

Immigrant entrepreneur, transfer of technology and knowledge spillovers: the case of Lyon Barcelona

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Abstract

The study explores the role of entrepreneurs and entrepreneurship in the creation of cross border business, through the figure of the immigrant entrepreneur. It examines how the relationship between immigrant entrepreneurs and local management impinged knowledge spillovers in the target economy during the interwar period. Based on a historical study of the Lyon Barcelona company (1933-81), the dynamic analysis provides evidence of the creation of knowledge spillovers. Indeed, the introduction of serigraphy by the company led to the creation of a cluster specialised in the manufacture of printing moulds in the Catalan town of Premià de Mar (Barcelona). The effects of the spillover were triggered as technology transfer was absorbed to create new knowledge that was initially transmitted from the factory itself and was disseminated on the basis of entrepreneurship and the creation of new specialised businesses, during a period of expansion of that activity. The astuteness of immigrant entrepreneurs for detecting business potential and the execution of that business by local management along with regional economic proximity benefitted the greater impact of cross border business on the target economies.

1. Introduction

The role of companies and entrepreneurs in the expansion of international business is a central issue for understanding the evolution of modern economic development. In order to explore this relationship it is necessary to understand the dissemination mechanisms of cross border business and assess its real impact on the target economy from a dynamic perspective.

The study is based on the hypothesis that the relationship between the immigrant entrepreneur and local management encourages knowledge transfer and impinges knowledge spillovers in the target economy. The lack of aggregate indicators to enable us to account for this phenomenon forces us to readjust the methodology employed. The option chosen is the historical study of the Lyon-Barcelona company (1933-1981) in Premià de Mar (Barcelona).

Lyon-Barcelona was a pioneering company in the introduction of a new printing system to Spain: serigraphy or Lyon printing (screen printing). But its important contribution went further, for it generated true momentum for the development of local talent, which made it possible to consolidate the specialisation of the printing industry at the heart of the major Catalan textile district.

This paper has been divided as follows: the first section is devoted to an overview of the role played by immigrant entrepreneurs in the building of local talent; afterwards, it analyses the origins of the founding of Lyon-Barcelona thanks to French-Swiss entrepreneurship and capital; the technical contribution of serigraphy to the printing industry; the role played by the company in the building of local talent; finally, some conclusions have been drawn.

2. Foreign investment, immigrant entrepreneurs and talent building in host economies: an overview

The study of international business in the course of globalisation processes requires in-depth examination of the parties involved and of the articulation of that business in order to assess its potential impact on the target economies, as well as the bandwagon effects on developing economies.

Economic globalisation processes have led to an intensification of international economic relationships, thus changing the way that business is conducted (Jones. 2014) Historically, the first globalisation (1870-1914) led to unprecedented expansion of international economic flows (international trade, migration and investment). The new dynamic of international trade meant companies could be supplied with newer and

larger amounts of products and services from a wider range of origins. While commodity markets started opening in the 19th century, there were also changes in the scope of activity of many companies, which increasingly operated in a more international market. Mass international migrations grew in magnitude and became both agents of change and of growth, in that they provided capital, knowledge, human capital, labour and entrepreneurship in the places of destination. International investments, albeit led by indirect British investment during the first globalisation, underwent an increase in the form of foreign direct investment through free-standing companies and the appearance of the first multinationals of the industrial capitalism era.

The First World War brought an end to the first globalisation. During the interwar period, the globalisation process was affected by the increasing regulation of western countries, which hindered the free circulation of people, commodities and capital, while some countries were less encouraging of the presence of foreign companies. Nevertheless, the transfer of technology and knowledge associated to the second industrial revolution between countries and companies continued to advance relentlessly in the 1920s (Jones.2014).

Our case study initially relates to the Barcelona of the interwar era, shortly after the reinforcement of Spanish protectionism in 1922, when the Spanish state opted to intensify its regulation of economic activity. Despite these trends, and according to Comín, the protectionism, interventionism, economic nationalism and corporatism of the Primo de Rivera Dictatorship (1923-30) were more rhetorical than practical, given that foreign trade did not decrease while foreign investment was notably prominent in the 1920s (Comín.2002:307).

In fact, Spanish ultra-protectionism may have fostered the localisation of production from cross-border enterprise, in that it encouraged manufacture and distribution in greater proximity to consumer markets depending on the type of product. This circumstance would explain why companies that imported a relatively new product on the domestic market decided to produce it in the target market while in the case of other products, localisation of production close to the target market was unavoidable. The latter was the case of the Lyon Barcelona company, which produced printed textiles using a new and pioneering technique, and was an auxiliary textile business that enjoyed comparative advantages through being located inside a major textiles district and close to the consumer markets.

During the interwar period, the articulation of foreign direct investment was undertaken by companies and entrepreneurs that operated between countries, very often no further than beyond the closest borders, which was a particularly characteristic feature of the 19th century (Jones & Wadhvani. 2007: 9). As economies became more interrelated, more entrepreneurs would operate across their borders, and such figures as immigrant entrepreneurs would become more common, thus associating entrepreneurship and foreign direct investment with migration. The immigrant entrepreneur has been a recurrent figure in contemporary history, leading to the creation of companies in new countries, whereby knowledge and capital accumulated in the place of origin are connected with the immigrants' own entrepreneurship and crystallised through the establishment of businesses in the target country.

On a theoretical level, the notion of immigrant ethnic entrepreneurship has been proposed as a key factor for understanding the entrepreneurial behaviour of people that cross cultural, economic and national borders. (De Vries. 2011; Jones et al. 2011) At the same time, it has been claimed that there is a need for further analysis of entrepreneurship from business history and to potentiate dialogue with entrepreneurship research, (Jones & Wadhawani, 2007& Gil et al 2016) as has occurred with some prominent studies of the role of immigrant entrepreneurs in the history of the United States (Godley, 2001; McCraw.2010).

The Shumpeterian definition of the entrepreneur as an entrepreneur-innovator is close to the concept of entrepreneurship. The entrepreneur's function is defined as making decisions in uncertain conditions, which must be related with the notion of successful entrepreneurs being those that are more likely to be mature people and may well be outsiders and well-connected. (Casson & Godley. 2005: 14) In this regard, an immigrant entrepreneur is an outsider by definition and, indeed, did not and does not act in isolation. If an entrepreneur needs to be well-connected and to reduce the amount of uncertainty, then it is useful for them to have social, ethnic, religious and cultural networks as well as be able to operate in a more open economy.

Historical studies of the agents that structure international economic relationships have devoted careful attention to commercial and business diasporas, which provide an interesting and dynamic view of this phenomenon. Some recent contributions have reasserted that such identification is contrived, for commercial and business diasporas have been able to readapt over time (Baghdiantz; Harlaftis; Pepelasis; 2005). Very often, business diasporas have been brought together through ethnic identification elements, for their members are thus able to share the same culture and/or religion,

which may become a key factor when establishing economic relations in an unfavourable (foreign) context that requires a framework of trust.

The main competitive advantage of commercial diasporas is that they create a channel through which a flow of information and communication circulates among its members—brought together by a common ethnical identity—in order to solve agency problems and transaction costs. Some studies have identified the role of diaspora networks in improving levels of confidence and fostering the circulation of information and resources among their members, which helps to reduce the risks of operating in a growing and more open market (McCabe; Harlaftis; Minoglu.2005). Further still, some studies have shown that the history of diasporas creates a new theoretical perspective for the study of entrepreneurship (Ioannides; Minoglou.2005:163-190). The people that played the main roles in setting up Lyon Barcelona may also refer to the figure of the immigrant entrepreneur and to the Jewish diaspora, for a large number of the contacts regarding the analysed company's capital and technology may be identified with the contacts established in France by many of these people during the First World War that were members of the Jewish faith. This is not a unique case in the Catalan economy, as it appears in the Issac Carasso' Danone company established in Barcelona in 1919 and Bassat SA, which in 1968 made the Filomatic shaving machine so popular.

Having defined the entrepreneurial profile of analysis, we now turn to the debate as to how international business can affect target economies from different analytical perspectives. Based on development economy, the analysis of foreign direct investment has been given priority due to its implications as an eventual factor of economic development. Some of its empirical contributions emphasise that, by incorporating technological change, FDI not only entails an increase in the stock of physical capital of the host economy because, since it is accumulative, it may also indirectly foster the development of human resources and better technology (technological upgrading and knowledge spillovers). However, the impact of FDI on growth depends on the degree of complementariness and substitution between foreign direct investment and domestic investment. But FDI is not an independent variable, for the characteristics of the economy that is the target of foreign investment condition the choice of the technology that is to be implemented. *Foreign investors can then be deemed to select the technologies embodied in FDI-related capital accumulation depending on specific productive and institutional characteristics of the host economy.* (Mello; 1999:148) Several contributions have proven that the relationship between foreign direct investment and the availability of human resources works in two directions. On the one hand, some studies prove that labour supply may be one of the

causes of FDI localisation, mostly since and due to the second globalisation (Noorbakhsh; Paloni; Youssef; 2001); however, it was not a determinant factor in previous historical periods (Rhoot; Ahmed; 1979). On the other hand, other authors have noted that the availability of qualified human resources is a requirement of transnational companies and affects the FDI volume (Zhang & Markussen; 1999). The relationship between human resources and FDI inflows may end up building a true virtuous circle making the training of human resources favour the entries of FDI inflows, while being the mechanism of technological transfer in the recipient country, and, more than anything else, its exploitation in the development process (Miyamoto; 2003:39-41).

On the other hand, by means of technological change, foreign direct investment would clearly appear to impinge on the economic growth of the target economy. The relationship, however, is not automatic and depends greatly on the capacity of the host economy to absorb more advanced technologies (Borensztein; De Gregorio; Lee; 1998). The studies carried out on the geography of innovation emphasise how innovative activity tends to concentrate in some specific areas. In this debate, a key aspect is how knowledge spills over, how knowledge spillovers operate, and which externalities are generated in the business environment. Given the fact that the innovative company qualifies its workforce based on the new knowledge provided, it may disseminate it outside by means of entrepreneurship (Audretsch & Feldman, 2004). Being invisible and non-measurable flows, there is little empirical evidence of how knowledge spillovers operate, or of how a new localised production specialisation ends up being generated thanks to capital injection and imported technology.

Historically, the potential gains from international investment could be high and become powerful agents for the dissemination of knowledge and the generation of isolated economic enclaves without bandwagon effects on the target economies. The disseminator effects of international investment could involve the introduction of new products and techniques, the introduction of labour practices, new management methods, and the indirect effects of improved transport and distribution, although in truth, those results varied widely (Jones. 2014). Technology and knowledge transfer has worked between western countries, but limitations have arisen when this transfer is from western countries to the rest of the world (Bruland & Mowery. 2014). Moreover, *contemporary research provides little or no aggregate evidence of strong spillovers from multinational firms to local firms in the same sector, especially in developing countries* (Jones & Wadhvani. 2007:17). This implies the need for a better understanding of how international business has been articulated and what conditions

are needed in the target economy in order to generate and absorb spillover effects and create local talent. Our case study has been developed within this theoretical framework.

3. Foreign investment and entrepreneurship: the origins of Lyon Barcelona

In this section we will deal with the founding of La Preparación Textil SA, a basic, preliminary step in order to understand the founding of Lyon Barcelona within the context of foreign investment in Spain before the Civil War. Foreign investment counted on fundamental agents that organised it; without them, it would be impossible to evaluate its importance and repercussion.

The founding of La Preparación Textil SA.

Estampados y Aplicaciones Lyon Barcelona was a complementary company of another that was previously established with the name La Preparación Textil SA founded on April 30th, 1929. The case of the La Preparación Textil SA company refers to a company of foreign capital (75% of the total capital at the moment of its foundation in 1929) that is not a multinational enterprise because it doesn't have a foreign parent company.

Its partners were Alfredo Tey Marfà (a Spanish trader who had settled in Barcelona), Henri Grebler (a Swiss trader who lived in Barcelona), and Achille Laborge, Pierrer Chavrier and Alberto Poucet (three French manufacturers from the Rhône-Alpes region).

When it was founded, La Preparación Textil SA was a French-Swiss foreign capital company, with a minority participation of local capital. In its original deed, Alfredo Tey and Henri Grebler each had a fourth of the shares, whereas the other shareholders had a smaller stake, but altogether they controlled 50% of the company. The first two founding partners had had previous businesses in Barcelona during the 1920s. On the one hand, since 1920, Alfredo Tey Marfà had a silk yarn factory, which explains why this local partner was already familiar with some aspects of the initial activity to be carried out by the company. On the other hand, Henri Grebler and his brother Albert, who had Swiss citizenship, had been working as representatives of several companies since 1921. In 1922 they were deported from France for having carried out commercial operations with the enemy during the First World War, and settled in Barcelona in August 1923. Since 1924, Henri Grebler appears as living in Barcelona and devoting

himself alone to the production of writing materials, another of his main fields of activity.¹

The role of the French partners in La Preparación Textil SA was nevertheless very important. In the setup of the first company's board of management, the French partners were clearly interested in ensuring their participation in the business management, for it was established that, as long as there were French partners in the company, two of its four managers had to be French.

The initial registered capital stock was 150,000 pesetas. One year later, the capital had increased to 350,000 pesetas, and in 1931 the company bylaws were modified. Initial manufacturing was located in Badalona, an industrial city near Barcelona; in 1932 it already had 350 employees.² Factories were to be enlarged later on in other towns such as Premià de Mar, Ripoll and Sallent.

In the partnership deed it was established that the aim was to be the preparation of silk thread for weaving, as well as any other textile processing that the management board considered convenient.³ The activity carried out by the company in the field of publicity and advertising in 1931 was more explicit; it introduced itself as: "it is the most important factory of artificial silk twists in Spain, specialised in artificial crapes, voiles, sizing and tinting (for temporary coloration).⁴ Documentation proves that in 1935 the Badalona factory was devoted to the import of rayon and the artificial silk fibres were twisted at the factory for posterior weaving.⁵

The industry of artificial silk was meant to be an emblematic example of chemical contribution to the broadening of the supply of artificial raw materials, which

¹ Enrique Grebler supported the construction of the new factory in Sarrià de Ter of the Torras Hostench company; Juan Torras Hostench was the president of the Management Board of La Preparación Textil SA in 1948, and in 1970 Grebler presided over the Fundación Torras Hostench (Gutiérrez; 2006:295-301 and *Anuario Financiero y de las Sociedades Anónimas 1948-1949*). The relationship between both businessmen began in 1940, when Henri Grebler registered the brand Enri and used its headings; this trademark was to become one of the most popular ones in manufacturing metal spiral notebooks. Later on, the Enri brand was to be divested to the Torras company, in which Grebler participated as a partner (Trademark nr 0121316). See BOPI

²An announcement of a workers' dispute in La Preparación Textil SA in Badalona provides the number of workers. ABC (23/1/1932), p. 21.

³ Simple copy of the deed of La Preparación Textil S.A. CIF A08021008. Registre Mercantil de Barcelona.

⁴ *Industria Textil*, Barcelona, 5/1931, nº 5, p. 62.

⁵ *Guía General de Cataluña Bailly-Baillère-Riera*, Barcelona, different years.

complemented and/or replaced some natural fibres, with better price, quality and uniformity in the fibres (Puig; 2002:127). This innovation, which was characteristic of the Second Industrial Revolution, meant a true impulse for the textile industry for it enabled new production possibilities for the textile cluster, a consolidated industrial sector that was diversifying.⁶

The main innovations and patents of manufacturing were carried out at the end of the 19th century and the beginning of the 20th, although they were not commercially exploited until the first third of the 20th. Three corporate manufacturing groups were hegemonic in this field: the English company Courtlands, the Comptoir of the French group Gillet-Bernheim and the Dutch Algemene Kunstzijde Uni (AKU). These last two corporate groups, with Catalan capital injection, were to catalyse the pioneering endeavours of rayon production in Spain during the 1920s: SAFA (1923), which began manufacturing in the factory in Blanes three years later, and La Seda de Barcelona (1925), located in El Prat de Llobregat. Both companies were to play a key role in textile rayon in Spain until the Spanish Civil War (Puig; 2002:12).

The location of such initiatives was developed within the framework of the Catalan textile macro-district, which in 1936 concentrated more than 75% of Spanish textile manufacturing. The evolution of textile rayon manufacturing was spectacular: between 1927-28 and 1934-35, the production of textile rayon quadrupled. Therefore, autochthonous production made it possible to reduce the need for imports.

The collectivisation of the factory during the Spanish Civil War meant Henri Grebler had to seek the intermediation of the Swiss Consulate in Barcelona to protect his interests. There is evidence that in 1938 Henri Grebler had increased his stake in the company to a third of the total capital and was still associated with the French partners Pierre Chavier and Albert Poncet in La Preparación Textil SA. Grebler thus became the main shareholder of the company, which most probably was the reason why the Banco de España rated La Preparación Textil as a Swiss company (Tortella, 2008:80). At the end of the Civil War, La Preparación Textil SA, which had been collectivised during the conflict, was given back to its owners, but, in order to adjust to the new directions of the Francoist dictatorial regime, which was against foreign investment, appointed Spanish businessmen (Juan Torras Hostench) and military men (Jorge

⁶ Without the rayon fibre, the emergence of fine hosiery in Spain in the 1920s would not have been possible (Llonch; 2007:107-108).

Aused Saila, retired infantry captain) to important positions in the presidency and management of the company during the 1940s. During the autocratic period of the Franco regime, importation difficulties hindered the dynamics of industrial production and most probably were the cause for the change of company specialisation from artificial fibre to cotton textile production.

Figure 1. Strategies and factories of La Preparación Textil SA (1929-2005)

A) Strategy of vertical integration of the textile cycle (1929-1970)

Factories:

- 1929 - 1976 Badalona (tasks related to spinning preparation or weaving))
- 1930s-2005 Ripoll (fibres and cotton et al spinning)
- 1933-1964 Premià de Mar (Estampados y Aplicaciones Lyon-Barcelona SA) (textile-finishing: printing)
- 1943-1969 Premià de Mar (Sederías Ibéricas) (weaving)
- 1947-1970 Sallent (weaving production)

B) Vertical disintegration and specialisation in cotton and blends spinning (1970-2005) at the Ripoll factory

Source: The authors

From the beginning of La Preparación Textil SA in Badalona, the company experienced the major labour conflicts that were so typical of large industrial cities, which probably influenced the setup of some later facilities of the company in other small towns located far from the tense climate of the urban workers' movement. In 1933, the Lyon Barcelona printing factory was set up in Premià de Mar, and two years later Henri Grebler bought some premises in Ripoll for the manufacturing of cotton spinning and yarns. In 1941 he established a section of fabrics on premises annexed to the factory in Premià de Mar. Later on, he opened new facilities in Sallent devoted to cotton weaving. It is worth highlighting that each factory kept its own particular field of production. The last ones to be closed were those in Ripoll in 2005.

Lyon Barcelona (1933-1981)

Since the foundation of La Preparación Textil SA, there was an attempt to organise the manufacturing of the vertical cycle by including the combined textile cycle, from spinning (in the factories in Badalona and Ripoll) to woven fabric (in the factories in

Sallent and Premià de Mar) and textile-finishing (in Premià de Mar). In relation to the Badalona factory, the other sites were located within a radius of between 15 and 100 km, the coastal factory in Premià de Mar being the closest and the one in Ripoll, on the periphery, being the furthest, while the Sallent factory was located in inland Catalonia at a distance of 80 km from Badalona.

In 1933, Estampados y Aplicaciones Lyon Barcelona SA started to operate in Premià de Mar. The location of the factory was more of an accident than what we might imagine, for originally it was located in Sant Celoni (Barcelona), but when its establishment was already at an advanced stage, La Preparación Textil SA accepted the purchase offer of an entrepreneur from Barcelona specialised in silk finishes and dyeing, Josep Pamiàs. The common element of both locations was the easy access to high-quality water. The founding of Estampados y Aplicaciones Lyon Barcelona SA in Premià de Mar was the result of the purchase of some already-existing premises (the Puiggrós factory), of the presence of an aquifer of high-quality water, indispensable for printing, and of the optimal communication that its location offered.

Regarding textile-finishing, his aim was to introduce serigraphic printing, a technique that was growing in the French area of Lyon, more specifically around the town of Bourgoin-Jailleu (most curiously, in the same place in which Pierre Chavier, one of the founding partners of La Preparación Textil SA, was born). In Bourgoin, Grebler was also supported by another Jewish businessman who knew and was applying this new printing technique in his factories, Jean Badoy, with whom since 1931 he was to strengthen his business relationship.

The three main actors: Grebler, Badoy and Piera

According to the interview with the manager's son, the three agents that started the Lyon Barcelona project were: the entrepreneur who had the initiative, guessed its economic potential (Henri Grebler), the experienced technician in serigraphy that worked at the latter's factory in Lyon, who, in addition to contributing the patent, taught the basics of this technique to the staff that was to apply it at the company established in Premià de Mar (the Lyon-born Frenchman Jean Badoy), and the manager (Roman Piera), who was to become its exclusive entrepreneur from 1964 onwards.

Henri Grebler Weissmann was born in Kolomy in 1896. He was the second child of a family whose head was a Polish businessman of Jewish origins. The family emigrated to Switzerland in 1903 and obtained Swiss citizenship in 1911 in Geneva. A large part

of the family ended up settling in La Chaux-de-Fonds, a French-speaking canton where a very important clock and watch industry was developed⁷. But the brothers Albert and Henri decided to work beyond the Swiss borders from the very beginning and moved to the neighbouring Rhône-Alpes region in France, where they established strong industrial relationships. Fate made them take different paths: Henri settled in Barcelona, whereas Albert Grebler was to settle in another place that since 1925 was an international zone, the city of Tangier, another city with a sizeable Jewish community.

But the business relationships of Henri Grebler with traders and manufacturers of the Rhône-Alpes region were strong, which made it possible in 1929 for him to gain the support of three manufacturers from this French region in order to found together La Preparación Textil SA in 1929. The relationships with French manufacturers were to continue to be fruitful later on. His position in La Preparación Textil SA grew, and in 1936 Grebler was already in possession of a third of the share capital of the company. In 1952 he owned factories that provided work for more than 3,000 workers, and he was one of the leading political figures of the time.⁸ Grebler proved to be a smart businessman, who weaved a thick network of companies in several manufacturing areas, such as the textile industry, the paper industry and metal production, among others.

Grebler's relationship with Badoy was established through his partner in La Preparación Textil SA, Pierre Chavrier —also born in Lyon— during Grebler's stay in the Rhône-Alps region during the First World War. Be that as it may, it is a well-known fact that he and Badoy had the Jewish religion in common. Grebler and Badoy's religious identity possibly helped to strengthen the bonds of trust and socialization, on the basis of which their business networks would eventually be forged.

Jean Badoy was a businessman who owned a textile printing factory in Lyon, Établissements de J. Badoy, a limited liability company, where he was applying the new printing technique of serigraphy. Jean Badoy was more than anything else a technologist, as clearly shown by the fact that he registered a patent for his printing method based on screen printing.

⁷ Mireille, Henri's younger sister, was the director of the watch company Cauny Watch, founded in 1927.

⁸ Archives Fédérales Suisses. History Service of Swiss DFAE.

The third main figure, Roman Piera Arcal, had grown up and trained in a textile environment. His father, Domingo Piera Estefa, a textile designer, had pursued most of his career as a businessman in the Mexican factory of El Salto in Guadalajara. After the 1910 Mexican Revolution, he returned with his family to Barcelona where he started to work for the most important textile company in Spain, La España Industrial. Most likely, the origins of the relationship between Henri Grebler and Roman Piera may be found in the environment of the qualified staff of La España Industrial (which included a renowned printing section).

Around 1931, the contact between Jean Badoy, Henri Grebler and Roman Piera gained momentum. The young Roman Piera Arcal and his closest staff went to the factory in Lyon in order to get to know the new printing technique—that was very much used in the silk industry in Lyon—before establishing the factory in Premià de Mar. The personal relationship between Jean Badoy and Roman Piera Arcal was always very good, as can be seen in the correspondence analysed, until the French technologist's death in 1950.

From the very beginning of Lyon Barcelona, in October 1933, Roman Piera acted as the factory director, was a shareholder of La Preparación Textil SA and worked as the attorney and legal representative of La Preparación in this factory. The relationship between both companies was very strong, for the printing company supplied and carried out the sizing of the fabrics manufactured in the different facilities of La Preparación Textil SA.

In 1964, the company underwent an important change of ownership, for its manager and legal representative and attorney, Ramon Piera Arcal, became its owner thanks to the purchase of the company's shares that from then onwards was established with the name Lyon Barcelona SA until its shutdown in 1981.

The establishment of a pioneering screen printing factory in Premià de Mar at the beginning of the 1930s was not without difficulties. Lyon screen printing entailed the introduction of a new technique of transmitting the dye to the fabric by means of screen printing; the specific characteristic of this is that, initially, the material used for these screens was silk fabric. The most complex stage of the new technique was the production of the screen printing moulds, which led the company to set up three sections for drawing, carpentry and mould production. The factory premises were a true laboratory for the training of its staff and for the transfer of knowledge in the

production of moulds in a specific town, Premià de Mar, thus generating a new and highly concentrated industrial specialisation there.

4. Textile printing production in Catalonia around 1933

Catalonia was considered the *factory of Spain* during the first third of the 20th century. In 1933, the Catalan economy was mostly industrial with a clear predominance of the textile sector until 1950. The concentration of the textile industrial activity in Catalonia was very important for the whole of Spain, for in 1931, 93.57% of the cotton spindles, 85.98% of cotton mechanic looms, 74.75% of wool spindles, 81.31% of wool mechanic looms, and 74.39% of the knitted fabrics were located there (Nadal, Benaul, Sudrià, 2003). But it was also very important on a European scale.

Table 1. Total production per capita of cotton yarn, 1910 (in metric tons and kilograms per capita).

	Production	Production per capita
Catalonia	57,682	27,73
Switzerland	21,139	5,65
Belgium	39,698	5,34
Holland	19,200	3,25
Sweden	15,980	2,91
Portugal	14,940	2,51

Source: Maluquer, 2004:20, based on the data contributed by Asséo, 1989.

The high textile production in Catalonia made several specialisation areas possible: the cotton industry was established in a broad area that ranged from the banks of the rivers Ter and Llobregat, according to the model of the industrial colonies, to an area surrounding Barcelona; the wool industry located in the industrial district of Sabadell-Terrassa, in the Vallès region; the district of knitted fabrics in the Maresme region; and the silk industry in the city of Barcelona. The sector of finishing (dyeing, stiffening and finishes) had been strongly established in the seaside area of Poblenou in the city of Barcelona since the end of the 18th century.

The industry had an entrepreneurial structure that included many small and medium-sized specialised companies, but with a more reduced number of companies that would vertically integrate all the textile production cycle. Since the 1920s, the Catalan textile sector was undergoing some processes of vertical integration (Unión Industrial Algodonera SA) and the transformation of a growing number of larger companies into joint stock companies.

Since the 19th century, the Catalan textile industry had been modernised mostly based on the adaptation of foreign technology, but also on local technology. The most important Catalan innovation was the introduction of the high-draft cotton-spinning system by Ferran Casablancas in 1912. Foreign textile technology in Catalonia arrived through industrial espionage with the arrival of foreign technicians, machinery import, and, in a few cases, through direct foreign investment and the settlement there of foreign entrepreneurs. Despite the fact that foreign investment in the Catalan textile sector was scarce, during the contemporary period it began to appear in some specific textile production activities, such as the introduction of worsted spinning in the wool industry since 1891, in textile bleaching and in some printing techniques, but, more than anything else, in the field of artificial fibres that depended completely on technology.

The printing process is part of the last stage of the textile production process that belongs to what is known as the wet processing sector ("*ram de l'aigua*", in Catalan) (dyeing, finishing and stiffening), being by definition an auxiliary sector depending on the dynamics of textile production. In the mid-20th century, this Spanish sector was still clearly showing a very high concentration of production in Catalonia, and, more precisely, around Barcelona, where most of the human capital and specialised technicians working in this sector were men. Still in 1952, 82.5% of the factories of the textile-finishing sector in Spain were located in Catalonia, and most particularly in the Province of Barcelona. From 1952 to 1976, the finishing companies tended to specialise and locate their premises increasingly closer to each specific textile sector, as had happened with the factories that built textile machinery, so that the different Catalan textile districts were consolidating their specialisations.

5. Technological contribution: the introduction of screen printing

Printing is a complex process (art, chemistry and technology take part in it), which can be carried out on different media (fabric, paper, ceramics, among others) and that makes it easier to differentiate the final product. Fabric printing is a production activity

that involves “migrating or transferring a drawing, with pigments or colorants, by using a mould or a roller” on an already-woven piece of cloth.

Together with bleaching and tinting, printing is another step in the final stage of the textile production process, which is noted for contributing high added value to the final product (Nadal; 1991:34-35). Given the fact that it is an auxiliary and determinant stage in the textile production process, it is located around textile-manufacturing industrial areas. Printing can be integrated or not integrated into the textile company. It may also be established in not too large vertical-cycle textile companies, or it can even be located in standalone companies specialised in finishing.

Textile printing requires prior preparation of the woven fabric once it has been bleached. Another basic requisite for printing is a design or drawing, the colours to be used and the printing of the drawing on the printing moulds (one for each colour of the drawing to be reproduced). Engraving includes one of the most important stages in the printing process: the adjustment of the drawing to the dimensions of the rapport. Finally, the printing technique that is most suitable for each case is applied.

In the early 19th century, printing in Catalonia combined manual and mechanical systems, the latter being the ones that were adopted by the major textile companies. Through the 19th century, different printing techniques were used, which varied depending on the type of drawing and the fabric: printing moulds and printing rollers, although mechanisation originated in the latter.⁹ Mechanical printing arrived in Catalonia during the second third of the 19th century by adopting steam energy as the source of industrial energy. The mechanisation of printing was to modify some key factors in the localisation of this industrial activity, giving priority –in addition to significant water requirements– to coal availability. This is the reason why the water cluster showed, since 1861, preference for a special Catalan location close to the Harbour of Barcelona, in Sant Martí de Provençals, an independent population centre aggregated to the city of Barcelona in 1897 (Nadal; Tafunell; 1992:69-73).

Screen printing originated in Antiquity with the use of printing by means of stencils in Japan, most probably at the end of the 18th century. This technique was used in detailed drawings by using paintbrushes. As regards printing on fabric, we may find

⁹ For the improvements of textile printing in Catalonia see Sánchez (2013), Cabana (1992:26) and Nadal and Tafunell (1992:69-73)

antecedents in the batik manufacturers in the United States.¹⁰ According to Lengwiller, screen printing, despite not being a European invention, arrived on the continent from the United States after the First World War, and was developed in Germany and France (Lengwiller, 2013:438).

Textile serigraphy was the method that made it possible for the silk industry to print new designs. “According to research carried out by a writer for *CIBA Review*, the first stencil prints which make the change-over to silk gauze, or, in other words, to a continuous form of support, were made in 1850 in Lyon. Only very small quantities of each design were made. In 1870 screen prints began to appear in Switzerland and Germany, but none of them was any more than experimental.” (Storey; 1992: 114)

During the second half of the 19th century, in Lyon, printers used this method to print fabrics on screens of very finely woven silk. This was not by chance, for the Lyon area was the second largest textile region in France and it had specialised in the French silk industry since the 16th century. During the 19th century, Lyon’s silk industry increasingly developed around the clothing industry, closely linked to French fashion. The high added value of the silk fabric complemented the finishing that incorporated differentiated printings that provided design and fashion. In addition, from the last third of the 19th century, the industrial region of Rhône-Alpes also developed a strong chemical industry that was to introduce new artificial colorants from German and Swiss chemistry, which increased the availability of colorants.

In fact, serigraphy developed together with the introduction of new chemical materials – artificial fibres such as rayon and viscose–, as well as the supply of artificial colorants, which made it possible to give versatility to the printing process and enlarge the production and creative possibilities of the fashion industry.

In addition to being a more versatile technique, it was also cheaper. “This method entailed a good balance between economy and flexibility for the fashion market, which could not always prove the cost of the preparation of the engraved rollers for fashions that were becoming increasingly ephemeral.” (Marshall, 2005:51) That is to say, the key factors that serigraphy incorporated were that the cost of engraving was much lower than printing using rollers, it adjusted well to the different scales of the printing

¹⁰ In paper format, serigraphy disseminated during the inter-war years in the United States in order to meet the new manufacturing needs of the production of large advertising posters.

production and to the different dimensions of the fabrics and textures, it speeded up the production process and it achieved higher quality printing. Printing was no longer limited to the dimensions of the stamps or to the diameter of the rollers. It was then already possible to print large-size designs in different textures and effects. "From this time onwards, the advantages of screen printing became increasingly appreciated, especially in fashion houses. Designs are relatively easy to transfer to screens and the frame size can be readily varied. This provided a greater freedom for the designer to choose and repeat sizes, compared with the restrictions of copper rollers. In addition, the pressure applied in screen printing is much lower than in roller printing with the result that surface prints with an improved 'bloom' or colour strength are obtained. For the same reason, textured surfaces are not crushed." (Hawkyard; 1981:30)

"Screen printing also offered some advantages compared to mould printing. Stencils were not any cheaper to make than woodblocks, but screen printing had the advantages of greater flexibility in terms of design and inks, good colour transfer in large-format printing, and cost-effectiveness for short runs" (Lengwiller. 2013:438)

During the 1930s serigraphy spread all over Europe from Lyon, which meant that screen printing was expanding through serigraphy. The competitive context of the 1930s favoured it, for, with this printing system, it was easier to offer new fabric designs, which made it possible for a specific product to be differentiated from the others. This is the reason why it was called *estampación a la lionesa* (Lyon printing). A handmade technique displaced the technical modality, often spontaneously associated with modernity, thus fostering 20th-century printing.¹¹

Initially, the screen printing technique that was introduced to Catalonia was that of flat printing, which consists of printing an image that has been engraved on a mould, made of a screen or a fabric inserted in a wood or iron framework. As Mònica Dòria and Assumpta Danglà explain: "The screen of the framework receives several layers of emulsion that cover its whole surface. Previously, the printer has dissociated the colours of the original drawing that is to be printed, and has prepared one or several acetate clichés with the drawing that he wants to transfer to the mould. Each cliché shows the silhouette of the part of the drawing that corresponds to each mould, and

¹¹ Looking at the revenue office sources, *Contribución Industrial y de Comercio*, this technical change from the roller machine to serigraphy is very poorly registered, since manufacturers began paying by printing benches instead of making it as they did previously depending on the machinery. This might explain the paradoxical evolution of printing machinery in Sant Martí de Provençals over the first third of the 20th century, as observed by Nadal and Tafunell (1992:144).

each cliché is fixed on the corresponding screen and goes through an insolation process. The screen will keep the insolated parts, now already solidified, and will lose, by means of a water bath, that layer of the emulsion that has been covered by the cliché...” (Dòria; Sanglà; 2006:403) Each mould is placed on a piece of fabric spread on the table, and, by using a blade, the colorant is spread, applying pressure so that the colorant soaks through the screen. The operation is repeated with each mould until the printed drawing is completed.

Later on, the principle of colour transfer to fabrics through the screen was to be applied with more productive machines from the second half of the 20th century, thus achieving greater production performance. Flat screen printing was handmade until the flat screen printing machine was invented in 1954. During the 1960s, two important innovations were made: the automatic scraper and the rotational serigraphic machine (1963). Both innovations had already been introduced to Catalan printing companies since the 1960s, while transfer machines were slowly appearing. Mechanisation consolidated screen printing as the predominating textile printing method, thus allowing for the great dissemination undergone by screen printing for all types of fabric and textures from the 1960s on possible. By the end of the 20th century, the printing process was simplified by means of computer digitalisation, which has allowed printers to shorten again the time employed in printing production (Canals; Dòria; Fernández; 2009:10-17).

6. Lyon Barcelona, a talent building factory

The case of Lyon Barcelona shows how a new technique imported thanks to foreign capital and technology generates local talent and may create a cluster specialised in the manufacturing of printing moulds. The contrast between Lyon Barcelona and the company Pamiás located in Sant Celoni is very clear. José Pamiás, a printer that was already in operation in Barcelona, introduced Lyon printing to Sant Celoni in 1934 thanks to the arrival of a colour technologist from Lyon, Charles Metras, the son of a family of engineers specialised in the silk textile sector in Lyon. The Pamiás company lasted longer than Lyon Barcelona, but unlike the latter, it neither produced the same knowledge spillover effects, nor did it create local industrial specialisation.

The introduction of serigraphy to Catalonia began in 1931 with the invention patent number 122,214 granted in Spain in favour of the Lyonnais printer Jean Badoy for “Mejoras en el material que sirve para la aplicación o para la impresión sobre los

tejidos, por medio de placas o modelos perforados” (Improvements in the material used for the application or the printing on fabrics by means of plates or perforated models.” (BOPI) It was precisely at the company that Badoy owned close to Lyon (in Bourgoin-Jailleu) where high-quality printing was being carried out; initially, the training of the Lyon Barcelona staff began there. The knowledge learned through this training was to become very important in setting up the company in Premià de Mar. However, the contacts between Jean Badoy and Lyon Barcelona –thanks to Roman Piera Arcal– remained close and frequent until the death of the Lyonnais printer in 1950.¹²

If we take a look at the initial staff that worked at Lyon Barcelona since October 1933, we may see that some fundamental figures that played a key role in the consolidation of the company stand out. Roman Piera Arcal was its driving force throughout its life. After being attorney-in-fact at La Preparación Textil in 1933, he was to become its entrepreneur and manager in 1964.¹³¹⁴ Another fundamental figure with a more technical profile was Jordi Sancho Roca, a draughtsman and engraver from Barcelona; some documents prove that he was trained in France with Badoy when he was only 19 years old. His position in the company (from October 1933 until May 1950) and his high salary confirm his professional profile, which was to become determinant in the introduction of the new technique of serigraphy. The third professional figure is Ramon Izquierdo Penedés, born in Valencia, an experienced printer who was in charge of the printing section. The core of the original team worked together until the consolidation of the company in 1950, after some initial weak and uncertain steps that were abruptly cut by the Spanish Civil War, once production was normalised again and the harsh post-war situation was left behind.

The initial personnel included very young people (the average age was 20) who joined the company between October 31, 1933, and May 11, 1935, therefore, with great learning capacity. The first employees hired by Estampados y Aplicaciones Lyon Barcelona SA included 30 male workers and 20 female workers. Men performed several tasks, whereas women mostly helped in the printing and storing ones. The best-qualified staff came from Barcelona, but most employees lived in Premià de Mar.

¹² Since 1943, Sederías Ibéricas was integrated into the same factory of Lyon Barcelona in Premià de Mar with 100 looms. Until 1969 it supplied the fabrics needed by the printing company (Amat; 2001:23).

¹³ The fact that when the factory was collectivised during the Spanish Civil War his position as director was respected is good proof of his professional and personal competence (Amat; 2001:200).

¹⁴ During the 1950s, La Preparación Textil closed its fabric factories, sold the printing company in Premià de Mar and focused its activity on the spinning preparation at the factory in Ripoll, where the company continued to manufacture its products until 2004. In 2014, La Preparación Textil SA is under liquidation.

Family bonds were frequent among the company's staff, as happened with several couples.¹⁵

The registers of the beginning and termination of contracts show that professional mobility was very high, most particularly since the 1950s.¹⁶ The grounds given for voluntary departure include a variety of reasons depending on gender. Among women, marrying or giving birth was the most common reason, which entailed giving up their jobs or becoming housewives. Conversely, among men, we may discover great mobility towards other printing companies in Catalonia or towards becoming self-employed, most particularly from the 1950s on.

In 1967, the personnel of the Lyon Barcelona SA already comprised 300 employees working at about 50 printing tables. Only 10% of the personnel working in 1935 remained. The impact of the Civil War affected this high level of mobility, given the considerable loss of qualified personnel that this supposed. Staff mobility and turnover had become widespread; as a result, it was necessary to hire new workers from other areas of Spain.

A first approach to the new companies established in the field of printing in Premià de Mar tells us that in the registers of industrial taxes from 1953, two printer-engravers appear (Salvador Cisa and Josep Estrada), both former employees of the company Lyon Barcelona where they had been working since its foundation until they became self-employed. Salvador Cisa Gallofré joined the company in January 1934 and was to remain there for nine years working as an assistant to the drawing-engraving section. Josep Estrada Almorín had worked as a printer there since 1934.

“After these two cases, each printing workshop created its own engraving until it began to grow.” (Hermínia Miralles, draughtswoman)

In 1960, the number of engravers in Premià de Mar had grown and included nine new printing companies (Maria Sardà Roca, Cristobal Ferrer Ferrà, Carmen Luezas Cubero, Pedro Martínez Girona, Laura Miralles Jimeno, Juan Navarro Siscart, Gustavo

¹⁵ Museu de l'Estampació de Premià de Mar. Fons Lyon Barcelona. *Libro de Registro de Productores nº1. Estampados y Aplicaciones Lyon Barcelona SA. Premià de Mar*, which embraces the 31-10/1933-31/12/1954 period.

¹⁶ Museu de l'Estampació de Premià de Mar. Fons Lyon Barcelona. *Ministerio de Trabajo, Sanidad y Previsión. Inspección del Trabajo. Registro de Personal de Estampados y Aplicaciones Lyon Barcelona*, which includes the 31/10/1933-5/12/1955 period.

Paradell Civantos, Mariano Puighermanal Devesa and José Rovira Brull); most of them had been previously –directly or indirectly– linked to Lyon Barcelona.

Table 2. Textile industrial activity in Premià de Mar in 1972

TEXTILE PROCESS	COMPANY
YARNS	HILADOS TEJIDOS SERRA OLLÉ SA JUAN ESPIN CATLLA
FABRICS	TAKER SA SAMPERE SA
KNITTED FABRICS	JUAN BORRELL ANTONIO FERNÁNDEZ,
SHEARING	BALDOMERO OLIVA JORGE FERNÁNDEZ
YARN BLEACHING	BLANQUEO TEXTILES SA
YARN STARCHING	JUANA ESPIN
FABRIC PRINTING	ANTONIA AGUILÓ BENJAMÍN CAMACHO LORENZO CASTELLANO M. TERESA CERREDELO PEDRO GONZÁLEZ LYON BARCELONA SA ALEJANDRO MIRALLES GUSTAVO PARADELL
ROLLER ENGRAVER PRINTING MOULDS	JAIME MELCHOR JAIME PARRA JAIME DURAN JAIME ESTIVILL ROBERTO ESTRADA DIEGO GIL SANTIAGO MANENT JUAN MARTINEZ JUAN NAVARRO, MARIA PUIGHERMANAL FRANCISCO TUDELA

Source: Arxiu Municipal de Premià de Mar. *Padró Industrial* (Industrial Census), 1972.

Thanks to tax data, we have been able to understand the industrial structure of Premià de Mar in 1972.¹⁷ In the table 2, we may observe the textile specialisation in Premià de Mar related to printing, and, especially, to the preparatory tasks of engraving, which started to be carried out by elaborating moulds with flat serigraphy (already

¹⁷ Arxiu Municipal de Premià de Mar. Industrial tax data from several years and fiscal tax from 1972.

mechanical), and, from the 1960s on, based on engraving by means of rollers applied to the serigraphy of the rotational machine.

We should remember that in the serigraphy technique printing required a whole series of very specialised production activities that involved the artist or designer that carried out the original design or drawing, the draughtsperson that made the report of the drawing, the draughtsperson that carried out the decomposition of the drawing by colours, the engraver that carried out the moulds, the carpenter or smith that manufactured the moulds, and, finally, the printer who introduced the colorants to the fabric through the moulds. The engraving process (from the original drawing to the mould ready to be printed) included a whole series of specific tasks of this printing technique that had to be located close to the printing factory.

Learning these tasks could be done through formal training, in schools of vocational training, or in an informal one, within the context of the workplace. Given the fact that the curricula were not incorporating new techniques over the post-war years, the former option was impossible. What we would like to highlight is that Lyon Barcelona was not only leading the way for serigraphy in Catalonia; its contribution went far beyond it. The company trained many experts in the difficult technique of printing; a true reproduction of the printed design required many good skills, precise knowledge and much experience. We should mention the draughtspersons that carried out the design report, the designers who drew on different media (paper, glass, polyester, etc.), the people who made the clichés, the engravers of the moulds, the carpenters that carried out the wood frames (that were to be made of metal later on), the specialists who covered the frames with the cloth, and, finally, the printers who also required technical and chemical knowledge. Many specialised technicians trained at Lyon Barcelona, some of which ended up being self-employed outside the company; many of them remained in Premià de Mar. Some of these new companies continued to work for Lyon Barcelona, so the company did not prevent the departure of skilled workers, as it could call upon them if special circumstances so required or during the recurrent peaks in seasonal production. Most of them had their own independent customer base. This meant that their technical skills were complemented by the management and entrepreneurship skills of the new companies.

An important part of the production activity of the companies, workshops and the work done in printing has not always appeared in the official records. At the end of the 20th century, the Premià de Mar Printing Museum made an effort to document the setup of

at least 45 engraving workshops.¹⁸ If we take into account that, for each engraving, at least 12-15 draughtspersons were needed, the extreme concentration of this industrial design and production of printing moulds in this town in the Maresme area of the Province of Barcelona stands out, and even more so if we take into consideration its small demographic dimensions.

It is more difficult to find written documents proving the work carried out by the draughtspersons who worked at engraving workshops and/or at home, an option chosen by many women. The high skills of these male and female workers were well known; the work followed a strict hierarchy and was paid according to the workers' skills. The women that carried out the drawings and that have been interviewed explain that they used to take work home, for it required very little infrastructure (a table with a light from below, which was called a *caiman*). It was not so rare to work at the workshop and at home, keeping the simplest tasks to be done at home. From the 1970s onwards, the work done at home and paid according to a fixed rate began to be regularised and ended up being paid with a daily wage by the factory.¹⁹ To a great extent, the whole series of these activities led to seasonal work (summer and winter), under pressure, stressful and very intensive.

Industrial life in Premià de Mar in the second third of the 20th century turned around printing, "to print metres and metres of fabric, for orders came in great numbers and were urgent, and all the people in Premià made their living and worked from this industry, which contributed and followed the trends of fashion in clothes and home decoration in our country." (Llanas; 1984)²⁰ "In Premià, people said that each home had its engraving workshop. One could walk along the streets and see the moulds..., exposed to the sun, drying out, in every street one could see the moulds. Many tee-shirts and silk products were made..." (Hermínia Miralles) The printing and mould

¹⁸ Companies and workshops that were operating in Premià de Mar between 1953-1997: Gravats Cisa, Gravats Puighermanal, Gravats Palau Duran, Gravats Farré, Gravats Botella, Gravats Botella Gómez, Gravats Reunits, Gravats Martínez, Gravats Estivill, Gravats Juman, Gravats Manent, Gravats Sierra, Gravats Ansó, Gravats Samper, Gravats Gravimarc, Gravats Gravomars, Gravats Silvio, Gravats Fergrab, Gravats Macsa, Gravats Robert, Gravats Vallès, Gravats Gironès, Gravats Escumar, Gravats Rotomarc, Gravats Lyonestyl, Gravats Gravastil, Gravats Marta, Gravats Emsa, Gravats Artigas, Gravats Gilbe, Gravats Amsi, Gravats Maresma, Gravats Navarro, Gravats Palacios, Gravats Dot, Gravats Fermín, Gravats 2000, Gravats Mateu, Gravats Petit Marc, Gravats Redondo, Gravats Estadies, Josep Estrada, Gravats Unió, Gravats Printel and Gravats Alcalà. Museu de l'Estampació de Premià de Mar. *Catàleg de l'Exposició de Llorenç de la Varga i la construcció de motllos per estampar* (around 1997).

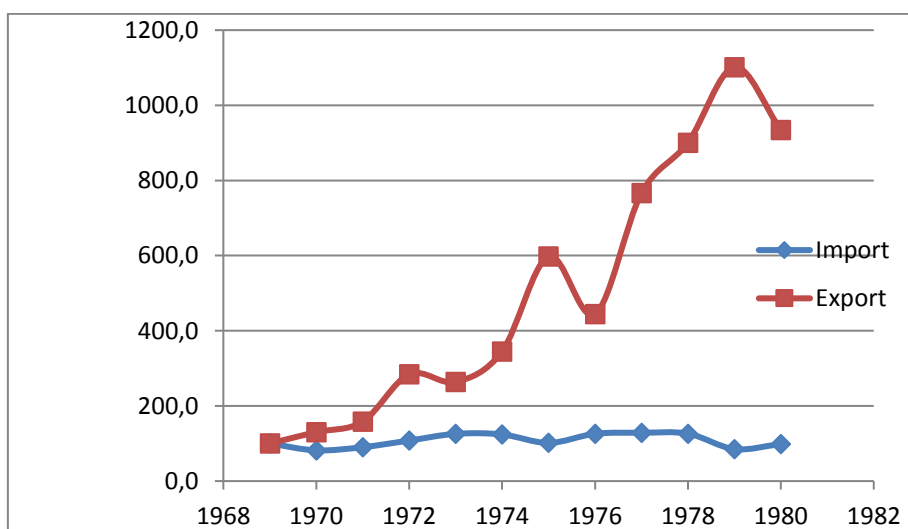
¹⁹ Interviews with Hermínia Mallorquí and Margarita Garreta.

²⁰ Joan Gómez's private archive, folder nr 1984, typewritten text by Joan Llanas, "Estampació premiarenca".

engraving activity continued to be carried out after Lyon Barcelona was shut down in 1981.

In this regard, the Lyon Barcelona company was a key point in the development of local entrepreneurship and talent. The quality level achieved by these companies was quite remarkable, and was even acknowledged by other Catalan companies working in this field and also outside of Spain. Its skilfulness and competency not only served the whole Spanish textile market but also many orders coming from abroad.²¹ In effect, we have been able to verify that the quality of the work done at the workshops of mould manufacturing in Premià de Mar was well-known in Europe. The evolution of the foreign trade of printing engraved rollers clearly shows a great expansion. The preferential markets of these goods were the Federal Republic of Germany and France.

Figure 1. Foreign trade of engraved rollers for printing machines. Spain, 1969-1980 (in constant pesetas) (1968=base 100).



Source: *Estadística de Comercio Exterior de España and Maluquer de Motes (2005)*.

On the one hand, new entrepreneurs appeared that knew the technique and that, within the context of increasing supply, created their own companies. On the other, the introduction of serigraphy provided labour and trained many workers that specialised in Lyon printing, and, especially, in the production of moulds for serigraphy, which made it possible to consolidate the specialisation of the printing industry in Premià de Mar, in

²¹ According to Margarita Garreta, rollers were engraved for Germany. She also remembers that Joan Rafegas, from Industrial Sedera, opened up the Asian market: photocopied stencils sent there to be engraved and printed.

the knitted fabrics district of Maresme and in the large Catalan textile district given the total lack of formal, official training.

From the 1990s on, the digitalisation of printing simplified the preparatory tasks of serigraphy. Based on an elementary process of the technique of analogical photography, digitalisation became simple by using scanners. Despite the improvements undergone in the price and speed that this change entailed, handmade engraving still continued to provide better quality and accuracy in printing.

7. Conclusions

The founding of Lyon Barcelona was part of a business strategy of vertical integration that began with the founding of La Preparación Textil SA in 1929, initially devoted to the twine of artificial silk. This process continued with the setting up of a new textile factory in Ripoll, Premià de Mar and Sallent. The location of the different factories around the large Catalan textile district favoured agglomeration economies, for there was a base of suppliers, manufacturing centres, mechanical workshops and a consolidated auxiliary industry, which made the exchange of factors related to production and goods possible. The context for these business relationships also fostered an optimal concurrency and collaboration framework among textile companies. The economies that were external to the company but internal to the industrial district were an essential part of it.

The project of La Preparación Textil SA incorporated two innovative elements: the twine of artificial silk and a new printing technique of the final product: serigraphy. The technical innovation of Lyon Barcelona was initially planned as an internal strategy of the company, for printing allowed it to provide higher added value to its products with a greater differentiation of the fabrics. The new printing system provided better, cheaper and more versatile printed fabrics, and it was better adapted to the latest fashion trends, which required a wider range of textile products, not only in pattern design, but also in a greater variability of the finishing.

Lyon Barcelona was founded around three unique figures: Henri Grebler (entrepreneur and capitalist), Jean Badoy (who provided and conveyed the technical knowledge in serigraphy and trained the Lyon Barcelona staff), and Roman Piera (the local manager and soul of the company throughout its history). The location of the factory in Premià de Mar was due to the availability of high-quality water, the exploitation of previous

industrial textile premises, the textile tradition and the good communication with other production centres.

Aplicaciones i Estampaciones Lyon Barcelona's initial project shows how foreign direct investment was channelled by the figure of the immigrant entrepreneur (a key figure in exploring business opportunities from previous knowledge and exploiting the possibilities of the textiles network around Barcelona. A large part of the business projected by immigrant entrepreneurs was based on prior enterprise networks, which were often related with diaspora-based networks that supported common economic, cultural and religious interests. But the executor, manager and innovator of the Lyon Barcelona project was Roman Piera, who played the decisive role in making the project a reality, and which he knew how to adapt to the socio-economic reality of an industrialised Catalonia. The association between immigrant entrepreneur and local management was one of the key factors behind the success of an innovative project and the bandwagon effects in Premià de Mar.

Seen from a dynamic point of view, the impact of foreign direct investment in talent building is strongly related to the contribution of new technical changes. We often associate technical changes with the application of new machinery and greater economic performance. But a new technical procedure has very important multiplying effects. The application of a new technique requires new training, which introduces a new knowledge that otherwise would not make its application possible, and takes a specific form by introducing new professional skills and hiring new employees. Since we are referring to an innovative procedure, its dissemination leads to a horizon of growth that fosters entrepreneurship and the setting up of new companies in the same field of activity. This, in turn, may give momentum to a concentration of specialised production in a specific location, as long as the economic conditions are good.

The consequences and durability of FDI in local building cannot be dissociated from the contribution brought about by the technical change in the target economy. However, as Borensztein, De Gregorio and Lee have pointed out, this relationship is not automatic and depends on the capacity of the target economy to absorb and transform the technical change into new applied knowledge of high added value. Long before the second globalisation, the conditions of the target economy already shaped the impact brought about by the technical change based on foreign direct investment, which was also complemented with domestic investment. In fact, implementing a new technique in a final stage of the textile process within the framework of a large

specialised industrial agglomeration favoured its quick development and multiplied its disseminating effects and spillovers on the target economy, thus creating a specialised cluster thanks to entrepreneurship.

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- Margarita Garreta (designer at Lyon-Barcelona where she was in charge of the drawing section. Later on, with her husband Antonio Sierra Serena, a printer at Lyon-Barcelona between 1935 and 1950, they became self-employed and established their own engraving workshop: Grabados Sierra). (Interview date: July 2013)
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