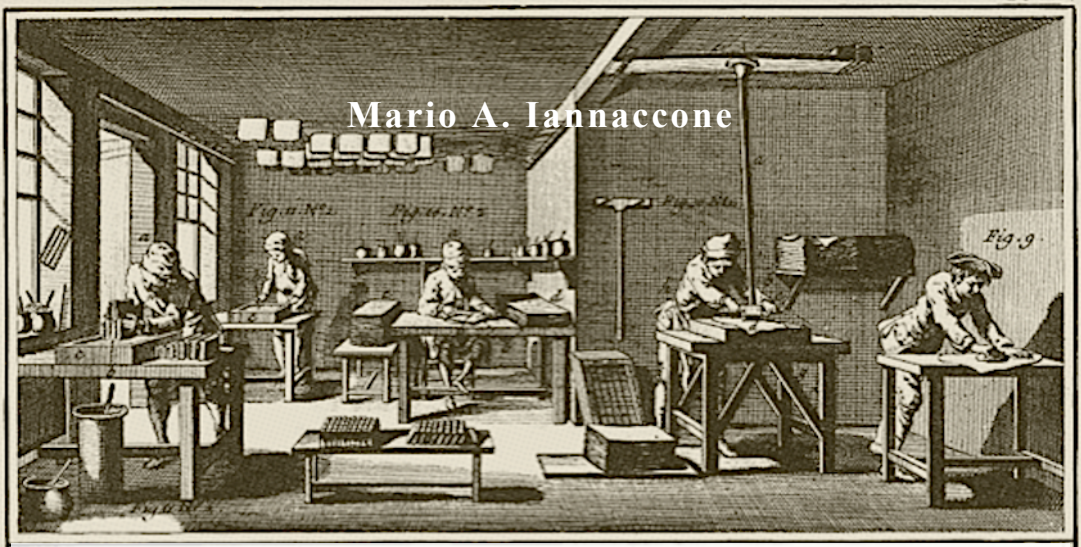


Mario A. Iannaccone

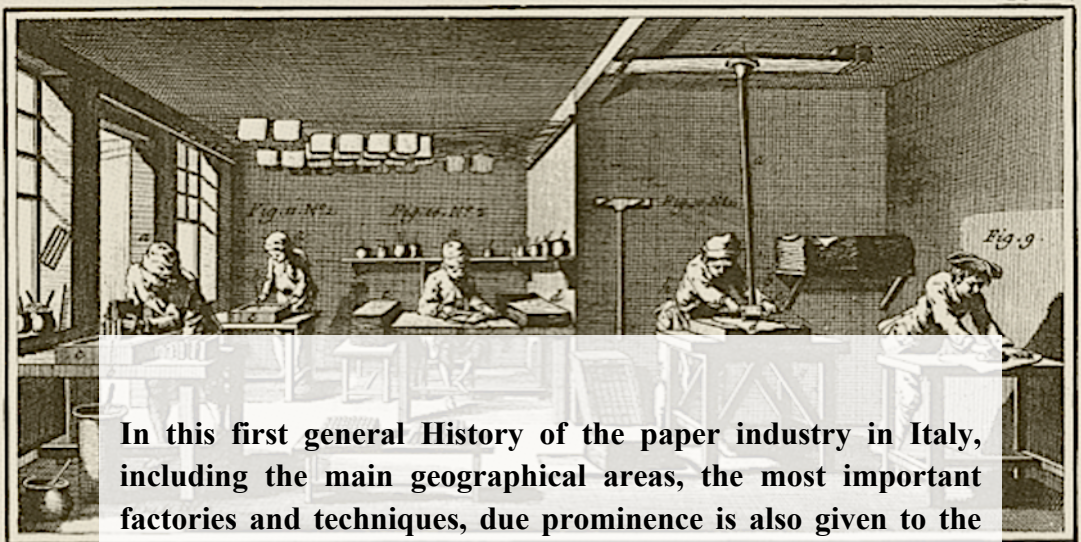
THE PAPER INDUSTRY IN ITALY

History, technology, men, markets

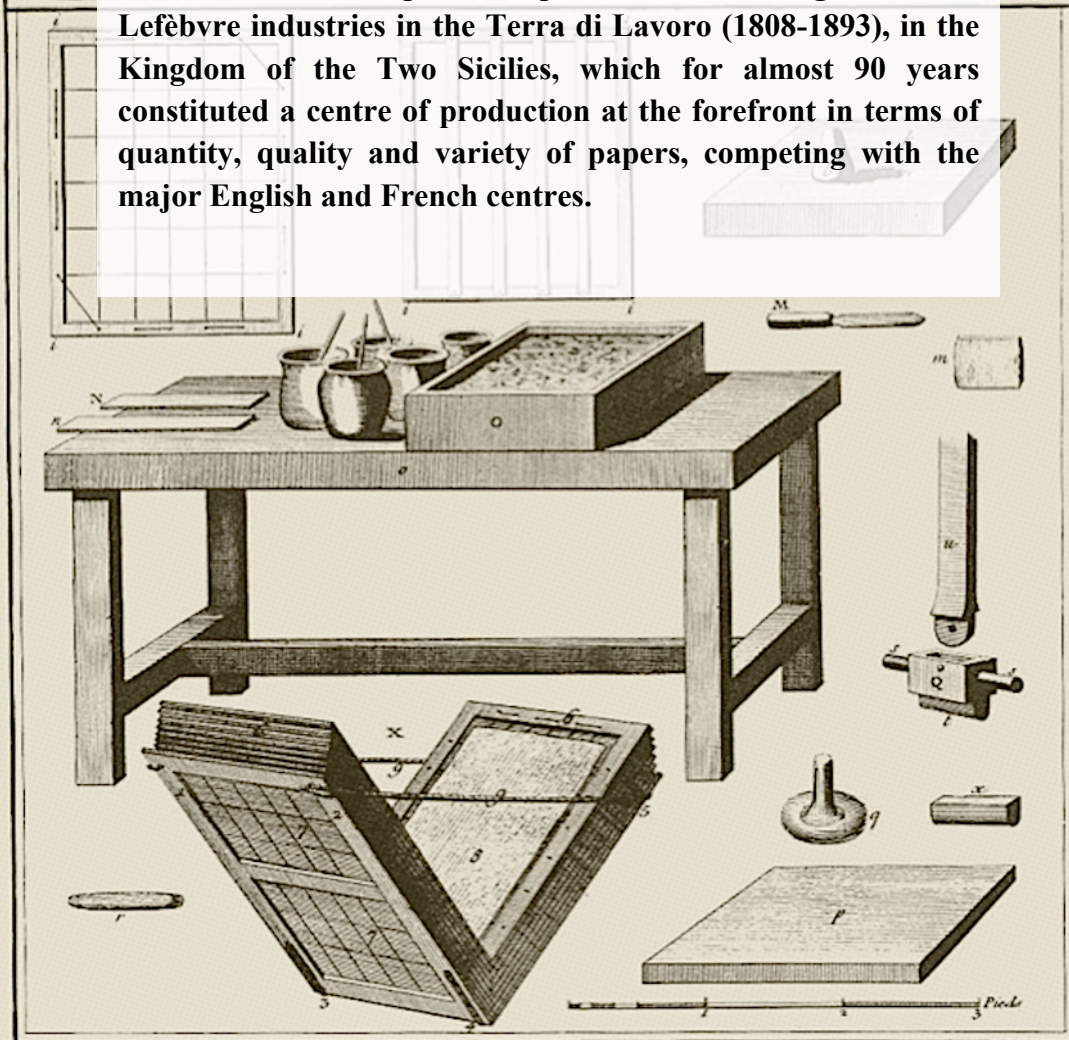
Book 1

Prevost Sculp.

Marbreur de Papier.



In this first general History of the paper industry in Italy, including the main geographical areas, the most important factories and techniques, due prominence is also given to the Lefèbvre industries in the Terra di Lavoro (1808-1893), in the Kingdom of the Two Sicilies, which for almost 90 years constituted a centre of production at the forefront in terms of quantity, quality and variety of papers, competing with the major English and French centres.



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First Edition 2021

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Book 1

Introduction

The history of paper is many centuries long. Even before it was used for printing with movable type, paper had been known for centuries. The first text written on paper to appear in Europe, one of the first in the world, dates back to the 12th century. This is the *Mandato di Adelasia* of 25 March 1109, by Adelasia del Vasto of the Aleramic family. The bilingual text, Greek and Arabic, has been preserved and is legible and contains a mandate requesting the protection of the Monastery of St. Philip in Demenna. For this deed, which was not particularly solemn, the paper in use at the time was chosen, the so-called bombacina, the production of which had been initiated by the Arabs.[1]

The development of technology to produce paper and improvements to the finished product continued throughout the 13th and into the 20th century. It was not until the beginning of the 19th century that paper became a widely consumed product and its production went from artisanal to industrial. The history of production and innovations to improve this medium, so important for culture, institutions, bureaucracies, is studded with names, places, mills, industrialists, inventors. Paper is a product that has improved after various international transitions; its first improvement took place in Italy, then in France, the Netherlands and England. Improvements in the paper machine were introduced

[1] Houben Hubert, *Adelaide "del Vasto" nella storia del Regno di Sicilia*, in "Itinerari di ricerca storica. Annual publication of the Department of Historical Studies from the Middle Ages to the Contemporary Age of the University of Lecce", 4, 1990, Lecce 1991 pp. 9-40.

in these countries, starting in the late 17th century and continuing throughout the 19th century. Apart from the great innovations of the paper machine, of chemistry allowing the use of coloured rags by bleaching them and of steam cylinders, there are many small, often undocumented, yet important advances to improve the quality of the product or some of its stages, improvements that are sometimes decisive for one paper mill or one district to prevail over another.

The history of paper is not only a story of inventors, machines and intuitions that improved processes, it is also the story of entrepreneurs and industrialists who believed in new technologies, introduced them by taking considerable financial and personal risks, thus enabling further developments and improvements. It is a story of resounding successes of paper mills that have created entire districts, but also of sudden reversals, of unforeseen conclusions (due to floods, financial troubles, wars, political and economic factors). In Italy, a dozen or so personalities, starting with the first in order of time, Polese da Fabriano, can be considered innovators for one reason or another: for having inaugurated veritable proto-industrial or industrial complexes, for having improved processes, machines, or for having been the first to introduce innovations in a certain territory that then served as a model for other territories. The question of proto-industry is not discussed here but only hinted at in preparation for the properly industrial phase of the second half of the 18th and 19th centuries. However, some mention will be made.[2] A

[2] The question of what is to be understood by proto-industry as opposed to manufacturing industry proper is still a matter of debate, even if one considers the introduction of the steam engine in John Lamb's textile factory (1693-1739) in Derby, which made it possible to concentrate

proto-industrial organisation can be referred to when the workers in the first paper mills are not exclusively employed in them. Thus, the Voltri mills of the 17th century are an advanced proto-industry. The factories that were founded between the 18th and 19th centuries, such as Pigna, Miliani, Lefèbvre, Rossi, Binda, Donzelli, Jacob, Vonwiller, even before the introduction of automatic machines, are, however, definitely industrial: they are so in terms of organisation.

The history of paper is also the history of personalities who have made a profound impact, such as those mentioned above, to which another dozen or so can be added, as we shall see. Personalities who built a glorious collective history that made Italy one of the world poles of the paper industry, at least until the latter part of the 20th century. In this book, we will attempt to recount the vicissitudes of the artisans, merchants, most representative industrialists and paper mills that made the history of paper in our country, with a necessarily incomplete overall view.

The first section of the book therefore contains an account of the main production experiences in the form of individual

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300 workers in one place, as a symbolicdate. However, there are other factors to consider: sociological, cultural, organisational. Franklin F. Mendels, *Proto-industrialisation: The First Phase of the Industrialisation Process*, in "*Journal of Economic History*", 32 University of California-Irvine (1972), pp. 241-261, which laid the foundation for the discussion; Peter Kriedte - Hans Medick and Jürgen Schlumbohm, *Industrialisation before industrialisation*, Cambridge University Press, Cambridge 1981. There are many texts on proto-industrialisation and its significance in individual areas of the Italian paper industry. I recommend Poni Carlo, cur., *Forme protoindustriali*, Quaderni storici, Il Mulino, Bologna 1985. see also Alberto Maria Banti, *Le questioni dell'età contemporanea*, Laterza, Milan-Bari 2014, the whole of the second chapter.

paper mills, districts, names of master papermakers, financiers and owners. The second section will attempt a synthesis of industrial history but also of history in the broadest sense of the term, trying to understand which were the reasons for the success of certain areas and certain individual paper mills, and which, on the contrary, were the reasons for the failure or decline of other areas structurally suited to the development of the paper industry even in its properly industrial phase. The dynamics to be grasped will be those of individual histories, the will to innovate, the availability of capital belonging to the paper industrialist or found outside, the fate of areas of Italy undergoing great historical changes (the South of Italy went into crisis after Unification), and other factors such as whether or not raw materials were available.

Chapter 1

A brief introduction to the history of paper

The history of paper is long and complex but, to try and summarise it, it can basically be broken down into a craft phase (12th-16th centuries), a proto-industrial phase (17th and 18th centuries) and an industrial phase (second part of the 18th century onwards). Then there was a long period in which the raw material used was the most diverse, especially outside Europe (seaweed, bamboo and other plant species); this was followed by a period in which paper was produced from rags (according to a technology perfected in Europe: Italy, France, Holland, England above all) and one, at the end of the 19th century, in which the raw material of excellence became the cheaper wood pulp. Studies on the history of paper, understood as the paper industry, are fairly recent. In Europe, Coleman's work, *The British Paper Industry* (1845-1860), is considered pioneering.[3] In Italy there are many studies that focus on individual cities, territories and regions; the complexity of Italian history and also of its territory, the presence of the numerous pre-unitary states, the importance of cities as cultural and economic poles must be considered.

Before 1980 there were few studies, afterwards they multiplied. Today, we have specific studies on the paper industry in Genoa, Amalfi, Tuscany, Venice, Veneto in general, Treviso, Bologna and so on, which will be quoted gradually.

[3] Coleman Donald Cuthbert, *The British Paper Industry (1495-1860): A study in industrial growth*, Oxford, Clarendon Press Oxford 1958.

There are few studies on the paper industry in Lombardy and Piedmont, which also seems to have been important in the Renaissance centuries and became a strong industry during the 19th century. Rather similar are the German and French cases, where there are many studies from the 1980s onwards, however, too numerous to mention here, where the Italian case is considered above all; studies on the European paper industry will be cited above all in relation to those countries, such as France, that have had more technical and human interchange over the centuries. The reason for the rarity of studies on the paper industry is obvious: it requires extensive archival research. The history of individual paper mills or policies initiated in specific areas must be done on the basis of archive material sometimes deposited in public or private archives (State Archives, Libraries, Diocesan Archives, Town Archives and archives of individual mills or families or associations). The material to be drawn on, likewise, is very heterogeneous: statistics, cadastral documents, memoirs, notarial documents, public deliberations by kingdoms or individual cities, findings of official enquiries and much more. All this, therefore, requires considerable work.

As we shall see, there are paper mills that are run by families for centuries, or rented out to various master papermakers by the owners (nobles or merchants) who can keep the property (such as Bartolomeo Dongo) or can in fact sell it in exchange for an income (as happened to Pietro Miliani), and then there are the actual industrialists: the first example in Italy is the Frenchman Charles Lefèbvre, followed by the Rossi dynasty of Arsiero and others, especially in Lombardy, Piedmont and Veneto. In the industrial phase, the machinery and instruments for processing the raw material became more and more expensive and also bulky, and the

factories grew bigger and bigger: they started with just a few workers and grew to hundreds and, in some cases, even a thousand in the latter part of the 19th century.

We anticipate here a description of the production phases, methods and systems, as well as tools, adopted by the master papermakers for production, which is necessary to understand the adventurous history we are about to discuss. Moreover, it must be considered that the sector soon gave itself rules of art and often this art joined that of the booksellers and publishers. The activities of papermaker, printer and bookseller were often carried out by the same people and companies. In pre-industrial times, the connection between a paper mill and a book publisher is often noted. In the industrial age, industries existed, such as the Manifatture del Fibreno in Isola di Sora, which had, as its own specialised section but detached to Naples, a publishing-printing house with dozens of specialised workers.

Movable writing media such as papyrus or plant materials already existed in ancient times, at least since the Egyptian civilisation. Later, supports were manufactured that we could already call 'paper', but a coarse paper, produced from vegetable pulp, mulberry bark and rags. These supports began to be called, in fact, paper (*charta*), usually 'bombacina paper' or 'bambagina' (akin to bamboagia, i.e. non-woven cotton, called *rizma* in Arabic). This type of product is attested in China from around 150 BC. It was already paper, but a poor quality paper, which aged quickly and, above all, was inflexible, not very resistant to the acid attack of inks and tensile strength. It served limited purposes and was used to communicate mostly short-term information. The above-mentioned *Mandato* of 25 March 1109 has nevertheless been

well preserved: perhaps the source material was unusually good, perhaps the manufacturer had secrets, in any case, at that time parchment was preferred for any document that had to be preserved over time.

Relatively cheap was the paper made in Persia using techniques imported from China from the 6th century onwards.[4] In the 8th century, traces of it can be found in some Japanese and Arab cities and even in Samarkand, where there was a mill run by a group of Chinese captured by local lords and forced into manufacturing. In Europe, it seems that the first factory of this type of paper was set up in the Muslim Spain of Al-Andalus, although the only testimony is indirect: a traveller who saw the facilities. Such Andalusian paper, however, was not marketed and did not circulate outside Muslim Spain.[5] Many scholars doubt that the isolated references to mills in and around Cordoba really referred to paper mills.[6] The first certain mention is from 1282 in the Kingdom of Aragon, when paper was already being produced in Italy.[7]

However, it seems that the Arabs also imported the cam pestle from China, which was originally used mainly for

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[4] Bloom Jonathan M., *The introduction of paper to the Islamic lands and the development of the illustrated manuscript. "*Muqarnas. 2000 no. 17, pp. 17-23.

[5] Bloom Jonathan M., *Paper before print: the history and impact of paper in the Islamic world*, Yale University Press, New Haven 2001, pp. 8-10, 42-45; George Mandl, *Paper Chase: A Millennium in the Production and Use of Paper* in Myers, Robin & Michael Harris (eds.). A *Millennium of the Book: Production, Design & Illustration* in *Manuscript & Print*, St. Paul's Bibliographies, Winchester UK 1994, p. 182.

[6] Burns Robert I., *Paper comes to the West, 800-1400*, in Lindgren, Uta (cur.), *Europäische Technik im Mittelalter. 800 bis 1400. Tradition und Innovation* (4th ed.), G. Mann Verlag, Berlin 1996, pp. 413-422.

[7] Burns Robert I., *Paper comes to the West, 800-1400,* cit., p. 417n.

hulling rice. It was later used in other processes such as paper production.[8] The first use of paper of a certain importance in Europe was with the bombacene paper, produced from the 10th century in Syria and imported via Constantinople or Sicily. Bombacina paper was also considered mediocre and fragile, so much so that in an edict of 1221 Emperor Frederick II of Swabia (1194-1250) prohibited its use, considering it unsuitable for preserving deeds and contracts in comparison, for example, with parchment made from sheepskin. This does not mean that in his time and even in the lands he administered it was not produced: it could be used for quick communications such as a list of goods to be transported on a ship, a list of prisoners, a list of property, notes. Consumption, however, only increased because of its decisive cheapness compared to vellum or parchment, and in the 13th century the merchant fleets of the Mediterranean, financed by the merchants of the maritime republics, imported it in quantity.[9] A document is known that makes no reference to paper but records that in the 14th century at least 300 water wheels, probably mostly small ones, were in motion in the city of Granada.[10]

[8] Buonora Paolo, *La presenza e la diffusione delle ruote idrauliche nell'Appennino e nella storia della tecnologia,* in *Energia e macchine. L'uso delle acque nell'Appennino centrale in età moderna e contemporanea*, curr. F. Bettoni - A. Ciuffetti, Narni (TR) Crace 2010, p. 46.

[9] Castagnari Giancarlo, a cura di, *L'arte della carta nel secolo di Federico II*, Pia Università dei Cartai, Fabriano 1998.

[10] Vaquero Pineiro Manuel, *Fra cristiani e musulmani. Economie e territori nella Spagna medievale*, Bruno Mondadori, Milan 2008, p. 49.

Polese da Fabriano's gualchiera

The hydraulic systems tested in Muslim Spain are adopted in various parts of Italy. Mills to produce bombacina paper can be found in Voltri near Genoa, in Amalfi, in Sicily. Traditionally, the presence of a paper mill in France in 1190 is taken for certain, while in Fabriano it would only be attested in 1276: so France would have preceded us by a quarter of a century.[11] However, there is a widespread consensus that the first person to have set up a real paper mill in Europe was a certain Polese da Fabriano (c. 1150-1200), in Fabriano, a few decades before the French paper mill. The historicity of Polese's person is not certain, but it is certain that paper was already being made in Fabriano between the late 10th and early 11th century. It was bombacina paper. Polese's factory was well established in the 13th century when the first, decisive improvements in the manufacturing process took place, improvements that allowed the foundation of a proto-industrial manufacturing network in the area.

The fundamental innovation brought by the factory in Fabriano, a town located at the base of the first spurs of the Umbria-Marches Apennines, was the use of the hydraulic pile with multiple hammers. This consisted of a water wheel connected, via a camshaft, to various pestles or hammers equipped with nails and bits. These reduced the raw material, consisting of rags, to a pulp of vegetable fibres. This produced a watery pulp that was then pressed into regular shapes, resulting in sheets that were thinner than parchment and less

[11] Batsell Fuller Neathery Clarice (2002), A *Brief history of paper*. Accessed, 30 August 2020. But this author, who is not known in paper history studies, draws on less rigorous authors such as Margaret Starbird and does not cite sources.

expensive. Without the innovative camshaft and the hydraulic gualchiera – a type of mechanism unknown to the Chinese, Arabs and Persians – the improvement in the productivity of the paper mills and the quality of the final product would not have been possible. The Chinese, in fact, used hand-operated mortars, while the Arabs and Persians preferred animal-powered grinding wheels.[12]

It was therefore this technical innovation, which exploited hydraulic energy, that improved the quality of paper: the vertical stroke of the mallet better pulverises and shreds the rag, which is mostly hemp. This system made paper production faster and more efficient, decreasing costs and increasing the durability, brilliance and mechanical and physical qualities of the finished product such as resistance to writing, tearing, folding and the action of acids and inks. In the short space of a few decades, other innovations were introduced that made Italian paper, and soon after French paper, completely different in quality from Arabic or Chinese paper, so much so that it could be considered a new product. The process was improved by the use, as a glue, of a paste obtained from rice starch, later replaced by animal gelatine and, finally, by other materials experimented over the centuries. The areas in which improved processes were experimented were the same ones in which the first paper mills were established: the Amalfi area, the Pescia area and the area of the Marches around Fabriano or Pioraco (not far from Camerino), Pale and Belfiore (in the Foligno area); and then Nocera Umbra and Fermignano (near Urbino). But already by

[12] Castagnari Giancarlo, cur., *Contributi Italiani alla diffusione della carta in Occidente tra XIV e XV secolo*, Ed. Pia Università dei Cartai, Rome 1990.

the end of the 15th and beginning of the 16th century, paper mills are certainly attested in the areas of Garda, Brescia, Sora and Trento.

The adhesives improved the cohesion of the paper and also improved tensile strength and the prevention of cracks. They also improved the grip of the inks by preventing them from expanding as was the case with cylinder paper or puncturing the paper itself. The loom to be dipped in the vat also changed: the cotton, bamboo or reed weave was replaced by a brass weave that would remain virtually unchanged until the 18th century. Gluing with rice or wheat starch was replaced with one based on animal gelatine, which significantly improved characteristics such as impermeability or resistance to insects and fungal or bacterial micro-organisms (chemical-biological deterioration has long been a serious problem in the preservation of paper and hence its dissemination).

The new technologies developed in various paper mills were highly successful and acted as a driving force for the spread of paper, which was increasingly in demand and widespread; new mills soon sprang up all over Northern Italy. Italian paper, of better quality and cheaper, quickly imposed itself throughout Europe and soon Italian master papermakers moved to France or the German-speaking area, via the Tyrol, creating new centres of production and innovation. The first paper mill North of the Alps was founded by Ulman Stromer (1329-1407) around 1390 in Nuremberg.

As we have said, around the 15th-16th centuries paper mills sprang up everywhere in Italy, especially in areas rich in water: along the Toscolano river, along the streams flowing down from the heights of Amalfi, along the Rapido, Liri and Fibreno rivers, but also the Serio, Adda and many other major and minor watercourses. Some secrets in the production of the

highest quality paper, apparently kept in Fabriano until the end of the 15th century, had by then spread throughout Europe and especially to France, and then to Holland, England and the Tyrol.

Throughout the 14th century, however, the monopoly of papermaking was Italian and lasted until the middle of the century when new papermaking centres with considerable production facilities established themselves in France and Germany. During the first half of the 15th century, France had a considerable increase in paper production, but in the second half, due to high taxes on mills and the transport of rags, production increased more in Holland.

Dutch machines

In the 17th century, it was in Holland that a remarkable innovation was devised: the so-called Dutch machines or Dutch tubs, consisting of oval-shaped tubs in which a moving cylinder equipped with blades simultaneously frayed and refined the fibres. Thanks to the Dutch vats, a whiter and more homogenous paper was obtained, although less resistant because the fibres were cut rather than crushed. The Dutch machines were adopted in many paper mills, certainly in all those that remained competitive during the 17th and 18th centuries, and improved versions of them were still to be found at the end of the 19th century in the large mills of Northern and Central Italy. Other paper mills sprang up in England to supply that country with the large quantities of paper it needed. Until the 16th century it had been imported mainly from Genoa. Innovations were produced in the same areas where the first large concentrations of mills of the First Industrial Revolution

were being built. It was an Englishman, John Baskerville (1707-1775), who in the 1750s introduced a new technique for making paper without the marks of virginity called *wove paper*.

As a result, during the 18th century, English industry acquired a monopoly on automatic papermaking machines. English engineers developed many innovations for about a quarter of a century, from 1750 to 1777. The French also participated in the technology race. Pierre Montgolfier (1700-1793) from Annonay (Lyon) introduced an important innovation by obtaining perfectly smooth sheets that took the name 'tissue paper', a name that recalled the parchment made from the particularly smooth skin of calves.

The period was also rich in process improvements with applied chemistry. In 1774, thanks to the discoveries of Swedish chemist Carl W. Scheele (1742-1786), the usefulness of chlorine for bleaching paper was experimented with. The innovation was acquired, but only later was it discovered that chlorine oxidation has negative effects on the long-term durability of the substrate, which becomes brittle and flakes off, so that additive was abandoned. In 1807 a system of mass gluing with alum and rosin was introduced, which was cheaper than that with animal gelatine, but made the paper much more acidic and also more brittle. Many of these defects were visible over time. These machines produced a real revolution in the preparation of the raw material and helped to improve the quality of paper. The new practice was that the rag mass was poured into an oval wooden vat filled with an aqueous solution. The mass was shaken energetically and then fished out by a defibrating cylinder equipped with blades, driven by hydraulic force, and finally brought to a gear that finished the defibration work. Basically, the machine, with multiple passes

of the mass between cylinders, blades and gears, made this stage of production very efficient and fast. Continuously improved, the Dutch system came to allow a hundred times the productivity of the previous system, which used simple pestle beating. The improvements affected the product: the fibre mass was made pliable and uniform by continuous rubbing, crushing and repeated rinsing. It quickly reached the optimum stage of refining and cleaning, becoming ready to be mixed with alkaline solution binders and then placed in wooden vats where it was freed from water to reach the ideal consistency. To facilitate evaporation without damaging the dough, a steam coil was placed near the vats to heat the mass while it was being kneaded. Later, a mechanically and uniformly operated stirrer was inserted.

Mariani writes about it:

The first news of this 'Dutch-style device' - as it was often called - spread across Europe thanks to Johann Joachim Becher (1635-1682) who wrote that he had seen it in operation in Zaandan in 1680 during one of his trips to Holland, the account of which was published two years later in Frankfurt. In 1680, Becher had set off from Germany bound for England but, due to bad weather conditions, the sailing ship carrying him took 28 days to reach his destination. During this time, Becher had the opportunity to write a small volume ('Närrische Weisheit und Weise Narrheit: oder Einhundert so Politische als Physikalische, Mechanische und Merchantilische Concepten und Propositionen'), which he had published after his return home. In this work, which is so important for the history of papermaking, Becher writes: 'We do not know who conceived the art of papermaking, but it is a beautiful and wonderful invention. In the normal system, rags are beaten with many hammers and much noise. I, however, saw a new type of paper mill in Serdamm [Zaandan], Holland, which does not use the crude

hammers, but a cylinder with which the rags are macerated to form a suspension without difficulty and in a short time'. The pamphlet was published in 1682 and had subsequent editions (in 1706 and 1725).

Recent research would date the first applications of the new device to around 1670: documents from the Zaandan archives would indicate that a group of paper-makers in the summer of 1673 claimed to have introduced improvements to the Dutch machine (use of a bronze plate, and knives, also made of bronze, of a different shape), thus proving that the first examples of the machine must have been earlier than that. The architect Leonhard Christoph Sturm (1669-1719), who visited Zaandan in 1697, described the machine in a travel diary that was, however, not published until 1718, a full twenty years later. In this work ('Völlstandige Mühlen Baukunst'), the Dutchman's first drawings appear, while the first descriptive plates of the device were only published in Amsterdam in 1734.[13]

Regarding the introduction of the Dutch cylinder, recalling the importance that Karl Marx attributed to it – as a factor in the breakdown of craft production and the transition to industry – and also recalling an *instrumentum* that in 1235 bound a master papermaker and a worker in a contract (the first document of its kind in Europe), Sabbatini recalled how:

From its very beginnings, paper production in Europe presented itself with the characteristics of a process that, while requiring a very high level of professionalism (knowledge of what the tool called the mysterium of art) implied the cooperation of several workers and the use of complex equipment. The break with the artisan mode of

[13] Mariani Franco, *L'introduzione dell'olandese nelle cartiere dello Stato Pontificio, 'Cellulosa e carta',* Ente nazionale per la cellulosa e la carta, Rome, 1992.

production, which Marx places at the time of the introduction of the Dutch cylinder, occurred as soon as the hammer mill was adopted, from which the new machine differed only in the shorter time taken to perform the same operation.[14]

The Dutch cylinder will, of course, often be cited in this study, but as a modernising and improving factor, certainly not as a breaking factor in the sense that Marx attributed to it in the first pages of Volume I of *The Capital*.

Piles and vats

Since in mentioning the equipment of paper mills one will often refer to stacks and vats, it should be explained that the number of vats is a significant quantity to evaluate a paper mill while the stack, which has more variable numbers, is less so. Sabbatini's clarification is therefore appropriate:

Generally, paper mills are classified and their production evaluated according to the number of vats; sometimes, with an apparently more refined, but actually less correct procedure, reference is made to the number of stacks. Sufficient attention has never been paid to the relationship between these two quantities, which varies so much from period to period and from area to area [...] the pile-to-vat (and more precisely pile-to-vat) ratio is the most significant datum for understanding the organisation of work, the result of particular social relations of ownership and management of the production pieces, and the cause of the different productivity.[15] This is how the pile, or rather the hydraulic machine derived from

[14] Sabbatini Renzo, *La manifattura della carta in età moderna,* cit., p. 16; Briquet Charles M., *Papier et filigranes des Archives de Genes 1154 à 1700*, in "Atti della società ligure di storia patria", XIX 1887.
[15] Sabbatini Renzo, *op. cit.*, p. 18.

the gualchiera, is defined in the Paper Museum in Pescia. The pile with multiple hammers, it can be a 'disgrossing' pile; a 'refining' pile; a 'surfacing' pile. In the "disgrossing" pile, the heads of the hammers are equipped with large, pointed nails that reduce the fabric of the rags into fibrous "frays". In the 'refining' pile, they are equipped with 'flat-head' nails that turn the rags into 'fibres'. In the 'refining' hammers, which have no nails, the refining or homogenisation is completed or the already refined pulp is rehydrated and kept in stock for periods of low water availability.[16]

In any case, it is the vat labour that determines 'the absolute value of production, the best way to increase the product was to increase the number of vats; but the simplest method was not always the cheapest. Building a second vat required, if not a doubling of the overall labour force, then certainly a doubling of the skilled labour force [...] the optimal vat-to-vat ratio was not given once and for all, not least because the building was not always constructed from scratch, but very often paper mills that were already in operation were expanded, and so the intervention was necessarily anchored to the pre-existing conditions'.[17]

[16] Pila, *Paper Museum, Fabriano*.
[17] Sabbatini*, ibid*, pp. 19-20.

Chapter 2

Industrial era

The machine continues

By the mid-18th century, English innovations were bringing paper production into the properly 'industrial' period, but probably the decisive invention in this respect was the one announced in December 1798 by the Frenchman Louis-Nicolas Robert (1761-1828). After three years of research, he filed a patent for a machine capable of producing a very long and potentially continuous sheet of paper (it was also called 'infinite'). The patent was acquired by Saint-Léger Didot (1767-1829), a member of a large family of papermakers, printers and typographers whose cousin, Firmin Didot (1764-1836), became the official printer of the Institut de France in 1811. Another French family that became famous at that time was the Montgolfier family, who went down in history above all for having invented the paper balloons that made their first flight in 1783 in Versailles and took man off the earth for the first time over 2 kilometres. Actually, apart from this invention, master papermakers practised in France and Italy.

Saint-Léger Didot was the owner of the Essonnes paper mill (Île-de- France) and promised Louis-Nicolas Robert a large sum to buy the machine. The machine was in operation in 1799, and Nicolas produced a few prototypes, with experimental variants. They were not yet fully productive: they wobbled, they were not accurate, yet they were already able to produce a sheet of paper 60 centimetres wide and

virtually infinite. The idea was brilliant but needed to be perfected. Nicolas, who had to work in secret in Essonnes, without being seen by the workers, was not properly remunerated and in the end was paid with a promissory note (which apparently was never honoured) and left the patent to Didot.

Didot had the design perfected by his brother-in-law, one John Gamble, who in turn moved to England where he filed the patent, in spite of Didot. In England, he worked with the French brothers Sealy and Henry Fourdrinier on a project that cost £60,000 and also enlisted the help of mechanic Bryan Donkin. The first actually working machine was set in motion at Aspley in Hertfordshire in 1803. Perfected further, it was patented on 24 July 1806 and from then on began to be marketed. It was this new type of machine that gave rise to the industrial production of real paper, under the name endless machine, which was perfected further and further over the next 50 years. Nicolas Robert, the inventor, never had any recognition of his invention, except moral, and died in 1828, the same year in which the first Italian endless machine was installed in Isola di Sora in the Lefèbvre factories.

During the first half of the 19th century, the improvements successively introduced by Italian and French technicians reduced production costs more and more, allowing production to increase; however, the increasingly limited supply of the raw material (rags) forced the search for new sources. From this point of view, experimentation never ceased. Attempts were made to use nettle, fern, hops and maize, but for a long time none of the substitutes could compete in quality and cost with rags. A type of paper devised in Italy began to be made from surrogates (straw, lime) but was not suitable for writing, rather for wrapping paper.

The first attempt to produce paper from wood took place between 1800 and 1801 in England by Matthias Koops (mid 18th century-1805), who printed a small book called *Historical account of the substances which have been used to describe events, and to convey ideas, from the earliest date, to the invention of paper*. But there were still problems: the method was expensive, there were no automatic machines to help with production, and in 1801 Koops' enterprise failed.[18]

In 1844, when the need for paper had grown tremendously and there was an absolute necessity to find new raw materials, a weaver from Hainichen, Saxony, named Friedrich G. Keller (1816-1895) came up with the idea. He filed a patent for a pulp prepared from wood. The German Heinrich Voelter (1817-1887) further improved the process in 1846 with the invention of a defibration device consisting of a large stoneware grinding wheel that chopped up the wood. The product obtained was mediocre but suitable for producing an abundant, inexpensive, low quality paper that was increasingly needed as it was used for periodical, mainly daily printing. The defibrator only came into its own after 1860 when chemical treatment was added to it.

The first treatments were done using hot soda and potash, followed by bleaching with chlorine. With this process, the hemicellulose and lignin are dissolved, while the cellulose remains intact. Soda and potash were soon replaced by bisulphite, which operates in an acid environment. A distinction was made between a 'mechanical pulp', obtained by pulping hardwood (mainly poplar) with stone wheels, and a 'chemical pulp', cellulose, obtained by cooking coniferous

[18] Koops, Matthias, *Historical account of the substances which have been used to describe events, and to convey ideas, from the earliest date, to the invention of paper*. T. Burton, London 1800.

wood (poplar or fir in particular) with solutions of sulphate or calcium bisulphite. In the sulphate process, the cellulose had fibres with very good mechanical properties, but such that they could not be completely descaled and bleached. By using the sulphite process, developed in the 1870s by Alexander Mitscherlich (1836-1918), the youngest of the sons of the famous chemist Eilhard (1794-1863), better quality products could be obtained.[19]

Meanwhile, the introduction of the steam engine doubled production in the 1850s-1860s during which the major paper mills equipped themselves with the new plants, which were, however, very expensive, forcing most mills to fall behind due to lack of capital. From 1880 a new sulphate process made it possible to obtain a very strong paper called Kraft paper which revolutionised the world of packaging. With the arrival of pulp, production increased and the fall in price turned paper into a widely consumed product. In England, for example, production rose from 96,000 tonnes in 1861 to 648,000 tonnes in 1900.[20] Forest-rich countries such as Scandinavia, Canada and the United States became the new market references.

In the Po Valley, the cultivation of poplar for papermaking purposes was greatly increased, replacing other crops. For a long time, until at least 1880-1890, the import of chemicals necessary for pulp production made this raw material unprofitable in southern Italy. The only noteworthy attempt was that of the paper entrepreneurs Lefèbvre who had plants

[19] Mitscherlich Alexander, *Das Gesetz der Minimums und Das Gesetz des abnehmenden Bodenertrags*, Landwirdschaftliche Jahrbuch (1909) no. 38, pp. 537-552.

[20] For the history of the paper industry in England, the archives, also digital, of the British Association of Paper Historians, at baph.org.uk, are well-stocked.

in Isola del Liri and who founded a chemical industry, the Chimica Lefèbvre in Bagnoli, whose aim was precisely to produce at reasonable cost chemicals that could be used for much of Italy. Despite the courageous and financially burdensome venture, due to the post-Risorgimento depression, the plant failed to emerge and for a long time products were still imported from abroad at high costs. It is no coincidence that the first large pulp plants were founded at the foot of the Alps, mainly in Arsiero, Vaprio and other locations in Piedmont.

At the end of the 19th century, abundant and low-cost industrial paper diversified its uses: in 1871 the first toilet paper in rolls appeared, in 1906 the first milk cartons in waterproof cardboard, in 1907 corrugated cardboard and then toys, clothing, furniture and electrical insulation.

The paper industry remained an important item in Italy for many years. Before the 15th century, its production is widespread but the areas with a considerable density of mills are not many. Almost all of them are for local consumption and only partly for export. The paper produced in the Genoese, for example, was exported to England before the development of English industry. From the various production centres in the Veneto and Marche, paper was exported to the East: Greece, Turkey and various parts of the Ottoman Empire. Isolated paper mills can be found everywhere in Italy, even in Sicily, albeit in small numbers. The entire pre-industrial and proto-industrial period, with a few exceptions, is characterised by modest investments. Paper mills developed mainly where there were three conditions: availability of water, availability of rags and availability of labour. This is why, generally, the paper industry arose in contexts that were also favourable to the wool and textile industries. The technology that sets in

motion the machines needed for paper processing is the mechanical-hydraulic technology, the same as for mills. Paper mills could be adapted or converted rather easily from wool and textiles to papermaking and vice versa, at least until the appearance of the large mills in the mid-19th century. This explains the contiguity of mills dedicated to these different specialisations and the passage of some entrepreneurs from one sector to the other, as happened, for example, to Lorenzo Zino of Naples, to cite a relevant case, or that of the Ciccodicola family of Arpino. There was often a significant geographical contiguity between a wool cluster such as that of Arpino and the paper cluster of Sora.

All the places that saw the development of the paper industry have additional common characteristics: not only an abundance of water but also the presence of water jumps capable of driving hydraulic systems. At the beginning, in the proto-industrial period, there are mills and an initial division of labour, but the workers do not work exclusively for the master and the machines are hydraulic; hydraulic works are minimal. Then, such hydraulic works became more and more important, necessary and costly to ensure a regular and abundant supply of water to be used as motive power (it set in motion the gualchiere, which allowed the raw material to be crushed) and for kneading. It is in fact the water that, combined with the raw materials, forms the pulp used to create the sheets of paper. The water had to be clean, preferably limestone, and free of impurities (suspended earth, dyes, algae), as this affects the whiteness of the paper and its homogeneity.

It is also the abundance of labour that allows the paper districts to start up, such as the artisan and then proto-industrial settlements of Fabriano, Genoa or Amalfi. Labour increased when the factories became larger and needed hundreds of

workers as in the factories of Isola di Sora and then Vaprio, Romagnano Sesia, Arserio, Fabriano. The availability of rags and rags is also very important, a characteristic of the Italian proto-industrial economy, from the Centre to the North of Italy. In fact, this was never an abundant raw material and the attempt to create a continuous supply gave rise to economic conflicts between regions and States.

The history of Italian paper, at a certain point, becomes an international history: technology transfer takes place from Italy to France and from there to England and Holland, then backtracks between the 17th and 19th centuries. Part of the Italian paper industry will be created, literally, by foreigners, mainly French, during the 19th century: Frenchmen who will invest in factories by founding some large paper mills. After the French Decade, immigrants of French origin emerged in the South: the Lefèbvre, the Roessingers and the Boimonds in the Kingdom of the Two Sicilies, to mention the most important names. Even members of well-known families who came from the world of transalpine paper production, such as the aforementioned Didot and Montgolfier, found investment opportunities in the same places. But other areas too, such as Piedmont, when it was the Kingdom of Savoy or when it was already part of the Italian state structure, benefited from the arrival of French entrepreneurs such as the Bernard di Fossano.

In any case, in order to write a history of paper in Italy in the 19th century, and to get to know its protagonists, it is necessary to start from individual stories, from the development over the centuries of small and large initiatives; from the start-up of modest mills with a few workers or proto-industrial systems that already practised economies of scale; to the actors who, in the various social and economic contexts, allowed this production to start up.

Raw material

Italian papers were good mainly because, from very ancient times, rag, or cencio, was used instead of the mulberry and bamboo fibres used by the Chinese. This consisted of light-coloured, undyed cotton fabrics, as well as linen, jute and hemp cordage, macerated in water to isolate the fibres and amalgamate them into a watery paste, to form the raw material. Obtaining this homogeneous, ductile, soft, light-coloured dough was the stage of the process on which most concentrated for centuries. Until the 19th century, dark or coloured cloth was avoided until it was possible to bleach it. These rags were selected according to their condition, quality and lighter or lighter colour (white was not always possible: this explains why antique papers often have an amber colour).

The pulp obtained by steeping, defibration and beating was then stretched and drained in special looms until the paper cloth adhered by felting and compression of the fibres.[21] Until the end of the 18th century, the papermaking process was constantly improved but not revolutionised. The real change came at the end of that century with the invention of a continuous production process, which effectively mechanised the shaping of sheets that were continuously produced by machines. This revolutionised the process while leaving the use of the raw material, always textile, unchanged.

[21] In the definition of the Vocabolario Treccani, felting is the effect produced by fulling in woollen fabrics, the fibres of which interpenetrate and weld together, so that the fabric becomes more compact, its weight per unit area increases and the interlacing between the threads is rendered almost invisible. Felting is also called gualca (from the tool of the gualchiera) or felting.

At an early stage, the rags were piled up in order to promote fermentation, often with the addition of lime, which promoted bleaching and maceration. When the different types of rags needed different treatment, they were beaten and macerated separately and only in a second stage mixed. In this way, the first mixture (also called coacervate) was more uniform. However, the natural fermentation of rags, which had been used since the Middle Ages, appeared too slow at a certain point to facilitate a continuous supply of the raw material. Sometimes the production of the coacervate took longer to complete depending on atmospheric conditions, temperature, humidity, the state of the rags and the place where fermentation took place. Other physico-chemical and environmental variables such as room conditions also played a role. Because of this unpredictability in the timing and quality of fermentation, this phase was gradually replaced by increasingly efficient systems such as beating or boiling with additives (from which certain ancient papers derived a certain colouring). This first phase served to prepare the raw material to be subjected to the mechanical stages of fraying and defibration.

Valencia fraying system

For the actual unravelling, the fibres had to be subjected to a very vigorous physical treatment that had to separate the fibrous elements. This process went through several increasingly efficient stages: manual labour, animal traction, wind and then hydraulic traction. This was followed, in the 19th century, by the hydroelectric phase with the installation of expensive turbines and, towards the end of that century, by

the electrical phase proper, which made papermaking less dependent on the availability of water for motive power.

The fibrous material was accumulated in mortars or piles that were initially hollowed out of large hardwood logs. The blows of the hammers or pestles, arranged in groups of 3 or 4, were driven into them. This device, which is thought to have originated in Valencia and then spread throughout Europe, was used throughout the 16th and 17th centuries. The system worked as follows: arms raised pestles alternately by means of teeth or eccentrics arranged in a helix on a horizontal shaft fitted with flywheels, which was turned first by hand, then by hydraulic force. Like every other element of this machinery, the pestles were improved over time by becoming increasingly sharp, sharp, and capable of effectively crushing and shredding the mass of rags, which were then subjected to beating and grinding processes with rounded hammers. Water was poured into the mortars alternately with the action of breaking up the fabric: it was to keep it rinsed until another similar refining operation reduced the frayed mass into the so-called fibrils, the minute, short fibres that made up the paper. This process would later be replaced by chemical leaching. It was a delicate process that had to be carried out carefully so as not to obtain a paper that was too soft and porous; it had to be rather compact, resistant, and transparent like the finest and most sought-after paper.

Shaping

The ready dough was collected in small successive doses from the vats with a thin rectangular shape slightly larger than

the size of a sheet of paper.[22] It consisted of a frame criss-crossed lengthwise by small sticks (called columns) that supported a warp of brass wires stretched in parallel, called wire rods. These were less than half a millimetre thick, arranged lengthwise and spaced differently from period to period, although a distance of one millimetre was mostly preferred. The wire rods were held neatly parallel by other threads larger than the strands, superimposed on them at intervals of 2 or 3 centimetres, with the function of tightening them against the colonels in order to form a firm weave.

An additional insertion of columns and threads to support the watermark was common. It was only later, in order to ensure greater uniformity of the sheet, that the columns were eliminated, leaving only the threads with the function of fixing the wire rods. A second template, the cascio, was placed on the frame and its hemming determined the thickness of the sheet. The edges of the sheet were irregular because the dough seeped along the edges. Once the mould set by the cascio was filled, the 'prenditore' would vibrate it to pour and condense the dough so that it was uniform. When it had the right consistency, the dough was tipped onto a woollen felt so that it would lie perfectly flat. Other sheets of felt were placed on top of the woolen sheets to form a pile of 144 sheets, which were then pressed and placed on a drying rack to dry.

[22] The process is described in Simonetta Iannuccelli, *L'Europa di Carta*, in Carla Casetti Brach, cur., *Gli Itinerari della carta dall'Oriente all'Occidente*, Istituto centrale per il restauro e la conservazione del patrimonio librario, Gangemi, Rome, pp. 95-148, especially pp. 120-127.

Drying and finishing

Various methods were used to speed up drying: the pressing of the stack of sheets and the alternation of paper and hot chalk plates. The paper used for writing underwent a further procedure of gluing in a bath of starch or animal gelatine made from scraps supplied by tanneries and butchers (called carnicci or limbelli). These operations made the sheets of paper less absorbent and more resistant to ink. The sheets were then squeezed of excess glue and dried on drying racks, hanging them in pairs of 4 or 5 from waxed ropes of horsehair or cattle hair.

To finish the paper, colouring baths, glueing, sanding with an abrasive stone and then, from the 17th century, beating with a mallet under which the entire surface of the sheet was run until it was completely smooth. From the 18th century, this too was replaced by hammering and then by cylinders that smoothed the sheet more evenly and quickly. The paper was then coated and finally the sheets were sorted and packaged in reams of 200 or 500 sheets. The watermark, which makes it possible to identify the various factories, spread from Fabriano as early as the 13th century: it is a special mark produced in the final stages of the coating process.

Robert's car

Until the end of the 18th century, the various stages, although better defined and perfected, remained the same. Only then came the great innovation of the Frenchman Louis-Nicolas Robert, who built a machine that revolutionised the

paper production system.[23] An improved version of it was financed by the London paper manufacturers Sealy Fourdrinier (1773-1847) and Henry Fourdrinier (1766-1854), thanks to the work of mechanic John Gamble (who patented it in 1801). Robert's machine went down in history as the Fourdrinier machine. An improved version of it was installed by the Englishman Bryan Donkin (1768-1855) who installed a version of it at the Frogmore Paper Mills from 1803 (he registered two patents in 1803 and 1804). The first actually working models were installed in 1804 and 1805. Several dozen were installed in Europe during the 1810s and 1820s, one of them in Italy, at Isola del Liri.

The development of the Fourdrinier Machine or Continuous Machine (or even Endless Machine) made it possible to manufacture paper on continuous reels, multiplying the possibilities. The pulp was homogeneously prepared and mixed, then distributed on wire meshes, then drained, arranged on felts, pressed, glued, dried with various systems on steam-heated rollers and finally passed to the subsidiary plants for polishing and coating. The first paper machines were small in size, then were continually improved and in the second half of the 1810s the first large models were introduced. The first real and functioning paper machine for industrial use was installed in Italy in 1828 by the industrialist Charles Lefèbvre in his factory in Carnello (Sora).

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[23] Surhone Lambert M., *Fourdrinier Machine: Papermaking, Pulp, Paper, Louis-Nicolas Robert, Corbeil-Essonnes, Paris, October 20, Bryan Donkyns,* Betascript Publishing Academic Press, Beau Bassin Mauritius 2010; on the Fourdrinier Brothers adds new information Peter Simpson, *The Forgotten Fourdrinier: The Life, Times and Work of Paul Fourdrinier*, Author House, Bloomington IN 2017.

New raw materials

When paper production changed from artisanal to industrial, new raw materials were sought: rags were no longer enough. As we know, paper cuttings and above all wood substances were used that had cellulose as their main component and offered the possibility of eliminating encrusting, gummy or resinous, colouring, tannic, starchy or sugary components. In this field, starting from the intuition that the common essential fabric is composed of cellulose, the use of other raw materials, such as wood, was experimented with.

The wood had to be fresh, winter-cut and therefore not too wet; it was soon realised that it was important to classify it according to the state it was in at the time of scraping and defibration against the rotating wheels. These, first of all, were not to 'grease' on contact with too pasty material. The wood, which was not too resinous and coloured, had to offer long, white fibres, which did not entail an excessively onerous task of freeing itself from encrustations. Pine (Pinus picea) with its white, long, strong fibres; fir (Pinus albes) with fibres that were less soft but easier to extract; young saplings (Populus tremula) with fibres that were easy to pluck, white, soft, were particularly suitable. Mountain pine (Pinus Sylvstris) with its darker reddish hue, poplar (Populus nigra), birch (Betulla alba) and beech (Fagus selvatyca) with less pliable and shorter fibres were also used. Still others such as linden or maple or hornbeam proved suitable for a lower quality paper because they were darker. However, the range of sources of raw material became more abundant and, in addition to the cutting of wild trees, the actual cultivation of them began, such as poplar cultivation, which spread across the Po Valley.

We know that experiments were carried out in many paper mills, from those in the Toscolano district to those in the Adda, Veneto, Marche, Umbria and the Liri Valley. At a certain point, many became convinced that wood was indeed an excellent source of cellulose raw material, but that much needed to be invested in research. Above all, there was a lack of an efficient defibration system to process the wood pulp.

New defibering systems

The new defibration systems introduced in the second part of the 19th century required the construction of expensive and bulky machinery. The logs, reduced to 0.60 to 1.20 m pieces, were crushed with a stone grinding wheel rotating in the normal direction of the fibres, which was continuously cooled, cleaned with a spray and a water bath. The mass thus shredded was placed under pressure and heated in an autoclave to free it from lignin, a waste substance; finally, the remaining cellulose, treated with alkaline and acid-acting reagents, was pulped by refining discs. The use of wood and chemicals altered the original characteristics of fine paper, compromising its quality. It was only later that chemistry made up for this by adding other substances to the pulp so that paper made from wood pulp could be called 'quality paper'.

Chapter 3

North-eastern Italy: Garda, Trento, Rovereto

The history of the paper industry must be studied in the Italian micro-regions and macro-regions, partly corresponding with the successive administrative districts, but sometimes better defined by the course of a river, a mountain ridge and orography (Apennines and Alps, pre-alpine belt) in relation to water availability and soil layout. A not secondary aspect for the development of paper mills were the customs and tax policies of the pre-unitary states, the political alliances that favoured (or depressed) the possibility of exporting the finished product. There is a world and a way of paper production that is pre-modern and proto-industrial in technology and organisation, but in this it is also influenced by being in the pre-unification period, with its customs barriers, or post-unification.

It must be considered that, after the unification of Italy, some areas suffered more than others from the changes introduced by the political unification process and others that, if not favoured, were not damaged by it. Geography also played an important role; the paper industries in the centre-south suffered greatly from the difficulty of creating infrastructure and transport, made more difficult by the lack of a policy for the South but also by the conformation of the land: in the South it made more sense to use the sea for transport and less sense to build the railway; the South, which in the 19th century had an important paper district in the Liri Valley,

could not take advantage of the Po river current to transport paper as the paper mills of the Adda, Lombardy, Piedmont and, of course, Veneto could. The history of paper, the reasons for the development of some areas and the lesser development of others (or the failure to develop at all) is complex and multifactorial.

There are specific studies, which will be mentioned from time to time and which take into account all or some of these variables; studies dedicated to the paper industry in Liguria, Piedmont, Lombardy, Tuscany, Marche, Veneto or individual smaller districts. Smaller, for example, than the current reference regions or straddling them. Studies that take into account territorial specificities from every point of view. It is nevertheless possible to trace a general history of the Italian paper industry, albeit with difficulty, partly because there has been a certain stability between the most suitable regions or areas (such as the Fabriano and Brescia areas) and less suitable regions, where the presence of paper mills is much rarer due to geo-morphological, climatic and orographical characteristics, such as the regions of the far South (present-day Calabria, Molise, Apulia, Sicily but also Sardinia).

The north-eastern regions of Italy, regions that include parts of Lombardy that were under Venetian rule for centuries and the present-day Veneto, in particular the Brescia, Vicenza, Treviso and Verona areas as well as the Trento and Garda areas, have been the subject of numerous studies, monographs dedicated to localities, personalities, districts and individual factories that have gone down in history for their importance, the tendency towards innovation distributed perhaps over several centuries, the social actions implemented in the area where they were built, and the stature of the men who led them.

The development of paper production in the Salento, Trentino, Vicenza, Treviso, Padua and Verona areas was due to the book production of the respective capital cities (Trento, Vicenza, Padua, Treviso and Venice). The considerable and prestigious book production in Venice and the Veneto region in general was closely linked to that of paper production: publishers, typographers, and master papermakers worked closely together and often belonged to related families. The publishers-printers needed quality paper, which began to be identified by watermarks. We will deal with the main papermaking areas or districts with the focus on the modern era and the 19th century, although a look at the previous centuries is necessary to better understand the industrial, social and even cultural dynamics that led to the development of the settlements.

Many paper mills sprung up on the western shore of Lake Garda, around Salò (a territory that gradually belonged to various pre-unitary states: the Republic of Venice, the Duchy of Milan, Venice again, then the Empire up to united Italy).[24] In Salò and the surrounding area, on Lake Garda, there were already 34 different papermakers at the end of the 15th century.[25] Documents mention the names of some papermaking families such as the Dana family, who were very

[24] For this reason, only the geographical areas will be reported and not whether or not they belong to Italian regions as they were established after 1948.

[25] According to a papermaker from Toscolano, Claudio Fossati. Cdr. Charles-Moïse Briquet, *Les filigranes: dictionnaire historique des marques du papier dès leur apparition vers 1282 jusqu'en 1600*, Hacker Art book, New York 1966 (first ed. Geneva 1907 in 4 vols.), p. 537. Briquet has catalogued over 40,000 watermarks trying to link them to manufacturers, paper masters, paper mills, periods.

active in Riva del Garda in the 16th century.[26] Paper was good and in great demand, so much so that the fame of Salò's paper mills spread to Maderno, Toscolano, Maina and Lusedo and led to the establishment of many other paper mills in the neighbouring towns, but also in towns far beyond that area or State. Many Salodians established paper mills in Verona, Bologna, Brescia, Vicenza, Chioggia, Noventa, Ceneda, Faenza and even Krakow and Prague. The first evidence of a papermaking activity in the area dates back to 1381 when a certain Bellinzani worked 'papyrus sheets' near the Bellinzani stream. He was not the only one, others are mentioned.[27]

In 1960, historian Georg Eineder deduced that there were at least 15 or perhaps 16 paper mills in Trentino.[28] One, located in Valsugana, already existed in 1440 although the precise location has been lost. Later, the Ferraris of Bassano started the **Scurelle paper mill**, with its annexed spinning mill, and restructured it. A few years later, there is evidence of the existence of a paper mill near Trento, at Vela. The first paper mill in Riva del Garda, on the other hand, dates back to 1480 and was run by Michele da Caravaggio. In 1537 stood the **Gavazzo paper mill,** in the locality of that name, on Varone, run by a certain Franciscus Cartarius. The building in Varone

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[26] Segarizzi Arnaldo, *Bricciche Trentine*, Tridentum, a.VIII, Trento 1904, pp. 121-131.

[27] Aldo Chemelli-Clemente Lunelli, *Filigrane trentine. La vicenda delle cartiere nel Trentino,* Patrimonio Storico e Artistico del trentino no. 4, Assessorato alle attività culturali della Provincia Autonoma di Trento, Alcione Trento, p. 22. Of course, the actual papyrus has nothing to do with it, but the intention with this expression was to emphasise that sheets were processed that resembled papyrus, although not in consistency.

[28] Eineder Georg, *The ancient paper mills of the former Austro-Hungarian Empire and they Watermarks*, Hilversum (Holland) 1960.

was readapted by a certain Graziadeo Toscolano and then purchased by him. Thus, production spread, later causing a shortage of raw material in the area. The activity of the cenciaioli, therefore, became frenetic, as did the supply of butcher's scraps used as an indispensable glue (i carnizzi). Certainly, the antiquity of the Trentino paper mills was greater than that of the Inn and Upper Danube mills. During the 16th century, documents record the continuing concern of the managers of Trentino paper mills not to be deprived of the rags exported to nearby paper mills in Veneto.

During the first half of the 16th century, five Garda paper mills were renowned for their paper that was exported, as early as 1550, to Trentino, the cities of the Po Valley, Trieste and beyond, even to Smyrna and various cities of the Ottoman Empire. To their managers, like those in Trentino, the prince-bishops Ludovico Madruzzo (1538) and then Carlo Emanuele Madruzzo (1658) granted the right of pre-emption on raw materials, protecting their export in favour of local producers.[29] A contractor tried to distribute the cenci and carnizzi to the five main paper mills that had sprung up along the Albola (the Danza), near S. Giacomo, along the Varone (the Bertagno). Other families besides those mentioned were the Fiorio and the Bozzoni of Toscolano. By 1630, over 22 paper mills, mostly flourishing in the second half of the 16th century, had to close, crushed by competition from Venetian paper.[30]

In 1580 Trento's paper was contracted out to Mr Zuane Zanbi of Toscolano from the Salò Riviera, who guaranteed a

[29] Aldo Chemelli-Clemente Lunelli. *Filigrane trentine,* cit., p. 75.
[30] Mattozzi Ivo, *Produzione della carta nello Stato veneziano settecentesco. Lineamenti e problemi*, University of Bologna, Institute of Medieval and Modern History, Bologna 1975.

regular supply and also opened a paper shop in the city. This did not please the Prato nobles, the new owners of the **Cartiera della Vela** paper mill. A long lawsuit ensued, one of hundreds dotting the history of Italian paper mills from the proto-industrial era.

The alternation of papermakers-typographers-bookmakers in the principality of Trento continued throughout the second half of the 16th century and into the 17th century between the numerous small paper mills in the Trento area (Vela and Vella areas), Salò and the valleys north of Lake Garda. Many testimonies report foundations, refoundations, bankruptcies, pleas, attempts to secure raw materials through lawsuits and disputes. Disputes also flared up in the first 15 years of the 17th century and the lawsuits always had the same motive: the scarcity of raw materials. The protagonist of those years in this area was the papermaker Gelmini and the Bozzoni dynasty with their **Bozzoni-Zanetti-Golin-Spaventi paper mill** in Arco di Trento. Carlo Zanetti took over the established Bozzoni paper mill in 1655, running it until the end of the century.[31] Finally, he sold it to Spaventi, a notary public, who leased it to Giovan Battista Matinelli of Limone in 1691.[32] A little later, the Vela paper mills were held by a certain Biaso Golin.[33] Other leases and management changes followed. The Vela paper mill, under the management of Giovanni Spaventi and sons, was finally valued at 3,500 Alemannic florins at a

[31] Cited in Aldo Chemelli-Clemente Lunelli, *Filigrane trentine.* cit., p. 56.
[32] Then they argued and finally came to an agreement thanks to the mediation of an heir of Bozzoni of the Varone paper mill and Pietro Beramino and Antonio Bertagno of Toscolano of the Albola paper mills.
[33] AST, Ms. 4060/2. Taglione of the year 1693. In Arch. Cons. (B.C. di Trento) where the name of Giacomo Bozzoni cartaro is replaced by that of Biaso Golin (14 July 1693). Quoted in Aldo Chemelli-Clemente Lunelli. *Filigrane trentine,* cit., p. 62.

division of assets between 1712 and 1713.[34] Carlo Spaventi will still be the owner of the increasingly rich paper mill in 1740.[35] In the middle of the century, there is another administrative change. The manager Scutelli was succeeded by Francesco Antonio Spaventi as procurator of the paper mill in favour of the Spaventi heirs and the contractor from Riva, Giobatta Bozzoni.[36] The paper mill continued to operate with several generations of the same family throughout the 18th century and part of the 19th. Its last managers preferred to set up an oil mill and spinning mill in the building.

Another factory that was active in the mid-18th century was the **Casagrande Paper Mill**, run by Mr. Romano and his sons Giuseppe Paolo and Giovanni Antonio with the help of his brother-in-law Giobatta Belloni from Toscolano. A crisis around 1770 hit the Casagrande factory and the main Vela paper mill. The companies of Carlo and Francesco Spaventi gave up direct management, selling or renting what remained of their handicraft complex to others.

Around 1725, a report by the Cinque Savii of the Venetian Magistracy warned that the closure or bankruptcy of the Salò mills had risen to as many as 38, resulting in an exodus of papermakers to Germany, France and above all Genoa, which at the time was able to supply both the West (particularly England) and part of the Levant with paper. Between the Salò and Limone areas, 34 other paper mills were still operating and the Venetian Senate, backing the requests of a Serenissima

[34] *Ibid.*
[35] This management assignment dates back to May 1728 and involved various local businessmen and master papermakers.
[36] By consular edict 9 January 1750. Further ordinances were issued until 1770. Cited in Aldo Chemelli-Clemente Lunelli, op cit., p. 68.

magistracy, the Cinque Savii alla Mercanzia, suspended customs duties on rags and flesh-glue and all other customs and transit taxes for 10 years. According to the papermakers' complaints, these taxes, taken together, amounted to 20% on the value of rags and 10% on that of glue, weighing 20% on the paper manufactured. The ten-year exemption was renewed in 1736 and 1748, while in 1756 and 1768 the taxes were very low. In this way, during the 18th century the activity of the paper mills on the northern shore of Lake Garda came to life, so much so that nine more were added to the original 34 immediately and then in the next few years, reaching a total of 72 vats of pulp. As the Garda paper mills rose, the Trento paper mills went into crisis. The two markets were close and, at that time, they could not survive together.

At the end of the 18th century, many historic families of Trentino papermaking from the proto-industrial period ceased their activities, such as the Casagrande, Spaventi and Sinibaldi families, although there was no lack of attempts, especially by outside merchants and artisans, to restart production. The **Martinelli paper mill** in Buco di Vela, owned by a certain Martinelli, went into crisis at the beginning of the 18th century. Due to various debts, he had to make an agreement with a certain Giovanbattista Tomaselli, agent of the Scurelle paper mill, to pay six heavy instalments starting from 1795. Martinelli's creditors were also overwhelmed, such as the Ferrari brothers, who were taken over by the firm of Emerich & Co. of Augsburg. In 1802, he was sued as a debtor by Giorgio Adamo Emerich for insolvency. His buildings at Buco di Vela went to auction in 1808. But in 1815 he was still active and in 1818 the paper mill was bought by the Counts Malfatti and then put to another use because it is no longer mentioned.

Vittorio Spaventi's heirs decided to sell the inheritance that included 'two cartare alla Vela' (31 December 1802) and found the Testori brothers of the Cartiere di Rovereto to be the worthy continuers of their tradition. Giovanni Maria Testori had purchased the former Casagrande paper mills a few years earlier, held them until 1808 and then sold them back to Gioseffa Testori in 1817.

Thus, by 1847 the situation of the Trento area's paper mills had simplified and many had succumbed to competition from Rovereto and Riva. In that year there were two paper mills in the Vela area: the first was **Giuseppe Colombari's paper mill,** with five mills, only three of which were in operation, employing, in addition to the mill manager, 23 men, 26 women and 10 children (59 workers in all). The machinery was driven by water and produced 12,000 reams of paper of 480 sheets each; 500 reams of writing paper; 1,000 for printing; 1,000 for wrapping; 1,000 for cardboard. It was all marketed in Italy, the Salzburg area and the Tyrol.

Another very small mill in the area was the **Giobatta Dalla Costa paper mill** run by Marco Parule. It was a small 1-tonne paper mill that employed 3 women, 2 men and 3 boys (6 workers in all). It produced 2,500 reams of wrapping paper; 500 of cardboard. It was driven by water and closed in the middle of the century. On the other hand, the **Cartiera Colombari paper mill** survived, competing with the firms of Rovereto, Scurelle and Tesero, which exhibited 85 types of paper in an 1857 exhibition. Only industrialists Jacob & Co – of whom we shall speak – did better in the area, producing 100 types of paper. After the death of the proprietor, the Colombari mill reduced its work considerably, and finally, in 1890, it became a branch mill. Another paper mill in the area, just outside Trento, famous for its production of stamps was the

Biacesa paper mill on the Ponale, which, after years of prosperity, went into crisis after 1881 and closed down for good in 1904.

Four factories in Riva del Garda on the banks of the Varone, that of the Bozzoni, Francesco Nicolò Fiorio and the factories of Albola and Tenno, joined forces in 1808 to ask the Bavarian Royal Commissioner to supply the State with stamp paper to the same extent as was granted to the paper mills in the Bavarian Tyrol. This request can be found in a plea from 1808.[37] The Royal Bavarian Commissioner invited the four mills in Riva to send samples of normal stationery to Innsbruck on 19 July 1808. The proposal was partly accepted with agreements to guarantee the collection of fodder and raw materials.

During the 1830s, paper mills in the Riva del Garda area created elaborate watermarks to distinguish their paper from that imported from Milan and Rovereto. It was not until the middle of the century that Jacob & Co., which had an industrial outlook, forced the Varone papermakers to update their complexes. The **Cartiere Riunite del Varone** led by the Fiorio family stands out in this. First Francesco Nicolò Fiorio (died 1843), then his son Carlo Fiorio (died 1882) and Giulio (died 1832) up to Guido Fiorio (1859-1915). The son of the latter, Baron Livio Fiorio (1888-1975), lived at a time when the still wealthy family had been ennobled with baronage but no longer had anything to do with the paper mill. The Fiorios managed to have their excellent paper adopted by Emperor Franz Joseph for his personal correspondence. After various vicissitudes, the last Fiorio, Guido, sold the Cartiere Riunite

[37] Municipal Archives of Riva del Garda, manuscript no. 908, fasc. ad a. 1808, Aldo Chemelli-Clemente Lunelli, *Filigrane trentine*, cit., p. 95.

del Varone di Riva to Oscar Sernfeld along with the rights acquired from the installation of the new turbine in 1902. The company, however, went bankrupt and was given to bankruptcy administrator Andrea Peloso and then sold to the Fedrigoni group of Verona. The old plants (of Cornish boilers, two straw dough kettles, the now-aged Dutchmen) were replaced by new plants housed in 4,000 square metre warehouses. As a result of Fedrigoni's activities, all the old paper mills no longer in step with the times closed, such as the Bozzoni in Riva del Garda, the Trento, Scurelle and Rovereto paper mills, the Mori paper mill and the small Dro paper mill.[38] By this time the panorama of paper mills in the area had been further simplified with the start of proper industrial production by Fedrigoni, which would later absorb several paper mills in the area. But the Fedrigoni story will be told elsewhere in this book. Here it was only necessary to show how old some of the paper mills belonging to the group were.

The ancient paper mills on the Albola stream, which flowed in the plain extending north of Garda, in the western area, towards Tenno, had different, often unfortunate, managements. At the end of the 17th century there were the managements of the Toscolani Pietro Bergamino, Michele and Bartolomeo Danza, and Bartolomeo and Antonio Bertagno. The Fiorio family took over from the Zaniboni paper mills in the 19th century when the Fiorio family concentrated on the Cartiere Unite del Varone (there were two paper mills on the Varone at this time: one 'above' and one 'below', later acquired by Fedrigoni). As can be seen, there were centuries-long

[38] Dro, now a municipality, once part of the so-called Magnifica Comunità, is the connecting point between Upper Garda and the Cavedine Valley. The Toscolano Valley was so rich in small paper mills that probably not all of them have been restored to historical memory.

continuities on the part of some families; when the paper mills resisted, in the late 19th and early 20th centuries, they entered the orbit of the large groups.

In 1821 Germano Zaniboni (younger brother of Amadio Zaniboni of the Mori Paper Mill) temporarily settled in Riva. When he died in 1849 the **Zaniboni Paper Mill**, which had just been taken over by the last papermaker of that family, Amadio junior, was ruined by fire and had to be rebuilt. The executive licence was given in 1852. After Amadio Zaniboni's death in 1881, however, the paper mill lasted only a few more years and was then closed.

Another Fiorio, Giacomo, a relative of the other papermakers, who owned the paper mill in Albola, tried to focus on quality paper. But in the area they mainly manufactured boards and papers of lesser quality, for wrapping, and this made it difficult for him to emerge. He tried again in Tesero in 1876, where he stayed for a few years. The paper mills at Albola, abandoned, were restarted by Lucio Castellini & C. and the brothers Achille and Vincenzo Usneghi (or Isnenghi) in partnership with Vincenzo Andreis, who continued until 1910 mainly making wrapping paper.[39] At one point the director of Usneghi was Félix Lebon, who was related to the French papermakers who ran the Fossano mill.

Also in Gavazzo, on the Varone, the paper mill operated in the first decades of the century by Francesco Lonardi continued to operate. His continuators included Giovanni Scrinzi, who entered into partnership with Guido Fiorio and Guglielmo Morosi to form the Cartiere Riunite del Varone.

[39] Aldo Chemelli-Clemente Lunelli, *Filigrane trentine,* cit., p. 98.

Filippo Avanzini kept a paper mill open in Dro from 1886 to 1890.

There were two paper mills in the Rovereto area in the 18th century, located on the banks of the Leno from 1775. The **San Colombano paper mill** was run by Giuseppe Maria Fedrigoni and his partner Sarcletti until 1806. Apart from the fate of this paper mill, Giuseppe Maria Fedrigoni was the first exponent of a dynasty of paper industrialists that would continue into the 21st century, forming a group, the Fedrigoni Group, that would also absorb the historic Cartiere Miliani of Fabriano, becoming one of the largest paper groups in Italy.

A Gian Maria Testori founded a **paper mill at the Ronchi di Borgo S. Tomaso** on the Leno di Vallarsa (parish of Lizzana). The Borgo San Tomaso building stood in the locality of 'Ai ronchi' in Lizzana and had annexed 'the building for making paper, cloth, rooms, kitchens, courtyard, ballad store'. In 1806, Gian Maria Testori, having returned from his experience in Trento, resumed his quality production in Rovereto.[40] In the last period, the paper mill was managed by his widow Testori, who closed the factory in 1881.

History records the existence in the area of a **Mori Paper Mill** run by the papermaking brothers Amadio and Germano Zaniboni. In 1817 they expanded by buying the paper mill on the Cameras stream, which they ran until 1845. The Mori paper mill was abandoned for a time and then taken over and managed by Enrico Passerini, who until 1896 produced hand-made wrapping paper, the only one that could stand up to the

[40] A sign of vitality is the presence of many watermarks, a trademark that distinguished the papermills and is now considered a historiographically important element.

competition, considering the not too distant and flourishing Jacob Paper Mill.

A little further south of Mori, in the locality of S. Margherita di Serravalle, the small **S. Margherita paper mill** was opened, run by Gian Battista Zuanelli, Passerini's former collaborator.

Important for the area was the **Scurelle Ferrari-Weiss paper mill** in Valsugana (different from the other, older Scurelle paper mill, named as active in 1440), which must date back to 1715. Around 1791 the spinning mill on the Maso stream was purchased by the Ferrari brothers of Bassano who modernised it, adapting it to paper mill production. In 1795, the paper mill was administered by the papermaker Giovanni Antonio Setti, who entered into the business of contracting rags and flesh. Around 1797, the company was sold because it was burdened with a heavy debt position. Ferrari had lent money to the papermaker Martinelli of Trento, as we have seen above, but he was unable to repay because his business was overwhelmed by a structural crisis that had led to a decrease in the demand for paper or, more probably, because of the Napoleonic wars. Consequently, the Ferrari brothers of Scurelle had also found themselves in difficulty; their debt to the Weiss brothers of Strigno amounted to 2,117 florins and cart. 30 and they had had to mortgage much of their property. In order to pay part of it, they had to assign credits at disadvantageous conditions. There were also serious commitments with the Emerich company in Agusta that led to the seizure of the textile and paper group in Scurelle. In order to resolve the issue, the parties met in 1797 and agreed on the free use of a certain amount of assets to finish some work already planned. On 25 June 1797 the firm was sold by the

Ferraris to the firm of Giorgio Adamo Emerich.[41] The final liquidation of the spinning and paper mill factory took place in 1814. That year, it was bought by Pietro Weiss & Bertagnoni, who completely rebuilt the plant to start a more qualified production. In a cadastral note of 1830, we have a description of the plant of what became the Weiss Paper Mill. In 1837, the management passed to his son Pietro Weiss: the business continued into the 20th.[42]

In the year that followed Emerich's first management in 1798, Giovanni Battista Dal Maso, an ingenious carpenter employed at the mill, obtained a patent for a practical paper pressing and polishing system that advantageously replaced the outdated German one. The paper mill was given a new lease of life when Pietro Weiss of Strigno (who died in 1843) took possession of it between 1814 and 1815; on that occasion, the facilities were radically renewed in order to start a more qualified production that began with a new watermarked patent. The 1830 cadastral note summarises: "three laps of maj for ash strips, with a lap for the majo to clean the paper, another lap for the modern cylinder and triplicate scuso; three vats with their separate basins and three screws (presses) for pressing the paper, with all the necessary rooms on the first and second floor, (all) well built and equipped for this branch of industry, with a straight Rostra, with Lisciara and Ruota that raises the water for better comfort and finally with ten dwellings for workers in the evening, which include the land of 63 pertiche... estimated for profit F. 4500".

[41] Aldo Chemelli-Clemente Lunelli, *Filigrane trentine,* cit., p. 107.
[42] *Ibid*, pp. 109-110.

In 1837, his son Pietro Francesco continued his father's work by adding an F. P.W.F. (son). For the first three lustrums of our century, production in Scurelle increased to the point of satisfying a large part of the southern Tyrol; but, after the Weiss filter papers acquired international fame for their fineness right at the beginning of the Great War, the factory, straddling the two fronts, was the target of bombings that destroyed it and, at the end of the war, the owners, short of means and materials, were no longer able to get it back on its feet.

The Valsugana Paper Mill was rebuilt later and improved during the first and second post-war period with considerable improvements in machinery, external structures and management criteria, which allowed for a more modern variety of 'special papers'.[43]

Overall, the Weiss family maintained control of the Scurelle paper mill for a century, from 1812-1813 to 1915, and the reasons for its closure were purely force majeure. Later, however, the paper mill was purchased by Beniamino Donzelli in 1836.[44] Its history has continued into the 21st century. It is therefore a paper mill in continuous use, except for some stoppages and reconstructions, from 1715 to 2020 and beyond.

[43] Land Registry Archive 19/3 Scurelle ad. A. 1830 min AST.

[44] Beniamino Donzelli with his son-in-law Ferruccio Gilberti bought and rebuilt the paper mill, which in 1973 was purchased entirely by the Gilberti family, who specialised in the production of fine papers. At the end of the 1990s, the company – which includes the two production sites, Scurelle and Cordenons – took the name Gruppo Cordenons. In July 2018, the Cordenons Group was acquired by Bain Capital Private Equity.

The **Tesero paper mill** was established on Stava and was probably not the only one in the area. Giuseppe Zaniboni also operated here from 1876 after leaving the Albola di Riva del Garda paper mill. At the end of his experience, his brothers Ferdinando and Antonio took over the management from 1881 to 1903.

In Predazzo, two other paper mills were in operation on the Abisio towards Moenta in the Travignolo valley, both run by the Guadagnini family. The first, the **Cartiera Guadagnini-Valentini** (dyeing and paper mill), began operations in 1859 and continued with Francesco, Antonio and Giacomo from 1876 until 1889. The second **Cartiera Guadagnini** was started by Antonio de Francesco in 1869 and continued in its last period by his son Carlo until 1881.[45]

The Fedrigoni-Jacob paper mill in Trembileno **was an** important paper mill in the Rovereto area, where Giuseppe Fedrigoni, who was very active at the beginning of the century and would become an important figure in the history of the Italian paper industry with a brand that is still known today, worked. The Fedrigoni family had been active in the paper industry in that area for some time and would become a major player in the following decades. On the subject of the Fedrigoni family, historian Mario Martinelli wrote in 1999 about the town of Mori:

The Fedrigoni family originated from Mori, as shown by a document of sale of land in the locality of Tierno di Mori dated 1564. The progenitor, according to the signature on the document, is a

[45] *Elenco degli industriali che hanno il diritto attivo di elezione nella Camera di Commercio e Industria del Tirolo italiano in Rovereto per la sezione industriale*, Rovereto 1858; *Elenco degli indirizzi degli esercenti industriali nel distretto camerale*, 1869-1910, Rovereto 1911.

certain Federico, of the late Antonio Fedrigoni of Mori. This family was probably, like the vast majority, of peasant origin. Towards the end of the 17th century, one of the members named Marco opened a haberdashery shop in the centre of Mori, which the family ran for almost a century. In 1698, Giuseppe, Marco's son, tried his luck in Rovereto after the death of his father. Giuseppe, a young man with entrepreneurship in his blood, who was to become the future pioneer of the paper industry, opened a shop together with his godfather Antonio Moiola di Besagno in the Rialto district of Rovereto. On 11 March 1707, he obtained from the Rovereto municipality the exclusive licence to sell meat, and again on 10 February 1712 the licence to sell salt. The young Giuseppe was noted for his industriousness, so much so that he gained the sympathy and credit of the banker Tacchi, who was willing to lend him money. With the money he borrowed, he bought a palace in the locality of Pontello and shortly afterwards purchased another from the notary Pietro Malinverno in the locality of Forno. But things do not go as planned. A few years later, he had to sell everything, even the two houses he owned in Mori to pay off the debts he had accumulated. That economic misfortune was a decisive moment in the future of the Fedrigoni family. In fact, on 25 August 1717 Giuseppe rented Giuseppe Pivani's paper mill in Ronchi di Lizzana for 110 florins a year. After a few years, the young man opened his own mill. And on 17 January 1724, he buys a 705-perch plot of land with the right to use the water of the Leno stream from the foundation of the S. Colombano chapel. With a mortgage loan of 1,200 florins at 6% interest (according to documents dated 15 April and 2 June 1724) granted by the banker Giuseppe Cosmi, he began the construction of the new paper mill. Further money was provided by the dowry of his wife Teresa Plotener of Trento to the value of 782 ragniesi, corresponding to 704 florins. The new factory became fully operational in 1736, and from this moment on, the long dynasty of Fedrigoni family papermakers began. Giuseppe, the progenitor, had seven sons, one of whom, Martino, became a priest. After his father's death, his sons Marco and Antonio continued their father's business.

On his death, Marco named his son Giuseppe Filippo di Colombano as universal heir, while to his daughter Teresa he left a legacy of 250 ragniesi. Giuseppe Filippo married Giuliana DeVigili of Mezzolombardo, who bore him nine children, of whom only three survived: Giuseppe Maria was captain of the Austrian guards; Giusto was an aide to H.H. Prince John of Habsburg. Giovanna Francesca embraced the religious life as a nun in the Salesian convent in Rovereto. But it was the latter's cousin, Giuseppe Antonio son of Antonio Lorenzo Simone, who continued the centuries-old papermaking activity by finding new outlets outside the province. In fact, on 9 January 1888, he founded the new paper mill in Verona, drawing its motive power from the new canal commissioned and built by the mayor of Verona, Giulio Camuzzoni. The Fedrigoni paper mill was Verona's first industry powered by the new canal. Here is what the daily newspaper *l'Arena* of 7 June 1888 wrote on the subject: 'Yesterday our municipal council went to visit Mr. Fedrigoni's new factory on the industrial canal near Tombetta. It is the first and only one that has been erected after three years since the waters of the Adige ran into the canal that our municipality had built to give an industrial impulse to our city. Mr. Fedrigoni has given a great example of courage and constant patience in the implementation of his project matured over the years with wisdom and intelligence guided by his long experience in the paper business. With such factors, the success of the industry conceived by Mr. Fedrigoni cannot fail, and we wish him prosperity and depth. The Fedrigoni group is also the owner of a plant in Africa for the production of fibreboard, founded by Gianfranco Fedrigoni, sole director of the S. A. Adams Fedribord Company. This, in short, is the story of a dynasty of entrepreneurs in our township.[46]

The lease gives information on equipment and expires on 19 August 1818. The rent was 300 florins to be paid semi-

[46] Martinelli Giacomo, *Mori e la sua gente,* No. 31, Mori 1999 (brochure also reproduced online).

annually in two instalments. Three years before the expiry date, in 1815, the Trambileno paper mill was sold to Luigi Jacob and took the name *Cartiera Jacob di Trambileno*. Its motto was 'Come back the sun, not the weather', it equipped itself with a bindery and began its work until 1837. That year, the owner, aided by his sons and a partner, Gaetano Tacchi, set up a company and adopted the Fourdrinier machinery that produced the continuous sheet paper, commissioning the patent-holder Bryan Donkin to supply a paper machine. The Austrian government granted an import duty rebate as an encouragement. The new production, however, required a new location.

The old hermitage of San Colombano was no longer suitable to house the machines that were to be purchased and was thus abandoned. The paper mill moved to Noriglio. The noble and wealthy Rosmini Serbati family came to the aid of the great enterprise by ceding a vast estate on the banks of the Leno at alla Sega. The fund enjoyed an ancient concession of free water and washing water suitable for the purpose. The re-launch of Jacob & C. was immediate: in a short time, the new company, organised on a large industrial scale, reached a quality and quantity level among the highest in Europe, with a daily production of 200-300 reams and an annual average of around 70,000 reams of various types of paper. The number of employees reached 150 at certain times and was supported by a mutual aid fund and a social infirmary. The Jacob company was awarded prizes at the Vienna Exhibition in 1845 and at the Trento Exhibition in 1857. At that time there was a demand for wallpaper, commercial wrapping paper, blotting paper and coloured writing paper in various colours. Paper produced by France entered Northern Italy more easily, while the Kingdom of the Two Sicilies remained more protected for this type of

production mainly due to logistical rather than customs difficulties. For this reason, in the Liri Valley, a Lefèbvre paper mill specialised in the production of a wallpaper of remarkable quality.

The water from Rovereto was of great quality: the components of the mixture were excellent, and the quality of the washing water gave the finished product exceptional compactness and lustre. The fame of this quality ensured regular patronage in the Austro-Hungarian Empire, France, England and other important Italian clients such as the Ricordi house in Milan or Zanichelli in Bologna for fine editions. In 1850, Luigi Jacob died, leaving the responsibility to his son Filippo, while two other sons, Albino and Pietro, increased production and distribution in Veneto and Lombardy. The paper mill was modernised and enlarged and until 1866 suffered from the double outgoing and incoming duty. In 1882, it suffered extensive damage from a flood and the old Trambileno paper mill had to be put back into operation. In 1907 it was destroyed by fire, rebuilt and again destroyed by war in 1914, so that the Noriglio mill also had to be abandoned. The old paper mill resumed later, producing wrapping paper. After an extension ordered by Eugenio Jacob, production was extended to various types of commercial paper, with 260 workers. The new building was equipped with a 700 HP power plant for the rapid drying of paper. The number of workers increased from 260 to 300 in 1924, and an output of 20 tonnes of paper per day of each type was achieved. When Eugenio Jacob died in 1937, the company was taken over and managed by Anonima Tabacchi Italiani, which modernised the complex, the building, the canals and the machinery. New reinforced concrete sheds were added, as well as new machines for decomposing and utilising straw and tobacco

styles, and new converting, die-cutting, printing and lithography departments were added.

Paper mills in Belluno

A few paper mills can also be found in the Belluno and Feltre area, although they are small, but the Cartiera di Vas paper mill stands out in the area, which was closed in 1965 after more than a century of activity.

Chapter 4

North-eastern Italy: Vicenza, Treviso

Overview: modern sources

In general, during the 18th century the number of paper mills in the Treviso area increased from 24 in 1725 to 38 in 1791.[47] The *Catasto Napoleonico* (1807) reports the following number of mills in the Veneto:

3 paper mills in Verona
17 paper mills in Vicenza (16 in the province)
40 paper mills in Treviso (29 in the province, including 2 in Serravalle and 6 in Ceneda)
2 in Belluno (of which 1 in the province, in Vas)
7 in Pordenone (of which 5 in the Province)
2 in Udine (in the province).

There are three paper mills in the municipality of Treviso:
Paper mills of Zuanne Comisso, 8 workers
Antonio Romin's paper mill, with 5 workers
Antonio Paluello's paper mill, with 21 workers.

123 people out of 1,252 inhabitants work in the three Carbonera paper mills. But there are 12 paper mills in all.[48]

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[47] Gasparino Danilo, *Cartiere e cartai nel Trevigiano tra XVI e XIX secolo*, in Fontana Giovanni Luigi - Sandal Ennio, *Cartai e stampatori in Veneto*, Grafo, Brescia 2001, pp. 55-70. Ibid, p. 60.
[48] *Ibid*, p. 63.

The Austrian land register records 40 paper mills, more or less the same. By 1807 the production poles that had been confirmed during the eighteenth century were confirmed: Ceneda-Serravalle above all with Follina, Villorba, Carbonera and Treviso with a dozen or so mills. The entire Veneto region, due to the presence of ancient courts and prestigious cultural centres, has a tradition of paper mills in the pre-industrial and proto-industrial phases. Paper mills in the Vicenza area are attested from the 15th century with the **San Pietro Paper Mill**, although it is probable that small mills were active even earlier.

Paper mills are attested in the Treviso area from the beginning of the 13th century and in the Padua area from 1339.[49] As we have seen, paper mills have been active in the Salodian and Veronese areas since at least 1350. Printers and booksellers are active in the city of Vicenza, which suggests that there was local paper production as early as that period. There is also talk of book production in various monasteries in the city of Vicenza from the 13th century onwards. The first known paper mill is the named San Pietro Paper Mill inside the monastery of San Pietro in Vicenza from the year 1445. This was founded when the nuns' chapter changed the use of some old mills that had sprung up on the Bacchiglione river and transformed them into small paper mills. Some of the nuns, such as the abbess, belonged to noble families in society linked to literary circles. In 1476, some humanists, such as Bartolomeo Pagello (1446-1526) and Barnaba da Sossano (first half of the 15th century, post c. 1480), entered into a

[49] For the case of Treviso and its territory in the Middle Ages, see Giancarlo Cagnin, *Prometeno de fare le carte le più fine e li miore como si feceno in sulo Trevixano*. *Le origini e lo sviluppo dell'industria della carta a Treviso nel Medioevo*, in Giovanni Luigi Fontana-Ennio Sandal, curr., *Cartai e stampatori in Veneto*, Grafo Brescia 2001, pp. 25-35.

partnership with the printer Giovanni del Reno. In 1477, there is evidence of a papermaker called Francesco da Fabriano. Later, the paper mill was entrusted to master papermaker Antonio di Torrebelvicino, who had already joined another paper mill in Vicenza, the **Ponte Pusterla Paper Mill,** in 1460. A third paper mill, the **Ponte degli Angeli Paper Mill**, was entrusted to the nuns of San Pietro from 1482, who in turn entrusted it to Antonio's sons. The family of Giacomo da Rotzo (Vicenza) and sons also worked at Ponte Pusterla.

During the following decades, the two paper mills, San Pietro and Ponte Pusterla, were active, although documents show the existence of other buildings devoted to paper production linked to bookshops, such as the shop in Piazza dei Signori owned by Girolamo Zeno (in activity from at least 1478-1498) and run by descendants until 1547. Another workshop in Piazza dei Signori belonged to master Giovanni da Velo, who owned buildings used for paper production in Borgo Berga where his son, master Zanandrea, worked in 1453, and in 1477 a Nicola cartaro del fu Matteo.[50]

In San Michele, towards Porta Borga, we find the presence of a Bartolomeo "cartolario" from Treviso recorded in 1453. In 1470, the workshop of Battista cartolario, belonging to a family of humanists, was also located there. And this workshop was maintained by his son and then grandson until at least 1519. Paper was also produced in the city, as evidenced by the small mill kept by Gaspare Monza since 1487 in Dueville and run by a certain Lorenzo, which probably ceased at the beginning of the following century.

[50] Simeone Maria Nicoletta, *Le origini della produzione cartaria nel Vicentino*, in *Cartai e stampatori in Veneto*, cit., pp. 7-9.

The 16th century was a time of crisis, if it is true that only 10 works were printed in the city of Vicenza in the first half of the century despite the 10 printing workshops. Since domestic production had declined so much, the Vicenza area became an interesting market for master papermakers from Brescia, Salodi and Verona: it gave many an opportunity to become rich. Famous is the case of Pietro di Giampietro degli Zanini, known as Perin libraro (died 1588). He belonged to a family of paper merchants from Salò who arrived in Vicenza in 1580 and gave a boost to paper and book production. He came from Ca' dell'Aglio near San Martino Buonalbergo where papermakers had existed since 1425. Around 1560 he lived in the **Dueville Paper Mill**, founded in Bosco di Dueville at the end of the 16th century, which was bought by Laura Salona of Vicenza in 1500. The history of the paper mills in Dueville, although not numerous, is not easy to decipher: Walter Panciera however distinguishes between a **Paper Mill in Bosco di Dueville** (founded at the end of the 16th century) and a **Paper Mill in Vivaro di Dueville**, whose building still exists and which should correspond to the Cartiera Grande dei Rizzardi.[51]

The paper mill in Bosco di Dueville produced paper of various types, 'bombacina, bergamina e cartoni'; the building that still exists today was built at the end of that century with subsequent alterations. The first Dueville paper mill passed

[51] It was run by the Bellon family and did business with Giacomo Fontana, a book merchant, whose wife Anna Collosin was part of the family that owned several paper mills in San Martino Buonalbergo. Panciera Walter, *Le attività manifatturiere del vicentino nel XVI secolo*, in Uomini del contado e uomini di città nell'Italia settentrionale del XVI secolo, Atti del Convegno internazionale di Storia, Arte, Architettura, Torrossa, Vicenza 2017, p. 220.

under the management of the Bellons to Pierin in 1563. The latter in 1586 addressed a plea to the lords of the city to keep him the rent for the workshop in Piazza dei Signori. His partner was his nephew Iseppo Da Porto, who purchased the Cartiera di Bosco di Dueville paper mill from Laura Salona, the previous owner in 1581. He always surrounded himself with workers from his village so that the secrets of the trade would not spread. The Dueville paper mill was rebuilt in 1595, as Marco Maule and Giovanni Marchetti write:

"Thanks to a notification from 1595, we know that Iseppo Da Porto had the present paper mill built on the site of a pre-existing grain mill already owned by the Buosi brothers. However, the first map dated 1628 depicts the building in question rather vaguely. Much more precise, on the other hand, is the map of 1667 that depicts the paper mill as consisting of two bodies juxtaposed along the irrigation ditch with three water wheels.[52]

In 1791 the Da Porto paper mill passed into the hands of Giovanni Battista Farina. In 1849 a Farina, probably his son, sold it to Gaetano Longo. Under his management, with as many as five water wheels in operation, the Dueville plant experienced a moment of expansion. In 1885, the paper mill was purchased by Gaetano Busnelli from Schio, who introduced the sophisticated 'endless machine for the production of straw paper', an heirloom still visible inside the mill. This brings us to the 20th century: Busnelli sold the paper mill to the Bagarella brothers who, in 1930, leased the mill to Giuseppe Valente, who then bought it outright in 1934.[53]

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[52] Maule Marco and Marchetti Giovanni, *La Cartiera di Dueville,* Associazione Antica Cartiera, Dueville 1996, p. 33.
[53] *Ibid*.

The Marca Trevigiana has been considered very suitable for paper production since the Middle Ages. Environmental factors, even here, played in its favour: a lot of water, many fontanili that flow between Vicenza and Treviso and act as a hinge between the high and low plains. Straddling the band of fontanili emerges the phreatic zone; the Sile system that receives the waters of numerous watercourses from the North: the Cera, the Giavera, the Pegorile, the Boteniga, the Piavesella, the Cagnani, the Storga, the Melma, the Rul, the Piovenzan, the Mignagola, the rio Bagnon, the Musestre, the Nerbon, the Vallio, the Meolo. These are not only real rivers, but also streams, rivulets, canals with abundant and constant or semi-constant flow rates that form a system highly suited to energy exploitation. Moreover, the Marca Trevigiana is close to a city that has been culturally alive since the Middle Ages, Treviso, but also to Padua and Venice. It was a lively area, with considerable trade flows, which naturally needed a lot of paper.

Of all the mills present in the Middle Ages, from the end of the 15th to the beginning of the 16th century, the Carbonera district along the Melma river system remains the only ancient district in action. In Treviso and surrounding areas, paper mills were transformed into woolen mills, while the district of Ceneda remained alive with master papermakers who came from Salò. From the middle of the 18th century, the Visnadello-Villorba-Fontane paper pole was born and the suburban belt of Vicenza was affected by the establishment of new paper mills in Selvana, Fiera and S. Maria del Rovere.

During the 18th century, thanks to the abolition of duties, many paper mills developed: 6 in the city and 20 in the suburbs, 26 in all. Small, family-run mills for the most part, but sufficient for local needs. Between 1725 and 1770 the

number of paper mills increased from 24 to 36 and in the following decade greater productivity was noted. A profound transformation took place in the sector at the turn of the century but the Treviso area, despite the changes in ownership that characterised the period, remained an important production centre in the Veneto.

Treviso District

Ownership of the paper mills in the Treviso area remained for a long time among families of ancient nobility, such as the Gritti, Gradenigo and Priuli families; then, as in the rest of Italy, a new class of wealthy upper middle class appeared, mostly of commercial origin, who first took charge of running the mills and later became their owners. Among the tenants were Giovanni Berti and Pietro Florian, who ran three paper mills each. Giovanni Venerando, between 1821 and 1840, bought 4 small paper mills and Florian owned 2. The number of mills that continued to fluctuate for decades between 37 and 40 was probably the maximum that the area could manage. More paper was evidently not needed or could not be exported. The real limitation, as all contemporary observers and historians point out, is technological renewal. Gasparini quotes a *Ricordo della provincia di Treviso* (1874) by Antonio Caccianiga in which he points out that the 36 paper mills in the Treviso area practised an 'ancient system and could not compete either for quality or price with hand-made paper'. Silvio de Faveri in 1877 spoke of the handmade paper produced by the Cartiera Masini paper mill, which works with 2 vats and employs 9 families of workers. The number of Dutch cylinders, which are the first criterion for distinguishing

between pulp produced using methods that are still medieval and that produced using a faster and cheaper method, rose from 6 in the late 18th century to 12 in the mid-19th century. Still very few, then. In 1817, out of 9 paper mills in the municipality of Treviso, only 3 produced writing paper, all the others ordinary, or brown or waste paper.

In 1831 all 12 paper mills in Treviso employed 370 workers, rising to 388 in 1841 and falling to 200 four years later. [54] In the 18th century, the paper mills of Ceneda and Serravalle (which numbered 8) and those of Carbonera (which numbered 10) were notable. In 1870 a survey was carried out that showed how important paper mills were in that small municipality: out of 1,250 inhabitants, 352 (30%) belonged to families that worked in the paper industry, not necessarily in production. The survey showed that in the district of Ceneda and Serravalle (Marca Trevigiana), three paper mills were owned by the Gentili family and employed 260 workers, 138 women and 128 men.

The history of the paper mills in Ceneda and Serravalle (Treviso) has been studied and reconstructed using archive documents from the 17th century to the 19th. On the existence of paper mills we are first informed by a contract dating back to 1602, and quoted by Tranchini, which mentions the desire to build a factory on the part of the Toscolano master papermaker Francesco Belloni, located in Ceneda, in a dilapidated but well-situated mill.[55] Six paper mills were

[54] Tranchini Eugenio, *Le cartiere vittoriesi tra il XVII e il XIX secolo*, Editrice La Vittoriese, Vittorio Veneto 1991, p. 67.

[55] For the former ASTV, Notarile I, A.D. Leoni, b. 1031, Sept./Oct. 1602; another deed of 1608 names another master papermaker, Antonio Colombo, from the Salò Riviera (Toscolano). V. Eugenio Tranchini, *op. cit.*, p. 16 4n.

active from 1602 to 1608 on the banks of the Meschio river, between Ceneda and Serravalle (which were later united into a single municipality in 1866). Mainly Brescian masters and Jewish merchants were active. The larger ones had six wheels, three vats and five fools each, other smaller ones had two wheels. They are small towns but not so small considering the time, Ceneda had 3,000 inhabitants and Serravalle 2,500. Period documents mention paper mills in Villa di S. Giacomo, Contrada di Salsa, Contrada di Rizzera, Borgo alla Biorca degli Hebrei. Others are mentioned above or beyond the Meschio. These mills were inserted into pre-existing mills, while the **Negrisola Paper Mill** was specially built.

Over time, production increased and the financial contribution of the Venetian nobility was also seen. The 9 paper mills in the area at that time had 253 workers (111 men, 114 women, 28 boys), second only to the spinning mills that employed 870 people. The decline, as in the Genoese and the Amalfi area, occurred in this area due to a lack of technological adaptation, a lack or scarcity of raw materials (rags) and a lack of *carnuzzi*. At the end of the 19th century, only 4 paper mills continued their activity, with 7 active vats (16 only 10 years earlier). It was realised that handmade paper production had no future.[56]

It must also be said that the introduction of pulp technology had constituted a further element of crisis or change. Where substantial capital did not arrive, as happened in the paper mills of the Valle del Fibreno at the end of the century when capital from the North saved various realities, such as the Manifatture del Fibreno, the Cartiere del Liri, the Boimond paper mills acquired by the Cartiere Meridionali, or the Miliani

[56] *Ibid*, p. 69.

paper mills, financed by the bank Credito Commerciale and the bankers Toeplitz and Joel, or the Vaprio paper mill, financed by the Turati family, it was not possible to adapt to the new technologies because of the excessively high costs. The interest of large financiers in paper indicates how strategic it was considered at the time along with networks (electricity especially at the turn of the century, after the development of other infrastructures such as water and railways). In order to understand the typology of the paper mills in the Ceneda-Serravalle district, which was then a common profile of many mills not only in the Republic of Venice or the Veneto marches and principalities, but of all the mills of the time, it may be useful to describe them in greater detail.

The **Crotta di Ceneda paper mill**, run by Mattia Raccanel on behalf of the Crotta counts of Venice, appears to have been active since at least 1769. It produced straw and coloured paper for wrapping up to 60 quintals a day. In 1782, it was taken over by Isidoro Mori who, operating with three vats, decided to produce paper of a higher quality: fine paper, mostly sold in the Venetian warehouses of the Balkans. At that time, in 1782, it had 36 workers. In 1799, Antonio Gava and brothers (32 workers) became owners, producing mainly register paper. The small paper mill ventured into the 19th century producing good profits and in 1870 the Fratelli Gava di Luigi company was formed. The three Gava brothers incurred considerable expenses: they built an elevation that doubled the processing space, added a hall and living quarters. During this period, five wheels are in operation, producing 100 engine horsepower through a turbine. In 1885, they modernise the facilities further by opting to build a new, larger building. The factory is also equipped with a large endless machine. In 1917 the factory was almost destroyed by bombing. In 1920, the complex was

bought by the Cartiere Riunite Florianello company of Milan, where a Gava had also joined, but due to some disagreements, the company dissolved and the complex was put back up for sale and finally, in 1935, the factory became a grain mill. In this case, therefore, the end of the paper mill was due to a wartime event, evidently not adequately repaid by the insurance companies after substantial investments by the Gavas.

The **Rizzardi-Galvani paper mills have** stood a short distance from the centre of Vittorio Veneto on the banks of the Meschio river since 1635.[57] Their history recounts the complexity inherent in the management of a medium-sized mill as generations passed and tells of the economic problems that arose especially with the rapid obsolescence of buildings and plants.

The paper mill was established at a time of crisis in the Venetian paper industry, a crisis that lasted, for various reasons, from the end of the 16th century to the first decade of the 17th century, coinciding with the rise of paper mills in the Verona area. In 1602, Francesco Belloni, a Toscolano papermaker trained in the Chiuppano paper mill (Bessè district, founded in 1593), decided to open his own business in Ceneda on the Meschio river. His example was followed by other papermakers from the Salodiano area who settled in the

[57] The history of this paper mill, forgotten for many years, has been rediscovered in a study entitled *La Cartiera Rizzardi-Galvani a Vittorio Veneto* financed by the Heritage Italy Foundation. The study cites documents found in the State Archive of Treviso, files and documents conserved in the Civic Library of Vittorio Veneto. Since the quoted text does not give a page number or other data, nor an author, it is quoted here as a reference but the individual points are given with the bibliographic and archival data: it is understood that they are taken from this text.

area in the early years of the century and established a Paper Company between 1618 and 1619, which acquired a number of paper mills in the area.[58] The Company was dissolved in 1621, for unknown reasons, and the two active plants went to the two majority shareholders, who were Venetian nobles, Correr and Mocenigo.[59] It seems fairly constant to observe that the master papermakers were helped by local nobles, who had the money.

There were at least four paper mills active in the area during this period: the Belloni Paper Mill, the Mocenigo Paper Mill, the Correr Paper Mill and the Paper Mill of Giuseppe Calappo and Domenico Bertella established between 1629 and 1632. Belloni, Calappo and Bertella soon went bankrupt, mainly due to the plague epidemic of 1630.[60] Two Venetian paper merchants, Urbano Urbani and Giovanni Maria Rizzardi, took over the paper mill on the Meschio owned by the nobleman Carlo Contarini.[61] These realised within a few years that business was going well, the surrounding area needed good paper and so they split up to follow two different projects. They entrusted the Contarini paper mill to Francesco Bressanini and then, from 1635, while Urbano Urbani took over the paper mill that had been Bertella's, Rizzardi built a new one next to Carlo Contarini's mill in San Giacomo di Veglia. At that point Rizzardi settled in Ceneda.[62] In 1638, the

[58] Mattozzi 2001; Mattozzi 1988, p. 115.
[59] Mattozzi 1988, p. 117.
[60] Mattozzi 2001, p. 158.
[61] Giovanni Maria Rizzardi had a shop in Rialto, ASVE, Bruzonico, b. 1124, cc. 124 ff.
[62] Bressanini was a well-known master paper-maker to whom the Compagnia della carta had entrusted the Cartiera di Civran (AST, Artico, b. 1462, cc. 79); (ASTV, Artico, b. 1468, fasc. Atti civili 1629-1637, 12 May 1636); ASTV, Artico, b. 1468, fasc. Atti civili 1629-

paper mill was entrusted to Nicolò Serravalle and Domenico Bertella.[63] Evidently it was very profitable and so Rizzardi, who had become an entrepreneur, built two more buildings for use as a paper mill by 1640, one equipped with 2 wheels and 4 stacks (rented to Domenico Bertella) and one called Edificio novo di qua dal Meschio with 3 wheels and 4 stacks per wheel which he entrusted to Nicolò Serravalle.[64]

The defined paper mill on the *other side of the Meschio* was located where the former Cini wool mill now stands, while the large paper mill on *this side of the Meschio* became Rizzardi-Galvani and survived for over 260 years. After a renewal of the previous conditions, in 1647 Rizzardi entrusted the two paper mills to Domenico Bertella. A few years later he fell ill and on 4 May 1650 dictated his will to the notary Artico, leaving everything to his wife and specifying that the paper mill would be the sustenance of his children.[65] The widow's

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1637, 21 March 1635. [24] ASTV, Artico, b. 1462, cc. 69 tg.-ss.; Mattozzi, 1988, p. 125; AST, Artico, b. 1463, cc. 85-87. AST, Artico, b 1468, fasc. Atti Civili 1629-1637, 13 April 1636. These as well as the other archival references are cited in the study *La Cartiera Rizzardi-Galvani a Vittorio Veneto*.

[63] BCV, Estimi, no. 94 c. 59.

[64] ASTV, Artico, b. 1467, cc. 110-111; 108-109.

[65] ASTV, Artico, b. 1466, cc. 92-93. Giovanni Maria Rizzardi and Margherita Piccinelli had five sons, Bernardo (who died before October 1653 because he did not appear in his mother's will), Zuanne, Zuan Angelo, Pietro and Marcantonio, and five daughters, Veronica, Caterina, Cecilia, Maria and Angela. Of the male children named in the will, it appears that only Pietro will carry on the Rizzardi patronymic, but neither he nor his son will contribute to the running of the mills. We know for certain that Pietro's son Giovanni Maria would do business in Venice, but it remains to be seen whether the Giovanni Maria Rizzardi who held a printing licence granted in Venice between 1700 and 1705 is really the direct descendant of the family that started the paper mills in the Cenedese area.

economic conditions, however, were not good: she sold the third paper mill, the one in San Giacomo di Veglia, to Francesco Zanucco and kept the large one. However, she has to settle a debt with Menachem d'Abram Coen and Girolamo Bragadin. The former is paid, the latter accepts the paper as partial compensation, testifying to the value of this commodity at the time.

In 1652, Zuanne and Angelo Rizzardi signed a new contract with Pietro and Vincenzo Dall'Acqua to run the two-wheel paper mill *on the other side of the Meschio*.[66] In 1653, in order to pay her debt to Girolamo Bragadin, Margherita Rizzardi mortgaged the 'large' paper mill,[67] but within a short time other creditors were knocking at the widow's door.[68] Margherita fell ill at the end of 1653 and had her will drawn up. The bequests to her children fell from the 1,000 ducats decided by her husband for each male child, to 10 ducats. To her daughters she gave the paper mill building where she lived. Margherita, however, wanted to pay all the debts that burdened the family. She closed her will by naming her executor Bernardo dal Legname, her brother-in-law, who rented the large paper mill on *this side of the Meschio* (3 wheels and 4 stacks per wheel) to Giambattista Sarcinelli.[69] The contract lists the types of

[66] ASTV, Arctic, b. 1466, c. 162.
[67] The 'francabile level' was sold, which meant ceding a property in its entirety, but with the possibility of redeeming it within the contractual terms, which could in turn be renewed. From the same deed we learn that the paper mill at that time was leased to Giacomo Gallina (ASVE, Bruzonico, b.1124, cc.141-ss); Bernardo dal Legname was the husband of Laura Piccinelli, sister of Margherita Rizzardi.
[68] ASVE, Bruzonico, b. 1124, cc. 59tg.-61; ASVE, Bruzonico, b. 1124, cc. 106-107.
[69] ASVE, Bruzonico, b. 1466, cc. 128tg.-132; ASTV, Artico, b. 1466, cc. 126tg.-128.

paper, from which it can be deduced that the mill was of a good standard because in addition to producing paper for writing and 'stendardo' it also produced printing paper. Despite aid and rents, the Rizzardi's economic situation did not improve when Margherita, as a contractual clause, obliged Sarcinelli to give work to her and her daughters and to teach Pietro the profession of master papermaker. Important work was done at the Rizzardi paper mill during the Sarcinelli tenure and by 1655 the mill had four wheels.[70] Then the Sarcinellis and the Rizzardis became related when the tenant married Margherita's eldest daughter, Veronica Rizzardi, who received the Rizzardis' large paper mill as dowry[71] . The tenants meanwhile followed one another: Francesco Bressanini (1664) then rented it out to Messer Gioel, a Jew from Conegliano, who also lent him money.[72] In 1668, his daughter Veronica found herself involved in a lawsuit brought by Beatrice Bragadin before the Giudici del Mobile (Furniture Judges) for an alleged debt of 500 ducats, a lawsuit followed by the procurator Giacomo Collò dal Legname, a Venetian merchant.[73] In 1672,

[70] ASTV, Sacello, b. 1991, 10 April 1655.

[71] Four children were born from the marriage between Veronica Rizzardi and Gio Batta Sarcinelli: Bernardo, Raffael, Antonio and Caterina. The first two will have great merit in putting the pieces of the Rizzardi inheritance back together. The declaration on the dowry can be found in Veronica Rizzardi's will.

[72] ASTV, Leoni, b. 2021, c. 142; BCVV, Estimi, b. 94, c. 216 tg.; see in this regard the 350 ducats that Conegliano advances to cover the debt that still existed with the heirs of Isaac Grazzini (ASTV, Munari, b. 1782, fasc. 1664 II, cc. 32 and 88).

[73] SVE, Giudici del Mobile, Sentenze, b. 501, c. 71; ASTV, Munari, b. 1784, fasc. 1666 I, c. 75. In addition to the lawsuit with Bragadin, Giacomo Collò took care of Margherita's affairs for some years, so much so that it was he who rented the large paper mill to Gioel Conegliano on behalf of the Rizzardi (ASTV, Munari b. 1787, fasc. 1669 II, c. 89). Unfortunately, in the case of the Rizzardi-Gavani paper

Margherita gave full powers in the management of the paper mill to her son Marcantonio Rizzardi, who had the mill restored and then entrusted it to his uncle Bernardo dal Legname.[74] The following year, Marcantonio died. At that point, Bernardo dal Legname decided to withdraw from the lease of the paper mill.[75] From the appraisal Bernardo made before leaving the paper mill, it can be seen that although the grande had one more wheel than the Contarini, it was still appraised at a lower overall value of about 1,000 ducats.[76] On 13 November 1679 Carlo Contarini's small paper mill was valued on behalf of Domenico Sordina, a paper merchant from Padua who wanted to rent it. His interest was better realised on 2 December when the large paper mill *on this side of the Meschio* was sold to him by Margherita Rizzardi.[77]

Sordina had plenty of money to invest in the mill to ensure continuous paper production for his workshop in Padua. The paper mill was in such disrepair that Rizzardi had difficulty finding tenants who could pay the rent and anticipate the cost of restoration. Sordina's intervention was therefore providential: he restored the building and agreed to good terms for Margherita and her heirs. He also left her the use of a room in the paper mill as well as the rental income from two fields

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mill, few estimates have been found; ASTV, Munari, b. 1787, fasc. 1669 II, c. 171

[74] ASTV, Munari, b. 1791, fasc. I, c. 300; ASTV, Leoni, b. 2025, fasc. 1673, c. 3.

[75] ASTV, Munari, b. 1792, fasc. II, c. 181.

[76] ASTV, Munari, b. 1793, cc. 76-80; ASTV, Munari, b. 1797, cc. 151-153.

[77] Sordina Domenico, or Gian Domenico as found in some documents, was the son of Marco Sordina, himself a paper merchant and one of the most important managers of the Battaglia paper mill; ASTV, Munari, b. 1797, cc. 163; ASTV, Munari, b. 1797, cc. 187-189.

near the mill itself.[78] At that time the value of the large Rizzardi paper mill was one third that of the small Contarini paper mill.[79] The sale of the paper mill did not, however, change Margherita Rizzardi's precarious economic conditions, which undermined her health to such an extent that she dictated her last will in her room at the *cartera.*[80] When Margherita died, the Sarcinelli brothers divided up the large paper mill. To each family unit, they assigned a follo for making paper. After some time, Bernardo Sarcinelli decided to entrust the management to Geremia Conegliano.[81] In contrast to the large paper mill, the Carlo Contarini paper mill shows a greater regularity in maintenance work.[82] Details on

[78] ASTV, Munari, b. 1797, cc. 187-189; Margherita appointed a new procurator for the occasion. The document confirms that the large paper mill had four wheels, while Contarini's small mill had only three (ASTV, Munari, b. 1797, cc. 155); ASTV, Munari, b. 1797, cc. 187-189; Rizzardi's heirs divided up the mill: each in fact received a follo, except for Cecilia to whom part of the paper mill house went.

[79] ASTV, Munari, b. 1798, c. 131; ASTV, Melsio, b. 2286, fasc. 1680, c. 63; ASTV, Munari, b. 1798, c. 18; ASTV, Melsio, b. 2286, fasc. 1680, cc. 61-ss.; ASTV, Melsio, b. 2286, fasc. 1680, c. 88. The appointed procurator was Antonio Sarcinelli, brother of Gio Batta, and uncle of Bernardino and Raffael, advocates in the reconstitution of the Rizzardi estate.

[80]ASTV, Munari, b. 1797, cc. 187-189; the house consisted of two rooms and a kitchen. It was, however, a modest house, with a few chairs, a table, a bed and a few paintings, a walnut chest and a stool. ASTV, Melsio, b. 2286, fasc. 1681, c. 6.

[81] Geremia Conegliano belonged to that family of Jews, including Israel, already encountered in the affairs of Giovanni Maria Rizzardi; ASTV, Melsio, b. 2287, fsc. 1687, cc. 75-76; ASTV, Melsio, b. 2287, fsc. 1687, c. 73.

[82] ASVE, Provveditori e Patroni all'Arsenal, Catastico mulini, b. 619, c. 214; ASTV, Munari, b. 1809, fasc. I, cc. 52-54. The two paper mills saw many vicissitudes between Conegliano, Sordina and Sarcinelli, ASTV, Munari, b. 1809, fasc. I, cc. 49; the qm., which stands for quondam, when the person to whom it refers is deceased; ASTV,

the ownership of the large paper mill and who ran it can be found in the 1708 estimo. Only Bernardo Sarcinelli was recorded among the owners of the paper mill, but there are others.[83] Of all the heirs of Giovanni Maria Rizzardi and his wife Margherita, only his nephew Bernardo and his brother Raffael show interest in continuing the family business. Bernardo Sarcinelli, in 1725, probably in order to be included in the census taken by the Savi alla Mercanzia della Serenissima, had a declaration attached to the deeds of the notary Bertoia stating that if it had not been for his industriousness in having the paper mill set up, it would have been a lump of stones. It is likely that Sarcinelli was the owner of most of the paper mill at this date.[84]

In 1726, Sarcinelli himself rented two rooms in the Rizzardi paper mill from a certain Francesco Catuzotto. The contract specifies that they were in such poor condition that Sarcinelli had to ask permission to refurbish them. At the beginning of the century, Raffael and Bernardo Sarcinelli bought back what had been sold to others in the paper mill, portions, land and

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Munari, b. 1815, fasc. I, cc. 161-162; ASTV, Munari, b. 1815, fasc. I, cc. 164-165; the first contract signed between Bernardo Sarcinelli and Anzola Dall'Acqua dates back to 18 June 1700 (ASTV, Munari, b. 2472, fasc. 1706, c. s.n.); often in documents, starting from the mid-17th century, the location of the Rizzardi paper mill was identified as Rizzarda: ASTV, Munari, b. 2469, fasc. 1701, c. s.n.

[83] The names of the other owners can be deduced from the file regarding Geremia Conegliano, the tenant of the establishment: the heirs Brunelli and Antonia Collò Bertozzi, BCVV, Estimi, b. 95, c. 204 tg.; probably Giacomo Collò and Antonia Collò Bertozzi were siblings (BCVV, Estimi, b. 95, c. 395).

[84] Five Savi alla Mercanzia, an administrative body of the Venetian Republic, were in charge of controlling maritime and land trade; ASTV, Bertoia, b. 3003, prot. IX, c. 39; ASVE, Quarantia Civil Nova, b. 571.

more. Relations between the two deteriorated, however, and when the former died (1742), he left most of his possessions to his niece Veronica. Raffael recalls in his will that his father had left them miserable and that his grandfather Rizzardi, although he had been rich, lived in one room at the paper mill.[85]

When Raffael died, Bernardo Sarcinelli and his family took full possession of the large Rizzardi paper mill, living in relative comfort for a few years and hiring two servants.[86] Bernardo, however, died in 1747 and already in 1749 his widow Augusta and daughter Veronica had to resell portions of the property, sell the small paper mill and have their furniture seized.[87] On the death of the third brother, Antonio Sarcinelli, creditors turned on the two women.[88] Between 1751 and 1754, Augusta Colletti Sarcinelli and her daughter Veronica with her husband Marino Bertoia wrote their will. From Veronica's will we learn how, after her death, the paper mill became the property of the Colletti brothers, Augusta's grandchildren. This happened in 1770, when Marino Bertoia made a claim to ownership of the paper mill. A long period of

[85] ASTV, Bertoia, prot. X, c. 8; Raffael Sarcinelli's contribution to the re-establishment of the large paper mill was fundamental, ASTV, Melsio, b. 3503, fasc. 1733, c. s.n.Veronica and Antonio were the children of Bernardo Sarcinelli and Augusta Coletti (ASTV, Melsio, b. 3517, prot. 1741-1753, cc. 126-127); it is probable that two of Giovanni Maria Rizzardi's ten children died at a very young age if Raffael only remembers eight; ASTV, Melsio, b. 3517, prot. 1741-1753, cc. 126-127.

[86] From a certain Giovanni Ruzzini ASTV, Brescacini, b. 3371, fasc. 1743, c. 61.

[87] STV, Mardegani, b. 3311, fasc. 1749, c. s.n.; ASTV, Valle, b. 3412, fasc. 1743-1757, cc. 92-93; ASTV, Bertoia, b. 3009, fasc. XXXIX, c. s.n.

[88] ASTV, Munari, b. 3429, fasc. 1750-1751, c. s.n.; ASTV, Bastanzi, b. 3480, fasc. testamenti.

dispute began in 1772 between Bertoia and the Colletti brothers, linked to various wills and the interpretation of codicils.[89]

In the meantime, the paper mill was leased in 1772 to Bartolomeo and Isidoro de Mori, who were able to enjoy an establishment still consisting of three wheels with 16 stacks. In 1782, the contract was still in place. In that year a new survey of the paper mills in the territory of the Venetian Republic was carried out and Isidoro de Mori declared that the mill worked with two tines producing only two types of paper. In 1789, Benetto Sarcinelli obtained the validity of Raffael Sarcinelli's will from the magistrate and yet, due to bureaucratic red tape, still in 1791, it was Domenico Colletti who appeared as the owner of the paper mill.[90] It should be noted that that survey mentioned that the mill had two vats, one of which was idle. The paper mill was therefore in decline. The final transaction from the Colletti brothers to Benetto Sarcinelli took place in 1793 when the paper mill was leased to Bartolomeo de Mori. The handover of the paper mill to Sarcinelli also marked the break in relations with the de Mori because the mill was handed over to other tenants.[91] In the description of the time, the paper mill appears to consist of

[89] The Colletti family consisted of Domenico, canon of the cathedral and referent in matters concerning the paper mill; Bartolomeo, archpriest of Ogliano; Giuseppe, archpriest of Col San Martino; Chiara and Elena; ASVE, Beni Inculti - Processi, b. 423 fasc. Bertoia Marino; the Magistrato ai Beni Inculti registered the transfer of the paper mill to the Colletti only in 1783 (ASVE, Beni Inculti, b. 407); ASTV, Sarcinelli, b. 4247, protocol primo 1768-1773, c. s.n.; ASVE, Inquisitorato Arti, b. 23.

[90] ASVE, Quarantia C.N., b. 571 ASVE, Inquisitorate Arts, b. 25.

[91] ASTV, Bontempo, b. 4459, fasc. no. 1032, c. 31; ASTV, Bontempo, b. 4460, fasc. no. 1088, c. 225.

about ten rooms for the various stages of processing. In 1796, Benetto Sarcinelli decided to sell the mill to the nobleman Domenico Lioni, who already owned the small paper mill. With Lioni's purchase, the reunion under one name of the two paper mills founded in 1640 by Rizzardi became a reality.[92] The nobleman from Ceneda sold the paper mill to Gio. Francesco Alberti on 16 September 1798.[93]

In the same year, Lioni leased the small paper mill to Zuanne, Nicolò and Gio Batta, father and son Raccanelli. This paper mill was equipped with a Dutch cylinder, a system that allowed paper to be produced more easily and in less time. The specification of this detail in the contract, which is missing from the contract for the sale of the large paper mill, suggests that the latter did not have it and therefore produced paper using traditional technology. There is very little information on the running of the paper mill during the period when it was owned by Alberti. Unlike his predecessors who lived in Ceneda or in the immediate vicinity, Francesco Alberti, being from Venice and having business there, did not sign his contracts in the foothill town of Ceneda.[94]

We find the first useful information relating to Alberti's management of the large paper mill in 1808. The *provisional Census* records of 1808 describe Alberti as the owner of two paper mill buildings in the Cenedese area, one of which was the Rizzardi paper mill. In addition to the paper production building, the mill included the rooms where the workers were

[92] ASTV, Bontempo, b. 4462, cc. 12-18.
[93] ASTV, Bontempo, b. 4463, cc. 217-218.
[94] With this, the author of the very interesting research on the Cartiera specifies that it is difficult to trace documents because the Venetian notarial fond is indeed very rich but still, in 2020 at the time of writing, not catalogued.

housed, those occupied by the head of the paper mill and those reserved for Alberti when he was in Ceneda. The industrial census of 1818 explains that Alberti's paper mill at Rizzarda was a 'very remote establishment', had four vats and a cylinder; it produced eight reams of paper a day and used rags from Friuli. A total of 46 workers were employed at the mill, 18 of whom were men and the remaining 28 were women and children. It was therefore a good-sized paper mill considering the period. It produced 9,280 reams of paper per year of eight different types, which it sold in the port of Trieste. A comparison with other paper mills in the Treviso area shows that the Rizzardi-Alberti paper mill was the one that produced the most income. Nothing is said about the running of the paper mill but it was probably entrusted to Isidoro de Mori. The paper produced in Ceneda between 1818 and 1840 all bore the watermark I.M., i.e. Isidoro Mori, except for that produced in Valentino Wasserman's mill which had the initials V.W. Thus, the paper mills in the Ceneda district were all run by Mori.

Prior to 1838, the Rizzardi Paper Mill was purchased by Andrea Galvani, a member of a wealthy family of papermakers from Pordenone who greatly contributed to the improvement of papermaking techniques. Born in Cordenons in 1797, he studied at the Liceo di Treviso and graduated in Padua in law and then in mathematics. Andrea Galvani was a man of great inventiveness and intellect as in just a few years he managed to obtain several patents for paper production including, in 1818, one for a machine that was used to clean rags without the use of soap, and in 1846 one that overcame the use of rags in paper production by introducing the exploitation of the pulp of certain species of tree. We know that Galvani had his interests in the Rizzardi paper mill followed directly by one of his agents, a certain Pietro Polazet. Andrea Galvani died in

1855 and his heirs continued the activity in the Rizzardi paper mill for more than half a century. It produced straw, ordinary and drying paper Between 1876 and 1822 it was referred to as a medium-sized mill: it was in fact equipped with five 40 hp hydraulic bellows, had four vats and 30 employees, so it had decreased by about fifteen elements certainly due to the introduction of machinery and mechanical procedures. The workers, however, lived inside the paper mill: it was not a large number but the fact that they lived inside was rather unusual. Productivity, in any case, was very high for a facility of that size. After 1882, work declined: in 1883 there were 25 workers and 4 working engines. This was the crisis that affected part of the Italian territories, although not all of them, but above all it led to a general restructuring of the paper industry.

The Galvani family continued to produce paper at the Rizzardi until 1895, after which they sold the entire complex to the Dalla Colletta family, who converted the structure for their flooring company. The consideration that can be made at this point is that in all probability the structure created by Rizzardi in 1640 has remained unchanged for over two hundred years and that the superfetations existing today between these two bodies of the factory are instead from a more recent period, between the transfer of the Galvani business and the establishment of the Dalla Colletta paper mill. With them production ceased definitively

The Reverend Mothers of Jesus had a four-storey building in Ceneda, a monastery partly adapted in 1768 as a paper mill, the **Cartiera Madre del Gesù Sartori**. It underwent several changes of ownership: Isidoro Mori in 1855; Valentino Wasserman and brothers between 1860 and 1885; Giacomo Zuliani from 1885 to 1900 and, lastly, the Sartori brothers from 1901 to 1903. At the time, only 10 two-wheeled workers with

a driving force of 20 c.v. were employed. Little survived during the 20th century.

The **Gentili-Botteon Conventi** paper mill has an unknown foundation, probably dating back to the 17th century. It was managed from 1870 by the Gentili family who installed 80 hp engines and employed 36 workers. It was sold in 1891 to the Botteon brothers. During their management, also due to the crisis in the sector, the paper mill halved its production and employment to 17 people. They exported to the Levant and Egypt. When it was destroyed by fire in 1926, the Botteons were unable to put it back into operation and ceased production.

Located in a place now occupied by a cycle industry (Carnielli), the **De Mori Paper Mill** was known as 'the Carteron'. Active since the second half of the 17th century, its owner was Isidoro Mori (or De Mori) who had already run the Crotta di Ceneda paper mill before selling it to the Gava brothers in 1799. Between 1810 and 1840 it produced large register paper, writing paper and wrapping paper. It was quite large considering the others in the area, with its 40 workers and six water wheels. In 1892, however, the paper mill went into crisis along with others in the area. The number of employees dropped to 10. At the beginning of the century, in 1902, the factory closed.

The first industrial manager of the **Wasserman - Gentili Paper Mill** was Francesco Wassermann, who ran it between 1768 and 1800. He belonged to the same family that was later active in the Sartori Madre del Gesù Paper Mill. The paper mill had two shovels fed by the Savassa spring coming down from Mount Visentin with a motive power of 100 hp. After 1800 it passed into the ownership of De Mori Isidoro e F.lli, who had already met in two other paper mills in the area. From 1830 it

was purchased by Benedetto Gentili. When he died in 1862, his three sons took over, who continued production until 1908 when the paper business ceased. Around the 1890s there were 35 workers, by the end of the decade they had been reduced to 8/10 people. Gentili was exporting to the Levant. The old building was not reused: it was demolished and another rebuilt in its place.

In Serravalle there is one of the oldest and most documented paper mills in the area, the **Cartiera Mocenigo Sartori**, named after the owners of the mill and then after the last tenants and managers. Still existing today, it is a large building in the locality of S. Floriano. One part was intended as a summer residence for the Mocenigo family of Venice, the other part was used around 1660 as a paper mill with four wheels powered by the water arm of the Saccon (or Battirame) stream diverted along a stone canal. In 1666 it was enlarged, equipped with two more wheels plus a vat and rented to a certain Fosco Bozzoni of Riva del Garda. In the course of time there are other documented leases: from 1783 to 1795 it was run by Cristoforo Wasserman and his nephews who operated four vats and produced all kinds of white paper.

The Wassermann family at that time also operated at the Savassa paper mill and a paper mill in Ceneda. In 1810 the paper mill, with 3 wheels in action, belonged to Alvise Mocenigo, a resident of Cordignano Castle. After a few years, (December 1817) ownership passed to Garatti Pietro di Lorenzo. During this period the paper mill employed 60 people. In 1856, due to tax debts, the paper mill was declared bankrupt. It was purchased by Cavalier Marco Giulio Balbi Valier di Girolamo. In 1871 it went to a relative of his, Luigi Sammartini, who added 2 wheels. An inventory of the period informs us that the large building had 26 rooms used for paper

production and warehouses, 19 for the owner's use, there were also 2 kitchens and various adjacencies. At the time, the mill had 41 employees and manufactured 30 different types of paper. The destination of the paper was mainly the Levant. In the years between 1870 and 1880, 3 vats were in operation. In 1886, the paper mill was used for 5 months to quarantine bersaglieri from a nearby barracks, causing the temporary cessation of activity. In 1900 the paper mill was taken over by Antonio & Fratelli Sartori, remaining active until early 1918. [95] It can be seen that three families in particular were active in this area: the Gentili, the de Mori and the Wasserman families.

Little is known about the **Fighera paper mill** that stood in Serravalle di Vittorio Veneto on the land known as 'bus de Fighera' crossed by the Battirame stream. The owner, Domenico Fighera, born in 1823, started the mill in 1866 with five workers. It had a modest production even in terms of quality (absorbent paper for offices). It had a press and two 10 c.v. hydraulic motors. It supplied the local territories: Treviso, Belluno, Udine. From around 1890 it was no longer in activity.

As can be seen, many of the paper mills in Veneto continued to produce paper by hand until the middle of the 19th century. Among the most modern in this respect was the **Bernardino Nodari paper mill** in Lugo Vicentino. In 1854, after various complex transitions, the mill was taken over by the Ranzolin company of Thiene, which managed to operate until the mid-1960s when it was purchased by the Nodari brothers of Rovereto.

The brothers were adopted by their paternal uncle. Bernardo Nodari Junior, known as Bernardino (1836-1894), had studied in Innsbruck and then honed the art of

[95] Tranchini Eugenio, *op. cit.*, pp. 45-47.

papermaking in Lyon. He then looked for a place to set up a factory where there was water, ideal environmental conditions, roads and labour and found it in Lugo Vicentino. His intention was to set up a company with very innovative characteristics in an area, Veneto, that had a great tradition of producing quality paper by hand, a great typographic and publishing tradition, but which had lagged behind in paper production.

The three brothers Bernardo, Andrea and Antonio Nodari inaugurated their company on 31 January 1866. They purchased machinery from abroad, including a endless machine, and adapted and enlarged the old paper mill, finding financing from the Papadopoli counts, their relative Giobatta Nodari and cousin Camillo Nodari. They thus raised as much as 580,000 lire: 320,000 was paid by the founding partners, the rest by the nominated financiers. On 4 February 1866, the factory was opened under the direction of Bernardino Nodari while Andrea took care of the accounts. It was decided that profits would be set aside to purchase a new endless machine. Compared to more modern paper mills, such as Manifatture del Fibreno, Nodari was equipped with the paper machine some 40 years after its first installation in the Lazio region. But it was the first in the Veneto region. The factory also had considerable motive power: 150 to 200 HO. A smaller motor drove the endless machine, the other two motors other machines. In addition, three fraying cylinders, two bleaching machines and a sanding machine were in action. And water from the Astico river powered the machines thanks to a turbine. Lignite mined not far away was used to dry the dough. The plants were all of foreign manufacture: Belgian, French and English.

At that time, the paper mill used 100 tonnes of white rags and 200 tonnes of brown rags. The rags were collected from a

warehouse in Veneto and one in Naples at considerable expense in terms of transport (for 1 quintal 5 lire from Bari to Venice and 3 lire from Venice to Lugo). Wood pulp, supplied by a nearby factory, was used to make newsprint. Sulphuric acid, soda, colours and other materials, including kaolin were imported from England or France. Mostly newsprint was produced (200,000 kg per year), followed by stationery (70,000 kg), protocol and letter paper and also a good amount of fine paper (30,000). Export, at least initially, was minimal because it was hampered by strong competition from Austria.

Remarkable for the time was the number of employees, which was 200 (100 women, 70 men, the rest children). For a while, the director was engineer Corrado Nodari, who had studied in Graz and had had numerous experiences, becoming the director of the Vonwiller paper mill in Romagnano Sesia in the 1880s. The paper mill, like the Rossi wool mill, produced a social change in the surrounding area by introducing a working-class culture that replaced the one linked to the peasant world. Part of the population linked to the factory was disciplined by it. The aim was to make the factory a 'model of constitution and order' by establishing a primary school for literacy. As with other factories, houses were built for the workers. The factory was awarded gold medals for philanthropic works and conformed to the large textile industries. Strikes did not occur and increases were agreed upon. Despite his success, Bernardino Nodari did not want to devote himself to politics, but was three times mayor of Lugo and councillor in the municipality of Calvene. An important achievement was the Bronze Medal obtained at the Paris Exhibition of 1867, plus many others at local and international exhibitions (again Paris 1878, Vienna 1873, Amsterdam 1884).

Bernardino Nodari died tragically by drowning in a nearby turbine canal on 19 January 1894. After his death, his sons Bernardo and Camillo took over the reins. In 1903 they purchased two hammer and mill buildings in Calvene and built a small hydroelectric power station in their place, exploiting the 6.19 metre drop with two Francis turbines, using water used further upstream by the Cotonificio Rossi cotton mill. Bernardo introduced the coating that would later become a feature of the Burgo paper mill. The war and a disagreement between brothers led to the sale of the paper mill to Luigi Zeoloni of the Cartiere di Maslianico (Como). Bernardo became director of the Società Anonima Cartiere di Maslianico and at the same time director of the Lugo, Mortara Treviso and Mantua mills.[96]

Rossi paper mill in Arsiero

The Astico Valley was particularly suitable: in the province of Vicenza in 1876 there were 10 paper mills with 774 employees; by 1885 there were 12 with 945. The Perale di Arsiero paper mill was the most advanced at that time. In 1885, there were another 5 paper mills along the Astico river with 2 boilers, 5 hydraulic motors (one for each), 125 active vats for hand manufacture and two endless machines (in Arsiero and Nodari). There were other small paper mills in the province: the **Valstagna paper mill** (52 workers) and the **Rossano Veneto Favini paper mill** (20 workers), but, at that time, the most important in the province was the Arsiero mill. To set up the company, Rossi interested Eugenio Cantoni, Antonio

[96] *Cartiere e cartai in veneto da metà Ottocento a metà Novecento,* in *Cartai e stampatori in Veneto*, cit., pp. 90-93.

Baschera, Eleonoro Pasini, the Banca Industriale Commerciale and Credito Veneto as partners. He also acquired the old paper mills and various buildings of the Giuseppe Barbieri, Michele Fontana, Giovanni dalla Via and Cesare Nado companies.

The paper mill was established in 1873 on the site of an old iron hammer and was based in Venice. It reached full production between 1874 and 1875. The capital was set at 3 million lire. On the board of directors, alongside the president Gustavo Koppel, sat Eugenio and Antonio Cantoni, Eugenio Colorni, Augusto Cini, Arnoldo Levy, Eleonoro Pasini, Ignazio di Weil, Maurizio Weiss and Carlo Wirtz. And Alessandro Rossi played an important role. In 1875, he announced the arrival of his son Francesco indirectly at the shareholders' meeting on 15 March, when he advised that the administration be concentrated in Arsiero where his son was resident. And Francesco Rossi devoted himself completely to the paper mill, even acquiring the nearby Bessè paper mill. He selected personnel, enlarged the factory, acquired other plants. Thanks to the opening of the Gotthard, the French and Germans were favoured. Pulp was produced by the Arsiero paper mill but also by two plants in Lugo and Pozzoleone. The introduction of defibrating machines brought further problems because it was necessary to resort abroad for that processing. In 1884 the paper mill won the Gold Medal at the Turin Exposition and could now count on 4 boilers for a total of 440 hp for boiling rags and drying paper, and 14 hydraulic motors with a power of 700 hp. It also had 3 endless machines for paper and 5 pulping machines for pulp. There were 600 workers.

The Rossi paper mill developed on site by expanding premises and adding new buildings, as well as acquiring other paper mills such as the Pria di Cogollo paper mill purchased in

1893. An industrial canal and power station were built here. The growing need for hammers and water led to the acquisition of other hammers and mills, such as that of Giuseppe Barbieri bought to use water in 1895 and that of Giovanni and Antonio dalla Via (in the same locality of Pria). In 1900, Rossi instituted an eight-hour day for all his 1021 workers. In 1910, the Nado paper mill in Barco was also bought and converted into a hydroelectric power station.

A series of infrastructures (canals, railways, hydroelectric power stations, infrastructure for the people) developed around this paper mill and the Chioppano cotton mill and the Piovene wool mill. Francesco Rossi also employed Beniamino Donzelli in the Arsiero paper mill and then his own sons Alessandro (1880) and Girolamo (1882). In 1905, the paper mill was transformed into Società Anonima Cartiera Rossi with a capital of 2.5 million lire and Girolamo and Alessandro Rossi were elected managing directors. In 1906, Alessandro Rossi took over the technical management of the mill while his brother Girolamo was more inclined towards administration and finance. Girolamo had studied and spoke three languages (French, German and English) and had studied mechanics and chemistry in Belgium, Germany and England. After finishing his studies, he did an apprenticeship in the factory learning blue-collar and white-collar tasks; he moved to Milan where the administrative offices had been moved. In 1911, the offices returned to Arsiero. Later, the company would be managed by Franco (born in 1916).

The company produced paper, cardboard, wood pulp and provided various services on a total covered area of 17,875 square metres. The plant in Perale di Arsiero was destined for the manufacture of rag pulp, mechanical pulp from wood, paper and cardboard. That at Pria di Cogollo was for the

production of wood pulp and vegetable paperboard. Alessandro Rossi overcame a period of crisis by importing the latest generation of endless machines from Leipzig, rigorously selecting the best technicians and eliminating lesser products. Around 1916, the factory had 6 endless machines, 8 paperboard round machines, 8 mechanical pulp mills (4 in Arsiero, 4 in Pria). Four De Nayer boilers heated the 980 square metres. Various were the power plants. The value of the plant was estimated at 800,000 lire and the equipment at 2,300,000. Employment reached 900 workers.

While Nodari di Lugo (Thiene) and Rossi di Arsiero emerged, other paper mills lagged behind or failed to develop and renew their machinery. In his 1874 *Ricordo della provincia di Treviso* (*Memoir of the Province of Treviso*), Caccianiga noted that 36 paper mills worked in the province using the old method, mostly wrapping paper. Thus, the **Cartiera Masini paper mill** employed 9 families with 2 vats and produced 8-10,000 sheets a day (around 20 reams). The paper was sold wholesale and had a semi-local market. The families lived and lodged in the paper mill. Three years later we know that there were 50 workers. The workers were paid little, especially where there was no direct management as in the Reali Paper Mill, and they had to work even on holidays still in 1896.

Around 1901-1903, women between the ages of 16 and 40 worked at the **Brunelli paper mill,** mostly sorting rags and waste paper. Thus at the **Granzotto paper mill** (7 women), the **Ballanzin paper mill** (9 women), the **Lorenzon paper mill** (6 women) and the **Bellon paper mill** (8 women). The largest was the **Fedrigoni Paper Mill** founded in 1888 by Giuseppe Antonio Fedrigoni (2 paper machines, 147 workers)

to produce special papers. Gradually, the many small paper mills that produced wrapping paper or even quality papers disappeared. Even more backward was the situation in Udine.

A figure that unites the Vaprio d'Adda Paper Mill, the Conca Fallata Paper Mill, Maslianico and also the Rossi Paper Mill is Beniamino Donzelli (1863-1952), a technician and later paper industrialist. Born in Treviglio, in the province of Bergamo, in 1863, into a middle-class family, in 1883 he became a technical assistant at the Ambrogio Binda paper mill in Vaprio d'Adda. He then moved on to the Conca Fallata paper mill (Milan) of the same ownership. Here he was given important roles in the production process and also in the paper trade, and the skill and experience he demonstrated were such that he won the position of manager at the Rossi di Perale di Arsiero paper mill. He later moved to the Près-des-Vaux (Besançon) paper mill as director, where he remained until 1896.

All the companies he had worked in were modern. When he returned to Italy, he took over the management of the Valvassori Franco paper mill in Germagnano (Turin). Periodically he made trips to see the best paper mills in Europe and America. In 1898 the Argentine Compañia general de fósforos in Buenos Aires entrusted him with the direction of the Bernal paper mill. Before leaving, he married Bice Rossi (1870-1924), daughter of Alessandro Rossi of the Vicenza paper-wool dynasty.

At the end of 1902, he was called upon to reorganise the Maslianico paper mill, which was in crisis, but received an offer to become a managing partner of the Ambrogio Binda paper mill together with the founder's son, Cesare Binda. Donzelli accepted. He was to become managing director and president. Over the years he further diversified his activities,

although he always kept the paper industry at the centre of his interests. He also became involved in politics in a liberal party and in philanthropic enterprises.

In 1925 he left the Cartiere Ambrogio Binda and took over the shares of the Andrea Maffizzoli paper mill in Toscolano Maderno (Brescia), of which he became chairman and director. In 1927 he also purchased the Friulana paper mill of Gemona and established the Azienda cartaria italiana, whose object was the paper trade: he became chairman of both. In the following years he became owner and president of the Vignola Paper Mill and the Besozzo Paper Mills.

In the second half of the 1920s, the crisis that was general to the Italian paper industry arrived for Maffizzoli (as it did for Burgo and Miliani). The 1929 financial year closed with a record loss of more than 14 million lire, which was reduced the following year to 844,784 lire. Donzelli attempted to cope with the negative trend with great energy, deploying huge financial resources. After the issue of a debenture loan of 15 million lire at 6% repayable by 1958, the shareholders' meeting of 31 March 1930 decided to write down the capital from 20 to 6 million by reducing the value of a single share from 500 to 150 lire. Capitalisation with the payment of 16 million lire was also decided. Until the end of 1932, the company did not distribute any dividends or allocations to the reserve and could not even carry out depreciation. When the crisis was over, in 1937 it absorbed the Besozzo, friulana and Vignola paper mills paper mills into Maffizzoli, increasing its share capital to 24,571,500 lire. The group took the name Cartiere Beniamino Donzelli. After the war, D. abandoned political life and expanded his interests in the paper industry with the purchase of Cartiere Meridionali and other companies in the sector. He died in Milan on 6 November 1952.

Friuli, Gorizia

Paper production in the area of Gorizia and Friuli, which was then largely subject to the Empire (later the Austrian Empire from 1804, and the Austro-Hungarian Empire from 1867), began around 1760 by the merchant Tommaso Cumar, a man who applied to open a mill.[97] Cumar was a rich man but because of his fortune, not because of landed income or having received money as an inheritance.[98] As Paolo Iancis reveals, it was marriage above all that played an important role in consolidating his wealth position as his wife, Teresa Favetti, came from a noble family. Before committing himself to the paper industry, he tried other sectors, such as charcuterie and others.[99] He became involved in the paper industry from 1758 when he founded a factory in Gorizia to produce playing cards. He also succeeded in being entrusted by the Court of Vienna with the collection of stamp duties on writing paper, playing cards and the so-called 'Cyprus powder' in the territories of the counties of Trieste, Rijeka and Pazin. In short, stamp papers could only be sold by paying a certain tax to him.[100]

In 1769, he mortgaged a house for a conspicuous sum for the time, 8,000 florins, to secure two loans of 3,000 and 1,000 florins.[101] Cumar's market extends to the whole territory of

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[97] I take the news and archival sources from the study by Iancis Paolo, *Nascita e sviluppo della manifattura goriziana della carta. La "fabbrica" Cumar*, in "Metodi e ricerche", no. XVII, 1 (January-June 1998), Desigraf, Gorizia 1998, pp. 15-22.

[98] State Archive of Gorizia, henceforth ASG, Notarial Archive - testamentary series, b. 3, f. 9, no. 19.

[99] Iancis Paolo, *op. cit.*, pp. 15-16.

[100] Iancis Paolo, *op. cit.*, pp. 15-16. Who cites ASPG, States II, b. 334, cc. 179-181.

[101] ASG, Notarial Archives-Notaries Series (1563-1869) b. 63, f. 416, c. 18.

which he is an arrendatore (with 12,100 bundles per year) protected by customs blocks. At a certain point Raffaele Marsiglio obtains a ten-year privative for paper production in Trieste.[102] In 1766 Vienna decided to encourage the production of paper, the demand for which was constantly increasing, and to promise advantageous incentives to those who would commit themselves. In this sense, the Viennese measures are not far removed from those of the Kingdom of the Two Sicilies before, during and after the French Decade. Cumar prepares an ambitious project to found a paper mill in Aidussina on the Hubel stream. He wants to compete with the Salò mills, considered a model and the main papermaking centre in the Veneto region, which at that time had 49 plants compared to 5 in Friuli.[103] The investment required was 12,000 florins, he raised 8,000 but lacked 4,000, which he obtained from a local nobleman, Count d'Auersperch, who remained a simple creditor.[104] Finally, on 9 May 1767, the paper mill began operations; Cumar already had customers ready to buy his paper even before it opened, such as the Rijeka sugar refinery and administrative offices. In less than two years it became a thriving and expanding company, 'one of the most important and useful mills in the country'.[105] The entrepreneur invested 22,000 florins and produced up to 32 types of paper grades: white writing paper, wrapping paper, turquoise sugar paper, rag paper, cardboard.[106]

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[102] *Ibidem*, b. 327 (vol. I), cc. 172°, b. 329 (vol. I), cc. 176-182. Quoted from Iancis, *Ibid.* p. 17.
[103] Mattozzi Ivo, *Produzione e commercio della carta nello Stato veneziano settecentesco. Lineamenti e problemi,* Bologna 1975, p. 34.
[104] ASG, Notarial Archives-Notaries Series (1563-1869), b. 63, f. 416, c. 18.
[105] ASPG, States II. B. 332 (vol. II), cc. 42-44.
[106] Iancis, p. 20n.

The paper is produced by hand. It uses about 10,000 pounds of rags per year, which, soaked in water, are, as is customary, reduced to a pulp in piles, shredded, and beaten by a mortar and pestle driven by water. Then, according to artisanal custom, a thin mixture is spread out on a wooden frame with a dense network of wires. Only the paper intended for writing undergoes a sizing process by dipping it in a compound derived from tannery waste and collagen. In 1771, a 'follo a uso Ollanda' was introduced, which speeds up the processing and which Cumar was among the first to purchase in Italy. In 1774, there were at least 2 Dutch rolls, the capital invested was 50,000 florins and daily production was 22 quintals of 39 types of paper.

The Trieste merchants unanimously recognise that the sugar paper produced in Aidussina, a major revenue earner thanks to orders from Rijeka, has now equalled the renowned Dutch production in quality.[107]

Cumar felt he could supply not only Gorizia and Gradisca with his product but also many other districts. An entrepreneur involved in the sector, Count Priuli, visited Cumar's paper mill and was astonished. He offered Cumar the sum of 800 ducats a year plus half of the profits to move to Friuli to manage some paper mills he owned. Cumar is envied, in 1771 he produces 6,000 reams a year and has the security of a constant supply of rags (strazze). The 'rags' are sorted by separating the white ones from the 'black cloth' and 'black cloth', the worst ones.[108] How many workers were there in the Cumar Paper Mill? Probably a dozen, six for each working group associated with

[107] *Ibid*.
[108] *Ibid*.

a cylinder, if there are two. If there are more, even 18-20. So, it was big for the time.[109]

Paper mill activity was often interrupted by breakdowns, which were frequent in mechanised mills of the period (especially those of hydraulic parts). Repair times could be long and create considerable damage to the mills, with loss of orders.[110] Cumar tried to prevent the escape of skilled workers during downtime by offering a subsidy to cover the periods of inactivity.[111] Titled labour is rare, especially in the area where there was no papermaking tradition. The Aidussina entrepreneur's workers are made up of old labourers still employed at the time of playing card production, but the most technically relevant roles are in the hands of 'chosen and capable' artisans 'extracted' from Italy and incentivised to move to Aidussina by a salary that is sometimes even double that of their origin. [112]

In the paper mill, there is no master papermaker employed by Cumar. It is he who centralises most of the management, organisational and supervisory functions of the production process in his person, while his wife helps him in the sales function. In the early years he had difficulty moving between Gorizia (where he had set up a playing card factory: they were finished there) and Aidussina (where he produced the paper) and so he was replaced by directors, called in from distant Italy and Germany. But Cumar was not satisfied with this solution,

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[109] *Ibid*.
[110] In 1764, the Cesareo Regio spinning mill in Farra was idle for 161 days due to damage to the rosta from which it was supplied with water. L. Panariti, *La seta nel Settecento goriziano. Strategie pubbliche e iniziative private*, Milan 1996, p. 113. Cit. Iancis, p. 23.
[111] l guilder and 30 carantans per week.
[112] ASPG, *States Il,* b. 334, cc. 182-186.

because he could not keep the two manufactories under control as he wished, and so he decided to transfer the Gorizia playing card manufactory to Aidussina as well.[113] The manor house and a shop remain in Gorizia. When he unified production, he invested an additional 4,000 florins for a piece of machinery that included a manual press and a die driven by hydraulic power. The production of playing cards uses the product of the paper mill and allows Cumar to recycle imperfect sheets. In the 1780s, the paper mill seemed to be flourishing, but in the course of the decade it seemed to collapse. In 1789, a new paper mill was built in Podgora on the Soča River, owned by Count Thurn, and a document mentioning it alludes to a decline of Cumar's mill.[114] The *Catasto Giuseppino* drawn up in 1785-90 still records its existence with the same owner.[115] Later on, Tommaso Cumar died (around 1795) and his son in the family property report no longer mentions the paper mill, which must have been sold by the end of the century. As with other mills in the area, it was probably the Napoleonic wars that brought about its downfall.[116] In any case, the Cumar Paper Mill did not see the dawn of the 19th century.

[113] ASPG, *States Il,* b. 338 (vol. 1), cc. 147-158, b. 334, cc. 182-186.
[114] Calendar for the common year 1845 published by the Royal Agrarian Society of Gorizia, Gorizia 1845, p. 62.
[115] ASG, Catasto giuseppino 1785-90, b. 104ill, topographic nos. 539-542, b. l05ill, c. 70.
[116] As Iancis writes, there are no private archives that can, as far as is known, fill the documentary void, and even Cumar's account books seem to have been irretrievably lost.

Chapter 5

Lombardy:
varesotto, bresciano, alto milanese

The Paper Mill of Vaprio d'Adda

The Vaprio d'Adda paper mill was the subject of a beautifully illustrated volume full of documentary references by Mario Chignoli, *Fonti per la storia della Cartiera di Vaprio d'Adda* (Massetti, Vaprio d'Adda, 2013). The study recalls how the paper mill originated from a gualchiera built on the Adda river, present since the 15th century, which was used for various purposes over time. In fact, there were many silk mills in the countryside around Como, Lecco, Monza and east Milan as far as Trezzo and Vaprio. Around the latter villages, the Bovara and Gavazzi families had created empires for silk processing that they integrated with agriculture and manufacturing. In the area near the Adda river, cotton, wool and paper industries came to life, thanks to the abundance of labour, coal and water. The largest landowners in the area were the Oroboni and, closer to Vaprio, the Monti. Entrepreneurial efforts that, as Chignoli writes, were not 'organically conceived and directed' but 'contiguous' nonetheless and integrated. Manufacturing industry from complementing agriculture (as in the case of the silk industry) came to transform the original environment. Thus, over time, a singular industrial landscape emerged behind the mulberry and vine fields. The paper mill was located on the western bank of the

Adda, along the towpath of the Naviglio Martesana, and was a small water-powered mill for the production of reams of paper.

After the reclamation of the area in the 15th century, the first industrial activities were set up: furnaces, hammer mills and a quarry of Adda stump. In the first half of the 18th century, there is evidence of a paper mill and, not far away, a farm located in the ancient village of Vaprio, between the Adda and the Martesana, a sandy area with woods. In this strip of land, two buildings for a lime kiln and a water-powered mill for grinding grains were already in operation in the 15th century.

When the Austrian government took over from the Spanish in 1713, census, political and administrative reforms were inaugurated with the aim of stimulating manufacturing, commercial and industrial activities. The aristocrats of Vaprio, when peace came, chose to invest in an innovative production, papermaking, where Lombardy had significant traditions in the Brescia district of the Toscolano valley and the Valseriana district, just north of Bergamo, as well as in the Varese area.[117] The new production unit is a hydraulic hammer mill to beat rags and make paper pulp. The request for authorisation for the new mill dates back to 1737, but it did not appear on a map until 1749. We have no information on the structure. The paper mill tenant of the Folla was to pay 25,16.6 lire for "bocche n. 2", we do not know if they were the workers or his family. In 1757, a tax relief was arranged for the workers of the new facility activated by Count Cesare Monti Melzi (died 1774). The document mentions some workers by name: Carlo Fumagalli, Giacomo Nava, Antonio Nava, Andrea Vimercati

[117] Identified by the new *Catasto della Lombardia Austriaca* with State property number 432.

and specifies that they had been working there for 9 years, suggesting that the factory was opened in 1748.

In 1764, we learn that the paper mill was leased by the Monti family to the Milanese entrepreneur Giovanni Antonio Primo. Production was about twenty reams a day (i.e. 4,000 sheets, if each ream was 200 sheets) in 18 different qualities of paper. In line with the production of other Lombardy paper mills located in the Cremonese and northern Milanese areas.[118] Raw material was rags (linen, hemp, cotton, jute). A testimony from 1767 tells us that the Folla di Carta of Vaprio employed 15 people, so it was still a small workshop.[119] In 1770, the archives of the Austrian tax authorities record a certain Gregorio Cedrone as a conductor, who succeeded the late Francesco Antonio, probably the first papermaker. Cedrone – the name is of Marche origin – lived at the plant with his sons Francesco and Giovanni, his wife and two women. In 1774, Paolo Monti, the last heir of Count Cesare Monti Melzi, died. As he was unmarried and childless, he was succeeded by his mother Maria de Loyasa for the most conspicuous part and cousin Massimiliano Giuseppe Stampa di Soncino (1765-1824). The Monti estate was split up and the largest estate passed to the Stampa di Soncino family, while the paper mill and mallet sites passed to his mother. A year later, in 1775, she ceded the copper mallet, the crowd building and the right to extract water from the Martesana canal from a special mouth to the Monastery of S. Ambrogio Maggiore in Milan of the Cistercian Congregation. In later years, wall divisions were

[118] Caizzi Bruno, *Industria commercio e banca in Lombardia nel XVIII secolo*, Milan 1969, pp. 123-124.

[119] S*eguito delle visite del consigliere la Tour alle manifatture dello Stato di Milano*, 1767, ASMI censo p.a. cat. 2170. It is significant that the name Cedrone is of Marche origin.

created between the Congregation's property and that of the Stampa di Soncino.

After the suppression of religious property (1782), the Vaprio Paper Mill was confiscated by the State and became state property. It made less paper for writing and books, and more paper for stamps, beginning a phase that (apart from the period 1799-1804) lasted until 1834. In 1799, with the advent of Napoleon, the mill passed from the Olona State Administration to the private Andrea Mainardi. At the beginning of the century, the Vaprio paper mill employed 100 people and was bought back by the Ministry of Finance of the Italian Republic.[120] The adjoining mill that remained to the Stampa Soncino and was run by a certain Casati Paolo began to constitute a limit to the factory's expansion. The neighbouring kilns belonging to the Stampa Soncino were leased in 1802. In 1806 the negotiations conducted by the State for the purchase of the Molino Stampa failed. In 1807, the Kingdom of Italy asked all the municipalities to fill in a questionnaire to find out what they produced. For Vaprio, the document was filled in by Antonio Galimberti, steward of Count Stampa Soncino, who wrote that the only factory in the area was a paper mill producing playing cards, writing paper and stamp paper.

At that date, the factory employed 102 workers. The document states that in the three-year period 1804-1806, two fatal accidents had occurred in the factory, which had returned to the state property.[121] Sixty years after its foundation, the paper mill was therefore of a substantial size, not a small mill

[120] Pederzani Ivana, *Tra agricoltura e industria: l'alternativa manifatturiera*, in *La storia di Vaprio d'Adda*, edited by Claudio M. Tartaglia, vol. VI, *L'ottocento*, p. 50.
[121] ASMI, Studies, p.m., cart. 1168.

and belonging to the Treasury. Vaprio d'Adda, in the area, is the only municipality with such a mill. A communication of 1807 informs us that Casa Stampa Soncino wants to build a sawmill for timber downstream of the paper mill. It will be built, and the sawmill together with the grain mill will form a new nucleus of buildings downstream of the paper mill.

In mid-July 1807, fire destroyed the roof of a furnace very close to the factory owned by the Stampa Soncino family. In December 1814, a second fire occurred, possibly due to workers' grievances: the State had dismissed over 90 workers from the factory.[122] When Lombardy returned to the Austrians in 1814, the Vaprio factory remained with the State and manufactured stamps. Between 1813 and 1816, the State administration (in both regimes) studied extensions. At that time, the old canals were replaced with new ones, reducing water dispersion. From at least 1810 and beyond 1816, the paper mill was leased to a new tenant, Andrea Locatelli. An arson attack in 1829 destroyed the Maglio furnace.

In 1834, the paper mill from the State returned to private hands. It was taken over by Giacomo Antonio Perrucchetti and then by Perrucchetti himself with Tommaso Pastori, then it was only the latter who would run the mill as owner until 1839. Pastori introduced the first endless machine in 1838. In 1839, the factory went to a newly formed company comprising Pastori and the engineer Paolo Pigna (1802-1888). The firm Turati & Radice of Busto Arsizio, led by an important industrialist and financier, of aristocratic origin, Francesco Antonio Turati (1802-1873), son of Antonio Ilario Turati

[122] Canella Maria, pp. 131-133.

(1770-1828) and a Crespi woman, Anna Maria (1776-1855), also participated in a limited partnership.[123]

Cotton manufacturing in the north-west had started around 1810 by Giacomo Muller and Andrea Ponti. A few years later Pasquale Borghi had joined them with his mechanical spinning mill in Varano (today Varano Borghi) and about 15 years later the Cantoni family in Legnano and the Turati family in Busto Arsizio (with the Krumm, Radice, Pigna and Lualdi families). This partnership brought Turati, a member of a well-known family of entrepreneurs-industrialists and merchants, into the paper mill.[124] In 1840, the partners brought in Giovanni Maglia. Pastori was given the management of the mill while Pigna and Maglia were in charge of commercial development and the warehouses in Milan. In 1841 Pastori sold his share to Maglia, who became Maglia, Pigna and Compagni. Pigna is given technical-managerial responsibility.

The two, Pigna and Maglia, remained in charge of the factory until 1867. In 1850-1853 the Gordon boilers were put into operation and the transition from motive power to thermal power (which had already taken place around 1835 in the

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[123] *Strategia d'impresa nella Lombardia ottocentesca: il caso di Francesco Antonio Turati* (1802-1873). In Archivio Storico Lombardo.
[124] Romano Roberto, *La modernizzazione periferica*. *L'alto milanese e la formazione di una società industriale (1750-1914),* Franco Angeli, Milan 1990, p. 70 ff. At the time they financed the paper mill on the Adda, the Turati family owned 4 cotton textile mills along the Olona river (2 in Busto, 1 in Legnano, 1 in Castellanza). In 1845 they also acquired the Realdino spinning mill in the large Lombard cotton sector of Monza-Albiate-Carate Brianza. In 1846, Turati founded in Montorio (Verona) the first mechanised yarn factory in north-eastern Italy. In 1857 he was awarded the Habsburg Imperial Knighthood and in 1862 he was a shareholder and bondholder in several companies involved in the construction of the most important northern infrastructures, such as the railways.

cotton industry) was completed. In 1856 Pigna added a new plant in Valseriana, incorporating three factories of 17th century origin and a silk spinning mill in Alzano Maggiore (today Alzano Lombardo). Turati and Radice also brought the group a small paper mill in Maslianico, between Cernobbio and Chiasso.

A financial crisis emerged at the end of 1867 and led to the liquidation of the Pigna factory. In 1868, the factory's managers were Ambrogio Binda & C. and Giuseppe Colombo. The deed that marks this transition compares the values of three paper mills: the Vaprio paper mill, the Alzano Maggiore paper mill and the Maslianico (Como) paper mill. The technician attests that of the three, the largest is that of Vaprio and estimates it at 509,000 lire. In another contemporary report, Ettore Maffioretti and Giuseppe Pindo make other considerations regarding the strategic nature of the paper mill and its location.

In December 1867, the preliminary contract for the sale of Pigna & Maglia to Binda was signed for a price of 364,000 lire. In February the purchase was finalised and on 30 March 1868 Count Turati, who had been financing the paper mill for 29 years, left the scene. Turati, however, remained in the paper industry with the Maslianico plant, while Pigna managed the Alzano paper mill and in 1870 set up the Paolo Pigna Premiate Fabbriche di Carte company based in Milan, destined to develop with Paolo and Carillo Pigna and their heirs Pesenti.

1868 marks a new beginning for the factory, which is now equipped with two endless machines. Alongside these modern tools remains the centuries-old Paper Mill, with the room with terracotta tubs for shredding ashes and the large room crossed by stone channels and containing six stone tubs with cylinders

for shredding ashes and two large stone vats. They are historical spaces that survive and are still used in this period.

On 29 May 1869, Ambrogio Binda assigned 65,000 lire to purchase the sawmill with the adjoining grain mill from Count Carlo Basilio Stampa Soncino, as well as ploughing, grazing and arboreal land between the Martesana and Adda rivers for 24 perches. Between the seventies and eighties, as obstacles disappeared, the factory expanded eastwards and southwards. An extension was made in 1871 and a more conspicuous one in 1887-1888, with the construction of new premises for calenders, reels, cutting machines, boilers and steam engines. The Binda family also had the towpath along the Martesana widened.

The Ambrogio Binda paper mill in Vaprio (powered by 250 hp of which 200 water and 50 thermal) now employed 370 workers, four times as many as in 1807, and exported to India and the Americas. Cristoforo Benigno Crespi's industrial adventure also began between 1877 and 1878, from a water concession. His integrated factory comprising spinning, twisting and weaving was to be the productive heart of the Bergamo Riviera and the pivot of a new centre created from nothing: Crespi d'Adda. Between 1888 and 1896, the paper industry, in contrast to other sectors, appears to be in full development, at least in Northern Italy.[125] Binda was headed by Ambrogio's son Carlo (died 1874). Lombardy, with its 69 paper mills out of 374, together with Piedmont, led the Kingdom's production. In this context, the two factories, Binda of Conca Fallata and Vaprio, are among the most competitive. The history of the paper mill would continue for much of the 20th century.

[125] Ferrari Dante, *Le carte della carta*, Scheiwiller, Milan 1999, p. 100.

The Conca Fallata Paper Mill

For over a century, the Milanese company that ran the Conca Fallata paper mill was one of Italy's most important and prestigious paper enterprises. It stems from the one-man company of Ambrogio Binda, founded in the Lombard capital on 8 December 1855. The long supremacy among companies in the sector has always been maintained thanks to the excellent quality of production organised in three modern plants, the one in Conca Fallata (MI) – the most important in terms of size and labour employed –, where mainly decor paper was processed, the one in Vaprio D'Adda (MI), mentioned above, destined for papermaking and the manufacture of paper for industrial uses, and the **Crusinallo-Omegna paper mill** (NO), reserved for combing printing paper and the production of substrates for the faux vinyl leather and carbonless paper industries; the energy needs of these plants are met by a number of thermoelectric and hydroelectric power plants owned by the company. To build the new factory, Binda identified land adjacent to the Conca Fallata, a dock located on the Naviglio Pavese: the water jump of about 5 metres would act as motive power for his machines. The factory saw the light in 1857 and the first years of activity were immediately successful. The locks of the Naviglio, designed for navigation, also began to be exploited as a source of energy. Having a large water flow that jumped about 5 metres was an excellent reason to locate industrial production near the basin, not to mention the advantages of transport:

Binda could use the barges that sailed on the Naviglio to transport his paper.[126]

Unfortunately, a disastrous fire destroyed a large part of the complex in 1871, but this event did not stop the entrepreneur who, despite his not-so-young age, immediately set about rebuilding. When Ambrogio Binda passed away in 1874, the rebuilt paper mill had long since begun to make a profit. In 1896, according to *Statistica Industriale. Riassunto delle notizie sulle condizioni industriali del Regno* (Rome, Bertero, 1906, p. 206), the Binda paper mills in its two units at Conca Fallata and Vaprio d'Adda employed 1,600 people and produced 50,000 quintals of quality paper a year. In 1917 the paper mills took the name Cartiere Ambrogio Binda, incorporated as a joint stock company in 1917.

Ambrogio Binda (1811-1874) is one of the most important figures in the history of the modern paper industry. Born in

[126] The history of the Conca Fallata, a system of locks and canal-drains, is linked to that of the Naviglio Pavese. Construction of the canal began in 1564, when Milan was under the power of the Visconti family but was interrupted in the mid-1580s near the city gates where the second basin was to be dug. For more than two centuries, until the Napoleonic period, the work remained at a standstill. That is why it was called Conca Fallata, i.e. wrong basin. The works were blocked due to technical and excavation difficulties, but probably also due to the insistent protests of Pavia's merchants, who feared that the connection to Milan via the Ticino could damage them. Work resumed in 1807 and the lock was completed in 1815, four years before the inauguration of the Naviglio (1819). Navigation on the navigli waned shortly after the middle of the century, due to competition from the railway, which was faster than the barges. The original functions of this basin were to raise and lower boats by means of a system of locks and the outflow of water for irrigation purposes. For this, a side canal was also built, where the water dissipates its potential energy under control. The already complex project in itself contains a further technological complication: the Naviglio flows on a canal-bridge under which the southern Lambro spillway passes.

Milan on 15 February 1811 to Gaetano Asperioni and Teresa, he was orphaned at an early age and thus placed under the guardianship of his paternal uncle who was a pharmacist in Gallarate. In the summer of 1818, he began working at the Vigoni trimmings factory. In 1829, he bought two second-hand looms and started his own business, producing pieces for making buttons. In 1833 he married Angela Grugnola (1814), by whom he had three sons: Carlo, who became interested in the paper industry; Cesare, who devoted himself to the button industry; and Girolamo, who died young. Binda has undoubted social merits, in fact he established aid works for his workers, and undoubted entrepreneurial and inventive skills. He lived above the factory as was the custom in those days. In 1847, he bought land in Porta Romana where he intended to set up a factory for the production of metal and gold-plated brass buttons. Due to the riots of 1848-1849 and the Five Days of Milan, with the aftermath of the urban war, he encountered financial and commercial difficulties. When he recovered, he completed the button factory by expanding his business. In 1855, he bought Giovanni Rautter's comb factory, which he then preferred to close. In the same year, 1855, he entered the paper industry. On 8 November, in fact, he set up, together with his two sons and twenty partners, a limited partnership (initial capital of 500,000 lire in fifty shares) for the 'privileged manufacture of vegetable and all kinds of paper', a type of gelatinous paper first introduced by Binda in Italy. Since the government in Vienna hesitated to grant him permits, based on the prevailing policy of not favouring the industrial development of peripheral territories, work on the paper mill did not begin until 1857, the same year in which the company was registered, but with retroactive effect. When it finally began production about two years later, Binda obtained

favourable conditions from the partners for the introduction of papermaking processes that were still little known in Italy, as paper was still mainly made from rags. Thanks to these processes, and to the initially free services of the employees, and perhaps the workers in the button factory who were promised employment in the paper mill at the end of the year, the new business expanded rapidly, favoured immediately after 1859 by the enormous flourishing of newspapers and magazines in Italy.

The Conca Fallata paper mill on the Naviglio pavese soon became a small centre on the outskirts of Milan: Binda took care to build houses, shops and other civil amenities for his employees. In 1869, the village around the paper mill had, according to Lessona, a thousand inhabitants. The birth and development of the small centre around the paper mill documents not only the entrepreneur's commercial enterprise, but also that reawakening of industrial activities in the second half of the last century, linked to a new spirit, which also conceived the factory from a social point of view, that is, as an enterprise that included in its organisation welfare initiatives such as to ensure order and efficiency for the workers.

In 1868, Binda took over the paper mill in Vaprio sull'Adda with a million obtained as a loan. Three years later, on the morning of 15 July 1871, a fire almost entirely destroyed the paper mill on the Naviglio; the damage amounted to 2,000,000 lire and seven hundred workers were left unemployed. The misfortune, however, did not slow down the company's activity. Binda died on 3 April 1874 and was also remembered with emotion by his workers.[127]

[127] He had been a councillor of the Milan Chamber of Commerce (industry section) from 1859 to 1862 and from 1867 to 1970. In 1856,

Ambrogio Binda is of medium stature, of straightforward manners and always distinguished dress, sympathetic in appearance, animated in his gaze by vivid pupils. Honours, titles, riches did not change his character, very little his habits. His heart, very sensitive to the misfortunes of others, gave him a good character, sweet, but energetic and sometimes proud when faced with disloyalty, disloyalty and lies. He was a worker and therefore knows the needs, virtues and vices of workers.[128]

Pigna Paper Mill

Also in Lombardy, no more than 50 kilometres from Milan, a considerable papermaking activity has developed since the Renaissance in the area of Alzano Lombardo, at the mouth of the Val Seriana, a few kilometres north of Bergamo. It is an area rich in water with streams and a river suitable for papermaking. At least since the 16th century, there has been a Via delle Cartàre (currently Via Pesenti) so named in the town planning registers of the 17th and 18th centuries. This was the area of the paper industries, where there were also some beautiful palaces, in particular of the Grittis, Berlendis and Stefanini families, owners and administrators of the paper mills. In those centuries, the artisanal production of good paper made good money. The Stefaninis had a small paper mill on the banks of the Serio River, which they moved to the Roggia Morlana in 1675, later to become the Pigna Paper Mill. On the

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he had exhibited his production of buttons at the Universal Exhibition of Household Objects in Brussels, and later participated in the Universal Exhibitions in Paris and Milan, displaying various types of paper.

[128] Bibliografia Italiana, No. 6, 31 March 1874, Milan p. 19.

site where the old paper mill stood there is still a plaque that reads:

OPUS EX LAPIDE – PRIMUM – ALZANI ACTUM - YEAR 1675

Around 1745, 14 paper mills were active throughout the Bergamo area, which became 10 in 1766 and 8 in the early 19th century, 4 of which were in the Alzano area: the **Stefanini Paper Mill**, the **Clivati-Ghisalberti Paper Mill**, the **Sonzogni Paper Mill** and the **Milesi Paper Mill**.

In 1868, on 19 May, Paolo Pigna drafted a letter in which he declared the liquidation of G. Maglia e Pigna e C. completed, taking over its remaining assets and liabilities. In another letter, bearing the same date, he declares his continuation in the same branch of trade in the Alzano factory, which has become his exclusive property. During this period Pigna took over three pre-existing small paper mills: Ghisalberti, Milesi and Sonzogni, all in Alzano Maggiore. After renovating their buildings, he began paper production. In 1870 the company name became: Paolo Pigna Premiate Fabbriche di Carta, with registered office in Milan. The founder wanted his company to be known for the quality of its products. This goal is achieved through the use of technologically advanced machinery and the training of an increasingly large workforce motivated to pursue optimisation in new productions. In particular, it purchased a reel machine capable of guaranteeing the production of 6/7 quintals of fine quality paper per day. At the 1870 exhibition in Bergamo, the company was rewarded for its quality.[129]

[129] Mandelli Angelo, *Alzano nei secoli,* cit., p. 323.

In 1872, an Industrial Investigation Committee was set up, before which Pigna testified: 'There are others, but they only manufacture ordinary paper, whereas I also manufacture fine paper, for registers, ordinary and very fine letter paper, and telegraph rolls, coloured in pastes and coloured with patinas, marbled'.[130] In 1875, Pigna had a endless machine installed that could produce up to 25 quintals of paper per day at a considerable investment.[131] At this point, Pigna in Alzano Lombardo was producing a considerable amount of paper of all kinds, which it was able to sell almost all to Milan and the surrounding area, where newspapers, publishing houses, companies and offices needed quantities of paper unheard of until a few years before. In Milan, the company had a depot and employed 50 workers at this stage; from this point of view, the company did not employ many workers but the considerable mechanisation nevertheless guaranteed a good volume of production.[132]

Pigna himself admitted that, apart from a few large realities in the south (Valle del Liri) and in the North (Piedmont, Lombardy and Veneto), most production took place in a fragmented reality of small factories, which used backward systems and had to overcome the fierce foreign initiative.

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[130] *Deposizione di Paolo Pigna* in Comitato d'inchiesta industriale, Riassunto delle deposizioni orali e scritte., v. IV, t. 1 Firenze 1874 (without page).

[131] Gola A., *Annuario delle cartiere italiane* e *delle industrie operatrici della carta e del cartone*, Anno I, Giuliani, Milan 1875, p. 11.

[132] Ascenzi Anna, *Le cartiere Pigna e la produzione industriale dei quaderni scolastic*, in *Educar em Revista* v. 35, no. 76, July-August 2019, Curitiba (Brazil) 2019, pp. 119-149. Ibid, p. 121. The article shows how important it was for the success of this paper mill to develop a visible and recognisable brand, and to specialise in producing lines of school exercise books that became very popular with generations of students.

In the late 1870s (circa 1878-1879), a statistic published by Vittorio Ellena gave us the following data:

521 paper companies
17,312 workers
13,980 hp total motive power
813 vats
73 drum machine
95 paper machines
600,000 quintals of annual production[133]

According to this statistic, therefore, the more than 17,000 Italian paper mills employed an average of 33 workers. In reality, little more than a dozen reached many hundreds of workers, even a thousand, and therefore, apart from the largest, the others had an average of certainly less than 20.

On 1 April 1883, Paolo Pigna sold the company, based in Milan at Via Fieno 3, to his son Carillo and to Messrs Giuseppe Boschi, Luigi Sartirana and accountant Carlo Conti.[134] The new partners set up a company between them, registered with the Chamber of Commerce, with a share capital of 200,000 lire and a special feature of this was the fact that all three partners signed in the name Paolo Pigna. The Dall'*Annuario dell'Associazione Tipografico-Libraria di Milano*, dated 15 October 1883, shows Cartiere Pigna to be active, operating and well-known. At the same time, the plant was renovated to

[133] Ellena Vittorio, *La statistica di alcune industrie italiane*, Ministero di Agricoltura, Industria e Commercio pp. 117-126; ID *Notizie statistiche sopra alcune industrie*, Roma 1879.
[134] Deed of notary Luigi Morandi of Milan, repertory no. 10782. It should be noted here that the dates of birth and death of Carillo Pigna, son of the founder Paolo Pigna, could not be found.

make it a new factory: Jonval hydraulic turbines, Dutch machine batteries, flat paper machines and steam boilers were installed. The raw materials also changed: no longer just cut cotton rag but wood pulp and then cellulose. On 26 November 1888 the founder Paolo Pigna died and the management passed to his son Carillo. The company was founded as a limited partnership and began to expand further. In nearby Alzano di Sopra, following a decision probably made by the founder but nevertheless implemented by the heir Carillo, a workshop is established for the production of wood paper, gradually eliminating rags.[135]

The latter died in turn on 17 November 1894 and everything passed to his heirs, his wife Barbara Pelliccioli Pigna and daughter Giuseppina.[136] The latter, from 1892, was married to Daniele Pesenti (1861-1911), a family of entrepreneurs who owned the **Nembro paper mill**, although they had concentrated mainly on hydraulic lime and cement.

Daniele Pesenti was part of an entrepreneurial dynasty of cement manufacturers. Giuseppina had brought the paper mill as a dowry for her marriage. The destiny of the Pesenti and Pigna families was then united. The Pesenti cement factory

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[135] Subbrero Giancarlo, *L'industria cartaria e poligrafica* (1861-1951) in Vera Zamagni-Sergio Zaninelli (curr.), *Storia economica e sociale di Bergamo fra Ottocento e Novecento*, II, *Il decollo industriale*, Bergamo, Fondazione per la storia sociale ed economica di Bergamo, Bergamo 1997, p. 319 ff. Further reflections on paper in the Bergamo area and also on the possible diffusion of paper in the area as early as the 13th century can be found in Zonca Elisabetta, *Et si fabrica carta di ogni sorte. Appunti sull'industria cartaria e l'editoria a Bergamo*, in Bibliologia 12, 2017, Studi per Giorgio Montecchi curr, Cesana Roberta-De Franceschi Loretta-Venuda Fabio, Olschsky, Pisa 2018, pp. 127-136.

[136] Deed No. 5053 of 7 February 1895 by Notary Dr. Giovanni Dolci of Bergamo.

and the Pigna paper mill, always fighting over the use of water from the Roggia Morlana, ended all quarrels in 1892. However, the paper mill was not in an ideal condition and Daniele Pesenti describes its state in a memoir:

> The Pigna paper mill was in very poor condition. In disarray in its excessively old machinery; irrational in the layout of the buildings; poorly utilised hydraulic power; poorly arranged transmissions; poorly regulated transport; full of false manoeuvres that made work difficult and uneconomical, the paper mill was in debt, produced too little and did not have sufficient modern technical means for the need.[137]

Within 15 years, therefore, the company had aged: its rapid development had rendered some machines obsolete, probably not the last ones installed in the mid-1870s, and denounced an organisation no longer suited to industry at the turn of the century, when concepts of space organisation, ergonomics, processing times, hygiene, and the elimination of lengthy and uneconomic procedures were beginning to enter Italian industrial culture. However, it must be considered that Cesare Pesenti's Memoirs were written in 1931, at a time of marked modernisation, when the concepts of Fordism, for example, had by then penetrated among Italian industrialists.

In the deed of transfer of ownership in 1895, it is understood that, on the death of Carillo Pigna, Messrs Conti, Sartirana and Boschi ceased their capacity as general partners, leaving the company to be continued by Carillo's heirs: Barbara Pellicioli and Giuseppina Pigna, his wife and only daughter respectively,

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[137] Pesenti Cesare, *Memorie di famiglia. Lotte, travagli e fortune* (1931), pp. 51-52. This text can be found cited in various books although its location is not indicated: it is probably a private text.

as per his will. The two heirs decided to join other partners in the company, which the notarial deed showed to be: Daniele Pesenti, Augusto Pesenti, Fisico Pietro Pesenti, Carlo Pesenti, Luigi Pesenti, Cesare Pesenti, all born and domiciled in Alzano Maggiore. The new company set up in this way continued its activity under the name "Paolo Pigna" and appeared in the Register of Notifications of Tradesmen and Shopkeepers in the City and Province of Bergamo on 26 March 1895.[138] It was Cesare Pesenti, above all, who reorganised and rationalised the production flows, built new premises, restored the financial situation, bought new machinery, and organised the flow of production.[139]

In the early years of the 20th century, when it now had 150 workers (few compared to others but still growing), the factory proceeded to purchase more strategic land for expansion, especially in the direction of the railway. It also managed to overcome the difficult situation of the First World War by focusing above all on the school exercise book sector with its own brand or on behalf of third parties. Daniele Pesenti died on 23 October 1911, at the age of 50. After a few years of management ups and downs, on 1 July 1919 the company was transformed from a limited partnership into a joint-stock company under the name Cartiere Paolo Pigna S.A., with headquarters in Alzano Maggiore while the administrative headquarters remained in Milan. The initial capital was 4 million, later increased to 8 million in 1920. In the same year, the **Clivati-Ghisalberti paper mill** in Alzano Maggiore

[138] State Archives - Historical Archives of the Bergamo Chamber of Commerce, under registration number 3943.
[139] Pesenti Cesare, *Family Memoirs*. *Lotte travagli e fortune*, pp. 55-61.

joined the group, as well as the Nembro paper mill used for particular sectors.[140]

Contrary to other companies in the sector, which at the beginning of the 20th century substantially maintained the same characteristics and size, Pigna's production doubled, rising from 600,000 to 1,200,000 quintals of processed paper, thanks above all to mechanisation and the gradual expansion of its structure in the Bergamo area. This had a significant impact on the socio-economic development of neighbouring towns in the Seriana Valley, as well as the city of Bergamo itself.

In the 1920s, the heirs of the Pigna dynasty set up a continuous, as well as a complete, production cycle, introducing the production of stationery and paper materials, which complemented simple paper, while maintaining excellent quality standards. Paolo Pigna was the first to produce large-scale illustrations for the covers of the notebooks it produced and set up a new stationery sector in 1926. Over the next twenty years, the Alzano-based company became a national reference point for the production of school exercise books, thanks to its distribution and sales network that supplied stationers all over Italy.[141]

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[140] Subbrero Giancarlo, *L'industria cartaria e poligrafica* (1861-1951), 1997, p. 333.

[141] The brand of the spread-winged eagle acquired prestige and recognition at that time and became a guarantee, for many, of the reliability of the quality of Pigna notebooks. On 6 May 1925, the company Cartiere Paolo Pigna was registered with the Bergamo Chamber of Commerce, Economic and Administrative Repertory No. 716. 1928 saw the first exports of Pigna paper products to Egypt and Argentina. In 1936 Carillo Pesenti Pigna, Daniele's son, bought land adjoining the company for possible expansion. The company became Cartiere Paolo Pigna S.p.A. and, on the death of Carillo Pesenti Pigna

Maslianico and Cernobbio paper mills

The paper industry in Breggia (northwest of Como, Italy-Switzerland border) has been the driving force behind the economic development of the valley for years. The first records of paper mills date back to the 16th century: originally, all the paper mills were grain mills, except for the mill called 'Majetto', where a mallet operated, and the one called 'Folla', run by the Carcano brothers. From the 18th century, almost all mills were converted into paper mills to produce paper by hand. In 1861, machine manufacture began. At Majetto a flat-table machine was put into operation for the manufacture of continuous paper, thirteen years later one for the manufacture of hand-made paper.

In the last years of the Lombardy-Venetia Kingdom, along the course of the Roggia Molinara, there were nine paper mills, six in Maslianico and three in Cernobbio, that produced papers, watermarks, parchments, cartons, a wide range of manufactured goods, from valuable handmade paper to 'fine' machine-made kinds, from raw wrapping paper to industrial materials.

Canziani-Vita Mayer Paper Mill

In Cairate (Varese) there is evidence of a Nuns' Mill, a paper mill, and in 1772 another small paper mill near Lonate Ceppino. The settlement later occupied by the **Canziani-Vita Mayer Paper Mill was** certainly already in use in 1744, but a

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in 1940, management was entrusted to Paolo Radici. The last Pesenti Pigna was Carillo Pesenti Pigna (1968-2011) who died prematurely.

settlement dated perhaps from 1608. In 1853, Mulino delle Monache was enlarged and converted into a small paper mill that changed hands several times, becoming, in 1881, Cartiera Canziani & C. In 1891, the business was taken over by Enrico Vita, who renamed it (1897) Cartiera Enrico Vita & C. and expanded it with new buildings and the acquisition of the Lonate Ceppino 'crowd'.

In 1900, after his death, the management passed to his sons and the company took the name Fratelli Vita. A few years later, with the marriage of Tilde Vita and Sally Mayer (1875-1953), a member of an important industrial family, the name became the final and famous one of **Cartiera Vita & Mayer**. Sally had come to Italy in 1891 and obtained Italian citizenship in 1920. In 1904, with the birth of the Valmorea Railway, then known as the Olona Valley Railway, several special infrastructures were built near the paper mill; in 1908, when it employed 440 people and produced 6,000 tonnes of paper a year, new machinery was installed. It was hit several times by violent flooding of the Olona River (1908, 1911 and 1917), but this did not slow down its development: a new renovation of the machinery took place during the First World War, and in the 1920s and 1930s huge new buildings and a vocational school were built to train employees. In 1937 a pulp mill (8,000 t. per year) went into operation, but the following year the Mayers, who were Jewish, were forced to emigrate due to the racial laws, while ownership of the industry passed to the government. In 1940 there were 985 employees. The handover period would last five years: in April 1945 the Mayers regained possession of the paper mill and management passed to Astorre Mayer (1906-1977), the future consul general in Milan of the State of Israel, who was involved in local and international politics. An ambitious renovation plan began

between that year and 1949: the mill was enlarged with new, huge halls, and a power plant with a tall concrete chimney was erected on the hill above. The production of paper for hygienic products also began (1957) and two adjacent companies in Fagnano Olona, the **Sterzi Paper Mill** and **Sacchettificio Bisson & C.**, were purchased, which took the name of **Aquila Paper Mill**, which, with 200 employees, was dependent on Vita Mayer.[142]

[142] The crisis, due to competition from Eastern countries, would only manifest itself at the end of the 1970s also due to the shortage of timber. Vita Mayer obtained 2 million against the 6 million needed but had to take over some paper mills in the Centre-South. Meanwhile, the Olona Valley railway closed in 1976. Two violent floods followed in 1975 and 1976. The company closed in 1977 and later the Aquila Paper Mill also went bankrupt.

Chapter 6

Tuscany:
Grand Duchy of Tuscany, Republic of Lucca
Post-Unification Tuscany Region

Paper mills of Lucca

Considering the importance and centrality of Tuscany in the economic, political and cultural landscape of medieval and modern Italy, it is easy to understand how early paper mills developed in this area. What emerges from the research of this century is that the Tuscan paper-making nucleus is the oldest on the peninsula after that of Fabriano and developed shortly before that of Garda-Brescia. In the Tuscan context, we know that paper production was probably introduced in the city of Lucca as early as the 13th century.[143] There are few documents

[143] For the Tuscan case, Renzo Sabbatini's studies are fundamental, starting with his doctoral thesis, *La manifattura della carta in età moderna. Il caso moderno,* 2 vols., Doctoral Thesis, University of Florence, Florence 1988. In subsequent years, Sabbatini continued to study the paper industry in Tuscany, focusing on individual aspects: the condition of women *in L'occupazione femminile in cartiera: tra manifattura e industria*, "Società e storia" (49), 1990, pp. 547-565; ID, *Nacque formata da maestra mano. La carta a Lucca e Pescia, una storia antica e viva,* BdC Editore, Lucca 2012; ID, *Cartai e cartiere*, in *Il Rinascimento italiano e l'Europa*, v. III, Produzioni e tecniche, Fondazione Cassamarca-Angelo Colle, Treviso 2007; ID, *La formazione di un centro cartario: Villa Basilica*, in "Quaderni Storici", 59 (1985), pp. 427-444; *Pescia: città industriale del Sette-Ottocento. In Itinerario museale della carta in Val di Pescia,* pp. 20-50, Periccioli Pescia 1988. And others. These studies and others by the same author will be taken into account in this book.

for that century, only documentary traces, and likewise for the following century. However, it is significant that in 1307 the Corporazione dei Cartolai was created in Lucca. This is indirect but important evidence: there were already workshops and technicians working in this field for years.[144] The Tuscan papermakers were dedicated to the production of parchment paper, a medium that was completely different from real paper because it was made from animal fleece, but had a similar use. In time, they also began to produce so-called 'reason books', used by merchants to mark their administration. The mercantile power of Florence in the first place, not to mention that of other Tuscan cities in the late Middle Ages, made these work supports useful and necessary.

In addition to the ancient paper mills in the Colle Val D'Elsa and Pescia area, along the Lima torrent and the Serchio river, there were paper mills that rose up from the plain of Lucca to Versilia, where papier-mâché processing is still alive. Since the 15th century, the history of Pescia has been closely linked to paper production, with diversified activities (production, transformation, research, experimentation), but the greatest concentration is in the area straddling the provinces of Lucca and Pistoia, where the landscape is marked by numerous mills that, in the form in which they appear today, were built from the first decades of the 18th century. But if these are the survivals, the records of earlier factories are much older.

There are certain records of various attempts to open a paper mill at the confluence of the Lima and the Serchio between 1401 and 1409. However, the first real paper mill, historically certain, is the **Buonvisi di Villa Basilica Paper**

[144] The State of Lucca emerged around the 2nd century and remained independent until the invasion of Napoleon's armies in 1799.

Mill created around 1550 by the printer Vincenzo Busdraghi, with the financial support of the powerful Buonvisi family of merchants and bankers. For about a century, this remained the only paper mill in the Lucca area. Around the middle of the 17th century, some Lucca families from the local nobility, such as the Biagi family, began to dedicate themselves to paper production. The growing need for paper in the still independent and powerful city of Lucca at this time was evident and well known.[145] In those decades, there were no less than 8 paper mills in the State of Lucca: the already mentioned Buonvisi Paper Mill in Villa Basilica and also the **Montecatini Paper Mill** in Piegaio, the **Biscotti Paper Mill** in Villa Basilica, the **Tegrimi Paper Mill** in Vorno, the **Pacini Paper Mill** in Villa Basilica (belonging to Captain Francesco Pacini), the **Grassi Paper Mill**, the **Paper Mill of Anchiano** and the **Paper Mill of Collodi**.

The eight paper mills of this period achieve an annual production of between 16,000 and 20,000 reams of paper. So not much, but evidently enough for local needs. As happens in other nascent paper districts, at a certain point, increased production causes a shortage of raw material. Rags, especially first quality, light-coloured, fine cloth, became increasingly rare and expensive. The system of the time, many small States with customs and protectionism, made the exchange of material difficult. The at a certain point imperious rise of paper production could not keep up with the availability of rags everywhere. At that time, the tendency was to use clothes for a long time, to mend them, to reuse them. The availability of

[145] Giovannini Francesco, *Storia dello Stato di Lucca*, Maria Pacini Fazzi, Lucca 2003.

rags came not so much from the discarded clothing circuits but also from cemeteries: the dead were stripped, especially if they were poor, especially if they had no relatives, especially in circumstances such as epidemics. The collectors of rags or rags were organised into collection, distribution and sale networks, selling the raw material to the highest bidder. If this abounded in some areas, it was lacking in others.

In the second part of the 17th century, the so-called 'war of the rags' (c. 1668-1690) broke out in the Lucca area, a heated dispute between some merchants who, sailing from the port of Viareggio, exported rags, and the entrepreneurs of the paper mills who wished to keep the raw material at home.[146] The latter, the paper manufacturers, got the upper hand, so that the export of rags was limited and in some periods stopped altogether, and regulated. Similar phenomena occurred in the Toscolano and Garda areas, in various areas of Veneto and, later, in the Liri Valley and the Church State.

The paper mill in Villa Basilica belonging to the Buonvisi marquises was still functioning, but in October 1800 the family died out when 15-year-old Francesco (1785-1800), the last son of Girolamo Buonvisi (1749-1790) who bore the marquis title, died. At that point, the Buonvisi estate was poured into the

[146] The question of rags as an inelastic raw material, the scarcityof which had given and still gives rise to clashes, debates, on the advisability of applying duties, was posed by an anonymous economist who in 1864 published a short text in which he said that all industries can do their office on the basis of raw materials, but "rags do this office with regard to paper, rags differ in one essential point from the materials that feed the other industries: They cannot, like most of these, if not all of them, multiply according to the needs of demand, they exist in a determinate quantity, which does not and cannot undergo anything but, so to speak, insensible variations', Anonimo, *L'industria della carta in Italia e le sue condizioni per un economista*, Faziola, Torino 1964, p. 15.

Montecatini estate and the Buonvisi paper mill was leased to the Giusti family. Thus we arrive at the threshold of the 19th century, which brought with it the straw paper revolution in the area. The panorama of paper mills in Lucca, and especially in the Villa Basilica area, along the banks of the Pescia minore, changed profoundly.

The year 1834 is considered a turning point for Lucca's paper industry: in that year, in fact, Stefano Franchi, a pharmacist from Villa Basilica, had the idea of attempting the production of paper using different raw materials: straw and lime mixed with water. Thus straw paper was born, a paper unsuitable for writing, but perfect for parcels and packaging. This invention, which allowed production with inexpensive raw materials, met with considerable commercial success: those who could not easily obtain rags converted to straw paper. A statistic carried out in 1911 allows us to discover that the province of Lucca at that time had 106 small, family-run artisan paper mills in which about 1,400 workers and technicians worked. Straw paper was of considerable economic importance in this area; 65,000 quintals of it were produced annually. So much so that the price of the raw material for the whole of Europe is set in the Lucca district of Borgo Giannotti.

As early as the beginning of the 20th century, the geography of the plants began to change, with the birth of the Marlia pole; later it was the turn of Capannori, Porcari and Altopascio. Mechanisation spread and the nature of products changed, packaging paper (cardboard and cardboard products) and

tissue, paper for household and hygienic use, became widespread.[147]

Another important Tuscan paper district stretches in the Pescia area, between Florence and Lucca. Here, historical, cultural, architectural and landscape testimonies are linked to papermaking in a vast territory in the north of Tuscany in the current provinces of Lucca and Pistoia, as far as Versilia.[148] The papermaking activity, linked to the availability of good quality water throughout the year, water suitable for the production of particularly valuable papers, determined the use of the valley bottoms of the Pescia di Pescia and Pescia di Collodi streams already in historical times. In addition to paper mills (the presence of which is documented as early as the 15th century), there are many hydraulic factories of which most of the ruins remain today: ironworks, mills, mills, spinning mills. These constituted important productive realities for the local economy linked to the resources present. At one time there was frequent trade not only along the communication roads that ran along the valley floors, but also in the connection between the valley floors and the elevated areas and the Fucecchio alluvial plain. The area was traversed by the Via Francigena, the Cassia

[147] And the face of the production structure changed, more accentuated from the eighties onwards, with the exhaustion of a large part of the family business and the arrival of large multinational companies. In 1971 there were 211 paper mills in Lucca and it was in the seventies that straw paper was replaced by the production of *tissue* and corrugated cardboard. The era of 'yellow paper' came to an end: in 1976 a law, aimed at protecting water as an environmental good, made its production too costly.

[148] With 110 production companies, this area has created the most important paper district in Europe, representing one of the five largest production sectors in Tuscany.

minor and there were also waterways that reached Pisa and Livorno.

The first trace of the foundation of a paper mill dates back to 24 June 1235. On that day in Genoa, in front of a notary public, three people undertook by contract to manufacture paper and not to reveal *dictum misterium* to anyone: this is, moreover, the oldest European document relating to the manufacture of paper. One of the three people was Mese from Lucca, but unfortunately we know nothing else about him: neither where he had learnt the secret of the art, nor what relationship he had with the mother country. Nor is there any news of paper mills operating in Lucca or Pescia during the 13th century. The oldest evidence of paper production in the Lucca area in the 14th century are the records of the Gabella di Villa. They show that in the second half of 1344, some reams of paper (about six over a period of four months, for a few thousand sheets) passed through on their way to the market in Pescia. This is a faint trace, which is corroborated by the presence in the State Archives of Lucca of sheets with the watermark of the spotted panther, the ancient emblem of the municipality, used for public deeds in 1376 and 1377. Where did the craftsmen of Villa get the secret of the paper? Probably from Fabriano, the cradle of Italian and European paper, via Colle di Val d'Elsa. Here, the first record of a paper mill is contained in a document dated 15 February 1319. In Colle di Val d'Elsa, the artisans of Villa, then famous manufacturers of swords, ran ironworks, roterie for sharpening blades and gualchiere for wool: but they had also learnt the new art of papermaking so well that they rented some paper mills. And yet this first experience would not leave a lasting impression. Nor did attempts in other areas of Lucca's territory encounter greater fortune. For example, Prospero Serconforti

in 1401 asked for a licence to build a paper mill at Ponte a Serraglio near Bagni di Lucca; a document from 1409 tells us that the mill had passed into the hands of a certain Antonio di Giovanni, "aromatario". Then nothing more: was the paper mill started? Probably yes, but it did not last long.

In 1466, the brothers Jacopo and Cristoforo Turchi spoke of 'new art' when they asked the General Council of the city of Lucca for permission to erect 'a building to make bambacine paper', but to no avail. In 1489, Cristoforo Turchi's sons, Stefano and Sebastiano, asked for a public subsidy for the paper mill they intended to build in Quiesa. Lucca's rulers responded positively and on 10 March 1490 the first of a long series of proclamations was published to prohibit the exportation of old rags suitable 'ad fabricandam cartam', and against any fraud the Turchi were obliged to use a 'signum', a distinctive watermark. But even this time, if it did get off the ground, the initiative remained without lasting results. The problem of the origins of the paper industry in Pescia therefore remains open to this day. A tradition, still alive in the mid 18th century, would like to assign it Tuscan primacy, conjecturing that the art was known there as far back as the 13th century. More precise is the testimony contained in the report to the enquiry launched by Pietro Leopoldo in 1766: 'What is known for certain is that the first two buildings existed in the year 1536. One of these two paper mills is certainly the factory or **Turini Paper Mill**, founded in 1481. The silence of the sources is now interrupted by a document of great importance: a notarial deed that represents the oldest testimony on the second paper mill in Pescia. On 25 October 1497, at the hand of notary Iacopo di Benedetto Colucci, Benedetto di Gherardo Orlandi rented a well-equipped building for three years to a master papermaker, Leonardo di Roma, who lived in Pescia.

By the end of the 15th century, the **Orlandi paper mill** was thus fully functional, and presumably by the years 1485-1492 when the family was engaged in the publishing business. The feeling, however, is that of being faced with a typical late-medieval paper mill, a subsistence craft, lacking in expansive force, a survival rather than a sign of innovation.

The **Busdraghi-Buonvisi Paper Mill** dates back to 1549 when Vincenzo Busdraghi opened the first printing works in the State of Lucca, which had previously only seen the occasional presence of a few itinerant printers. With the printing monopoly, Busdraghi also demanded that of paper manufacturing. On 20 August 1549, the General Council granted his supplication, granting him the paper mill and the monopoly of manufacture and trade for 15 years, exempting him from all taxes. The condition is that it supplies the city. An old mill in Villa Basilica was adapted for the paper mill and was in operation in 1565. Difficulties arose, the company was dissolved, in 1570 it passed into the hands of Paolino Vellutelli, and then to Alessandro Buonvisi. The latter entrusted the paper mill to the Biagi family of Villa Basilica, who kept it until the last years of the 17th century.

In 1627, the Republic of Lucca decided to renew the privileges of manufacture and exemption from taxes to the Biagi and the Offizio sopra le Entrate proposed to the General Council to abolish the monopoly, preferring 'public profit to private gain'. A **Boccella paper mill** in Anchiano operated in the area in 1656; in 1673 a **paper mill in Vorno** was run by the Tegrimi family. The **Biscotti Paper Mill** of the wealthy merchant Antonio Vincenzo Biscotti was founded in 1589. The same year, Antonio Grassi, also a member of the rich merchant class, founded the **Grassi Paper Mill.** A century

later, it was the turn of the **Pacini Paper Mill in Villa Basilica** of the wealthy merchant Francesco Pacini.

The **Garzoni Paper Mill was** founded by Romano Garzoni, a nobleman, in 1685 and passed to the Ansaldi family, master papermakers in Pescia, in 1694. At the beginning of the following century this is the only paper mill that is no longer in activity, perhaps closed with the transfer of the Pescia papermaker to Colle di Val d'Elsa. In 1693, the nobles Nicolao Montecatini and Ignazio Raffaelli built a **paper mill in Piegaio.** Next to this is a second 'fabrichetta' with three stacks. A **Duccini paper mill** in Collodi was instead inherited by the Garzoni paper dynasty.

In almost all of these paper mills, which were small with limited production, experienced Ligurian masters were active, who made the development of papermaking in Lucca technically possible: the Aradi, the Peralta, the Pollera. Soon, however, there was a shortage of rags. The State tried to put order among the rag merchants and paper mill owners. 'Rag merchants' and 'paper makers' animated the debate around the drafting of the new proclamation between the end of 1693 and the beginning of '94, when a convention was drawn up that tried to mediate between the two opposing interests. The entrepreneurs, a small but powerful economic bloc that chose as its representatives the Tegrimi family, who in addition to their building in Vorno ran other manufactories in Villa, had a de facto monopoly on the export of paper. At the beginning of the 18th century, under pressure from the 'paper mill interests' led again by one Tegrimi, Gregorio Tegrimi, they returned to the old instrument of the proclamation. Compared to that of 1694, the new regulations pay more attention to the figure of the retail rag merchant (also called stracciarolo) and his relations with the paper mill for which he works.

A further step towards rationalising the supply of raw material was taken four years later (1698), when the Offizio sopra le Entrate established a limit of fifteen quarterly licences per paper mill. During the following decades, four more paper mills were built: two in the area of Bagni di Lucca and two in that of Villa Basilica, but these were – with the exception of the Bertini factory in Villa – small marginal manufactures, workshops rather than real factories that had an ephemeral life or were reconverted. It was not until the last years of the 18th century that a new wave of development occurred. Some marginal paper mills closed for good; others stopped for a few years, renovated their buildings and overhauled their plants (without, however, adopting innovative technical solutions). In this climate, new paper mills were built on the Lima in the area of Bagni di Lucca, at Vorno, but above all at Villa Basilica; among the protagonists of this expansive phase continued to be the Genoese Pollera, later naturalised Tuscan and ennobled.[149]

The *Catasto Vecchio* (*Old Cadastre*) of 1802-1803 provides an accurate picture of the manufactures active in the early 19th century. In the municipality of Villa, by then the undisputed paper pole of the State of Lucca, nine buildings are surveyed, three of which are equipped with two vats: the Buonvisi paper mill run by Lorenzo Calamari, that of Sebastiano Pollera, and the other paper mill of which Calamari had acquired the 'useful domain'.[150] Lorenzo Calamari is the owner of two smaller buildings, while two others belong to collateral branches of this family that, starting from the lease

[149] The Lucchese ethnologist Alberto Pollera (1873-1939) was a member of this family, now Tuscan for generations.
[150] This is a special form of lease.

of a mill, implemented a rapid social ascent: four paper mills in a geographically limited area means exercising considerable commercial weight.

The last two paper mills saw the Bertini family involved: Giovanni Benedetto as owner-tenant and Arcangelo as tenant of the **Paper Mill of the Paoli**. Along the banks of the Pescia Minore stream, three other mills are in operation: a small **paper mill in Colognora**, upstream of the Villese mills; while downstream, in Collodi, the two Buonvisi-Garzoni mills, now centuries old and equipped with eight stacks, modernised and rented out, operate.

In Vorno, next to the old **Tegrimi Paper Mill**, a second factory had been set up a few years earlier by the Pollera family. To the 14 paper mills described in the old cadastre, the two **Piegaio paper mills** should be added; while three mills stood on the Lima stream, near Bagni di Lucca. The *Statistica del Principato* drawn up in 1808 and printed in the *Almanacco di corte* in 1811, describes paper as a "rich product of national industry that has flourished in times gone by, and that to flourish again only needs circumstances favourable to trade".

There were 19 paper mills in operation during this period, employing around 300 people and manufacturing mainly royal, mezzanine, French, Dutch and eagle paper; production averaged around 44,000 reams per year (just over half of which, 24,000, were for export).

For the paper mills of Lucca and Villanova, the Napoleonic period is full of difficulties: it is not easy to get paper out of the area and export it. The following period saw a notable transition between the expansion phase at the end of the 18th century and the remarkable development of paper mills in the years of Unity. On the whole, during the 19th century, the 19 small paper mills in Lucca, which employed about 300 people,

specialised in low quality but highly consumable paper, produced with straw, lime and water, and this was to be the case for most of them until the 20th century. In Carrara, paper mills appeared at a later stage: the **Cartiere Paper Mills** was founded in Pietrabuona, (Pescia, Pistoia) in early 1873.

Two paper mills were active in Pescia from the end of the 15th century. In the first decades of the 17th century, the two mills were run by Antonio di Michele Del Fabbrica, a Genoese master papermaker who moved to Pescia around 1610. In April 1650, the Ansaldi family from Voltri also appeared. This family was to be involved in paper production for part of the 19th century. The Ansaldis do well, although not always in compliance with the contract rules to which Tuscan paper mills are subject. Towards the end of the 17th century, they own one of the two mills and also subcontract the collection of ashes for Pescia and Barga. They also engage in smuggling by transporting the raw material to Viareggio where merchants load the goods and transport them, generally, to the Kingdom of the Two Sicilies. Francesco Ansaldi also dedicated himself to the restructuring of the paper mill by obtaining credit from the Monte di Pietà in Florence. A few years later, the family was also active in Villa and Collodi, and then in Colle Val d'Elsa. At the end of 1710, taking advantage of a market conjuncture apparently favourable to Tuscan paper, and above all of the climate created by the new private management of the contract, Giovanni Battista Ansaldi obtained permission to build the new **Pietrabuona Paper Mill**, near Pescia, in the area known as Valleriana (located between Lucca and Pistoia in the Pescia area). In March 1712, Monte dictated his conditions for the new factory. This was established and quickly became known for the quality of its product. In 1715, it started the production of a new type of fine paper, called

'Genovese style', which was commercially successful. Between 1710 and 1720, the Pescia paper mills produced an average of 270 bales per year (an average of 90 bales per mill). Pescia specialised in good Genoese style paper (i.e. for writing), which was 'fioretto', i.e. made from second quality rags (used for printing). Business was good and in 1724 Ansaldi obtained permission to build a fourth paper mill (after those the family ran in Collodi, Val d'Elsa and Pietrabuona). In 1730, the four mills together produced about 470 bales of paper a year. The relative proximity of the 'Altopascio craft' favoured the trade in paper from Pescia over that from Colle. On 1 January 1750, when the century-long contracting arrangement came to an end and paper production and trade in the Grand Duchy of Tuscany was once again free, there were four paper mills in the Pescia area: two in Pietrabuona, owned by Carlo di Giovan Battista Ansaldi, and two in Pescia (a third would be built in 1752), one in the hands of Matteo Ansaldi and his brothers, Francesco Ansaldi's sons, and one owned by the Reverend Francesco Cheli; the latter was run by Antonio Innocenzo di Domenico Ansaldi.[151] Another paper mill in Pietrabuona is the **Vincenzo Bocci paper mill** active between the second part of the 18th century and the mid-19th century.[152]

In the 1766 survey, the inhabitants of Pescia showed optimism for the future. By the end of the century, the

[151] Sabbatini Renzo, *Di foglio in Foglio*, *una lunga storia*, in *La via della carta in Toscana*, Pescia s.d., pp. 22-43.

[152] Merlo Alessandro-Butini Riccardo, cur, *La cartiera Bocci di Pietrabuona, documentazione e valorizzazione*, University of Florence, Florence 2014. Unfortunately, the booklet focuses on the valorisation of this and other similar paper mills in the area and contains little historical information.

productive structure had already taken on dimensions that would be observed until the Unification of Italy. In this phase, the Magnani family from Prato took on weight, which after operating in Lucca moved to Pescia. Giorgio Magnani was engaged in building, renting, purchasing and restructuring activities. In 1803, the **Magnani paper mills** consisted of six independent mills with 16 vats, plus others in a paper mill under construction: the Magnani family were major industrialists in the proto-industry of paper if we consider that three other rented paper mills (with a further 5 vats) worked for them with a turnover of 120,000 scudi each year. In all, the Magnani controlled 9 paper mills. The Magnani paper mills employed 'eighty families of workers and ministers... as well as woodsmen, blacksmiths, coachmen, bricklayers, navicellai'. Documents from the French period tell us that there were twenty-one paper mills in the canton of Pescia: eleven in the capital, one in the municipality of Uzzano and nine in that of Vellano, almost all in the community of Pietrabuona.

The production equipment is respectable: two mills are equipped with four vats, two with three vats, and the average is two vats per mill; the equipment remains traditional but is well utilised. At full capacity they can produce between 120 and 140,000 reams of paper per year of the most varied types and excellent quality. The average yield per vat is three thousand reams per year; at this juncture, the forty vats do not exceed one hundred thousand reams. In addition to the Lisbon market, Pescia paper also found excellent outlets in Brazil and North America.

During the 19th century, the valleys crossed by the Pescia Maggiore and Pescia di Collodi streams experienced an economically happy moment. The entry of Lucca into the Grand Duchy of Tuscany (1847) and the Unification of Italy

led to the administrative unification of the two areas within the Prefecture of Lucca. The market expanded, favouring the concentration of paper mills, a concentration that however did not correspond to large productions: the factories in the area, like those in the Amalfi area, were small. There are no settlements of large industries or installations of modern machinery, such as the paper machine. Management and production continue to be artisanal and family-run.

After centuries of similar development, the industrial dynamics of Pescia and Villa Basilica differed. In Villa, along the Pescia di Collodi stream, there had been a steady and slow development: 7 factories in 1770, twelve in 1803, 19 in 1837, 27 in 1863. In Pescia-Vellano it had gone from 5 factories in 1768 to 26 in 1863. After the Unification, development came to a halt. Villa continued only thanks to the paper pulp produced by Stefano Franchi's method, perfected by Gesualdo Franchi (born 1790). The lack of tariff protection opened up competition from more developed areas of Italy, such as Piedmont and Lombardy. But this was counterbalanced by the unification of the national market, which also opened up new markets. A survey by the Lucca Chamber of Commerce in 1863 censuses about 60 factories in the Province of Lucca, the employment of a thousand people and the production of 27,000 quintals of paper.

In Pescia, on the other hand, the Magnani factories maintained the manufacture of real paper using rags as raw material. Here, they successfully sought a place in the quality product sector where machine processing was slowest to penetrate, such as stamped paper, which the Magnani produced for Brazil and Venezuela. In the Pietrabuona paper mills, "cartridge" paper, i.e. made by reweaving used or defective scraps of paper, is gaining ground: the product,

destined for the packaging sector, is less resistant than rag paper and is cheap.

While the paper mills in Pescia had reached the peak of their development well before the Unification of Italy, those in the Villese area were registering 'a marvellous development' at that time. During the collection of data for the 1863 statistics, as many as 26 mills for a total of 41 vats were in an advanced state of construction in the Lucca area. This was an excessive growth that would be slightly scaled down, especially in terms of the workforce employed, in the following decades, when the vitality of straw processing would however be confirmed.

The first years of the 20th century, up to the difficulties and the real crisis induced by the Great War, saw the characteristics that had emerged during the Unification period strengthen, such as the split between the production of wrapping paper (which was rampant in Villa) and that of paper for writing and printing, exclusive to the Pescia area. However, what emerges from the statistics of 1907 indicates the accentuation of a phenomenon that was barely perceptible forty years earlier: Bagni di Lucca, Borgo a Mozzano and Capannori are becoming productive realities of a certain importance, even if Villa Basilica still maintains the undisputed supremacy in the number of paper mills and employees. The paper pulp sector in the province counts 78 mills with 621 employees, 60 per cent women, with an average of eight employees per mill. The companies, all from Pescia, that produce white paper are only 5 with 12 mills, 304 employees, 56 per cent women, with an average of 25 workers per mill.

A more detailed picture is provided by the 1911 national census. The paper industry is still growing: there are now more than a hundred companies with over 1,400 employees. However, in comparison with the national data, the model of

this district is limited. First of all, the lack of technological adaptation, which was evidently still being counterbalanced at the time, weighs heavily. In 1911 more than one third of Italian paper mills (i.e. over 33%) were powered by electric motors, while in Lucca the percentage stood at 4%. In Lucca the average number of employees per mill was 13, while the figure for the Kingdom was around 35. After the war the Province of Pistoia was established, and Pescia assigned to it. (1927). This seemed to cause some difficulties (Statistical Report, Lucca Chamber of Commerce, 1929).

Meanwhile, parchment paper was considered harmful because it released lime when in contact with wet food. This led to the spread of greaseproof paper, or 'parchment', preferred for food use because of its impermeability. Straw paper was only used to package goods without the release of liquids.

This area of Tuscany in the 20th century will have a revival with new areas and new factories, including large and medium-sized ones.

Chapter 7

Liguria: Genoa Voltri paper mills

Like the Amalfi, Pescia and Lucca paper mills, many of Genoa's paper mills went through a period of great splendour from the Renaissance to the modern era, but declined at the beginning of the 19th century, during the period of the introduction of automatic machines, when there was a real revolution in paper production, with the change in technology, the raising of the financial threshold for the creation of a functioning paper mill, the emergence of new players, the entry or rise of new families in the industry, the formation of industrial districts previously dedicated to something else and the simultaneous loss of competitiveness in other areas.

One of the areas that suffered the most was the Genoese hills: the expansion of the city did not allow much space to expand the mills that had been built according to an ancient typology, which took advantage of the water fall and had limited space available. The authors of the essay *La produzione della carta a Genova dal XVI al XVIII secolo* argue that papermaking was first concentrated in Fabriano and then, 'after the crisis in the Fabriano area, the centre of Genoa developed'.[153] In reality, the Fabriano area never reached a complete crisis, and some paper mills survived over the centuries, such as Miliani. In between there is the development

[153] Enrico Pedemonte-Silvia Vicini-Elisabetta Princi-Raffaella Ponte, *La produzione della carta a Genova dal XVI al XVIII secolo. Un esempio di impresa e organizzazione del lavoro*, in Enrico Pedemonte, cur., *La carta, Storia, produzione, degrado, restauro*, pp. 57-72, Ibid, p. 57.

of other areas, such as the Tosscolano, Brescia, Pescia, Bergamo and various parts of Veneto. We must also consider the Salodian area, the Rovereto area and the Liri Valley, which also had levels of production and quality, for the 16th-18th centuries, that were completely comparable to those of Genoa.

Production until the 16th century could only rely on an urban outlet, only after that century did demand increase from Spain, Portugal and England. So much so that in the first half of the 16th century, writing paper was one of the main export items of the Republic of Genoa. Paper production in the city was concentrated in the immediate hinterland of the Ponente, in the district of Voltri, then a seaside village pushed inland along torrential rivers. Voltri only became part of the city in 1926. In this area, with plenty of water and slopes to create the motive power needed to drive the gualchiere, and very close to the outlet to the sea, about 100 small paper mills were concentrated. Each paper mill employed between 16 and 18 people. Given that the population of Voltri and the neighbouring villages of Crevari and Mele did not exceed 3,000, one can understand how a large part of the population worked in this sector.

In the first period, the supply of raw material took place in the town and there was no division of labour: those who employed the limited capital needed to set up a factory, which produced and traded were the same people; only later did a true division of labour emerge. From the second half of the 16th century, factories employed an average of 16 people and therefore needed the use of more capital, generally provided by a merchant, and raw material, i.e. rags, which could be easily found in the fondachi and transported to Voltri on wagons.

A remarkable case among the paper manufacturers of Voltri is that of Bartolomeo Dongo (1581-1661). As he had a lot of capital, warehouses and proxies all over the world, in the second half of the 17th century he established no less than 19 paper mills near Voltri in the locality of Fabbriche and then also founded 3 mills, 1 furnace, 2 farmsteads, 1 palace and a church. Between factories, mills, etc. about 400 people worked for Dongo (even for 16 hours a day). He was able to achieve considerable economies of scale by purchasing a lot of raw material and having workers work at several mills at the same time: when a stage was completed in one and it was necessary to wait (e.g. the end of maceration or the defibration of rags), he would send the workers to another where they would begin to put the dough into the moulds. His patrimony was the largest among the non-nobles and in 1628 he managed to enter the nobility of the city by paying out 30,000 silver scudi. Two of his daughters became linked to noble families (the Spinola and Senarega families) and his eldest son, Giovanni Stefano Dongo, became a cardinal.[154] Dongo contracted out production to a master papermaker and the latter in turn chose and paid the workers. According to a very precise and detailed contract, the master papermaker undertook to produce a certain amount of paper for every 100 quintals of rags supplied. The minimum yield that the papermakers were required to give per 100 quintals increased continuously. It is a fact that the quality of paper deteriorated precisely because the conditions imposed on the master were getting worse and worse. A standard paper mill processed about 400 quintals of rags per year and thus produced one bale or ream per day.

[154] The events of the Dongo family are very complex and difficult to summarise here.

The paper mills in Dongo were arranged in a series of buildings close to each other in which the various processes took place. From an architectural point of view they were non-specific buildings, i.e. they had no particular construction characteristics. In short, the building was adapted, not designed in space and division for paper production. With a few adjustments, they could be used for other productions. This type of unspecificity was reduced during the 16th century when the buildings were designed to accommodate the processing of rags and their transformation, and the rational handling of men and things. The dimensions were also standard: in plan they measured 25 metres by 10, with small fluctuations depending on location. The number of floors was always 3 with a height varying between 9 and 10 metres. The division of the spaces and the functions of the interior spaces were fixed: the basement was a cellar and occasional storage for rags; on the ground floor, starting from the short side, where a water mill was located, were the stacks consisting of 10 basins, almost always made of stone, in each of which they beat between toothed wooden masses. Two mill wheels provided the motion to two shafts that, with a system of cams, set the hammers in motion, 15 for each shaft, 3 for each vat. In the same room there was a large tub where rags were placed to rot before being shredded by the stacks and other smaller tubs where the suspension of fibres in water was poured. On the opposite side of the pile room was the vat, a tub in which the worker would insert the mould separating the water from the fibres and obtain the sheet of paper of the desired size and thickness.[155]

[155] *Ibid*, p. 63.

Between the pile room and the vat room was the polishing room where the sheets were smoothed with combs and folded before shipping. The second floor was, in the Genoese model, divided into several areas: above the pile room was the area where the sorting of rags took place after they had been summarily cleaned of dust: the cleaning was done by beating them over a trellis. The two compartments were probably in communication through an opening in the planting. The area next to it was reserved for gluing the sheets, which was necessary to prevent the ink from being absorbed by the sheets. On the same floor was the home of the master papermaker and, in addition to his family members, the main production workers also lived there. On the top floor was the drying room, in an airy room with many partitions and many windows with adjustable shutters. The sheets were placed on cords.

Genoese paper production went into crisis at the end of the 18th century, a work organisation such as the one described above and the lack of further investment, due to a lack of will, mentality, a momentary lapse in liquidity, did not allow it to absorb the technological developments that were taking place. The merchant-entrepreneur, unfamiliar with the reality of production, probably did not keep himself informed and did not realise that certain production realities were changing, that the market required adjustments, that the cost of paper was destined to decrease. It is likely that the master papermaker was aware of technical and process developments but probably did not have the time, opportunity or authorisation to purchase new materials and machinery.

This is why the Dutch-style cylinder, the machine that replaced stacks in the processing of raw material, was introduced on the market in 1689 and was used in a few plants in Genoa more than 130 years after its invention, at the

beginning of the 19th century. The Dutch system made it possible to reduce defibration time from the 20 and up to 40 hours of stacks to only 2 hours, but with an increase in pulp yield of 75% to 90%. At the same time, however, its adoption meant that the standardised structure of paper mills for centuries had to be modified. Spaces were designed for a defined sequence of operations and processing and there was no possibility of inserting Dutch tanks. There was often no room to insert a bleaching stage that allowed the use of coloured rags.

The production of low-cost, high quality Genoese paper, which favoured its exportation to Spain and Portugal and their overseas empires as well as the Indies and the Far East, was disadvantaged and finally destined to end due to its own rigidity, so that by the end of the century the lack of technological development made other countries such as France and Holland, the poles of Northern Italy and the Liri Valley more competitive. These were the territories that managed to reconvert technologically thanks to the contribution of new capital and fresh intellectual forces.

...The History of Paper in Italy continues in Book 2...

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