

The Worldwide Web of Silk Production, 1300-2000

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Frame of Reference

- The present paper will deal with a number of relevant aspects related to the first phase of silk production cycle only, that is from mulberry and silkworms to ready-for-the-loom silk thread (raw silk / thrown silk).

This section of silk production cycle has involved throughout the period under consideration continuous significant exchanges, transfers and relocation - both long and short distance ones - of inputs (mulberry trees, silkworm “races”, silkworm eggs), commodities (cocoons, raw silk), knowledge (how-to information, drawings, letters, manuals, espionage), skills (qualified manpower, artisans, experts, instructors), technology, plants, entrepreneurs, capital, as well as shifts and variations in gender specialization, quality definition and control, cultural attitudes and beliefs.

The subsequent section of silk production cycle - silk textile making with related preparatory and finishing operations - will be considered here for its final demand role only. It is maintained here that the long-term trend in silk textiles demand in Western world has been a growing one from late Medieval ages to early 20th Century, acting as a continuous powerful stimulus to silk cultivation expansion in countries bordering the Mediterranean, Black and Caspian Sea, further extending its influence to India, China and, after its opening to world trade in middle 19th Century, to Japan.

Such a growing demand trend in silk textiles appears to have accelerated with the growth of middle classes and the spread of affluent consumption in Western Europe from 17th Century onwards and with the growth of Western elites and settlers in North and South America colonies.

A further powerful stimulus came from the veritable boom in silk textile production and consumption in 19th Century USA.

In the long run fluctuations and shifts in demand for silk thread quality on the part of silk textile production centers such as Lyon or London had a significant impact on silk thread production techniques and on transformation and/or relocation of silk thread production processes too.

LONG TERM SILK PRODUCTION GROWTH

Long term growth of aggregate demand for silk textiles in Western Europe and elsewhere where only partially satisfied by growing imports from South and East Asia. It had a clearly discernible effect on Mediterranean Europe and Near East countries silk production too.

Large growth of silk production took place in Southern Italy during 15th to 17th Century (Calabria, Sicily) followed by a real boom in silk production in Northern Italy (16th to 19th Century). Italy thus became the largest silk producer among Mediterranean countries from late 16th Century onwards, covering some 2/3rds of their aggregate silk thread output. By middle 19th Century Italy was the world second exporter of silk, after China.

Beside Italy, relevant increases took also place in Valencia and Murcia areas in Spain (15th to 17th Century), on the mountain slopes of coastal Syria and Lebanon (16th to 19th Century), in the Ottoman Empire (Bursa, Edirne, Thessaloniki) and as far as present day Azerbaijan (Nukha) and the Caspian shores of Persia (Ghilan). A large portion of exported silk thread output from such areas was directed to Western Europe (later on, to USA) silk textile producing centers. Oddly, most of these centers were situated in areas where little or no silk

cultivation existed, such as Lyon, Tours, Paris, London, Macclesfield, Vienna, Zurich, Amsterdam, not to mention silk textile factories which were developed in Sweden or in Moscow.

SILK PRODUCTION: ITS SPECIFIC CHARACTERS

a) Basic inputs

Among the elements that characterize silk production one should mention, firstly, its rigid connection with (optimal) mulberry trees growing areas. As a matter of fact, silkworms can be fed with fresh mulberry tree leaves only. It is therefore imperative that silkworm raising be conducted in areas where an easy-to-reach, abundant supply of mulberry tree leaves be available.

Moreover, mulberry trees can withstand repeated leaves spoliations under a rather favourable climate only: early cold spells may strongly damage leafless trees. Therefore the existence of mulberry trees does not imply *per se* the practicability of a profitable silk cultivation (such as in Northern France or in England where mulberry trees may be planted with ease, but cannot be regularly stripped of their leaves). (to be further elaborated)

Since the 15th Century, several attempts were repeatedly made to acclimatize mulberry trees varieties whose characteristics could maximize leaves output, resist sudden climate vagaries, ease leaves stripping operations etc. Successful man-guided and man-made interventions on mulberry trees were often instrumental in deeply altering the pace of development of silk production in certain areas, such as with the introduction of *Morus Alba* in Western Mediterranean in early 15th Century or with the cross-breeding of Chinese mulberry

tree *Lu* in Japan in late 19th Century allowing for multiple leaves cropping. (to be further elaborated)

Similar considerations may be made in regard to silkworm varieties, their cross-breeding and their adaptation to local climates, and to silkworm eggs and their optimisation of choice and sorting, preservation methods, long distance transport techniques etc. “Rejuvenation” every few years of local silkworm races through long-distance import of highly reputed silkworm eggs was a must in most advanced silk producing areas around the Mediterranean Sea up to early 18th Century and even later. *Calabria* and *Valencia* stocks were seen as the best ones, *Lebanon* too gained much public favour. When the *pebrine* silkworm epidemics struck European silk cultivation in the middle of 19th Century, ravaging it for some 25 years, Italian and French traders roamed, with much disappointment, the whole world unable to find a place from where to import, year after year, huge quantities of good healthy silkworm eggs. They eventually found it in Japan only, giving a big boost for some 15 years to its terribly weak balance of trade and at the same time saving an occupation which in Italy gave bread to millions. (to be further elaborated)

b) Market value

Silk (silk thread) enjoyed a very high unitary value (selling price/weight) throughout the period, a gradual decline taking place from around 1870s onwards only. It was by far the richest product a rural family could produce on its own, and such a consideration extends back to (good) cocoons. In Western Europe cocoons and, to a certain extent home-made silk thread hanks (raw silk) too, sold for prompt cash. It took less than two months (May to early June) to get a cocoon crop and a couple of weeks more to reel raw silk hanks out of them. Thus cash flowed in into

peasants hands in the most precarious period of the (Western European) agricultural year, when Winter food reserves had been worn out and Summer grain crop had not yet been harvested. Elders of a North Italian town commented with much satisfaction in early 17th Century on how the recent spread of silk cultivation in their countryside had made disappear the hordes of starving peasant beggars that used to roam their town streets in early Summer. King Henry IV spent huge sums to import from Spain and plant in and around Paris and in other outlets of Northern France tens of thousands of mulberry trees in order to free from misery his peasants and get rid France of the need to import costly silk from Italy and Spain. (to be further elaborated)

c) Market links in a geographically unlimited market

As a consequence of a very high unitary value of basic silk products (cocoons and silk thread), very little if any of them was kept home and most of it was brought to the market as early as in Medieval times. Merchants combed every corner of the country to collect silk thread to be used in far-away urban textile centers or to be exported to distant lands. In fact they bought even minute amounts of waste silk, highly appreciated for less expensive or mixed silk cloth. A Zurich firm involved in mixed-silk cloth production for North European customers used to send its agents as early as in late 17th Century into scores of French and Italian Alpine valleys - from Friuli to the East to Ardèche to the West - to collect in each place tiny amounts of waste silk to be reprocessed in Zurich

Thus silk production linked silk producing rural units to distant markets and to cash economy even in remote and secluded places where everything else was heavily linked to self consumption and to sleepy local market circuits. (to be further elaborated)

High quality raw silk fetched much higher prices and was always in high demand. Merchants were ready to go anywhere to get it. During the century-long *Pax Mongolica* traders had the exceptional opportunity to reach China without hindrances. An early 14th Century merchants' manual of one large Florentine trading and banking firm, tells us in detail how to go by land to China (with a 20-odd months return trip on horseback and foot) to buy raw-silk. It has been estimated that one third or more of silk thread that Lucca employed for its fabled luxury textiles in late 13th Century came from China. (to be further elaborated)

d) Supranational competition

The ease with which lightweight expensive raw silk could be moved around the globe under any circumstances, implies that nowhere in the Western world was raw silk production free from the challenge of competing raw silk of higher quality and/or of lower price. In a broader sense it appears that no guild, state or sumptuary regulation was ever able to seriously block or impede for long massive arrivals of competing products, or to suffer dire consequences by failing to adapt to the pressure of competition.

Those countries or areas that failed to come up with or who were unable or unwilling to match competing products were either kicked out of the market or cornered in much less profitable niches. Such were the cases of Grenada's silk production in late 16th Century, of Sicily

and Calabria during 18th Century, of Tuscany in early 19th Century. Spain attempted in vain to insulate its American colonies from raw and woven silk smuggled in from China via Manila. (to be further elaborated)

e) Supranational competition and silk thread making technology

Contrary to a widely held view, raw silk making technology, although apparently rather simple, has by no means been stagnant in the long run. Indeed, under the driving forces of a harsh, ever present, external competition, efforts have been constantly made to improve it and to adapt it to variable final users' request and to improve quality and productivity in order to maximize returns.

Technology historians, fascinated by the dramatic improvements to productivity brought about by entirely new, huge, costly complex mechanical devices of the Industrial Revolution have at times failed to grasp the crucial role played in productivity and/or quality enhancing played by small, cheap ingenious devices aptly inserted in a long time experimented low-technology chain of production. Contemporaries were indeed very well aware of the latter's role. Some of the foremost French technicians fought for decades during 18th Century in order to devise a reeling machine able to match the Piedmontese one - a mostly wooden simple structure which could be built by a good carpenter in a few days work. Crossing of a silk thread on itself on its way from basin to reel is a simple hand operation requiring a few seconds to be completed, yet there are scores of brevets and patents in Italy, France and England in the first half of 19th Century on how to best perform an operation which every expert agreed could enhance the market value of silk thread, if correctly performed, by up to 50%. An absolute must in high quality silk thread was its

perfectly constant diameter. Hand testing of the diameter of a silk thread of 0.1 to 0.2 mm and the act necessary to keep it constant, is an incredibly difficult task which required exceptional dexterity on the part of the *master* throughout the working day. In fact mechanisation of thread testing has been one of the most challenging task to mechanical engineers up to the early decades of 20th Century. It was only then that the fingers sensitivity of a master's expert hand could be safely substituted by automated mechanical devices in silk-reeling plants. (to be further elaborated)

f) Skills

Silk-reeling, being the chain of low technology steps which leads from cocoons to silk thread, was mostly performed in rural houses or in small, often home-made, plants usually employing a score or two of workers up to late 19th Century. In order to obtain a high-quality, highly appreciated silk thread, its (apparently) simple devices had to be operated by a highly qualified, highly skilled manpower. Dexterity, attention, care, and above all, solid experience dearly bought in many years of harsh apprenticeship, were essential elements for success.

In Italy, to be recognized as a *master* reeler required, as early as in 15th Century, from 4 to 7 years of apprenticeship and to pass a difficult entrance test in front of a commission made up by expert traders in silk. Such rules were not a guild barrier to limit access to trade, but an inescapable step to insure much needed stable quality (as defined by several sophisticated parameters) to silk threads employed in luxury cloth making. Piedmontese rules of 1670s detailed each and every step of silk-reeling process, both in regard to every minute part of machinery and connected devices as well as to masters' qualifications and duties, under harsh penalties and strictly enforced state control. At the same time it imposed to silk reeling plant

owners *not* to have masters work on piece-rate system, but on daily wages only, thus recognising that haste and quantity were lethal enemies to quality. As a result, Piedmontese raw silk enjoyed a virtual monopoly on European markets in its highly appreciated *organzine* silk thread for some 150 years. All cut-corners attempts made during 18th Century in Southern France, around Valencia in Spain, in British North America or in Bengal, trying to lower skill and/or machinery ingeniousness in order to obtain - cheaply and soon - high quality raw silk equal to the Piedmontese one, failed miserably. (to be further elaborated)

g) Skilled manpower migration

The quest for improvement in silk thread making led to innumerable cases of individual movements of highly qualified personnel to other places. Inversely, it led an equally numerous number of instances in which individuals slipped in into foreign places in order to acquire guarded skills or “secrets” to bring back home and/or to resell to interested parties. Examples of the former go, just to mention a few of them related to Piedmont “supremacy”, from one Piedmontese technician of late 18th Century employed in Naples and subsequently in Calabria to instruct local people in Piedmontese reeling techniques, to the score or so of Piemontese experts smuggled out together with machinery and drawings around 1760 by East India Company agents to be sent to Bengal in order to improve local silk making, to Piedmontese entrepreneurs lured to North Portugal by Lisbon Government officers in the 1770s, to a Piedmontese family of silk experts invited in the British colonies of North America, to an individual Piedmontese adventurer building a silk-throwing plant after Piedmontese design for Mehmet Ali in Egypt in the 1830s. Of the latter I may mention here the well known case of Lombe brothers who brought back to Derby in England the design of a Piedmontese silk-throwing mill around 1720, a mill, by

the way, which is considered by many as the first building of the industrial revolution. (to be further elaborated)

h) Gender specialization

In talking of silk reeling *masters* one should mention that they were all *female* masters. Indeed, most operations of the first section of silk production cycle were traditionally performed by women only, notably the most delicate of them - silkworm raising. From China and East Asia westward, through Iran, Caucasus, Lebanon, to Mediterranean countries, the role of women in silk production has been paramount in the whole period under review. Female knowledge of how best to handle extremely delicate insects (silkworms) or equally delicate passages in silk reeling have been often stressed or plainly acknowledged by contemporaries. In examining the long string of didactic poems and manuals devoted to silkworm raising published in Western Europe from late 15th Century to early 19th Century, one is struck by the fact that the absolute majority of them is dedicated to a woman and that many of their authors (invariably men) either recognize their debt of knowledge to a woman or beg pardon to women for describing a trade they, women, know best.

Hidden in archival documents are also practical proofs of such recognition: as it is in the case of an Italian couple hired by a Spanish employer in 18th Century to supervise silk-making operations, the weekly salary of the woman being by far higher than that of her husband.

Moreover, in several instances when attempts have been made to pass into male hands operations which were traditionally performed by women, quality and productivity declined to such an extent to render it necessary to revert to women's work. Such is the case of a large silk firm in Tuscany in the early to middle decades of 19th Century.

Inversely when in late 18th and early 19th Century in Sicily and in Calabria a few entrepreneurs attempted to modernise silk reeling (which - an exception in the whole Mediterranean - had been traditionally performed by migrant *men* masters only) they made use of women labour. Lower women salary compared to male levels did obviously count in their choice, but the progress obtained in quality performance appears to have been quite considerable. (to be further elaborated)

Literature, both in the East as well as in the West points to specific - I would venture to say ritualistic - links between females and silkworm raising. The common expression calling the woman in charge of a silkworm breeding room in China as the *mother* of silkworms is intriguingly reflected in several 16th and 17th Century Italian poems on silkworm raising in which the body of the woman in charge of them is called more apt for its natural warmth and youth force to raise those insects than a man could ever be. A number of beliefs and of so-called superstitions that have traditionally surrounded the extremely delicate process of silkworm raising, as well as practices with special herbs to fend off from silkworms sickness and nuisable enemies are strikingly similar from inner Asia to Spain, and almost always mastered by women only. It is suggested that in moving from China to the West in a several centuries long march along the Silk Road, silkworm raising techniques and related rituals might have kept the female-centered character they originally had in China. (to be further elaborated)