watermarks.

[38] The United Kingdom, according to "Committee Fourdrinier", increased its machines from 42 in 1822 to 279 in 1837. In France in 1840 they worked 148 and 175 five years later (André (1996), p. 153). In these countries some papermaking technical journals had appeared. In the United Kingdom were published *Paper Mills Directory* (from 1860), *Papermakers Circular and Rag Prices* (from 1861), *Papermakers Monthly Journal* (from 1863) or *Paper Mill Directory* (from 1869). In France the main publications were *Journal des fabricants de Papier* (from 1854), *Moniteur de la Papeterie Française* (from 1864), *Revue de la Papeterie* (from 1867) and *Annuaire Général de la Papeterie française et étrangère* (from 1865). Also technical handbooks were published. In France the most important ones, were *De l´industrie de la papeterie* de

the United Kingdom and France had appeared big factories and big firms. Meanwhile the Spanish mechanization process was quite slow and modest. There was only one machine in 1840, 16 in 1850 and 48 in 1879. In other words around 1880 the continuous papermaking industry in Spain was quite far away from maturity[39]. This backwardness had their explanations in the size and the structure of the Spanish demand. Also the institutional instability did not help in the mechanisation process. But Spanish machines were not only few, they had low capacity[40]. They were working in quite small factories and small firms (it was very unusual to find firms with more than a factory and factories with more than a machine). Also the demand factors explain the small size of Spanish factories and firms. The continuous papermakers with this productive structure looked for a bigger versatility and to cover the major number of market segments. The result was a more expensive production in Spanish papermaking. Anyway, the firms were quite different from the handmade paper ones (during the 1860s the share capital was between 1.000.000 reales and 2.000.000 reales[41]).

The most important part of the pioneering initiatives did not have any previous knowledge of the papermaking sector. In other words the presence of handmade papermakers in continuous fabrication was very scarce (there were only a few exceptions in Catalonia and Castille). The development of continuous papermaking in Spain was located in three main areas: Guipúzcoa (in the Basque Country), Girona (in Catalonia) and others a little more scattered in the surroundings of Madrid. The rest of the machines were disseminated in other interior provinces. The business structure had a strictly regional basis. Even the only attempt of a trade association**,** the *"Asociación de fabricantes de papel continuo de España"* ("Association of Continuous Papermakers of Spain") founded in 1879, kept a structure with this regional basis[42].

Gabriel Planche (1853), *Manuel du contremaître et du chef d'atelier de papeterie* de Louis Piette (1861) and *Guide pratique de la fabrication du papier et du carton* by Albert Prouteaux (1864). See Coleman (1958) and Magee (1997) for the British case and André (1996) for the French case.

[39] Such a small papermaking sector did not allow the appearance of papermaking technical press. This lack was replaced with technical journals of general kind such as *El Semanario de la Industria* (1846-1848), *La Gaceta Industrial*, *El Porvenir de la Industria* (from 1875), *Crónica de la Industria,* etc. These journals were very important for the diffusion of the new technical knowledge. Neither the sector had any papermaking handbook in Spanish.

[40] A handbook dated in 1864 distinguished three kinds of machines: the big ones (with a width from 2 to 2,4 metres), the medium ones (from 1,4 to 1,9) and the small ones (from 1 to 1,4) (Proteaux (1864), p. 183). In Spain in 1879 over the total number of 48 machines had 14 with less than a metre and only 10 had more than 1,5 metres.

[41] The four factories located in the province of Girona had an average capital of 1.165.000 reales. In the eighteen handmade paper mills of the same province the average was 40.000 and in Capellades 60.000. (Giménez Guited (1862)).

[42] The papermakers elected the delegates from a regional basis (*Revista del Fomento de la Producción*

The Basque and Catalan nucleus had a growing pattern, especially the first one after its railway connection to Madrid. The cases of the hinterland of "Madrid" factories and the scattered factories from inland were different. In both cases the papermaking industry declined relatively[43]. The divergent dynamics were especially clear from 1870. Both realities were part of two different business and economic settings. The Basque and Catalan development were directly linked to its articulation as industrial districts (Tolosa in the Basque case; Girona, firstly, and Sant Joan les Fonts, afterwards, in Catalonia). Meanwhile the majority of the other factories were in industrial "waste land". The Basque and Catalans factories counted with an own labour market[44] and some specialized services (like small mechanical workshops[45]). Furthermore its proximity to very dynamic areas allowed them an easy access to technical information[46]. Meanwhile, the isolated factories were condemned to loose technological ground and to close. In this sense it is very important to underline that the continuous machine could be capable of partial improvements (could be in this sense an example of incremental innovation). The Basque and Catalan factories incorporated them but the inland factories had machines with very small changes. Generally all the Fourdrinier factories put very poor emphasis in commercial policy. The reason was that the bulk of the demand of continuous paper was concentrated in Madrid and Barcelona. For this reason the papermakers concentrated their commercial effort in both cities.

The Basque and Catalan productive realities favoured the appearance and development of the first firms with some importance. This change was focused in the surroundings of the Basque village of Tolosa. During the 1860s the leading role was that of the banker Bartolomé Arza Urbina. His firm called "Arza, Eizmendi y Compañía" (1863) succeeded to own three factories. A second entrepreneur very important for this change of firm size was Baldomero Ollo Urriza who in 1872 had two factories ("La Tolosana" and

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Española, IV, 13-IX-1879, nº 166, p. 618).

[43] The Basque Country passed from 2 machines in 1850 to 13 in 1879; Catalonia increased its Fourdrinier machines stock from 3 to 9; Castile and Madrid passed from 7 to 16.

[44] In labour market matters the areas with a former papermaking tradition had a favourable position. For example all the process of preparation and beating of rags did not change very much. In consequences all the women involved in rag preparation and men in Hollander section could continue working at the factory. Even all the new technical requirements could be more easily understood in a frame with previous knowledge. This helped the foreign engineers, mainly from France, to teach workers.

[45] Among the Spanish papermaking workshops the most important one was "Planas, Junoy and Cª" (located in Girona). The Catalan workshop built auxiliary machinery from the 1860s (Hollander for example). "Planas" in 1871 was able to offer a Fourdrinier machine. The same firm said in advertisement *"first Spanish workshop which has built Fourdrinier machines"*.

[46] Catalonia enjoyed a very good place in that sense, because of its textile development. For example, Juan Pedro Canal was a very important import agent of textile machinery established in Barcelona. But also Canal offered Fourdrinier machines (*Diario de Barcelona*, 25-II-1842, pp. 7-9).

“La Guadalupe»). In the Catalan district of Sant Joan les Fonts something similar happened with the change from handmade paper to continuous paper in the Torras family. Their family firms began to be very important from the 1860s onwards.

Both business cultures had quite a different productive specialization. Obviously, this affects directly the perception of innovative process in each firm. For example the machines from inland Spain had as a main production low quality printing, writing and wrapping paper. Quite similar was the case of factories from the city of Girona (not the ones located in Sant Joan les Fonts). Both cases had declining trajectories during the studied period, at least relatively. Another reality was the cases from Tolosa and Sant Joan les Fonts because its output was more focused on medium and high quality printing and writing paper. It is especially significant the Sant Joan les Fonts case because it was one of the very few exceptions of the pioneering continuous factories with a past in handmade process. Tolosa and Sant Joan’s innovative strategy had a very strong bias on adding value to the production and to compete with product differentiation. For example, the firms from Tolosa took special attention to the finishing processes and to make stationery products (even they patented engines to make envelopes, etc.).

The mechanisation process needed some parallel changes. The most important one was linked with the increase of the quantities of raw materials needed, especially rags. The continuous papermakers had to compete in the rag market with the handmade ones (which could pay more because of the higher prices of its products). Moreover, the rag market in Spain was less developed than in the closest countries (with a higher per capita consumption on textiles)[47]. This problem made them to look for supply in the international market[48]. This new necessity favoured the papermaking areas with a more open economy and those close to the coast.

The pressure upon rags supply made prices to increase. This inflationary process led to look for substitutes to rag. In this sense Spain followed the same pattern than France and United Kingdom[49]. Generally the adoption of these alternatives fibres was a

[47] The situation of the Spanish rag market was explained in 1870 by *“the smaller consumption of textiles and to the export to foreign countries”* (*La Gaceta Industrial*, 10-IV-1870, nº 206, p. 120).

[48] The Spanish papermakers used the two big rag suppliers of the international market: Germany and Italy. The first option was the German one, but in the future it was Italy the most important import supplier. The port of Leghorn was its main origin. In the mid-1850s were shipped 35.000 rags bales yearly (of 300-350 kg.) from the Tuscan port. To Spain came 4.000 of them (to The United States 25.000 and 6.000 to the United Kingdom) (Turgan (1870), p. 158).

[49] In Spain from 1840 to 1875 around fifty substitutes of rag to make paper were patented (see Sáiz (1999), p. 318). In the United Kingdom, from 1850 to 1884, the substitutes patents were 125, although only from 1855 to 1864 there were registered 63 substitutes (Magee (1997), p. 114). The situation in France was quite similar (André (1996), p. 425).

failure in Spain because of the high prices of coal and chemical products. The most significant failure was *esparto grass*. Spain was the most important international supplier of this cellulosic fibre but did not succeed in having a transformation sector for papermaking use[50]. Something similar happened with straw[51]. Even the production of mechanical pulp was very low. During this period there were only two wood pulp factories: the one owned by Felip Flores in Sarrià de Ter (Girona)[52] and the one by "Vda. Ribet e Hijos" in Villava (Navarra)[53]. It is interesting to highlight that both wood pulp factories were attached to pioneering continuous initiatives.

Another innovation line linked to mechanisation derived from the need of increasing power supply. The first option was water. In Spain its relative scarcity and the long low water period put a clear limit to mechanisation. But, anyway, the power supply experienced some changes. The traditional waterwheels which were used in pioneering factories were changed after some time by turbines much more efficient in power generation. The second possibility was the steam engine, but its use was completely marginal until 1860. The high coal prices in Spain placed steam in pioneering factories only as an auxiliary source to water.

2. The end of the nineteenth century changes: preparing something new

From 1880 onwards the papermaking sector lived a strong change in an international framework[54]. The new technological needs (among them the wood pulp integration in the papermaking process) and the power changes moved to increase the capital intensity[55]. That time some very big papermaking firms in the most developed

[50] There were some ambitious attempts. The most important one was dated in 1864-1865 when a chemist signed different agreements to four or five Spanish factories in order to use his own patent to make paper with esparto grass. This attempt did not have any economically profitable result.
[51] There were some failures too. But there were some factories making paper with straw fibre since the decade of 1860. These factories made only low wrapping quality paper.
[52] Felip Flores, a Catalan entrepreneur, had known the Voelter grinder during a travel to the Paris World's Exhibition of 1867. Also he visited some wood pulp factories in Grenoble in order to improve his knowledge about the new technology. He bought some wood pulp to prove it in his papermaking factory. This was a case of industrial espionage because he patented in Spain in his name the grinding machine.
[53] The grinder has the register number of 72 from Voelter's machines. It was made in Munich and officially was the *"first sold in Spain"* (*Ilustración Española y Americana*, XVI, nº 31, 16-VI-1872). Ribet previously went to Germany to see the machinery he wanted to buy working.
[54] To have a good introduction to this period see Maggee (1997). Magee compares the British and the US cases from 1860 until 1914.
[55] According to US industrial censuses the average capital per firm in 1880 was 64.878 dollars, and 219.538 in 1900 (Rantoul (1902), p. 1.015).

countries appeared[56]. Anyway, the heterogeneous nature of the paper market allowed to keep SMEs in some presence and even to increase its competitiveness.

The last two decades of the nineteenth century were of transition for the Spanish papermaking business structure. The sector was clearly different in 1900 that it had been in 1880. The main change was the increased maturity. Some indicators show it: the creation of new and big factories, the appearance of specialized journals[57], etc. From the business point of view during these two decades the basis for the big transformation that will happen during twentieth century appeared. Despite this, the sector was still very linked to the heritage of the pioneering factories.

2.1 The basis for a new business structure

Spanish papermaking industry lost weight in an international frame during the last two decades of the nineteenth century[58]. This situation does not mean that no change affected the business structure of the Spanish papermaking sector during this period. On the contrary, there were important transformations. The first line of change came from the innovations in the technological and productive field. During these two decades different new factories appeared. The new papermaking installations had machines according to the pattern they had in countries with a papermaking sector more mature[59]. The continuous technical innovation made the papermakers increase their investment level in order to avoid to become obsolete. Some of the pioneering factories did not succeed in this change. Also a big change was the diffusion of the use of wood pulp that until 1880 was very low. This process has two sides: its fabrication and integration in a paper factory and the simple raw material change (buying it mainly from import origin). Both sides nourished the

[56] During those years appeared some very important papermaking firms: "Zellstoff Waldhof A.G." and "Feldmühle, Papier und Zellstoffwerke A.G." (in Germany); "International Paper Co. Ltd." created en 1898 (in United States), etc. Especially interesting is the case by IPC which was result of a merger process (see Lamoreaux (1985), pp. 126-134; Heinrich (2001))

[57] *Mercado del Papel* was published in the mid-1890s. *La Industria papelera* began in 1898 and it was published until 1907. Their pages were very useful to collect the news about the second hand machinery market, skilled work market, etc.

[58] The Spanish production was in 1882 between the 2% or 2,5% of the world's production. In 1890 this percentage dropped to the 1-1,5% and to 1% in 1900 (1882 and 1890: Mulhall (1892), p. 437 and p. 612; 1900: Krawany (1910), p. 61; for Spain see an own estimate (Gutiérrez (1992)). The Spanish production in 1882 (for Spain the estimate for 1879 it has been used) was the 12,1% of German output, the 11,5 of the British, the 14,3% of French and the 51,3% of Italian. In 1900 these percentages dropped respectively to 6,4%, 8,7%, 11,6% and 20,3%.

[59] A British papermaking journal said in 1892 referring to Spain *"Within the last four years nine machines have been started, at the end of this year ten more probably will be ready, some of them of very large size, so that a very radical change in the conditions of the trade require such as a large increase of production"* (*WPTR*, 14-X-1892, XVIII (nº 16), p. 597).

increase of plant size. In Spain the second one was much more important because the national production of wood pulp was only marginal. There were only five or six wood pulp factories in 1900 and even all of them were located in Basque Country (and dedicated only to mechanical pulp). Also the only use of wood pulp without elaborate needed some changes, mainly in the search of new suppliers. The previous training, a result of the knowledge of foreign rag wholesalers, was very useful. For example Hamburg used to be one of the most important international suppliers of rag and it became headquarters of some the main wholesalers of wood pulp. At the same time the factories specialized in high quality paper (the majority of Tolosa, for example) maintained the rag as a main raw material until quite late.

Three regions focused the transformation: Basque Country, Catalonia and the Region of Valencia. In the three cases the industrial district dynamics was very important (Tolosa in the Basque Country, Sant Joan les Fonts in Catalonia and Alcoy in the Region of Valencia). The three districts had every one its own labour market[60], specialized workshops[61], representatives of the main international papermaking workshops, offices of raw materials wholesalers[62], other goods suppliers[63], etc. The other side of the coin was the decline of inland papermaking sector, doomed to become progressively marginal.

The change of firm dimension was mainly located in the Basque Country. This process had two phases. The first one, during the 1880s, was located in Tolosa and its area of influence. In this industrial district, factories with a major capacity than the existing ones until then began to appear ("La Guipuzcoana", part of a business holding owned by Baldomero Ollo and built with the financial help of an important publishing house of Madrid and "Laurak-Bat" as a second example). In parallel, the importance on adding value to paper trough finishing processes and branding grew in the Tolosa area. The

[60] There was no technical school specialized in papermaking in Tolosa in spite of some projects to create it. In consequence the skilled workers learn the technical basis of the industry on-site. Antonio Maria Labayen, a former papermaker, described perfectly the situation: "*Here everybody speaks about mechanical and chemical pulp; of cellulose and bisulphite [...]about the calenders, the cutting machines, the bleaching machines, etc.*" (Labayen (1947), p. 89).

[61] Some Spanish workshops made auxiliary or transformed the machines. There were this kind of workshops in the Region of Valencia ("Fundición Primitiva Valenciana", "La Maquinista Valenciana"), Basque Country ("La Maquinista Guipuzcoana" de San Sebastián, Felix Yarza in Tolosa), etc. Some of them succeeded to develop the whole machine (such as "Planas, Flaquer and Cª" (Girona)). In this group it is necessary to underline the case of Alcoy because in that town a mechanical centre specialized in low wide machines appeared ("Talleres de Jorge Serra" (Alcoy) and "Aznar Hermanos" (Alcoy)). This specialization was related with the production of low grammage paper.

[62] "A. Wertheim & Co." from Hamburg, probably the biggest pulp import-export agent, had an office in San Sebastián (very close to Tolosa). "Peterson, Möller & Cia.", other import-export agent from Hamburg, had delegation in Barcelona. The Swedish pulp producer "Tockfors J.N. Biesert Son" and the Norwegian "Bamble Aktie Cellulosefabrik" had offices in Barcelona.

[63] The most important wire mesh producers were: J. L. Perot a French established in Tolosa in 1880.

second phase was mainly located in the neighbour province of Biscay[64] and it happened during the last decade of the century. The novelty was exemplified by three big factories ("La Papelera Vizcaína", "La Papelera del Cadagua" y "Papelera Vasco-Belga") with an average of share capital of one million pesetas. Their production was mainly low-medium printing paper (especially newsprint). "La Papelera Vizcaína" and "La Papelera del Cadagua" were part of the diversification policy followed by the iron and steel oligarchy of Bilbao. The three firms were registered as joint stock companies. In all cases a management different than the property appeared. The managers of these firms used to be engineers. This common training was the origin of close personal links[65]. Also these firms, in some cases, had common commercial networks[66].

Meanwhile in Catalonia the dynamism of Sant Joan les Fonts was growing. Progressively Torras family had more and more power in the district. The main tool was the family firm called "Sucesores de Torras Hnos." established with this name in 1889[67]. The only real competency to Torras family came from Joan Capdevila and its factory called "La Reformada". Both firms were specialized in high quality printing and writing paper. A secondary Catalan axis of papermaking was in the province of Barcelona. It was dedicated to board production.

The Valencian dynamism came from 1880. This modernisation process consisted in the change of the handmade paper production in the old mill to continuous paper. The change was very fast. As a consequence in 1900 no vat was productive in Alcoy district. The mechanisation process was a result of the sudden change of supply policy by the State owned tobacco factories that began to demand continuous paper. But the entrepreneurs of Alcoy kept as a main production the low grammage papers (cigarette, copying, orange wrapping, etc.). This kind of products and the manufacturer tradition favoured a business structure with small firms and low capacity machinery[68]. Its productive proposal had two

[64] None of the new factories were in Tolosa (two were in the neighbourhood of Bilbao and the third one was in Rentería a town located in the province of Guipúzcoa), but all of them partially participated in the dynamics of its industrial district. For example, the skilled workers of "La Papelera Vizcaína" came from Tolosa like some of the shareholders of "La Papelera Vasco-Belga".

[65] See about the importance of common training and personal links in family firms in Fernández; Puig (2004).

[66] An example was Pedro Ribed, who owned a factory in Navarra and was commercial agent of «La Papelera del Cadagua» in Madrid.

[67] This firm was the origin of many more entrepreneurial initiatives developed by members of the Torras family in the following fifty years. The family members had in their mill, first, and factories, after, the environment to learn about papermaking. The best example was Paulí Torras who began to work in family mills in his childhood. Paulí was the brain of the modernisation of family factories during the first third of the twentieth century.

[68] When Rigoberto Albors, an entrepreneur and banker from Alcoy, decided to change this average

different sides: very standardized products (the orange wrapping paper) and those that competed with product differentiation policy and branding (with cigarette paper).

Even after these changes at the end of nineteenth century the business structure of the papermaking sector was dominated by firms with small capacity (and even very small). Their plant size allowed them an important degree of flexibility. The factories and the firms which could be included in an European pattern were really exceptional. Any of them had various factories or, at least, did not have them outside of the limits of an industrial district. There was no leading firm. The consequence was periodical war of prices and cyclical factories closures. So the business structure was defined those years by a high instability. These problems made the papermakers try to articulate sectorial cartels, following the national and international tendency of those year[69]. The aim was obvious: to regulate production and to agree prices. These attempts, led by Basque firms, happened during the last decade of nineteenth century (in 1891, in 1893, in 1897, in 1898, in 1900 and in 1901). Their final result in all cases was the failure.

2.2 The beginning of the end for handmade paper

The handmade paper was in clear decline from 1880 onwards. This process was extremely fast in the Region of Valencia meanwhile in Catalonia was slower. The main reason for the first case was the mechanisation of mills in Alcoy. The reason for the decline in Catalonia was the adoption of the *picardo* machine (and in some cases the adoption of the continuous machine). In this period the declining capacity of the working vats were gradually concentrated in some areas, mainly in Catalonia, and in some firms. The handmade papermakers also changed their management mechanisms. The decentralised productive structure turned into a centralised system during the last decades of the nineteenth century and the first of the twentieth. Different factors contributed to the change: the giving up of *balaires* system by the direct management[70], the partial mechanisation due to *picardo* machine and the growing labour pressures. Nevertheless the decentralised mechanisms of production never were completely given up (especially

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factory size the new factory was built quite far away from its native village (in the Andalusian province of Córdoba). However, he kept the traditional specialization of Alcoy factories: low grammage paper.

[69] The most important national papermaking cartel was, obviously from Germany, “Verband Deutscher Zeitung Druckpapier Fabriken” (“Association of German Factories of Newsprint”) created in 1900. Also there were national papermaking cartels in Austria, Belgium, Switzerland, etc. There were some failed attempts of organization on an international papermaking cartel.

[70] Some of the handmade papermaking firms chose the centralised management during the last decade of nineteenth century and the beginning of the twentieth. The best two examples were the Miquel family, specialized in cigarette paper, and the Guarro family, focused on high quality writing paper.

subcontracting). In parallel with changes the papermakers who came from handmade tradition reinforced their strategic main lines during this period: to compete on product differentiation and the growing use of branding[71]. The "modern" and "traditional" side of papermaking were two different realities despite the fact that contacts increased among them in this period[72].

3. The twentieth century: a business landscape dominated by "La Papelera Española"

During the first third of the twentieth century the changes of the international papermaking industry followed in a context of impressive dynamism. The growth of the countries with big forests (and consequently cheap pulp) increased their relative weight in papermaking industry[73]. Despite the changes, the SMEs kept a piece of the cake. Actually, the big firms decreased their relative weight in the sector[74]. Spanish papermaking slowed down its relative loosing of weight in an international framework[75]. This was a big success in a period with such a growth of international production. Obviously, to get this process a deep modernisation was necessary in technical matters as much as in organizational and management methods. Regarding technical innovation Spain began to incorporate the most vanguard changes from the international papermaking engineering market. But even more important than that was the fact that Spain had during these years some national papermaking workshops with the ability to maintain the machines and incorporate the main innovations. These workshops allowed the old machines and the machines from the second hand market to keep being productive and competitive. Sometimes machine

[71] A brand by "Miquel y Costas Hnos." arose during this period: "El Pino". It had an important success in Latin-American markets. This branding policy has an important complement with the warehouse created in La Havana in 1879.

[72] The main meeting point was the employers association. Example of that was Ramon Romaní i Puigdengolas. He was a very important papermaker who came from handmade tradition (his family was dedicated to papermaking al least from the early seventeetnh century). He got the chairmanship of the main Catalan employers association. The same Romaní shows the convergence between both cultures. Despite its origins in "traditional" paper, he started up a continuous factory in 1888 (though outside his home village of Capellades).

[73] Magee analyses comparatively the growth during this period, coming from 1860, of the British and US cases (Magee (1997)). To complete the knowledge of the US papermaking industry of the interwar period between wars see Cohen (1985) and Ohanian (1993).

[74] The four first papermaking firms of the United States in 1900 had 25% of total capacity, 12% in 1920 and 16% in 1940 (Ohanian (1993), p. 75). Consequently the ideas are that even in the United States, the big firms country, a big part of the market was held by SMEs.

[75] The Spanish percentage over the World's production was stabilized between 0,7 and 0,9%. Even more indicative than that was the fact that the Spanish production improved its percentages with regard to other countries. It was in 1900 the 8,7% of the British, the 11,6% of the French and the 20,3% of the Italian figures. These numbers grew in 1929 to reach respectively the 11%, the 21,3% and the 46,7%. Obviously the trajectory in comparison with Scandinavian countries was the contrary (from the 45% to 14,2% of the Swedish and Norwegian joint production) (1900: Krawany (1910), p. 61; 1929: *Annuaire Statistique de la Societé des Nations* and *OEEC Statistical Bulletin: Industrial statistics 1900-1959*, París 1960, pp. 155-157).

rebuilding was parallel to a specialization shifting (an old printing machine with some changes could be very competitive in making other kinds of paper). This process of innovation needed a more or less formal network of news about all the sector factories. The closing of some factory or the change of machinery was closely monitored by other papermakers. It was a good opportunity to renovate machinery or any component. The information flows were mainly focused in technical press and in personal relationships[76].

The changes in organizational and management matters were defined by the progressive firm concentration. This process has two main displays: the creation of a big firm, "La Papelera Española" (LPE), and the creation of cartels. Both changes could not to hide the fact that the Spanish business structure consisted mainly of small and medium firms with a high presence of those with familiar basis. Moreover, the Spanish SMEs were favoured, in some aspects, by the existence of LPE itself. In conclusion, in "big firm times" there was enough room to other kind of firms.

3.1 "La Papelera Española": an exception

The failure of the formation of a cartel at the end of nineteenth century mentioned above had a successful side. The previous works reinforced the interpersonal links among papermaking entrepreneurs and managers. This reality, added with sectorial problems, made it easier not to set up cartel but to merge the bigger firms, mainly from the Basque Country. Among the managers who led the negotiations the role developed by Nicolás Mª de Urgoiti was central. Urgoiti was the manager of "La Papelera del Cadagua". In the raising merger process two strategies were confronted: to include the highest possible number of firms or to merge only the biggest ones. Finally the second option succeed with the merger of eight firms (and two with its factories closed). The firm was constituted with a capital of 20 millions of pesetas and an issue of 10 million pesetas bonds[77]. The new firm became rapidly the sector leader, especially in medium and low quality papers[78]. Its central

[76] The journals specialized on papermaking were in Spain very few. Actually, they were only two journals: *La Industria papelera* (later called *La Industria papelera Española*) until 1907 and *Boletín de la Industria y el Comercio del Papel* (from 1907 to 1919). In these journals several advertisements dealing with the market of second hand machinery were published. In this network wholesalers of paper, workshops, etc. were involved. Easily one machine from the Madrid area could end up working in a factory in the Basque Country for many years.

[77] According to capacity data it would be in 1922 the fifteenth papermaking firm in Europe and it was among the first thirty firms of the World (Krawany (1925), pp. 360-362). These data characterise clearly LPE as a very important firm according to an international pattern. Also in Spanish scale it was a very important firm. In 1917 it hold the twenty-sixth place in the list of Spanish joint stock companies according to its share capital. In 1930 it occupied the place sixty-third. Among the industrial firms it ranked respectively the sixth and the sixteenth places (Carreras; Tafunell (1993), pp. 149-173).

[78] *The World's Paper Trade Review* described the creation of LPE in 1902: *"Spain: We understand that a trust or syndicate composed of the makers or `news´ is in process of formation"* (*WPTR*, 10-I-1902, XXVII (nº 3), p. 66).

office was in the Biscayan city of Bilbao but actually the management was done in Madrid offices. The strategy of the project did not run only by horizontal concentration but through vertical integration (the new firm had a forest policy, built new pulp factories, created its own network of warehouses and improved the finishing workshops, it had participation in publishing houses and newspapers, etc.). Previously it was necessary to rationalise its productive capacity. The rationalisation process meant to increase the specialization of factories and to close the less efficient ones.

Despite the superiority of the firm from Bilbao the other firms had some chances to achieve success. Many of its competitors possessed a bigger flexibility. This characteristic allowed them to leave most competitive markets (such as newsprint) and to focus its production in other kinds of paper. When the price of newsprint increased the competitors could “hit and run” in this market using its idle capacity. This made the first years of LPE history very difficult as a result of restructuring costs and some bad investments. From I World War the solidness of LPE was clear, although LPE had problems to maintain its percentage of the total Spanish papermaking industry in a very dynamic demand context[79].

The LPE project was defined by constant innovation in technical and organizational matters. With regard to technical innovation the Spanish firm bought the more advanced machines[80]. The result, together with the productive rationalization, was an important increase of productivity (from 420 metric tons per metre wide per machine in 1902 to 1.020 in 1926)[81]. The Basque firm created in 1904 its own engineering workshop to maker the continuous technological change easier. As a result of the incorporation of technical change as a value in the firm culture a technical school was created in 1915 attached to one of their main factories. From that time onwards this school was the main training place of skilled workers of the firm.

The organizational and management changes were as important as technical innovation. The biggest Spanish papermaking firm introduced a management structure completely unknown until then in the sector[82]. In the highest firm level its particularities came as a result of merger process. Its first management board, with a clear Basque predominance, attempted to have members from all the firms merged. This caused

[79] Urgoiti estimated that merged factories productive capacity (26.000 metric tons) was over two thirds of the total Spanish production of paper. This percentage grew until the four fifth attending only to the qualities produced by LPE (Urgoiti (1913), p. 300). These estimates were too optimistic. According to an own estimate for 1902 to 1913 its percentage over the Spanish production was 43,9%. Between 1919 and 1935 the percentage decreased until 41,1% (Gutiérrez (1992) and Gutiérrez (1996)).

[80] LPE, for example, incorporated until 1936 nine machines by Voith, which was the main papermaking engineering firm of Germany. Likewise, the Spanish firm bought components to British suppliers (“Millspaugh”), from the United States (mainly in the wood pulp factories, etc.).

[81] Urgoiti (1927), p. 326.

[82] One of the main criticisms about LPE at the beginning of its life was focused on the high cost of the management. The papermaking journal *La Industria Papelera* said in 1907 that *“no exists any industry in Spain which spends so much money in management as Papelera Española does”* (*La Industria Papelera Española*, 8-V-1907, p. 3).

management problems. Its meetings had to be monthly but late the board began to meet every three months. The managers tried to solve the problems reducing board's members and creating a management committee. The number of the members reduced from 24 in 1902 to 18 in 1912 and to 16 in 1927.The aim of the management committee was to speed up the decision-making process. Therefore their meetings were very frequent. It members were five (with the possibility to arrive to nine members). During the first years of LPE history there was a committee chairman (actually he was a real manager of the firm). Shortly, the chairman of the committee was replaced for a collegiate management formed by the General Manager, the Administrative Manager and the Commercial Manager (the last two management positions merged in a single one soon). This committee and the General Manager were really the ones who ran the firm. The General Manager deseigned the productive policy of the firm from Madrid, to all the factories scattered throughout Spain. During the first twenty years of history firm the key person in decision-making was the General Manager, Nicolás Mª de Urgoiti who also was a very minority shareholder. Finally he was sacked because of agent-principal problems regarding investment policy. Obviously every factory, workshop or warehouse had its own manager. When there were different LPE branches in an area it used to open a delegation for coordination purposes. The administrative structure had, even in medium and low jobs, skilled workers with a high occupational training level. In this sense it was very important the creation in 1907 of the "Escuela Teórica-Práctica de la Industria y el Comercio del Papel de Tolosa" ("Theoric and Practical School of Paper Industry and Trade of Tolosa")[83]. This innovative initiative had two specialties: administration / accountancy and sales / finishing. The studies took three years and the students learnt management and account techniques as well as foreign languages, economy, chemistry, basic papermaking technical knowledge, etc.

3.2 The Spanish business structure: something more than LPE

The unquestionable superiority by LPE cannot hide that it was an exception in a landscape dominated by small and medium firms, although these firms were more and more medium and less and less small. An indicator of the changes was the proliferation of joint stock companies[84].

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[83] The school had a double partnership: "La Papelera Española" and the "Escuelas Pías" (a Catholic school). C. Bailey Hurst, general consul of the United States in Barcelona, summed up the success of this school: *"a significant side light thrown upon the story of the development of the papermaking industry in Spain is the successful operation of the paper-making school [...]. There were 21 graduates placed in positions in the paper industry in Spain in 1912"* (Bureau of Foreign and Domestic Commerce (1915), p. 144). Almost eighty former Tolosa students worked in LPE and "Central Papelera" in 1919 (Papelera Española (1919), p. 20-23).

[84] Taking into account all the papermaking joint-stock companies (in manufacturing, distribution, commercialisation and finishing) they increased from 11 in 1917 (with a total capital of 25.725.00 pesetas) to 37 (with 124.515.000 pesetas). In 1917 the LPE share capital was 20.000.000 pesetas. This let the firm average in 572.500. In 1930 the share capital of the firm from Bilbao was 39.180.000. The

The hypothesis is that under the LPE umbrella independent firms acquired a remarkable development. Therefore, the Spanish business reality was something more than the leader. To face the increasing demand LPE had two possibilities: continuing the increase of capacity (and to give up the returns distribution to shareholders) or to change the direct hegemony for other more subtle ways like cartel.

At the beginning of twentieth century the business structure had a deeply regional basis. The three main areas were: the Basque Country, Catalonia and the Region of Valencia. Each crisis reinforced this geographical and business reality. Inside these regions the same concentration happened at firm level. The success of this regional concentration was very linked to the industrial district dynamics.

The geographical axis of Spanish papermaking industry still was in Tolosa in the Basque Country. Usually its firms did not exceed the medium size. But the reality was much more complicated than this. For example in this frame some papermakers from Tolosa were shareholders and at the same time managers of different firms[85]. Therefore, the real power on some firms was bigger than it could appear. Furthermore these firms were parts of a very specialized industrial district and they could to take advantage of it. Tolosa and its area concentrated some services very important to every day factory work. The technical innovation in Tolosa district was helped by some of the most important papermaking engineering workshops in Spain[86] and by sales representatives of foreign paper-machine makers[87]. The information flows were continuous and shared by the papermaking firms. They had in common the interest to have the best machine possible and the best maintenance. These interests culminated in getting one of the old papermaking engineering workshops into a new firm: “Talleres de Tolosa”. The new firm was created for the main members of the papermaking oligarchy[88]. It had signed contracts with some of the main European engineering firms as a way to keep alert in technical vanguard. The “Talleres de Tolosa” role was to adapt the technological improvements to the needs of local papermakers[89]. Some papermaking entrepreneurs cooperated with Scandinavian

average for other firms was of 2.370.442 pesetas.

[85] Gregorio Mendía during the decades of the 1920s was manager of “Mendía S.A. "Papelera del Urumea"“ and “’Echezarreta’ S.A.”. The same Gregorio Mendía is an inbreeding example in the Tolosa district. His wife was a Ruiz de Arcaute family, one of the most important families of the district. “Biyak-Bat” and “La Salvadora” had the same managers. Luis Sesé, owner of factory in Tolosa, also was shareholder of “Biyak-Bat”. The main shareholders of “La Papelera del Oria” were Miguel Ruiz de Arcaute (owner of “Ruiz de Arcaute y Cia.”) and Eduardo Zaragüeta (owner of other papermaking firm).

[86] Gorostidi (from 1915), “Talleres de Tolosa” (from 1918) and Pasabán (from 1928).

[87] This was the case of “Agencia Imex” created in 1933 with central office in Tolosa, which supplied all kind of papermaking machines. This firm shared its offices with “The Northern Pulp Co. S.A.” (*The Paper Makers Directory of All Nations* (1935), p. 539).

[88] “Talleres de Tolosa S.A.” had a modest share capital of 150.000 pesetas. Its management board was formed in 1922 by important members of the papermaking oligarchy from Tolosa such as Pedro Limousin, Jenaro Ruiz de Arcaute, Pedro Pasabán and Leopoldo Villanave. Serapio Huici, a very important shareholder of LPE, was among its shareholders.

[89] The activities performed by “Talleres de Tolosa S.A.” at the beginning of the 1920s were described in the following way: “*complete installation of paper and board machines, transformation of papermaking*

exporters in order to ensure a continuous supply of pulp. The best well-known case was that of the “Northern Pulp” firm owned by Scandinavian pulp producers[90]. Other case where papermakers used its personal links in favour of the district dynamics was banking. The local dynamism generated growing needs to make easier payments. The result was the “Banco de Tolosa” created in 1911 (called in Spain “Bank of Papermakers”)[91]. The sectorial complicities were nourished by these collaborative firms and by a trade association of the province ”Asociación de Fabricantes de Papel de Guipúzcoa” ("Association of Papermakers from Guipuzcoa”[92].

To the factors underlined above it is necessary to add a new one: the proximity of LPE (which even had two factories in Tolosa). Both dynamics (industrial district and big firm) were complementary, actually they feedbacked each other. For example, many of the workers trained in the schools owned by LPE could work, and many of them finally did, in non-LPE firms. In some years a great number of jobs of the main part of Spanish papermaking firms had LPE training. This personal network was very important to coordinate activities in the cartels created by LPE[93]. On the other hand, the active engineering industry from Tolosa allowed LPE to close its own workshop in 1911 when the reorganization period was finished. Also LPE bought “Perot” the metallurgical firm from Tolosa specialized in wire for papermaking uses. Even the cartels promoted by LPE contributed to nourish the cooperative spirit of the district.

Catalan papermaking was articulated in two main axes (Sant Joan les Fonts and Barcelona). The Catalan papermaking industry had a lower density than the Tolosa one, but it could take advantage of the main industrial region in Spain (its most important industrial sector was textiles, mainly cotton). The rich industrial structure of Catalonia had some papermaking engineering workshops[94], some sales representatives of pulp exporters

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machines […]; Hollanders, […], and in general all the engines used in papermaking industry” (Commercial Catalogue without date). The firm from Tolosa had the dealership of patents by “Bertram Limited” from Edinburgh, for example.

[90] “Northern Pulp” was registered in January of 1930 and it had its central offices in Tolosa. Besides the Scandinavian shareholders among its promoters it was Miquel Zavala, a papermaker with participation in “Gregorio Mendía and Cª” and “Papelera Beotivar”. “Northern Pulp” followed from 1930 to 1935 a policy of a very close contact with suppliers and consumers of mechanical and chemical wood pulp (Northern Pulp (1955), p. 11-12). Another similar firm was “Hansen & Cappelen” created in 1929 and with central offices in Tolosa too.

[91] The links between “Banco de Tolosa” and the main papermaking families were very close. For example in its management board were Gervasio Aramburu (“Limousin, Aramburu y Raguan”), Pedro Limousin (“Limousin Hnos.”), Luis Sesé and Ramón Sesé (“Sesé y Cª S. en C.”), Leopoldo Villenave (“La Soledad”), José María de Mendía and Gregorio de Mendía. Among its founding shareholders were other members of the main papermaking families (Calparsoro, Irazusta, Larreta, San Gil Ollo, Lazcano, Zavala, etc.) and even some firms (“Echazarreta S.A.”, “La Salvadora S.A.”, “Limousin, Aramburu and Raguán”, “Papelera del Araxes”, “Ruiz de Arcaute and Cª S. en C.” and “Soto, Tuduri and Cª.”).

[92] The “Asociación de Fabricantes de Papel de Guipúzcoa” had 12 members in 1912.

[93] Antonio Maria Labayen after listing some workers trained in the school of Tolosa said that they *“hold management jobs in firms related with papermaking industry”* (Labayen (1947), p. 92). It is necessary to underline that after LPE employees sons the natives from Tolosa had preference to enter at the school.

[94] The case of Joan Trabal, who was trained in the Capellades mill area where he worked as a carpenter, is very significant. He went to Barcelona and studied at the “Escuela de Artes y oficoos·. He began to work

and of foreign machinery suppliers[95] and different inputs very linked with papermaking[96]. The Catalan papermakers also had a regional association: "Liga de Fabricantes de Papel de Cataluña" ("League of Papermakers from Catalonia" (created in 1906)[97]). Without any doubt the Sant Joan les Fonts was the main Catalan district, where Torras family increasingly controlled the capacity. It is not surprising at all that the first Spanish technical handbook on papermaking had its origins in this area[98]. Anyway during this period grew faster the papermaking activity at the outskirts of Barcelona. In parallel, the handmade paper tradition became only symbolic, but it had generated half a dozen very competitive firms[99]. They used the *picardo* technology and even the continuous machine. The business culture, quite similar to the one from Tolosa, took special attention to product innovation (with the exception of board producers). Its basis was double (continuous tradition and handmade origin). The relationships between both cultures were very scarce[100] but they existed[101]. Its shared culture of innovation was one of the explanations for refusing to participate in the cartelisation projects led by LPE.

The third papermaking district in Spain, also very dense, was the Alcoy one. The factories of this town of Alicante province followed its specialization in low grammage paper[102]. The firms from Alcoy enjoyed a series of specialized services in its immediate

in a modern papermaking factory attached in the workshop (from 1915 to 1929), and created his own workshop in 1929.

95 "Escher Wyss", a Swiss firm specialized in turbines and papermaking machinery, had during the 1920s a sales office in Barcelona (with branch in Madrid) (*Anuario Industrial de Catalonia. 1923*, s.p.).

96 The Rivière family, wire producers, had as a key competitive tool its good and direct contact with its consumers. Even, as a result of this direct contact, one member of Rivière family got married with a member of Torras family (Fernández (2004), p. 83).

97 The "Liga" grouped the biggest papermaking firms from Catalonia. Its members in 1922 were "Rafael Torras Juvinyà", "S. Torras Doménech", "La Gerundense", "La Aurora", "La Gelidense", "La Papelera del Este de Spain" and "Viuda de Quirico Casanovas". Five years later their members factories had 1.725 workers (Central de Fabricantes de Papel (1932), p. 519).

98 The engineer Tomás Costa Coll who worked in papermaking from 1912 wrote the handbook. He had a first and short version of the book in 1935, but it was not published until 1946 (Costa (1946)). Besides his personal experience he read and used an abundant foreign literature of the 1920s and the 1930s.

99 An example was "Miquel y Costas & Miquel" which introduced at the beginning of the twentieth century a new brand: "Smoking" which was very successful in the Spanish market. Its marketing strategy was very modern with advertisements designed by important artists in order to promote the new brand. At the same time they kept a important presence in Latin-American markets from their warehouse at La Havana and the brand "El Pino". In this sense a report by the Bureau of Foreign and Domestic Commerce said about Cuba *«Spain enjoys a virtual monopoly of the market for this class of [cigarette paper handmade]»* (Murray (1931), p. 13). The situation described to the Cuban case was quite close in Venezuela, Mexico, etc.

100 It's quite illustrative that the papermakers from handmade tradition kept its own trade organizations until the 1930s (the "Unión de Fabricantes de Papel de Barba" or the "Asociación de Fabricantes de Papel de Hilo o de Barba de Spain" with headquarters in Barcelona).

101 An example of this communication was once more "Miquel y Costas & Miquel", the firm from Capellades and specialized in cigarette paper, which in 1914 began to produce continuous paper in a factory close to Barcelona. This step was done without loosing its own identity, origins and specialization. This firm became a joint stock company in 1929. That time it was the second one of Spain in share capital.

102 The factories of Alcoy appeared in *The Paper Makers Directory of All Nations* focused in *"cigarette papers"*, *"white and coloured tissues"*, etc. The papermakers from Alcoy were very successful in

surroundings. For example, the engineering workshops deepened in its specialization in small wide machines (focused in cigarette paper and orange wrapping paper). They were very small continuous factories. Its size conditioned their future evolution. But the firms had very strong links among each other mainly due to kinship relations. Also they had a permanent institutional framework to cooperate: "Gremio de Fabricantes de Papel de Alcoy" ("Trade of Papermakers from Alcoy") and, later, "Central de Papeles Sedas y Manilas" ("Syndicate of Silk and Manila Papers") (with nationwide field but it had its headquarters in Alcoy). The deep personal links of entrepreneurs from Alcoy was an open door to try to solve the excessive atomisation. The answer was the merger that involved all the firms from Alcoy, with one only exception. The new firm was "Papeleras Reunidas S.A." created in 1934 with a capital of 40 millions pesetas[103].

3.3 The cartelisation attempts

During the first third of twentieth century there were different attempts to articulate papermaking cartels, according with national and international tendency[104]. These cartels were an indirect way used by LPE to reinforce its position. The agreement included only the more standardised products (such as printing and writing paper of low quality and mainly newsprint). Other products were completely apart or only involved partially. The cartels, and firms created by them, made to increase personal links among the leading papermakers and to coordinate its decision-making possible.

The first step to sectorial syndication was dated in 1906 in anaction against a common enemy: a foreign competitor. It was the result of the heavy resistance of Spanish papermakers to a new factory. This attempt was made for a firm with French capital in Vall d'Aran. LPE and other 35 papermakers signed the agreement. But the syndication was a complete failure for the opposition to reduce production, mainly from factories from Tolosa. A new attempt happened in 1908. That time the result was the formation of the "Federación de Fabricantes de Papel Continuo" ("Federation of Continuous

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branding policy, especially in cigarette paper. The most successful brand was "Bambú" by "Rafael Abad Santonja y Sobrinos".

[103] Five papermaking firms merged to create PRSA. They were "Enrique Valors Raduán", "Hijo de C. Gisbert Terol", "Moltó Santonja S.A.", "Sobrinos de R. Abad Santonja S.A.", "José Laporta Valor S.A.". The new firm had eight factories and fifteen machines. In the merger process some firms focused in finishing ("Hijo de Genaro Marín", "Leopoldo Ferrándiz", "Miguel Botella and Hermano", "Pascual Ivorra Carbonell") were involved. Also a warehouse founded by people form Alcoy in 1850 with central offices in Barcelona ("Hijo de Genaro Marín") merged. Its objective was *"to make and finishing paper of all kinds, especially cigarette papers in booklets, silk and manila papers"*.

[104] A list of the recent literature on Spanish cartels in Fernández (2006), p. 55. During this period the former attempts to organise international papermaking cartel succeeded with "The International Committee on Newsprint" (TICON) created in 1928, SCANKRAFT in 1932, SCANGREASE in 1935, etc. Also the cartels in pulp industry were very important: "Mechanical Pulp Cartel" (M.P.S.) in 1927, "Sulphite Pulp Suppliers" (S.P.S.) in 1930, etc.

Papermakers")[105]. They did not succeed once more in having any agreement on production cut.

More ambitious was the "Central Papelera" ("Papermaking Syndicate") created in 1914. The new cartel grouped most of the Spanish papermaking firms, as full members or through particular agreements. The cartel agreement included printing paper, coated ordinary paper and packing paper. Other kinds of paper were excluded but with some price restrictions[106]. The LPE control over the "Syndicate" was complete because it had two-third parts of its productive capacity. Its main actuation was to keep newsprint paper prices during 1st World War in order to preserve consumption. The papermakers from Tolosa, Alcoy, Sant Joan les Fonts and those who came from handmade paper tradition had no agreement with this cartel.

A third step in this syndication project happened in 1919. Three cartels with different activities were formed: "Sociedad Cooperativa de Fabricantes de Papel" ("Cooperative Society of Papermakers") (SCFP) focused in manufacturing; "Almacenes Generales de Papel" ("General Warehouses of Paper") (AGP) dedicated to commercialisation matters and to sell the paper made by SCFP factories; "Sociedad Arrendataria de Talleres de Manipulación de Papel" ("Society of Finishing Workshops of Paper") (SAM) with activity in finishing process and stationery products. The agreement dealt with the joint sale of some kinds of paper. The links among the three firms were very close. They had its headquarters in Tolosa, at least theoretically, because actually they worked from the LPE offices in Madrid. Even SCFP and AGP shared the manager (they finally merged in 1929)[107]. Many more firms from Tolosa were involved in this syndication attempt, but those owned by the Torras family, other Catalan firms and the firms from Alcoy were out side the agreement. The SCFP changed in 1930 its name to "Sociedad Central de Fabricantes de Papel S.A." ("Central Society of Papermakers Ld.").

The "Asociación Reguladora de la Producción y Venta de Papel" ("Association to Regulate the Production and Sales of Paper") created in 1927 was the next step. Its main aim was very clear in its name. Its members were SCFP together with some other Basque and Catalan firms. The capacity of the "Association" was impressive. Its members had in 1934 the 52,3% of the total Spanish productive capacity. This percentage grew until the 68,2%, adding the capacity owned by the same cartel and the firms with special agreements.

[105] The firms involved in the project were forty-five. Some of them did it through their regional associations (*BICP*, nº 47, 31-12-1908; *La Papeterie*, 25-2-1909).

[106] Urgoti (1927), p. 320. According to C. Bailey Hurst, US consul in Barcelona, the cartel focused on "*standard and competitive varieties and grades of Spanish-made papers*" (Bureau (1915), p. 144).

[107] That time the SCFP had an agent in the United Kingdom ("Burnell Hardy, Ltd." with offices in London).

The cartels had some factories they owned. The creation of these factories was an answer to growing foreign competence, mainly in newsprint, and to factories with problems. The main example of this policy was “Papelera del Oarso”, promoted by “Asociación Papelera”. The new factory incorporated the most modern machinery in newsprint production and it began its productive life in January 1931. The SCFP created two new firms: “La Papelera del Sur” and “La Papelera del Grao”. The first one was a result of the purchase of a factory specialized in low-quality paper and straw paper in 1928. “Papelera del Grao C.A.” created in 1932 by the merger of two factories previously bought by SCFP. Both firms had their central offices in the delegation of LPE in Madrid, which were the headquarters of SCFP. Even the main person was manager of SCFP, “La Papelera del Sur”, “La Papelera del Grao” and “Papelera del Oarso”.

4. Conclusions

The Spanish papermaking industry in mid-nineteenth century had two main characteristics: the late and slow diffusion of the continuous machine and the continuity and even dynamism of handmade paper. It is quite significant that, among the pioneering initiatives in continuous paper, there were very few with roots in the handmade paper tradition. This was result of the demand structure in Spain. Unexpectedly, the leading firms of the “traditional” side of the sector had a very innovative behaviour during all the century. The most dynamic paper mills were located in Catalonia and in the Region of Valencia. The changes took place in the productive organization and distribution as much as in the creation of new products. The “modern” side of the sector was formed by very few machines and by very small factories. The firms with a more positive performance were located in areas with a denser papermaking activity (Tolosa at the Basque Country as a main example). During the second half of the nineteenth century, at least until 1880, while some pioneering continuous factories had a very difficult performance some handmade paper firms built a very ambitious project with a significant presence in international markets. It is not surprising at all that in the context of the stagnation of the “modern” side that the Spanish papermaking industry lost weight in an international framework during these years. This process continued from 1880 until 1900, but significant changes took place. The most important ones were the decline of handmade paper (mainly after the adoption of a kind of cylinder-mould machine) and the increase in size of the new continuous papermaking factories (mainly located in the province of Biscaye). During these years the district dynamics were enriched progressively in papermaking areas in Catalonia, Basque Country and the Region of Valencia. The instability of the sector moved the papermakers, without success, to try to form a cartel. Spain, during this period, continued to loose weight in an international framework due to the increasing importance of wood pulp supply.

The Spanish papermaking industry still had two different productive realities at the beginning of the twentieth century: the handmade one (with the last vats in production and with cylinder-mould machines) and the continuous one. In the first case there was a very strong tendency to produce innovations like in some continuous papermaking factories from Tolosa and the Region of Valencia. The biggest factories, specialised in low and medium quality printing paper merged in a new firm: “La Papelera Española”. Despite LSE power the other independent firms kept a piece of the cake. They stayed in the markets of high and medium quality printing and writing paper. In a context of growing demand LPE tried to control them through different cartel initiatives. Some of the SMEs firms were very reluctant to enter in these cartels. There were two different productive realities, but some points in common. The SMEs had their strongest points in the versatilility and the quality of their production. Furthermore they could use some advantages transferred from spillovers of the big firm (skilled labour training, distribution policy, etc.).

The Spanish papermaking sector had two different innovation cultures during the studied period. The first one, focused in process innovation, had its bias on technological matters. The second culture was focused in product innovation paying special attention to finishing, branding and commercialisation matters. Furthermore both cultures had transformations in management structures, looked for new markets or new raw materials. Likewise, both cultures coexisted in time and space. They were not exclusive, because often they nourished each other. Therefore it is quite difficult to know which part of this innovative reality had the origins in a firm, in a network framework, or in more or less formalised organizations.

This historical approach can be useful to understand the challenges and realities of the new times in papermaking. For example LPE, the big Spanish papermaker, is now only a memory while some firms with eighteenth century origins in eighteenth century development still have an important presence in their markets. The key answer to analyze their failure or success is their market choices and their innovation policy.

Abbreviation

AHCG, Archivo Histórico de la Ciudad de Girona.

AHCI, Archivo Histórico Comarcal de Igualada.

ANI, Archivo Notarial de Igualada.

BICP, Boletín de la Industria y el Comercio del Papel

OPEM, Oficina Española de Patentes y Marcas.

WPTR, The World's Paper Trade Review.

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