

## **From manufacturing to centralized industry: the case of the province of Pisa from the 19<sup>th</sup> to the 20<sup>th</sup> century**

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The aim of this paper is to highlight the particular socioeconomic circumstances in the province of Pisa during the period from the 19<sup>th</sup> century up to the mid 20<sup>th</sup> century. Indeed, over this time period this rather extensive area, which was heavily populated and heterogeneous in terms of morphological and geopedological characteristics, underwent a widespread process of industrialization, whose complexity defies characterization according to traditional models. For quite some time, centralized industry coexisted with widespread artisan production and proto-industry, eventually leading to the formation of industrial districts throughout the province.

Historically, beginning in the 17<sup>th</sup> century the area, which was crisscrossed by active trade routes and navigable waterways, gave rise to an integrated production system, with the city of Pisa acting as its geographic and economic hub, surrounded by a countryside teeming with activity and dotted with small suburban centers of social and commercial exchange.

From the mid-18<sup>th</sup> century up to the early decades of the 20<sup>th</sup>, the synergy between industry and agriculture, governed by sharecropping and thus the wide availability of low-cost labor both within the city and throughout the countryside, came to establish a 'hinterland' where widely varying industrial production activities were carried out.

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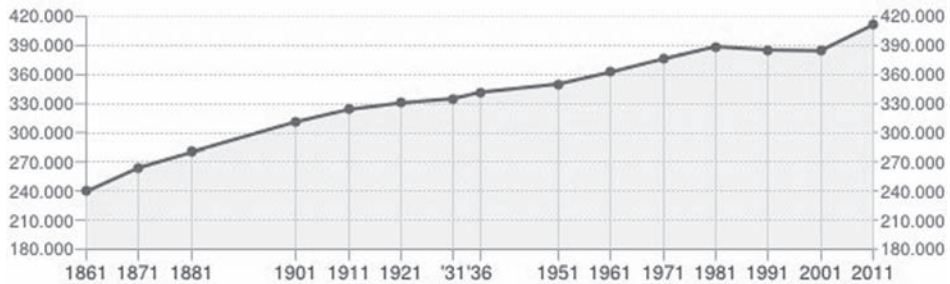


Following the various modifications made to provincial borders over the last two centuries, the Province of Pisa extends for a surface area of about 2500 km<sup>2</sup>, with extremely varied terrain –mountains, hills, lowlands and an extensive coastline– divided into 39 municipalities. In the 1840s construction of the railroad connecting the Tuscan regional capital, Florence, to the port of Livorno provided considerable additional impetus to the development of the province's mix of rural countryside, suburbs and small towns already connected by quite an efficient road system.

As can be seen in the following chart, the population has grown steadily and considerably since 1861, the year of Italy's unification.

### Resident population, census data, from Istat

Actually, the population growth, with a positive natural change, had already begun in the second half of the 18<sup>th</sup> century, when a series of positive factors combined to produce a general improvement in socio-economic conditions.



By the turn of the 20<sup>th</sup> century, therefore, the area already appeared rather industrialized, a fact that scholars of the time were quite aware of. A database (made by C. Torti) compiled by cross-referencing archive and bibliographical documentation gives an account of over two thousand (small and large) factories and confirms historians' assessments: textile mills, watermills, leather crafting, mechanical industries, tiles and ceramics kilns, furniture factories, chemical industries, and many other industrial activities largely associated with agriculture, with which they exchanged and/or shared a seasonal, usually temporary work force.

The first large group of activity is represented by the watermills and oil-presses located on the slopes of the Pisan mountains, where swift-moving, downhill brooks and streams could be exploited to operate the waterwheels for many months of the year. These were mostly small, generally family-run, businesses, which however sold their products not only locally, but were also able to reach foreign markets through overseas shipping from the port of Livorno. The presence of wheat mills in Calci, Montemagno and Buti has been documented as far back as medieval times.

The number of mills and factories grew greatly in modern age, in parallel with the increase in the cultivation of wheat enabled by the extensive land reclamation performed in the 16<sup>th</sup>-century. Construction of the port of Livorno and its increasing importance as a way-station increased flour availability for the manufacture of hardtacks, or ship biscuits ("biscotto"), used for sustenance during navigation. The mills of the Pisan Mountains, which were linked to Livorno by navigable waterways, grew in number and production capacity: in 1698 Calci had 11 presses and 63 mills with 79 millstones, by 1776 the mills were 82 and presses 21. The millstones were fashioned with a local stone called *verrucana*. By 1823, about 20 plants were operating in San Giuliano, 30 in Vicopisano, 50 in Buti and over 70 in Calci, all experiencing considerable growth.

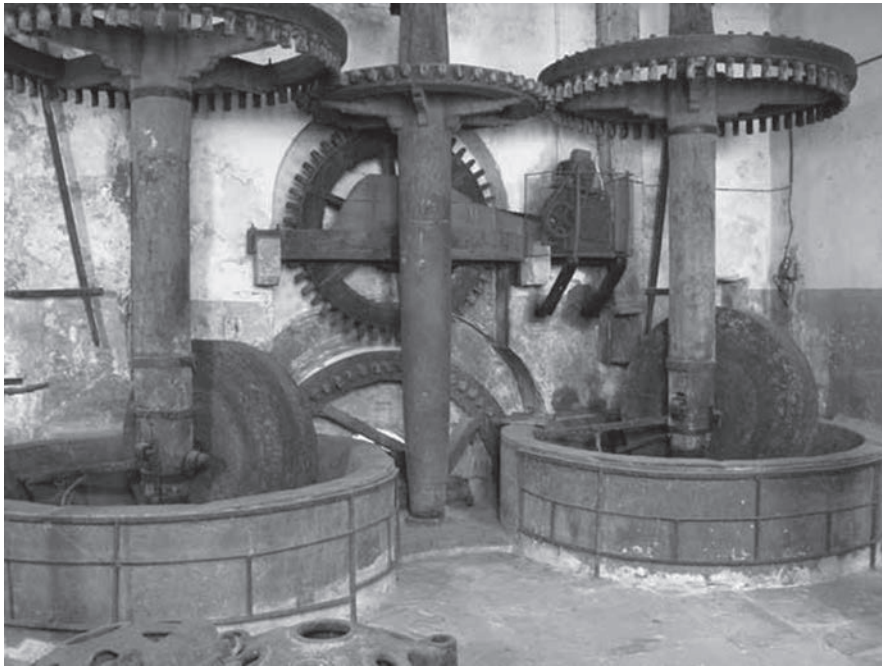
At the turn of the century a slow economic downturn began that within a few decades brought almost all the area's mills and presses to a halt. This crisis can be attributed to a number of causes: new taxes were levied on the use of water, new regulations governed the national market, the techniques used and the industrial plant operations were outdated, but, above all, it was the advent of electricity that conclusively marked the end of the previously positive growth trend. Many establishments adapted to the new energy source, but for others, their mountain location, distant from major roadways and difficult to reach, translated into an insurmountable disadvantage, which eventually led to their demise.



A press in Buti (2004, photo by Torti).

Another rather widespread activity that required a centralized plant, but continued to be linked to the land and the location of the necessary raw materials, were the bricks kilns, a concentration of which has been recorded along the course of the Arno River. The clay feedstock, in fact, came from artificial basins that, when the river overflowed, were filled with argillaceous sand. Already in the early 19<sup>th</sup> century a major concentration of plants was found at La Rotta, near the city of Pontedera. Production capacity was decentralized, modest, as it was labor intensive, and seasonal,

as it regularly had to be suspended from early November until March because it was difficult to air-dry the finished products. The earliest continuous-fire Hoffmann type kiln<sup>1</sup> was installed at La Rotta in 1872 by Francesco Capecchi. Here, many *mattonaie* (female potters) would prepare the clay paste and inserted it into special molds for firing. Until the 1950s the Tuscan industry underwent intense development, but due to the considerable expansion of tile-making activities in the north of Italy, Pontedera experienced a shortage of manpower as seasonal migrant workers chose to head to Piedmont and Lombardy for work. In 1893, 19 kilns are documented at La Rotta, while in the early 1900s, about 300 firms in the ceramics sector, including production and sale, were registered with the Chamber of Commerce in the entire province.



The millstones of a press in Buti (2005, photo by Torti)

1. Continuous-fire Hoffmann kilns have a circular or elliptical lay out with a number of small firing rooms (from 12 to 24), each divided into sectors the interiors of which are connected by a vaulted ring-shaped passageway. The fire within is kept burning continuously by propagating it through the passageway from one sector to the next in a 24-hour cycle. The sectors are worked in turn by closing each via a system of mobile walls. The furnaces of the province of Pisa used various different types of fuel –wood, coal, peat, or lignite– to produce both solid and hollow bricks as well as a wide variety of roofing tiles.

Moreover, many ceramics kilns were distributed widely throughout the area. Of medieval origins, the industry around Pisa specialized in supplies for eating establishments. Pisa was the first industrial center in Tuscany, and among first in Italy, to introduce the technique of stanniferous (tin-based) enameling, thanks to which it even managed to conquer European markets. Also in this case, the plants were located near the Arno, which guaranteed the supply of clay and enabled constructing kilns in conformity with town safety laws. In 1865, 11 crockery kilns were located in Pisa.



A Hoffmann kiln at San Giuliano Terme (2005, photo by Torti)

A prime example of a the reining production system of the time, combining distributed and centralized industry with hand-craftsmanship and cottage industry can be found in the textile sector, in which the practice persisted of employing home workers living near the factory to produce the finished product. The entrepreneurs of these often centralized and considerably large workshops would lend a loom and bring the necessary raw materials to each home worker, who would in turn receive a salary.

In the early 19<sup>th</sup> century, in fact, a small, but intrepid, group of entrepreneurs endeavored to launch cotton production in the area. New local powers —rich merchants, Jewish

entrepreneurs, well-established foreign industrialists— attracted by the potentials of cotton production, set up shop both in the city of Pisa and throughout the province. In just a few short years, cotton production spread, and looms became a staple in the country homes of the Pisan plains. One of the first workshops was probably that established by the Manetti Brothers, from Cascina, in 1824 at Navacchio, in an area just 10 km outside central Pisa. Others rapidly followed in the same area. By mid-century, in fact, an entrepreneur from Livorno, Matteo Remaggi, opened a large establishment equipped with Jacquard looms, while in the following years the area of Cascina became the site for cotton mills by Denchi, Ciampi, Fantozzi, Luxardo, Pierotti, Pozzolini, Silvi, Frateschi, Mazzei, Ciucci and Donati. Already in 1826, the French industrialist Giovanni Dumas had established a cotton mill in Pisa, while in the 1830s the Paoletti mill was founded, followed by that of the Padreddii in 1835. Such growth of the industry in Pisa continued between the 1830s and '40s, with the cotton mills of the Viti, Vannucchi, Della Croce, and Bederlonger from Tyrol. In 1841, Giovanni Nissim opened a large cotton mill and dye-house, while by mid-century the textile factory of the Calamini and Modigliani families had started operations. During the 1860s a dozen such firms were active in Pisa and its outskirts. The Jewish community was heavily involved in Pisa's textile industry, and by century's end the Pontecorvo family arrived and acquired the Gentiluomo mill, which would eventually become the Marzotto factory in the 20<sup>th</sup> century.

Documents from the 1860s attest to the presence in Pontedera, a small city about 20 km from Pisa, of the cotton mills Bellincioni, Comparini, Ciompi, Ferretti, Gotti, Magnani, Mainardi, Morelli, Morini, Pochini, Ricci, Stefanelli, and Zeppini. Some had already been in operations since the 1830s. All in all, according to the censuses of the times, about 2300 people, including factory and home workers, were employed in the industry, though other, quite reliable, sources, put this figure at closer to 4000.

In many cases the 'factory' consisted only of a single laboratory, for which a widespread network of home laborers worked: girls and women received the yarn from the entrepreneur, sometimes doing the work on their own looms, more often on looms borrowed from the firm. This particular form of decentralized production played a fundamental role in the Pisa area, with the females of the family maintaining the household economy while balancing family needs with those of the job, the loom and the fields. Although this particular work arrangement was also convenient for many male and female workers alike, it was obviously encouraged by many entrepreneurs, who with little risk and investment were able to exploit all the existing potential work spaces in every corner of the homes and fields near the 'factory'.

The most prominent industrialists cited above used workers and home looms extensively: the Manetti had about 400, as compared to only 200 in the actual factory; in 1873 the Remaggi could count on over 400 home versus 120 factory workers; Giacomo Nissim in Pisa had up to 600 looms set up in three workshops and 200 distributed throughout the surrounding countryside. Thus, a complex system was established in which various stages of production and local and foreign entrepreneurship were interwoven through various organizational schemes.



Historical  
postcards





Plaque at the Manetti factory in Navacchio (2005, photo by Torti)



Remaggi factory (2006, photo by Torti)



A major step forward toward a centralized industrial organization occurred in the area near the border of the Florence province, in particular, in that which was to become the leather district.

Already in medieval Tuscany, tanning and the working of hides was carried out not only in the cities, but also in the smaller urban centers. In the mid-18<sup>th</sup> century, fashioning leather into final products (shoe uppers, soles, footwear, saddle trimmings, gloves, luggage, engraved leather, various accessories, etc.) and tanning was widespread throughout the entire region, representing a sizeable industry, which experienced ever-increasing demand and thus often needed to resort to imported raw materials. Pisa thus came to be renowned as a center for high-quality tanning and leather goods. The Pisa-Florence axis, with many small urban centers along the Arno, benefited greatly from the presence of the Arno river, navigable up to Signa, as an easy, economical transportation route. The hides and tanning materials were sent upriver from the harbors to the river wharfs where small transport sail boats called *navicelli* moored. Some materials were also transported overland by carters. Tanneries were widespread and quite numerous, both in the Province of Pisa, as well as the entire Grand duchy of Tuscany, where in 1768 the working of leather in all its stages was carried out at 22 different sites, including Florence, Pisa and Arezzo. There were an estimated 60 different buildings devoted to tanning, employing at least 3600 'continuous workers', but about 10,000 occasional workers, hired for periods of stepped-up production. Apart from these, the industry also employed many workers in support and allied activities, such as transportation, the manufacture of finished products and the furnishing of tanning materials. Thus, all told, 15,000 to 20,000 workers were employed in the sector. In the early 19<sup>th</sup> century, tanning was begun at Santa Croce sull'Arno, an area characterized by the presence of many '*navicellai*' (boatmen) and carters in transit by water and land routes. The historical presence of cobblers and shoemakers, the possibility to obtain tanning materials locally from nearby woodlands and the presence of a surplus work force from agriculture were the determining factors in the birth of this new industry, which has been documented to as early as 1810. Following the success of the earliest ventures, many others attempted to follow suit, leading to consistent growth of the industry. In about 1875, some tanneries began using steam engines.

Favorable prices and environmental factors, and low labor costs, often involving the employment of minors, stimulated the proliferation of a production model characterized by small-to-medium, family-run enterprises. In 1893, Santa Croce had 32 operating tanneries, with 439 employees, amongst which 70 children.

At the end of the century, competition from Germany, Austria and France, which was exacerbated by customs imposed on imports, created great difficulties. Santa Croce reacted by concentrating its activities on less refined products, targeted to a wider market. This choice enabled Santa Croce's industries, overall, to hold up against the nation-wide trend towards decline. The crisis however revealed some structural weaknesses of the adopted labor-intensive work model, which neglected technological modernization. It became difficult to compete with enterprises in the north, which began using rotating tumblers. The failure rate of small and medium enterprises was high and the system managed to survive only through a process of Darwinian selection. At the turn of the 20<sup>th</sup> century, 33 tanneries were active in Santa Croce. During the same period, cobbler shops began to thrive at Castelfranco, while allied industries (glue, machinery) were established throughout the entire district. In the early years of the 20<sup>th</sup> century, Santa Croce had about forty operating tanneries, while 13 such plants were active in Ponte ad Egola. The rotating tumbler was finally introduced in about 1907. Thus, in 1916 there were 92 documented tanneries in Santa Croce, 47 in Ponte ad Egola, 11 at Montopoli, 3 in Fucecchio, 4 in Castelfranco, 2 in Santa Maria a Monte, 10 in San Miniato, 1 at Molino d'Egola and 1 at Ponte a Cappiano, and the beginnings of what was to become the Tuscan leather district were already discernible, with all told 171 leatherworking enterprises in the area.



Interior  
of a tannery  
in Santa Croce  
sull'Arno;  
fleshing table  
(2004,  
photo by Torti).

In the mid-19<sup>th</sup> century, in the midst of teaming small manufacturing activities, one of the most important centralized industries in the Province of Pisa was established – the manufacture of furniture. At the precise midpoint of the century, the first furniture factory was founded in Cascina by Rafael Puccini, based on a longstanding tradition of carpentry. The following year the Bonciani furniture factory began operations, while in the year 1870 the Emilio Bertini firm began to work wood with the aid of machinery and even to export a portion of its production. In a few years' time, many furniture manufacturers set up shop near the railway station (which enabled rapid delivery of goods), and the furniture industry expanded ever-more rapidly, with the establishment of about thirty different firms. In the late 1920s, despite an economic crisis that the smallest enterprises found hard to endure, Cascina, due to its modern equipment and especially the originality and wide range of its production, could easily hold its own against the competition of other furniture manufacturing areas in Italy, particularly the northern city of Brianza. In the immediate postwar period, that is in the 1950s and 60s, the area's growth became a true boom, with enormous success not only at a national level, but internationally as well.

Two highly significant factors certainly had a determining influence on the success of this entrepreneurial story: the first was due to the work of the *Società operaia di Mutuo Soccorso* (Workers' Mutual Aid Association), which in 1871 helped establish in Cascina a pioneering professional school, one of the first in Italy, the "*Scuola di Disegno per le Arti e le Industrie*" (School of Design for Art and Industry). The school's mission was to train highly professional workers and impart the know-how and techniques for the fashioning of quality manufactured articles.

The second factor was the 1911 founding, with the support of the Catholic Church, of a local bank devoted to financing and lending support to local enterprises, the "*Cassa Agricola e Operaia*" (Worker and Agricultural Credit Society), which was later renamed the "*Cassa Rurale e Artigiana*" (Agricultural and Artisanal Credit Society) in 1938 and finally became the "*Banca di Credito Cooperativo*" (Cooperative Credit Bank).

In 1922, the first furniture show, the "*Mostra del Mobile*", was organized, and was repeated a number of times over the following years, until 1927 when it was converted into a permanent furniture exhibition.

One aspect that most likely contributed significantly to the enormous success of this sector was the manual skill of its artisans. Their craft was the fruit of centuries-old

know-how, which combined individual ability with industrial organization. However, it was this very aspect that ultimately represented a limit to the growth of the industry, which never succeeded in going beyond the level of large-scale family-run enterprises devoted to quality craftsmanship.



The Bonciani furniture factory, established in Cascina in 1851 (photo by Torti, 2005).



The Signorini furniture factory, opposite the Cascina railway station (2004, photo by Torti).



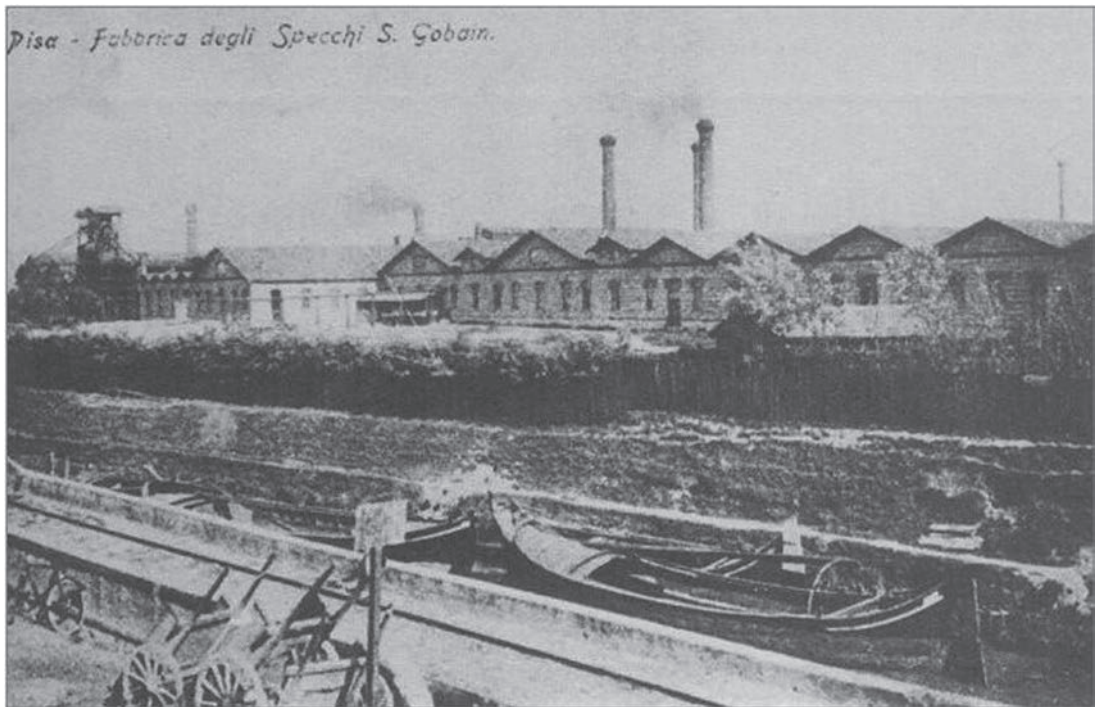
The Gamba  
Furniture factory,  
Cascina,  
early 20<sup>th</sup> century  
(2004,  
photo by Torti).



The Paoli  
Furniture  
Factory,  
next to the family  
residence (2004,  
photo by Torti).

Side-by-side with the numerous small and medium sized industrial activities the Province of Pisa was also home to a number of large-scale industries, in particular, Saint Gobain Glass and Piaggio Motorworks.

Saint Gobain was established in France in 1692 at the behest of the ‘Sun King’, Louis XIV. The original French firm grew rapidly during the 19<sup>th</sup> century, and prompted by protectionist customs duties, in 1887 it was decided to establish a presence in Italy, where it began production in 1889. The choice of Pisa was dictated by various factors: the presence of siliceous sands locally and good transportation links, by road, thanks to Via Aurelia, rail, from the so-called *Leopoldo* station and railway line, river, through the *Navicelli* channel, and sea, via the nearby port of Livorno. Dubbed the “*fabbrica pisana di specchi e lastre colate*” (Pisan mirror and plate-glass factory), it was in fact set up in an area adjoining the *Navicelli* channel, which led all the way to Livorno. By the early 20<sup>th</sup> century, the factory had already attained stable production capacity and experienced rapid growth during the postwar period. At the time it produced a wide variety of glass types, an activity that continues to this day.



View of the Saint Gobain factory, late 19<sup>th</sup> century.



Polishing the plates, early 20<sup>th</sup> century.



The factory entrance, designed by Giò Ponti.



The Piaggio Motor Company was founded by Rinaldo Piaggio in Pontedera in 1924 through purchase of *Costruzioni Meccaniche Nazionali* (National Mechanical Constructions). A native of Genoa Sestri, where already since 1884 the family had run a carpentry workshop for watercraft furnishings, in just a few years the young Rinaldo had successfully managed the switch to the transportation and aeronautics sector, and in the early 20<sup>th</sup> century set up a new plant in Finale Ligure. He was attracted to Tuscany by its long tradition of trading and its industrial setting. Before setting up in Pontedera, he established a presence in Pisa, where he quickly acquired the aeronautics firm owned by Francesco Oneto. Pisa had a long tradition in the aeronautics field – it was home to Gallinari aircraft (at the time, C.M.A.S.A. and later, in 1974 became *Motofides*) and boasted a respectable airport. Piaggio invested a good deal of energy and capital in both the railway and aeronautics sector, and managed to bring in Attilio Odero (Terni steelworks) as partner. The Piaggio factory in Pontedera produced the ‘Jupiter’ aeronautics engines. In 1938 Rinaldo’s sons Enrico and Armando continued their father’s activities.

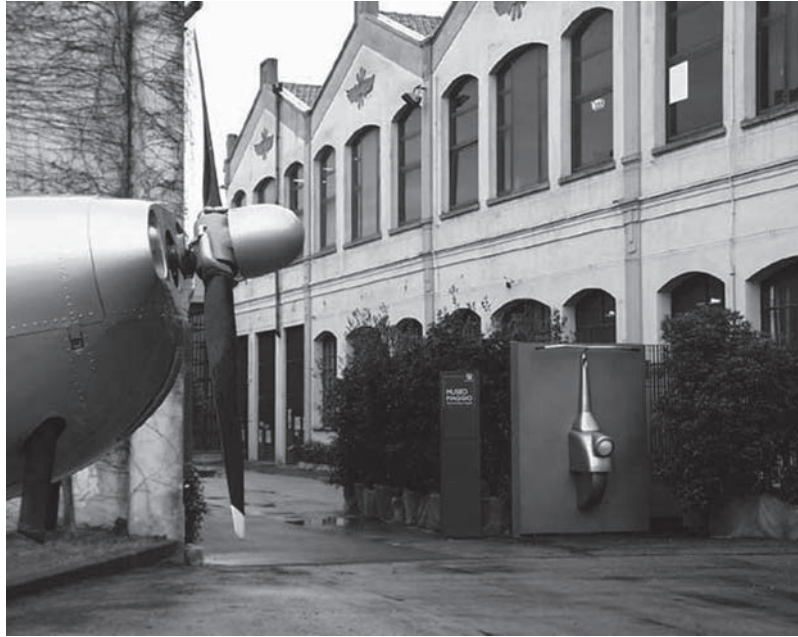
The break-through in production that determined the firm’s worldwide success came in the postwar period, when engineer Corradino D’Ascanio, who had been with the firm since 1932 and was already well-known for the successes achieved through his helicopter designs, engineered the soon-to-become world-famous scooter, the *Vespa*. Thanks to its ease of use, appeal to a wide range of drivers and versatility, the small scooter, produced and sold at reasonable cost, ushered in an era of individual mobility and, viewed nearly as a substitute for the most expensive autos, soon became a myth, a symbol, a mass consumption commodity within reach of all. Subsequently, control of the company passed from the Piaggios to the Agnelli family: first Umberto, in 1965, and in the 1990s Giovanni Alberto, who died prematurely in 1997. Giovanni Alberto was responsible for establishing the Piaggio Museum in the old foundry and maintenance buildings, the displays and furnishing for which were designed by his wife Avery Howe. The factory itself is arranged according to extremely rational criteria. Links between the various departments are insured by geometrically arranged pathways (later covered) and service catwalks. In 1960 a railway tunnel was built to facilitate workers’ coming and going. Between 1938 and 1940 an employees’ village had been built and was later enlarged in the 1950s. The village included twenty-five apartment blocks with 287 residences and services, such as a church, nursery school and kindergarten, social center and recreation hall, workers’ club, sport centers and gym (designed by Augusto and Giulio Momo). The workers’ club was designed by Luigi Bellincioni. The firm also built and managed a mountain holiday camp for employees’ children at Santo Stefano d’Avedo.



Interior of the Pontedera Piaggio factory, 1950s.



Interior of the Pontedera Piaggio factory, 1950s.



Entrance to the current Piaggio Museum with a steel Piaggio aircraft.

Lastly, some particular industrial sectors deserve specific attention, as they have been quite significant in the industrial development of Pisa and its province.

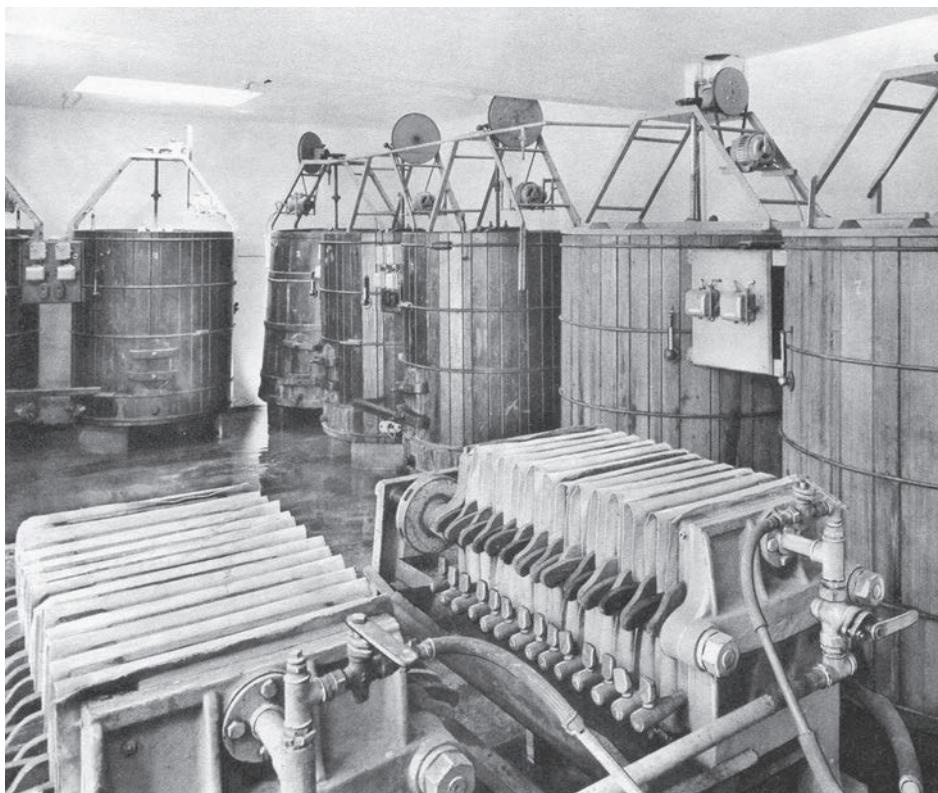
The chemical-pharmaceutical industry had its beginnings in Pisa during the very early 20<sup>th</sup> century and underwent rapid, intense growth during the First World War, in part thanks to the scientific support of the local university and hospital.

Production was quite varied and high-quality, with many products also destined for exportation. The pioneer in this sector was Valentino Baldacci, who founded the “Baldacci Laboratory” in 1904, which profited greatly from collaboration with the Pisan academia.

In 1914 Luigi Guidotti founded the firm named after himself, which later became famous for the reconstituent syrup, “*Jodarsenico*”, and two amino acids for the treatment of gastric and duodenal ulcers. Actually, during prohibition in America, *Jodarsenico* became the company’s prime product, as it was heavily exported there, where it was

served as an alcoholic beverage substitute (in fact, it contained wine and the essence of vermouth).

In 1917 the “*Istituto Galenico*” was founded (which in 1933 became the “*Istituto Galenico Chimico-Biologico A. Gentili*”), followed in the 1930s by the “Charles Conti Laboratory” (1932), which manufactured vials for intravenous and hypodermic use, the “*Istituto Fisioterapico*” (Physiotherapy Institute; 1932) and “Bigini Pharmaceuticals” (1939).



Some equipment of the Guidotti Labs, early 20<sup>th</sup> century.

Meanwhile, in the far southeastern corner of the province, in an area that was deserted at the time, Francesco Larderel (later ennobled as De Larderel), an intelligent, enterprising French merchant who had arrived in Livorno in the early eighteenth hundreds, quickly grasped the potential of borax fumaroles present in the area and

set out to produce borax using the heat from the fumaroles as fuel. Thus, from about 1915-30, the so-called “devil’s valley” in the new area known as “*Larderello*”, became the center of a sizeable industry able to market a competitive product that held up against international competition for many years. Subsequently, through the ingenuity of Ginori Lisci, geothermal energy was exploited to produce both electricity and heat (a process widely adopted nowadays by electric companies, including the Italian utility Enel).



Some product advertisements early 20<sup>th</sup> century.



The fumaroles of Larderello.

Brief as it may be, the foregoing account of the industrial development of the Pisa area during the period in question allows some conclusions to be drawn:

1. Over the years the area became a decidedly industrialized one, where disparate types of industries established a presence, with the widespread utilization of home labor.
2. Rather sizeable industries appeared already in the second half of the 19<sup>th</sup> century; one of the key moments seems to have been the times of Giovanni Giolitti (1901-1914), during which a large number of factories were first established.
3. Another important period in the area's development was represented by the years immediately following the Second World War and during the post-war reconstruction, which led to Italy's economic boom, during which period many industrial districts were established and fostered the growth not only of small and medium size industries, but in some cases, of large ones as well.
4. These years also marked the advent of a number of industrial innovations, with clear differentiation between sectors and enterprises that maintained their local and hand-crafted nature, and those that undertook the path to large national and even international industries.

The research work conducted to date reveals how different stages and forms of industrialization can coexist in the same area, all linked by a single overall industrial system composed of unique, specialized districts and widespread activity, in which small-scale production coexists with large industry. In this sense, it is reductive to stick to traditional schemes that in light of such development appear too narrow to describe a composite, ever-changing reality.

Georeferencing the activities ongoing at the time of the cadastral maps from the 1830s, with checks of subsequent dates (for example, the 1920s and 1960s) could enable determining the characteristics and particularities of the various factories and workshops during these times and more precisely identify any watershed periods in the development of the province of Pisa (see the paper of Massimiliano Grava).

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