# Bengal silk industry and laisser-faire policies in the nineteenth century: Deindustrialization revisited

**Karolina Hutková**

## Abstract

In the late eighteenth and early nineteenth centuries Bengal was, with over 40% share on total imports, quantitatively the most important exporter of raw silk into Britain. The English East India Company (EEIC) played an important role in Bengal’s dominance. During the period of 1760s-1830s the Company developed a value chain in raw silk manufacturing and integrated cocoon procurement, reeling, warehousing, transport, advertising and the organisation of sale among its business activities. The EEIC relied on economies of scale which gave it an advantage. Moreover, thanks to learning-by-doing the Company also developed an expertise in silk manufacturing. This expertise built on the adoption of ‘best practices’, on acquiring new knowledge through sending silk experts to Bengal, and on granting patents for innovations of silk technologies. The Company offered its knowledge and services such as warehousing, transportation, marketing, sales and guidance about new technologies, innovations and best practices also to private entrepreneurs. When the 1833 EEIC Charter forced the Company to withdraw from raw silk manufacturing, the sector lost entrepreneurial guidance. In comparison to the EEIC, private entrepreneurs had little access to specialised knowledge and skills, and could not take advantage of economies of scale. In the post-1833 period innovative activities were not successful, no major innovation was adopted and the share of Bengal raw silk on the total imports of raw silk to Britain decreased to around 13%.

## Introduction

The nineteenth-century textile production was characterised by innovations in technology and management. In cotton and silk production Europe – Britain in cotton, Italy and France in silk – lead the way and aspiring textile producers were importing new technologies and adapting them. Japan was one of the leaders in catching up with the major producers of cotton and silk and it relied on imported technologies as well as on domestic innovations and adaptations.[[1]](#footnote-1) Technological upgrading in Japan was assisted by state as well as large entrepreneurs. Both state and large producers provided entrepreneurial guidance about new technologies, best practices in production and management, and information about far-away markets.[[2]](#footnote-2) At the time when Japan started to import silk technologies, Bengal was steps ahead as it already possessed a system of filatures producing raw silk with the use of European technologies adapted to local conditions. Yet instead of surging further ahead, Bengal raw silk production fell behind its competitors and by the end of the nineteenth century Bengal raw silk lost its position in the European silk weaving. The share of Bengal raw silk on the total imports of raw silk to Britain declined from around 40% in 1790s-1810s to around 13% in 1860s. To explain this shift we need to look at changes in the political economy in Britain and consider the role of the English East India Company in silk manufacturing in the period 1770s-1830s.

The English East India Company (EEIC) has often been pointed out as a monopolist by contemporary pamphleteers, manufacturers, and politicians. Its most prominent critic was no one less influential than Adam Smith. The Company has been perceived as a monopolist also in the historiography. In particular this view was emphasised by the scholars of the Bengal silk industry. Indrajit Ray argued that the EEIC used its market power to limit competition from private merchants.[[3]](#footnote-3) This paper argues instead that the Company provided entrepreneurial leadership for Bengal silk manufacturers and that it provided private merchants also with services such as warehousing, marketing, and sales. The importance of the entrepreneurial leadership provided by the Company can be seen in the decline of the Bengal silk production for exports after the EEIC withdrew from silk manufacturing in 1830s. Indrajit Ray argued that no deindustrialisation took place in 1830s-60s as Bengal continued to export raw silk to Britain steadily throughout the period.[[4]](#footnote-4) Yet, it is important to consider the exports in relative terms, such analysis shows that the share of Bengal raw silk on the total raw silk imports to Britain was declining. Moreover, at the same time the relative share of silk imports by new raw silk producers such as Egypt was growing. The continued importation of Bengal raw silk in 1830-70 needs to be attributed to the fact that the EEIC built a system of filatures, created guidelines about the best practices in silk reeling, and most importantly innovated the reeling machinery in the 1820s-30s in order to decrease production costs, expand production capacity and improve quality. Private entrepreneurs who bought the Company’s filatures inherited infrastructure and system of manufacturing to rely on. However, many of the private manufacturers were unable to produce silk profitably and withdrew. Entrepreneurs such as Messrs. Watson and Company producing on a larger scale were more successful. Messrs. Watson and Company thanks to the experiments of Mr. Bashford, superintendent at their Surdah filatures, also provided entrepreneurial guidance but only in a limited extent.[[5]](#footnote-5) Overall, the business model set up by the Company was more successful than a business model in which silk manufacturing was done by private entrepreneurs. The fact that the private entrepreneurs could not rely on economies of scale in production and dissemination of best practices and innovations limited the innovativeness of the industry.

The beginning of the nineteenth century marked a shift from mercantilism to laisser-faire policies in the British political economy. Laisser-faire policies were promoted by many economists, politicians and pamphleteers, most notably by David Ricardo who was one of the greatest proponents of laisser-faire policies among the British MPs. Ricardo used British silk industry as a case to prove the detrimental effects of mercantilism on manufacturing. He argued that mercantilist regulation was to be blamed for the stagnation of the British silk industry and that only the disbanding of protective measures and a reduction of import duties on finished silks could revive the industry.[[6]](#footnote-6) Similarly as mercantilism previously, also laisser-faire policies were exported to regions administered by Britain. The new economic policies reverberated to Asia also through the 1833 EEIC Charter which stopped the Company’s direct involvement in any economic activity in India. For Bengal silk manufacturing this meant that in compliance with the new Charter, the EEIC had to sell its silk factories in Bengal. The Charter was based not on economic analysis but relied on the assumption that private entrepreneurs would be able to carry out economic activities more efficiently than the Company.

The end of the Company’s involvement came at a time when the Company was still experimenting with silk practices trying to innovate technologies and its management practices. It is true that the Company faced managerial failure and principal agent problems when attempting to improve the quality of the silk, yet silk manufacturing was still profitable. Through the process of learning-by-doing the Company gathered a pool of knowledge of ‘best practices’ of silk reeling as well as commercial knowledge and put this knowledge into practice through the setting off of guidelines and direct orders. In spite of the fact that it was unable to improve the quality of the Bengal raw silk to match the quality of the Italian silks, the EEIC managed to find a market for its silk in Britain among manufacturers of haberdashery.

This paper will first look at the transfer of silk technologies to Bengal and on the commodity chain in Bengal silk manufacturing. Second, it will consider the profitability of manufacturing of raw silk according to the transferred technologies. Third, it will consider the role of private merchants in silk manufacturing in the pre-1833 period and the relations between the private merchants and the Company. Fourth, it will consider the impact of laisser-faire policies on raw silk production in Bengal.

## Transfer of Piedmontese Technologies and Silk Commodity Chain

Bengal raw silk was never renowned for its quality and the inequality of threads reeled in one skein and coarseness limited its use. British manufacturers and weavers often complained of the silks quality and were wary to purchase it, to solve the problems with the quality of the Bengal raw silk, in 1769 the EEIC decided to transfer to Bengal the Piedmontese reeling technologies – the most advanced reeling technologies. The transfer of the technologies represented a considerable investment as the Piedmontese system relied on factory-type of production and the Company needed to the set up silk filatures and adopt silk reeling machines. Overall, in the period 1760s-1810s the transfer and adaptations of the Piedmontese system to the Bengal climate cost the Company almost £1 million.[[7]](#footnote-7)

Eighteenth-century business and entrepreneurial practices were not characterized by advanced management and accounting systems and it would be misleading to expect that the Company’s decision to adopt the Piedmontese technologies was based on analysis of the future returns on its investment.[[8]](#footnote-8) The EEIC knew that labour in India was cheap and it also counted on preferential access of Bengal raw silk to the British market. Foremost, the Company expected to be able to produce higher-quality silk at competitive prices if it integrated reeling into its business operations. Adopting a centralised system of production made direct control over silk reeling possible and allowed the Company to differentiate its product – Bengal raw silk – from other types of silk. Most importantly, integrating reeling into its business activities enabled the EEIC to manage a higher proportion of the global commodity chain in raw silk production and exports. A commodity chain is defined as “a network of labor and production processes whose end result is a finished commodity”.[[9]](#footnote-9) A global commodity chain “consists of sets of inter-organizational networks clustered around one commodity or product, linking households, enterprises, and states to one another within the world-economy”.[[10]](#footnote-10) Many industries were already characterized by global commodity chains in the pre-industrial period.[[11]](#footnote-11) The silk industry was one of these due to the diffusion of silk weaving to regions with climatic conditions unfavourable to sericulture. Moreover, the global commodity chain in silk production was characterized by high levels of competition in both raw silk production and the silk textiles market. According to Porter, a firm can succeed in a global industry only if it “manages linkages in a global commodity chain in an integrated and systemic fashion”.[[12]](#footnote-12) By implementing the Piedmontese system of reeling, the Company gained management control over another stage of the commodity chain. Figure 1 shows the stages of the raw silk commodity chain in in Bengal. The implementation of the Piedmontese system enabled the Company to take control over the secondary stage and control the process of reeling. The EEIC already controlled the tertiary stage which consisted of transport, sales and marketing.

**Figure 1. Commodity Chain in Raw Silk Production in Bengal, 1770s-1830s**

|  |  |  |
| --- | --- | --- |
| Primary stage | Secondary stage | Tertiary stage |
| Controlled by peasants | **Controlled by EEIC** | **Controlled by EEIC** |
| Inputs: Silkworm eggs, Mulberry Leaves, Water, Peasant Labour, Land for Mulberry Cultivation and Cocooneries. | **Inputs:** Land for filatures, Filatures, Labour of Reelers, Supervision, Cocoons, Wood. | **Inputs:** Freight, Customs, Charges for warehouses, etc. |
| Cocoons | **Product**Reeled silk | Bengal raw silk on British market |

Porter has argued that in industries characterized by global competition, competitive advantage can be achieved by integrating activities on a world-wide basis.[[13]](#footnote-13) Porter draws on a disaggregated view of the firm, which he has called a “value chain”.[[14]](#footnote-14) From this point of view a firm is a “collection of discrete activities performed to do business in its industry” and these activities are called “value activities”.[[15]](#footnote-15) Firms can gain competitive advantage either by focusing on product differentiation or by lowering their production costs.[[16]](#footnote-16) From this point of view the EEIC focused its activities towards achieving product differentiation in the eighteenth century. Such an approach was based on the structure of the contemporary market in raw silk, in which silk of higher quality attained higher prices, however market for middling quality silk also existed as producers of haberdashery purchased large quantities of such silk. Silk manufacturers and weavers did not necessarily seek raw silk of the lowest price but silk of suitable quality. In such a market, product differentiation was a source of competitive advantage because it enabled focus on a target market.

Figure 2 draws on Porter’s definition of firm as a value chain and adds the concrete operations carried out by the Company in raw silk production. The primary ‘value activities’ were cocoon procurement, reeling, warehousing and transport, advertising and the organisation of sale. I have estimated the cost of these activities, the figures represent the costs that the EEIC needed to incur for each activity for the production of 1sm. lbs. of raw silk.

Porter distinguishes between two sources of competitive advantage: cheap labour and “higher order” competitive advantages (proprietary technology, product differentiation, brand reputation, customer relationships and constant industrial upgrading).[[17]](#footnote-17) By implementing the Piedmontese system, the EEIC attempted to draw on two sources of ‘higher order’ competitive advantages mentioned by Porter: product differentiation and brand reputation. The EEIC adopted the most advanced European reeling technology with the aim of producing “Bengal Italian silk”. Their intention was to differentiate the silk from the other types and create a brand reputation for it.

**Figure 2. Value Chain in Bengal Silk Production**



6s.

Reeling

1s.

Warehousing

Transport

Customs

4s. 2d.

Advertising

Organization of Sales

Cocoon Procurement

*Source*: From Michael. E. Porter. Changing Patterns of International Competition, *California Management Review*, 28 (2), 1986, p. 13. Costs are for inputs necessary for producing 1sm. lbs. or for warehousing and transporting 1 sm. lbs.

The case of the EEIC’s raw silk production in Bengal illustrates the importance of transnational companies in shaping technological paths by increasing their control over global commodity chains. The decisions taken by transnational companies about the location of their business operations are based on factor endowments.[[18]](#footnote-18) Decisions are often influenced by the “visible hand” of managers as well as by governments’ actions.[[19]](#footnote-19) Since commodity chains are internalized within the organizational boundaries of vertically-integrated firms, the governance structure of these corporations has a decisive role in allocating business activities to different geographical areas of a chain.[[20]](#footnote-20) In the case of silk production in Bengal, it was the Court of Directors that represented the “visible hand”, who had decisive influence on the development of the industry.

From the point of view of commodity-chain and value-chain theory, the adoption of a centralised system in the production of raw silk in Bengal does not seem misguided. The EEIC found that substantial changes in reeling practices were needed if the quality of Bengal raw silk was to improve and that measures of quality improvement were impossible to implement under the existing putting-out system. Improvements were possible only by attaining higher levels of control over the production process. Thus, even though the adoption of a factory-type system in eighteenth-century India has been considered premature, the actual circumstances of the silk industry present a case in which its adoption was rational. Silk reeling remained however a labour-intensive industry relying on cheap labour. By integrating reeling into the value chain, the EEIC strengthened its position vis-a-vis its competitors on the local market and the Company gained higher levels of control over the quality of Bengal raw silk.[[21]](#footnote-21)

## Prices of Inputs, Costs of Production and Effectiveness of the Transfer

This section analyses the costs of production of Bengal filature silk and factor endowments in the Bengal silk industry and compares them to Piedmont. The EEIC did not possess estimates of the prospective costs of producing filature-reeled silk in Bengal or the actual estimates for Piedmont. The expectation that the adoption of the filature system would be profitable was based on the fact that labour costs in Bengal were significantly lower than in Piedmont. My analysis shows that it was not only labour that was cheaper in Bengal that in Europe. It was especially the cost of cocoons that made raw silk production in Bengal profitable.

Several documents allow us to consider the costs of filature silk production.[[22]](#footnote-22) Table 1 shows the breakdown of production costs and reveals that cocoons were the most expensive input in the production of filature silk. Cocoons accounted for over 85 percent of total production costs. All other items of expenditure in production were therefore small and comprised charges for fuel, reelers’ wages and sundry petty charges. Labour costs represented a low share of the total costs. Similarly the cost of the wood necessary as fuel for the furnaces which boiled water in basins was modest. Overall, producing one sm. lbs of reeled silk in Bengal cost the Company 7s. It is not clear whether the EEIC included costs such as the wages of overseers, silk specialists and directors of filatures under sundry petty charges.[[23]](#footnote-23) However, such costs would not dramatically change the overall costs incurred. Other charges included the cost of freight, customs and other charges – such as warehousing (Table 1). Hence, the total costs of 1 sm. lbs of silk, before it could be sold on the British market, amounted to 11s. 2d.

**Table 1. The Costs of Production of 1 sm. lbs. of Filature Silk, 1786**

|  |  |  |  |
| --- | --- | --- | --- |
| **Production Costs** |  |  | % Total Production Cost |
| Cocoons |  | 6s. | 85,7% |
| Wages of Reelers |  | 6.8d. | 8.1%  |
| Wood |  | 3.7d. | 4.4%  |
| Sundry Petty Charges |  | 1.5d. | 1.8% |
| **Total Production Costs** |  | **7s.** | 100% |
|  |  |  |  |
| **Additional Costs** |  |  | % Overall Cost |
| Custom |  | 3s. | 26.9% |
| Freight |  | 7d. | 5.2% |
| Charges on Merchandize |  | 7d. | 5.2% |
| **Total Additional Costs** |  | **4s. 2d.** | 37.3% |
|  |  |  |  |
| **Overall Costs** |  | **11s. 2d.** |  |

*Source:* IOR/E/4/630, 12 April 1786, p. 390; IOR/E/4/637, 6 May 1791, p. 429.

It is important to compare these costs with the costs of producing reeled silk production costs in Piedmont. Table 2 shows that cocoons were approximately three times more expensive in Piedmont than in Bengal. Similarly, daily wages of reelers were approximately three times higher in Piedmont (9d.) than in Bengal (3d.). However, such data does not tell us much about labour productivity. From the comparison of the costs of reeling 1 sm. lbs. of cocoons into filature-reeled silk, it is apparent that significantly more labour was needed in Bengal than in Piedmont (Table 2). Labour represented a higher share of the total cost of reeling in Bengal (18.4 percent versus 9.7 percent in Piedmont); however the lower cost of cocoons was an important factor which offset lower labour productivity. Therefore, the reeling of one sm. lb. of filature silk – when both reelers’ wages and costs related to cocoons are included – was still almost three times cheaper in Bengal than in Piedmont.

**Table 2. Cost of Inputs in Piedmont and Bengal, 1780s**

|  |  |  |
| --- | --- | --- |
|  | **Piedmont** | **Bengal** |
|  | d. | % Total | d. | % Total |
| Cost of Cocoons (1 sm. lbs.) | 13 | 90.3 | 4 | 81.6 |
| Cost of Reeling 1 sm. lbs. of Cocoons (Reeler Wage) | 1.4 | 9.7 | 0.9 | 18.4 |
| **Costs of Reeling 1 sm. lbs of Cocoons** **(Reeler Wage + Cocoons)** | 14.4 | 100 | 4.9 | 100 |

*Source*: IOR/E/4/630, 12 April 1786, p. 390; Giuseppe Chicco, *La Seta in Piemonte 1650-1800: Un Sistema Industriale D'Ancien Regime* (Milano: Franco Angelli, 1995), pp. 212-13 and 264.

Overall, the data shows that if one considers the prices of inputs, Bengal had favourable conditions for silk thread production. Bengal’s advantage came not only from cheap labour but also, and more importantly, the price of cocoons. Although the Court of Directors and the Board of Trade complained on several occasions about the rising price of cocoons, their price never undermined the profitability of silk reeling. The cocoon prices remained relatively stable in the second half of the eighteenth century; the real issue was instead their supply and quality.[[24]](#footnote-24) This does not, however, mean that access to cocoons was never a problem for the Company. Bad weather and natural disasters reduced the supply of cocoons on several occasions.[[25]](#footnote-25)

Moreover, such events had also an impact on the price of cocoons on the local market. However, apart from the occasional surge of prices due to natural hazards, the price of cocoons did not change significantly in the 1770s or 1780s and oscillated around 5 Sicca Rupees and 6 Annas (11s. 8d.) per Seer (1.88 sm. lbs.).[[26]](#footnote-26) The Court in London observed that “the price of Cocoons may be affected from accidental causes such as a scarcity of Crop, but we understand it has not undergone any very essential alteration for some years past”.[[27]](#footnote-27) The EEIC also tried to facilitate an increase in the supply of cocoons by decreasing taxation on land under mulberry cultivation.[[28]](#footnote-28) The principal problem was the system of cocoon procurement because it depended on agents (called Pykars).[[29]](#footnote-29) Pykars often sold cocoons to the Company’s filatures at much higher prices than they bought them from peasants. Pykars often forced peasants to sell the cocoons at a price that was below the market value.[[30]](#footnote-30) Although the sums lost in this way were not high enough to have a considerable impact on filature production, the behaviour of Pykars undermined the interest of peasants to sell cocoons to the Company.

Wood and labour were also important inputs, but they were not considered scarce or expensive. The Court was concerned more about the quality and availability of wood than its price.[[31]](#footnote-31) Several silk districts of Bengal lacked access to adequate supplies of wood, which undermined the production capacity of filatures. Moreover, green wood was used with detrimental effects on the quality of the produced silk.[[32]](#footnote-32) Similarly labour costs were never considered to be excessive by the Court, their sole concern was the quality of reeling and the supply of reelers.[[33]](#footnote-33)

The Company would very probably not have been able to procure raw silk at cheaper prices than it was able to produce it. Table 3 shows the prices at which the EEIC bought raw silk in 1765-71 before the adoption of the Piedmontese system. If the average prices at which the EEIC bought one sm. lbs. of silk from intermediary merchants are compared with the cost of producing one sm. lbs. in filatures, it is apparent that the EEIC was able to produce silk more cheaply in filatures than to procure it from intermediary merchants. Whereas the costs of producing silk in filatures in the 1780s was 7s., the Company had to pay on average 9s. 10d. for one sm. lbs. of reeled silk when procuring it from intermediary merchants in the period 1765-71.

|  |
| --- |
| **Table 3. Comparative View of the Prices at which the EEIC Bought Raw Silk, 1765-71** |
|  **In shillings and pence for sm. lbs of reeled silk** |
| **Region** | **1765** | **1766** | **1767** | **1768** | **1769** | **1770** | **1771** |
| **Guzerat**  | 9s. 6d. | 9s. 2d. | 8s. 2d. | 9s. 2d. | 9s. 6d. | 11s. 4d. | 11s. 6d. |
| **Tannah** | 9s. 6d. | 9s. 2d. |  | 8s. 7d. | 10s. 7d. | 11s. 6d. | 11s. 11d. |
| **Poddapor** | 7s.11d. | 8s. 1d. | 7s. 9d. | 8s. 5d. | 8s. 8d. | 11s. 4d. | 11s. 6d. |
| **Commercolly** | 6s. 7d. | 7s. 5d. | 6s. 8d. | 6s. 7d. | 7s. 3d. | 11s. | 11s. 2d. |
| **Rungpore** | 6s. 9d. | 10s.1d. | 5s. 9d. | 8s. 7d. | 9s. 2d. | 10s. 11d. | 11s. 1d. |
| **Jungepore** |  |  | 11s. 6d. | 11s. 9d. | 12s. 5d. | 11s. 4d. | 11s. 6d. |
| **Mean Price** | 8s. | 8s. 9d. | 5s. 8d. | 8s. 10d. | 9s. 7d. | 11s. 3d. | 11s. 5d. |
| **Mean Price of 1 sm. lbs. of Reeled Silk, 1765-71 9s. 10d.** |
| **Wound from Pod** |  | 19s. 6d. | 19s. 6d. | 19s. 6d. | 19s. 6d. | 12s. 11d. |  |

*Source*: IOR/E/4/630, 21 July, 1786, p. 561. Before the adoption of filature system, “raw silk wound from Pod” was a term used to describe raw silk reeled under the Company’s facilities and supervision. It was only an experimental production. IOR/E/4/616: ‘Bengal Raw Silk to be Investigated by Richard Wilder, Bengal Supplement 25 March, 1757’, pp. 656-57.

Most importantly, the adoption of the Piedmontese technologies had positive impacts on the EEIC’s capacities to export silk to Europe (table 4). From 1770s Bengal became quantitatively the most important exporter of raw silk to Britain. As the importation of raw silk from Bengal increased, importation of raw silk from Aleppo, Valentia, Naples, Calabria and other places in Mediterranean decreased.[[34]](#footnote-34)

**Table 4. The Share of Bengal Raw Silk on the Total Imports of Silk Imported into Britain, 1750-1789**

|  |  |  |
| --- | --- | --- |
| **Year** | **Total Average Annual** **Imports of Raw Silk** | **Quantity of Bengal** **Raw Silk as % of Total** |
| **1750-60** | 388,091 | 8.7 |
| **1773-79** | 930,202 | 43.2 |
| **1780-89** | 889,371 | 45.0 |

*Source:* Compiled from B. R. Mitchell, *British Historical Statistics* (Cambridge: Cambridge University Press, 1988), 343; K. N. Chaudhuri, *The Trading World of Asia and the English East India Company, 1660-1760* (Cambridge: Cambridge University Press, 1978), 534, Goldsmiths’ Library [G.L.], 1795 fol. 16280, *Reports of the Committee of Warehouses of the East-India Company relative to Extending the Trade on Bengal Raw-Silk* (London, n.p., 1795)*,* 6, 10 and 14.

The case presented here shows that the adoption of the factory-type system of production in the eighteenth-century Bengal silk industry was not detrimental to the EEIC’s silk trade. According to data presented by William Milburn, in the period 1798-1803 the prime cost of silk production amounted to £1,425,466, sales profits were £1,967,985, with net profits of £542,519.[[35]](#footnote-35) Manufacturing of Bengal raw silk continued to be profitable to the 1830s. According to the Company’s statistics in 1830s through its capacity to produce raw silk 1 begah of mulberry land created a profit of 34 Rupees and 4 Annas.[[36]](#footnote-36) This evidence contrasts with findings for the cotton industry which show that the factory system did not emerge in the Indian cotton industry because the system could not cope with unfavourable factor endowments.[[37]](#footnote-37) The evidence presented here shows that the situation was different for silk reeling and that the factor endowments did not play against a factory-type organisation. Even the returns to investment analysis shows that the investment was profitable (Appendix A). Overall, centralisation of reeling and the adoption of filatures in Bengal silk reeling had undeniable benefits. First, the quality of Bengal raw silk improved. Second, productivity increased. Quality improvement was the most significant benefit of the centralised system of organization.

## The English East India Company, Private Merchants and Bengal Silk Industry

The Company was never the only manufacturer of raw silk in Bengal, raw silk was produced by Bengalis for domestic market as well as for the Company, and by private entrepreneurs. However, as is apparent from table 4, the EEIC was quantitatively the biggest exporter of raw silk to the European market. Private manufacturers never expressed huge interest in raw silk production as only 17% of Bengal raw silk imported to Britain in the period 1829-32 was produced in private filatures. Moreover, the silk from private filatures sold for prices on average 19% lower than the Company’s silk (table 5). It is important to note that private filatures relied on the EEIC’s knowledge and services. Most of the entrepreneurs involved in private trade in silk hired the Company’s existing filatures, manufactured silk independently but relied on the Company for transporting this silk to London and sold the silk on the Company’s sales. This means that the entrepreneurs relied on the EEIC also for advertising, marketing, warehousing and organisation of sales. Moreover, the Company provided private filatures with guidelines about ‘best practices’ in reeling, innovations in reeling and machinery and in filature construction. The EEIC also sent its European silk specialists to the private filatures to share best practices and to assist in mitigating problems.[[38]](#footnote-38)

**Table 5. Imports of Bengal Raw Silk by the EEIC and Private Manufacturers to London, 1829-1832**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Years | Quantity Company | Quantity Private | Average Price Company | Average Price Private |
|  | **lbs.** | **lbs.** | **s.** | **d.** | **s.** | **d.** |
| 1829 | 1,129,710 | 258,044 | 14 | 0 | 10 | 10 |
| 1830 | 1,096,071 | 90,092 | 13 | 10 | 11 | 6 |
| 1831 | 1,030,280 | 64,597 | 14 | 0 | 12 | 1 |
| 1832 | 750,828 | 205,625 | 13 | 0 | 10 | 7 |
| Total | 4,006,889 | 618,358 | 54 | 10 | 45 | 0 |
| Mean | 1,001,722 | 154,590 | 13 | 9 | 11 | 3 |

Source: Robert Gordon, *East India Company, India and China Trade* (House of Commons, 1833), p. 4.

The EEIC gave entrepreneurial guidance and was the leader in innovations in Bengal silk manufacturing. Large scale changes to the system of production were implemented in the 1760s-70s during the transfer of the Piedmontese technologies. In the period 1770s-1800s the system was being adapted to the Bengal environmental and socio-economic conditions.[[39]](#footnote-39) The period after 1800 was characterised by small scale innovations and experimentations. Particularly 1820s-30s saw an increase in experimentation with both management and production practices.[[40]](#footnote-40) Italian silkworms and cuttings of Italian white mulberry trees were sent to Bengal with the aim to improve the quality of the silkworm breed and local mulberries. Commercial Residents from the Ragnagore, Commercolly, and Gonatea factories developed new methods of constructing basins and furnaces for filatures. It was decided by the Bengal government that these methods were to implemented as the methods enabled “saving of fuel and labour, superiority over the old filatures in the mode of supplying the basins with water, a greater degree of cleanliness in the interior of the filatures by the exclusion of smoke, and cheapness as well as in their original construction and adaptation.”[[41]](#footnote-41) Experimental filatures were established in Howrah and Gonatea. Their experiments brought merit especially in the case of the Gonatea filature. Colin Shakespear – the commercial resident of the Gonatea filature - experimented with the building of basins and furnaces and developed a system of furnaces and basins which he called pottery ghye. It was decided by the Bengal government that pottery ghye should be used as the standard “to be substituted on all occasions of renewing basins, and should be forthwith constructed in place of those previously in use in all factories, where there might appear advantage in carrying the alteration into immediate effect”.[[42]](#footnote-42)

The use of pottery ghye basins and furnaces thanks to their energy efficiency was supposed to lead to saving of approximately 70% of fuel as the experiments carried out in the Howrah filature showed as well an increase in the quality of silk.[[43]](#footnote-43) Pottery ghyes were not the only innovations that emerged in 1820s, also Sommerville furnaces, Sommervile reel, quad basins and reel by Messrs. Heathcoate and Co. of Tiverton, Devon appeared at the same time. All these innovations were created either by Commercial Residents in different filatures or by English companies with the aim to decrease the production costs, especially to decrease the quantity of fuel since wood was not in ample supply, expand capacity of production, and improve the quality of reeled silk.[[44]](#footnote-44) The Company diligently studied these innovations, considered the costs of their construction and adoption, their effects on the quality of the produced silk and the potential savings on production costs.[[45]](#footnote-45) Only after these calculations the Company recommended the adoption of pottery ghyes and Sommervile reels, which complemented each other and lead to the greatest savings of production costs.[[46]](#footnote-46)

Innovations were not restricted only to silk technologies, innovations of the system of cocoons’ procurement were also adopted. Prior to 1810s the Company was not very successful in managing cocoon suppliers. It relied on intermediary merchants called Pykars to deliver cocoons from sericulturalists.[[47]](#footnote-47) Since 1817 prices of cocoons were increasing and this incentivised management experiments. Before 1827 “it was the custom to make settlement with the Pykars for each bund, respectively, but not until all the cocoons of the bund had been wound into silk, when the Resident proposed such a price as he judged reasonable, and after the approval of the Board of Trade, the account was arranged, without reference to the prices paid at the other factories for silk of the same bund”.[[48]](#footnote-48) This system was amended in 1827 when silk districts were divided into silk circles and all factories in one circle started to pay a predetermined price for cocoons. In 1831 the system was further modified as the Board of Trade decided that Pykars will be notified before each rearing season about the maximum price that they will be paid for cocoons.[[49]](#footnote-49) This last measure finally helped to stop the rise in the prices of cocoons and since 1832 prices of cocoons started to decrease to former level which was reflected in the invoice costs (table 5). Overall, the innovations to the production techniques and management of intermediary suppliers of cocoons helped to decrease the costs of silk production. Experiments continued to be carried out until 1833 when they came to a sudden halt.

**Table 5. Invoice Costs of Company's Bengal Raw Silk per Bale of 2 Maunds, 1817-1835**

|  |  |
| --- | --- |
| Year  | Cost Sa. Rupees |
| 1817 | 962 |
| 1818 | 1,007 |
| 1819 | 1,063 |
| 1820 | 1,112 |
| 1821 | 1,193 |
| 1822 | 1,179 |
| 1823 | 1,181 |
| 1824 | 1,182 |
| 1825 | 1,224 |
| 1826 | 1,188 |
| 1827 | 1,222 |
| 1828 | 1,138 |
| 1829 | 1,048 |
| 1830 | 1,002 |
| 1831 | 972 |
| 1832 | 940 |
| 1833 | 918 |
| 1834 | 882 |
| 1835 | 884 |

Source: LSE Archives, W7204, East India Company, *Reports and Documents,* p. 95

The Company provided private entrepreneurs with range of services. Among the most important services offered to private merchants by the Company was the possibility to withdraw their silk from sale if prices offered at this sale did not reach an agreed minimum price.[[50]](#footnote-50) In this way the Company provided the merchants with a level of security highly appreciated by them as can be seen from this statement made in front of a by a silk merchant:

“I think the East India Company are nothing more than servants of the public; suppose I have a shipment of silk comes into the St. Katherine’s Docks to the Company’s warehouses; they are bound to take it in and to print it in the catalogue with that of the Company; then the day before the declared sale comes on, they may say to the Company, I withdraw that, though it is printed in your catalogue, and send it back from the Company’s warehouses to St. Katherine’s Dock; when the Company put up the sale it is put up at a certain price, and it is sold if it sells for a penny above that price”.[[51]](#footnote-51)

The Company also provided all manufactures in Bengal with information about the developments on the European markets and the changes in European demand.

## Laisser-Faire Polices and Effectiveness of the Business Model of Raw Silk Production after 1833

On 23 July 1833 the Bengal Government was informed by the Court in London that according to a new Bill debated by the Parliament the Company’s trade with India and China was to cease. The EEIC was to stop its economic activities by 1834, or as fast as possible without creating negative impact on economic activity in India and on British manufacturers depending on Asian imports.[[52]](#footnote-52) For Bengal raw silk manufacturing this meant that the EEIC was to continue buying raw silk for exports for an interim period as well as manufacturing raw silk in the filatures still owned by the Company. The sale of the silk filatures started in 1833 and the Court in London advised that it should be done as fast as possible yet at the same time with “prudence”. The Court in its letter to the Government in Bengal stated: “the Injunction to use prudence being understood to refer less to the pecuniary gain or loss of the Company, than to the interests of the people and the keeping up the supply of silk for this country, it was declared the silk-growers should not suddenly be deserted, unless there were capitalists ready to carry on the filatures, even though some loss should be incurred in protecting them”.[[53]](#footnote-53) Initially the EEIC reported that neither the quality nor the quantity of the Bengal raw silk exported to the British market declined. This is supported also by the quantitative data which shows that in the years following the sale of the filatures the quantities remained stable (around 1.4 and 1.5 million lbs/year). The decline was relative, whereas in 1842-49 the share of Bengal raw silk on total imports of raw silk to Britain surpassed 30%, in 1850s the relative decline accelerated and in 1853-56 the share decreased to less than 10% to then increase to over 13% in 1860s.[[54]](#footnote-54) We can find several explanations for this development. First, private entrepreneurs never expressed great interest in Bengal silk manufacturing. Second, the EEIC supported private silk entrepreneurs by providing services until the end of 1830s and the expansion of imports from China and from new silk regions such as Japan and Egypt to Britain took place only from 1840s onwards. Third, entrepreneurs in Bengal were less successful in their efforts to modernise silk production than their counterparts in Europe, Japan and China.

**Table. The Share of Bengal Raw Silk on the Total Imports of Silk Imported into Britain, 1842-56**

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Imports of Bengal Raw Silk | Total Average Annual Imports of Raw Silk | Quantity of Bengal Raw Silk as % of Total |
| 1842 | 1,359,599 | 3,951,773 | 34.4 |
| 1843 | 1,195,433 | 3,476,313 | 34.4  |
| 1844 | 1,669,133 | 4,149,932 | 40.2  |
| 1845 | 1,721,517 | 4,354,696 | 39.5 |
| 1846 | 1,415,325 | 4,407,264 | 32.1  |
| 1847 | 1,083,198 | 4,133,302 | 26.2 |
| 1848 | 772,152 | 4,471,735 | 17.3 |
| 1849 | 1,804,327 | 4,991,472 | 36.2 |
| 1850 | 1,569,995 | 4,942,407 | 31.8 |
| 1851 | 1,198,871 | 4,608,336 | 26.0 |
| 1852 | 1,335,486 | 5,832,551 | 22.9 |
| 1853 | 538,502 | 6,480,724 | 8.3 |
| 1854 | 696,728 | 7,535,407 | 9.3 |
| 1855 | 884,004 | 6,618,862 | 13.4  |
| 1856 | 610,422 | 7,383,672 | 8.3 |

Source: Hadfield, *A Return of the Quantities of Silk of the Various Kinds Imported into the United Kingdom from various Countries, from 1842-56, Both Inclusive, Distinguishing Each Year’s Importation, and the Countries from Whence they Came* (London: House of Commons, 1857), pp. 2-3.

**Table. The Share of Bengal Raw Silk on the Total Imports of Silk Imported into Britain, 1861-66**

|  |  |  |  |
| --- | --- | --- | --- |
| Year | Total Average Annual Imports of Bengal Raw Silk | Total Average Annual Imports of Raw Silk | Quantity of Bengal Raw Silk as % of Total |
| 1861-66 | 1,485,763 | 11,095,068 | 13.4 |

Source: *Annual Statement of the Trade and Navigation of the United Kingdom with Foreign Countries and British Possessions in the Year 1868* (London: George Edward Eyre and William Spottiswoode, 1869), p. 16; *Annual Statement of the Trade and Navigation of the United Kingdom with Foreign Countries and British Possessions in the Year 1861*(London: George Edward Eyre and William Spottiswoode, 1869), p. 12; *East India Products, Part II: Reports on the Silk Industry in India and on the Supply of Timber in the Burmah Markets* (London: George Edward Eyre and William Spottiswoode, 1874), p. 28.

Private manufacturers never expressed huge interest in raw silk production, in spite of the support from the EEIC, and only 17% of Bengal raw silk imported to Britain in the period 1829-32 was produced in private filatures.[[55]](#footnote-55) Instead private merchants were interested in trade in the so called “new articles” of Indian trade – sugar, indigo, and coffee.[[56]](#footnote-56) Thus, it might be surprising that by 1835 majority of the Company’s filatures were sold off. From the names mentioned in the Company’s documents it seems that mostly to European merchants and less often to Indian merchants.

 During the 1830s the new system of silk manufacturing for exports still resembled the pre-1833 system in which private entrepreneurs hired filatures and relied on the EEIC for warehousing, transport, sale, marketing and entrepreneurial guidance (figure 3). Only now the entrepreneurs bought the filatures instead of hiring them from the EEIC. The Company still held a position of coordinator of silk manufacturing for exports. In 1838 the Court reported with satisfaction that the sale of filatures did not “occasioned a falling off in the quantity of Silk forwarded to Europe in the last three years, and advert to the Export Warehouse Keeper’s favourable report on the quality of some of the Private Silk in those consignments.[[57]](#footnote-57) This favourable situation was a reflection of the Company’s continued involvement in silk exports. In 1835 the Court of Directors ordered that “any filature in the Company’s possession should be used for investment and this policy remained in practice until 1838.” [[58]](#footnote-58) The Company continued to provide services to the now privately owned filatures.[[59]](#footnote-59) Most importantly, it continued to provide guidance on profitability when it informed that: “226 Bales or 427 Maunds of the Investment 1836 had been valued at 302,650 Gov. Rupees giving an average of 1,417 ½ Rupees per Bale of 2 Maunds. This cost is evidently too high to afford a profitable remittance, according to the best estimate which can be made of the prospects of the home Market for the present year”.[[60]](#footnote-60) Considering the remaining EEIC’s filatures the Court pointed out that silk manufacturing “must cease altogether, unless Silk can be provided at a cost not exceeding over thousand Gov. Rupees per Bale, including Indian Charges”.[[61]](#footnote-61)

**Figure 3. Services Provided by the EEIC to Private Silk Manufacturers in Bengal**

|  |
| --- |
| Entrepreneurial guidance: best practices and innovations  |
|  |
| Information about export market |
|  |
| Transport |
|  |
| Marketing |
|  |
| Sales |

The British government perceived that private manufacturers would be more efficient in manufacturing silk in Bengal, yet the private manufacturers themselves never petitioned for the Company’s withdrawal from raw silk manufacturing in Bengal and even warn against it. Private entrepreneurs heard by theSelect Committee on the Silk Trade – a Parliamentary committee inquiring into silk manufacturing and trade – in the 1830s did not champion the withdrawal of the EEIC because as they argued the Company was able to produce silk more cheaply. Joseph Grout, a manufacturer of silk crape, argued in a hearing in front of the Select Committee on Silk Trade that the price for which he was buying the EEIC’s Bengal raw silk was 6% lower than the cost of producing raw silk in Bengal on his own. Grout drew attention to the fact that his business partner who managed the venture in Bengal had over ten years of experience with silk production. He also pointed out that the high chances of dying due to the epidemiological and climatic conditions in India decreased the interest in doing business there.

Grout ended his comments on the role of the EEIC in importation of silk to the British market by claiming that: “I should be exceedingly sorry, as a large consumer of Bengal silk, to see the Company decline the raising of it, for I am sure if it gets into the hands of individuals, we shall have very little raw silk imported into this country from India in future.”[[62]](#footnote-62) Grout’s perception was based on his own experiments with silk manufacturing in Bengal and on his conviction that the “Company put up their silk below the cost price”.[[63]](#footnote-63) However, Milburn’s analysis, the Company’s statistics and returns to investment analysis all shows that this was not the case.[[64]](#footnote-64) Instead the key advantages that enabled the Company to produce silk profitably were the knowledge of ‘best practices’ of silk reeling gained thanks to learning-by-doing, management practices developed through learning-by-doing, access to silk specialists, already existing network of employees that could be relegated to silk industry, networks of intermediary merchants dealing with silk cocoon producers, economies of scale on advertising, warehousing, and sales.

Development of silk manufacturing in the post-1833 period was less well documented, still three facts stand out. First, mulberry cultivation in Bengal was undergoing a contraction and raw silk was no longer produced in silk districts of Dinegapur, Rungpur, Bograh, Pubna.[[65]](#footnote-65) Decline of raw silk production for exports was accompanied with increased production of silk for domestic markets.[[66]](#footnote-66) Attempts to expand raw silk cultivation and manufacturing to new regions in India also followed. Yet, even the exports of silk textiles to Europe were declining over the nineteenth century.[[67]](#footnote-67) Second, nineteenth century saw increased interest in wild varieties of silk. The wild varieties of silk did not gain large markets in Europe due to their lower quality. Interest in these silks was driven mostly by ethnographic factors.[[68]](#footnote-68) Third, private entrepreneurs in Bengal were less successful in modernising silk production and in adopting scientific methods than their competitors in Japan and China. Contemporary government reports on Bengal silk as well as contemporary writings by Liotard, Mukherji show that experimentation with sericulture and silk reeling continued even after the Company withdrew.[[69]](#footnote-69) Majority of these experiments seemed to focus on sericulture, in particular attempts were made to adopt European and Japanese varieties of mulberries and silkworms in Bengal as well as in new regions such as Bombay, Madras and Assam. None of these experiments were successful. Innovations in reeling were implemented principally by Mr. Basford who gained for his silk produced according to new reeling methods gold medal from the Society of Arts. However, the quality of Bengal silk did not increase in the 1840s-1860s and Bengal raw silk sold for prices lower than Chinese or Italian silk and even Japanese silk – the newest competitor on the global market with raw silk – sold for higher prices.[[70]](#footnote-70)

Further explanation of the relative decline of raw silk exports from Bengal to Europe can be found in the changes in the commodity and value chains of raw silk production. Unfortunately, I did not find information about the breakdown of cost of silk production for private entrepreneurs. However, from the analysis of the changes in the commodity chain of raw silk production (figure 2) is clear that in comparison to the Company private entrepreneurs had less economic power vis-a-vis peasants due to the fact that they had less market power and had to compete for cocoons with other entrepreneurs, European as well as domestic. Private entrepreneurs had less control over the secondary stage of the chain since they had no administrative power over land and could not, for instance, attempt to promote silk production through lowering land taxes as the Company did.[[71]](#footnote-71) Moreover, the entrepreneurs could not take advantage of economies of scale. The Company relied on economies of scale when investing into innovations of technology and sending European silk specialists to implement best practices. Considering the fact that harvests often failed due to adverse weather conditions, having filatures in all silk districts was beneficial to the Company because it enabled the EEIC to spread risks. Private entrepreneurs could not rely on economies of scale in the third stage of the commodity chain. Moreover, when considering the changes in the commodity chain also from the point of view of value chain, it becomes apparent that the private manufacturers faced adverse situation. Figure 2 shows that the Company had spent 11s. 2d. before 1 sm. lbs. of silk reached the British market. This calculation does not take into consideration the costs of advertising, organisation of sales etc. as the Company itself did not add these to the costs of producing Bengal raw silk. From the 11.s.2d., 6s. represent the cost of cocoons, 4s.1d. are the costs of transportation, warehousing, and customs, and only 1s. is reeling. Thus, saving on transportation and warehousing and access to cheap and good quality cocoons was a necessity. Moreover, it seems safe to assume that the private manufacturers incurred costs in advertising their silk and organisation of sales. Besides, an important factor that is not considered in the calculations of production costs is information costs. The Company had both communication channels and personnel – Inspector of raw silk in London and Superintendent General in Calcutta – that gathered information at sales and from British manufacturers as well as information about technologies and these were transferred to Bengal. Again the Company had the advantage that this information was transferred to all filatures. Another factor that is not included in the calculation is knowledge of Bengal environment. As pointed out by private manufacturers such as Grout, in the pre-1833 period the entrepreneurs that newly arrived to Bengal relied on the Company for information and assistance such as architects for building their filatures.[[72]](#footnote-72)

 **Figure 1. Commodity Chain in Raw Silk Production in Bengal, after 1833**

|  |  |  |
| --- | --- | --- |
| Primary stage | Secondary stage | Tertiary stage |
| Controlled by peasants | **Controlled by entrepreneurs** | **Controlled by entrepreneurs** |
| Inputs: Silkworm eggs, Mulberry Leaves, Water, Peasant Labour, Land for Mulberry Cultivation and Cocooneries. | **Inputs:** Land for filatures, Filatures, Labour of Reelers, Supervision, Cocoons, Wood. | **Inputs:** Freight, Customs, Charges for warehouses, etc. |
| Difference with the previous period |
| Primary stage | **Secondary stage** | **Tertiary stage** |
| Less economic power vis-a-vis peasants, no coordination  | No economies of scale, less control over inputs such as land due to lack of administrative power | No economies of scale |

## Conclusion

In the beginning of the nineteenth century Bengal already adopted innovative European silk technologies such as advanced machinery and filature system of production and was ahead of regions such as Japan and Egypt which started to export raw silk in the second part of the nineteenth century. Yet, throughout the late nineteenth century Bengal silk manufacturing for exports stagnated – the share of Bengal raw silk declined to around 10%-13% in 1860s. This decline started from 1850s onwards, only two decades after the English East India Company ceased manufacturing raw silk and sold its filatures to private entrepreneurs. This paper pointed to the fact that the EEIC had several advantages that allowed it to adopt innovative technologies and profitably export filature-made silk to Britain. By incorporating silk reeling into its business activities the EEIC managed to take control over larger proportion of the silk commodity chain. Relying on administrative power, financial resources, and economies of scale enabled the Company to decrease the cost of knowledge transmission and adoptions of innovations. Moreover, thanks to learning-by-doing the Company gathered a pool of knowledge of best practices in silk reeling and improved its management practices. The Company also had a very good knowledge of the British market for raw silk and used this knowledge as well as its knowledge about the innovations in silk technologies to provide entrepreneurial guidance also to private entrepreneurs. Private entrepreneurs were involved in raw silk production during majority of the 1760s-1830s, yet they usually rented filatures from the EEIC and relied on the Company for services such as warehousing, transportation, marketing, and sales. Once the EEIC had to withdraw from silk manufacturing, the sector lost its leader providing entrepreneurial guidance. Innovations were adopted on a smaller scale and were rather an exception. No major innovation was implemented after 1833. Yet, the second half of the nineteenth century the silk industries in Europe and Japan were going through revolutionary technological changes – use of steam in reeling, microscopes in sericulture etc. It should not be surprising then that Bengal silk production was stagnating.

## Appendix A

In this paper I have shown that the adoption of the filature system did not increase the costs of silk thread production. In fact, the EEIC was able to reel silk in filatures at lower costs than it was able to procure the silk from intermediary merchants. Yet, one must also consider the initial cost of adopting the Piedmontese system. To assess the profitability of the investment I use a simple model calculating returns on investment (Table 4). The return on investment (ROI) is a commonly used measure of profitability. It shows the financial performance of a firm and enables informed management decisions about investment.[[73]](#footnote-73) ROI is the ratio of “net profits over the investment needed to generate the profits”.[[74]](#footnote-74)

$$ROI =\frac{Profit}{Investment}$$

ROI only provides information about profitability over a specific period; therefore my analysis also calculates the Net Present Value (NPV) and the Internal Rate of Return (IRR) – measures commonly used to determine profitability of multi-period projects.[[75]](#footnote-75) NPV is the “present (discounted) value of future cash inflows minus the present value of the investment and any associated future cash outflows”.[[76]](#footnote-76) NPV in other words is the difference between the present value of cash inflows and the present value of cash outflows over a period of time. NPV is commonly used in economics, finance and accounting to assess the profitability of investment – negative NPV denotes loss while positive NPV means that the investment is profitable: The NPV is calculated by:

$$NPV=\sum\_{t=1}^{T}\frac{C\_{t}}{(1+r)^{t}}-C\_{0}$$

In which $C\_{t} $is net cash inflow during the period, $C\_{0} $initial investment, *r* discount rate, and *t* number of time periods.

IRR is the “percentage return on the investment over a period of time”.[[77]](#footnote-77) IRR is also used for evaluating investment and is the discount rate at which the present value of future cash flows is equal to the initial investment. The higher the IRR the more desirable it is for a company to invest in a project.

The model includes data on the cost of setting up a filature, operational costs (the cost of producing one sm. lbs. of silk, including charges for merchandize, freight, and customs), the prices of silk on the British market, and the quantity of silk produced by the filature. The figures for the quantity of filature silk produced in a filature and setting up costs used in model are based on data for the Kasimbazar filature (a filature with 208 furnaces). The price of the Bengal filature silk on the British market denotes the average price for which one sm. lbs. sold. It was not possible to ascertain the figure for a specific filature. The figure for operational costs is based on calculations in Table 1. Total cost equals the operational costs (or the costs of producing one sm. lbs. of silk) multiplied by the quantity of produced silk.[[78]](#footnote-78) Revenue is the quantity of silk produced in a year multiplied by the price of filature silk on the British market. The total cash inflow is calculated as the revenue minus the total costs including setting up costs. The Internal Rate of Returns (IRR) on profit streams in the period 1772-79 was 55 percent. The NPV for investment into filatures in Bengal is positive both with a 10 percent discount rate (NPV 1) and a 5 percent discount rate (NPV 2). The NPV remains positive even for a 15 percent and 20 percent discount rate. This shows that the investment was highly profitable (Table A).

**Table A. Returns on Investment in Setting up Silk Filatures, 1772-79**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 1772 | 1773 | 1774 | 1775 | 1776 | 1777 | 1778 | 1779 |
|  |  |  |  |  |  |  |  |  |
| Quantity of Filature Silk Produced in a Filature (sm. lbs.)  |  | 20,565 | 20,565 | 20,565 | 20,565 | 20,565 | 20,565 | 20,565 |
| Price of Bengal Filature Silk on the British Market (£)  |  | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| Costs |  |  |  |  |  |  |  |  |
| Setting up costs (£)  | 10,774 |  |  |  |  |  |  |  |
| Operational Costs (£) = Costs of Producing 1sm. lbs. of Filature Silk  |  | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| Total Cost (£) = Quantity \* Operational Costs  |  | 12,339 | 12,339 | 12,339 | 12,339 | 12,339 | 12,339 | 12,339 |
|  |  |  |  |  |  |  |  |  |
| Revenue (£) = Price \* Quantity |  | 18,509 | 18,509 | 18,509 | 18,509 | 18,509 | 18,509 | 18,509 |
|  |  |  |  |  |  |  |  |  |
|  Total Cash Inflow (£) = Revenue – Total Cost – Setting up Cost | (10,774) | 6,170 | 6,170 | 6,170 | 6,170 | 6,170 | 6,170 | 6,170 |
|  IRR (%) | 55% |  |  |  |  |  |  |  |
|  NPV 1 (£) – 10% discount rate | 17,511 |  |  |  |  |  |  |  |
|  NPV 2 (£) – 5% discount rate | 12,405 |  |  |  |  |  |  |  |

*Source*: IOR/E/4/625, 9 April 1779, pp. 131-32; IOR/E/4/630, 12 April 1786, p. 390; IOR/E/4/637, 6 May 1791, p. 429.

1. Debin Ma, ‘Why Japan, Not China, Was the First to Develop in East Asia: Lessons from Sericulture’, 1850-1937”, *Economic Development and Cultural Change* 52 (2), 2004, pp. 374-76 and 383; Itoh and Tanimoto, Rural Entrepreneurs in the Cotton-Weaving Industry of Japan”, in Hayami, Y. (ed.), *Toward the Rural-Based Development of Commerce and Industry: Selected Experiences from East Asia* (Washington: World Bank, 1998), pp. 61-63. [↑](#footnote-ref-1)
2. See for instance: Eugen Choi, ‘Entrepreneurial Leadership in the Meiji Cotton Spinners’ Early Conceptualisation of Global Competition’, *Business History* 51, (6), 2009, pp. 930-32; Itoh and Tanimoto, “Rural Entrepreneurs”, 61-63; Kawagoe, ‘Technical and Institutional Innovations in Rice Marketing in Japan’, in Hayami, Y. (ed.), *Toward the Rural-Based Development of Commerce and Industry: Selected Experiences from East Asia*. Washington: World Bank, 1998, pp. 37-43, Yonekawa, University Graduates in Japanese Enterprises Before the Second World War”, *Business History* 26, (2), 1984, pp. 193-218. [↑](#footnote-ref-2)
3. Indrajit Ray, *Bengal Industries and the British Industrial Revolution, 1757-1857* (London: Routledge, 2011), p. 100. The Company was supposed to achieve this especially by offering cocoon producers high prices for their cocoons [↑](#footnote-ref-3)
4. Ibid., pp. 101-102. [↑](#footnote-ref-4)
5. Bashford experimented with the system of reeling. *East India Products, Par II: Reports on the Silk Industry in India and on the Supply of Timber in the Burmah Markets* (London: George Edward Eyre and William Spottiswoode, 1874), p. 28. [↑](#footnote-ref-5)
6. David Ricardo, ‘Spitalfields Acts, 9th May 1823’, in Works and Correspondence of David Ricardo, Volume V (Cambridge: Cambridge University Press, 1952). [↑](#footnote-ref-6)
7. IOR/E/4/625, 9 April 1779, pp. 131-2. [↑](#footnote-ref-7)
8. Sidney Pollard, *The Genesis of Modern Management: A Study of the Industrial Revolution in Great Britain* (London: Edward Arnold, 1965), pp. 190-3 and 250-70. [↑](#footnote-ref-8)
9. Terence K. Hopkins and Immanuel Wallerstein, ‘Commodity Chains in the World-Economy Prior to 1800’, *Review Fernand Braudel Center* 10 (1), 1986, p. 159. [↑](#footnote-ref-9)
10. Gary Gereffi, Miguel Korzeniewicz and Roberto P. Korzeniewicz, ‘Introduction: Global Commodity Chains’, in Gary Gereffi and Miguel Korzeniewicz (eds.), *Commodity Chains and Global Capitalism* (Westport: Praeger, 1994), p. 2. [↑](#footnote-ref-10)
11. An example is early-modern shipbuilding: Eyüp Özveren, ‘The Shipbuilding Commodity Chain, 1590-1790’, in Gereffi and Korzeniewicz (eds.), *Commodity Chains and Global Capitalism*, pp. 20-34. “We think it is quite clear that for these two fundamental processes of the capitalist world-economy in the seventeenth and eighteenth centuries, the commodity chains were geographically extensive, complex, and in constant recomposition.” Terrence Hopkins and Immanuel Wallerstein, ‘Conclusions about Commodity Chains’, in Gereffi and Korzeniewicz (eds.), *Commodity Chains and Global Capitalism*, p. 48. [↑](#footnote-ref-11)
12. Michael E. Porter, Changing Patterns of International Competition, in David J. Teece (ed.), *The Competitive Challenge: Strategies for Industrial Innovation and Renewal* (Cambridge, MA: Ballinger, 1987), p. 30. [↑](#footnote-ref-12)
13. Porter, *Competition in Global Industries*, p. 19. [↑](#footnote-ref-13)
14. Porter, ‘Changing Patterns’, p. 13. [↑](#footnote-ref-14)
15. Ibid., p. 13. [↑](#footnote-ref-15)
16. A competitive advantage as defined by Porter is a “function of either providing comparable cost but in unique ways that create more buyer value than competitors and, hence, command a premium price (differentiation)”. Ibid.,p. 13. [↑](#footnote-ref-16)
17. Porter, *Competitive Advantage of Nations,* pp. 49-51. [↑](#footnote-ref-17)
18. However, this is not always to the same extent that the theory would predict. Pankaj Ghemawat, ‘Competition and Business Strategy in Historical Perspective’, *Business History Review* 76 (1), pp. 38-40. [↑](#footnote-ref-18)
19. Alfred D. Chandler Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, MA: Harvard University Press, 1977), pp. 1-13; Atul Kohli, *State-Directed Development: Political Power and Industrialization in the Global Periphery* (Cambridge: Cambridge University Press, 2004), pp. 8-9 and 12-16. [↑](#footnote-ref-19)
20. Alfred D. Chandler Jr., *Scale and Scope: The Dynamics of Industrial Capitalism* (Cambridge, MA: Harvard University Press, 1990), pp. 3-47. [↑](#footnote-ref-20)
21. Roberto Davini points out that the EEIC faced competition from local merchants in silk procurement throughout the eighteenth and nineteenth century. Roberto Davini, ‘Una Conquista Incerta. La Compagnia Inglese delle Indie e la Seta del Bengala, 1769-1833’ (Unpublished PhD: European University Institute, 1994), pp. 10-54. [↑](#footnote-ref-21)
22. IOR/E/4/630, 12 April 1786, p. 390; IOR/E/4/637, 6 May 1791, p. 429. [↑](#footnote-ref-22)
23. It is not entirely clear which charges were put into the category “sundry petty charges”. It can be expected that they included the wages of non-reelers and costs of running filatures. [↑](#footnote-ref-23)
24. It has been argued by Roberto Davini that main problem the EEIC faced was inadequate access to cocoons and their high price. In his thesis, Davini cites several examples of the complaints lodged by the Board of Trade about the dearness and rising prices of cocoons. Quantitative evidence, however, shows that the price of cocoons was in reality very favourable. The complaints should not be considered as evidence of the high price of cocoons but instead as evidence that the Company tried to procure cocoons at the lowest prices possible. Davini, ‘Una Conquista Incerta’, pp. 129-135. [↑](#footnote-ref-24)
25. According to Davini external events such as the famine in Bengal in 1769-70 and the Maratha raids of the 1740-50s significantly changed factor supply conditions. Both of these events led to a depopulation of Bengal. Although these events indisputably had negative effects on the amount of labour available, shortage of labour was not considered by the Court as a long-term problem. Depopulation and natural catastrophes had had by curtailing the supply of cocoons on several occasions a negative impact on the quantity of Bengal raw silk imported into Britain. Davini, ‘The History of Bengali Raw Silk’, p. 8; Davini, ‘Bengali Raw Silk’, pp. 63-66; Davini. ‘Una Conquista Incerta’, pp. 33-34 and 53. However, trade data does not support the supposition that such events had long-term effects on the silk trade. Also the reports of silk specialists sent from Bengal to London imply that labour shortages were not a long-term issue or that they had a negative impact on reeling. Rather than complaining about shortage of labour, the silk specialists pointed instead to the benefits of the new system of reeling. “After the great mortality in Bengal in the year 1770 it was impossible for the Company to form any hopes of augmenting their investment in Silks. This augmentation however took place by the introduction of spinning after the Italian method”. [G.L.], 1795 fol. 16280*, Reports of the Committee of Warehouses*, p. 18; IOR/E/1/61 ff. 486-487v: 18 Nov 1777: ‘Letter 240 James Wiss in London to the Court Outlining the Advantages of the Indian Method of Spinning Silk in Bengal’, p. 487; IOR/E/4/630, 21 July, 1786, p. 549; IOR/E/4/640, 25 June 1793, p. 512. [↑](#footnote-ref-25)
26. Seer was a unit of weight commonly used throughout India. In Bengal 40 Seers equalled one Maund and one Maund equalled 75 sm. lbs., thus one Seer was approximately 1.88 sm. lbs. [↑](#footnote-ref-26)
27. IOR/E/4/630, 21 July, 1786, p. 549. [↑](#footnote-ref-27)
28. IOR/E/4/619: ‘Cultivation of Mulberry, 17 March 1769’, p. 334; IOR/E/4/623: ‘Growth of Mulberry Plant Encouraged, 24 December 1776’, p. 286. [↑](#footnote-ref-28)
29. Occasionally the prices would increase due to a shortage of cocoons caused by natural hazards. IOR/E/4/630, 21 July, 1786, p. 548. [↑](#footnote-ref-29)
30. IOR/E/4/630, 21 July, 1786, pp. 548-50. [↑](#footnote-ref-30)
31. Green wood did not produce enough heat to warm the water basins to the temperature necessary for reeling. IOR/E/4/625, 9 April 1777, pp. 187-89. [↑](#footnote-ref-31)
32. Some of the silk districts did not have access to as much wood as was needed during the reeling season. The problem was most serious in the filatures in the districts of Kasimbazar, Ragnagatti, and Boalia. The filatures in Kasimbazar and Boalia even competed with each other for wood. Davini, ‘Una Conquista Incerta’,pp. 237-41. [↑](#footnote-ref-32)
33. The directors of filatures frequently complained about limited supply, fluctuations in the number of reelers and the necessity of re-training them at the beginning of each season. However, similar complaints were not uncommon in the early days of the factory system. Moreover, the Company never considerably increased the wages of reelers, and was still able to attract sufficient labour. For complaints from manufacturers, see: Pollard, *Genesis of Modern Management*, pp. 160-240. [↑](#footnote-ref-33)
34. LSE Archives, W7204, East India Company, *Reports and Documents,* p. xxiv. [↑](#footnote-ref-34)
35. William Milburn, *Oriental Commerce* (London: Black, Perry & Co., 1813), Vol. 2, p. 257. [↑](#footnote-ref-35)
36. LSE Archives, W7204, East India Company, *Reports and Documents Connected with the Proceedings of the East-India Company in regard to the Culture and Manufacture of Cotton-wool, Raw Silk, and Indigo in India* (London: J.L. Cox, 1836), p. 171. [↑](#footnote-ref-36)
37. Broadberry and Gupta, ‘Lancashire, India’, p. 300; Irfan Habib, ‘The Technology and Economy of Mughal India’, *Indian Economic and Social Review* 17 (1), 1980, pp. 32-34. [↑](#footnote-ref-37)
38. IOR/E/4/625, 14 July 1779, pp. 484-86. [↑](#footnote-ref-38)
39. Karolina Hutkova, ‘Transfer of European Technologies and Their Adaptations: The Case of the Bengal Silk Industry in the Late Eighteenth Century’, *Business History*, forthcoming. [↑](#footnote-ref-39)
40. LSE Archives, W7204, East India Company, *Reports and Documents,* p. xl-xlii. [↑](#footnote-ref-40)
41. Ibid., p*.* xl. [↑](#footnote-ref-41)
42. Ibid., p. *x*li. [↑](#footnote-ref-42)
43. Extract from a Letter from Bengal Board of Trade to the Honourable Vice-President in Council, 20 August 1832, in LSE Archives, W7204, East India Company, *Reports and Documents,* , pp. 186-88, 196. [↑](#footnote-ref-43)
44. The reel made by Messrs. Heathcoate and Co. of Tiverton, Devon did not prove to improve the quality of the reeled silk. [↑](#footnote-ref-44)
45. LSE Archives, W7204, East India Company, *Reports and Documents, p.* 197 [↑](#footnote-ref-45)
46. Ibid., pp.199-201, 202-204. [↑](#footnote-ref-46)
47. Direct dealing with growers of cocoons was less common, LSE Archives, W7204, East India Company, *Reports and Documents,* p..xxxvi [↑](#footnote-ref-47)
48. LSE Archives, W7204, East India Company, *Reports and Documents, p.* xxxvii. [↑](#footnote-ref-48)
49. LSE Archives, W7204, East India Company, *Reports and Documents, p.* xxxvii. [↑](#footnote-ref-49)
50. House of Commons, Report from Select Committee on the Silk Trade (London: n.p., 1832), pp. 698-99. [↑](#footnote-ref-50)
51. Ibid., p. 699. [↑](#footnote-ref-51)
52. LSE Archives, W7204, East India Company, *Reports and Documents*, p. xli. [↑](#footnote-ref-52)
53. LSE Archives, W7204, East India Company, *Reports and Documents, p. x*lii. [↑](#footnote-ref-53)
54. *East India Products*, p. 28. [↑](#footnote-ref-54)
55. Robert Gordon, *East India Company, India and China Trade* (House of Commons, 1833), p. 4 [↑](#footnote-ref-55)
56. Bowen, *Business of Empire,* p. 245. [↑](#footnote-ref-56)
57. IOR/E/4/754, 10 April 1838, p. 749. [↑](#footnote-ref-57)
58. IOR/E/4/754, 10 April 1838, p. 747 [↑](#footnote-ref-58)
59. Ibid. p.748. [↑](#footnote-ref-59)
60. Ibid., p. 751. [↑](#footnote-ref-60)
61. Ibid., 754. [↑](#footnote-ref-61)
62. House of Commons, Report from Select Committee on the Silk Trade (London: n.p., 1832), p. 697. [↑](#footnote-ref-62)
63. Ibid., p. 699. [↑](#footnote-ref-63)
64. Milburn, *Oriental Commerce,* p. 257, LSE Archives, W7204, East India Company, *Reports and Documents,* p. 171; Appendix A. [↑](#footnote-ref-64)
65. *East India Products,* p. 29. [↑](#footnote-ref-65)
66. Ibid., pp. 28-30. [↑](#footnote-ref-66)
67. Ibid. [↑](#footnote-ref-67)
68. Thomas Wardle played an essential role in popularising wild silks of India. Thomas Wardle, *The Wild Silks of India, Principally Tusser* (London: n.p., 1880). [↑](#footnote-ref-68)
69. N. G. Mukherji, *A Monograph on the Silk Fabrics of Bengal* (Calcutta: Bengal Secretariat Press, 1903), p. 62; l. Liotard, *Memorandum on Silk in India, Part 1* (Calcutta: Superintendent of Government Printing, 1883). [↑](#footnote-ref-69)
70. *East India Products,* p. 28. [↑](#footnote-ref-70)
71. IOR/E/4/619: ‘Cultivation of Mulberry, 17 March 1769’, p. 334; IOR/E/4/623: ‘Growth of Mulberry Plant Encouraged, 24 December 1776’, p. 286. [↑](#footnote-ref-71)
72. House of Commons, Report from Select Committee on the Silk Trade (London: n.p., 1832), p. 697. [↑](#footnote-ref-72)
73. Robert Rachlin, *Return on Investment Manual: Tools and Applications for Managing Financial Results* (New York: M. E. Sharpe, 1997), pp. 3-8. [↑](#footnote-ref-73)
74. Paul W. Farris, Neil T. Bendle, Phillip E. Pfeifer and David J. Reibstein, *Marketing Metrics: The Definitive Guide to Measuring Marketing Performance* (New Jersey: Pearson Education, 2010), p. 338. [↑](#footnote-ref-74)
75. Ibid., p. 337. [↑](#footnote-ref-75)
76. Ibid., p. 346. [↑](#footnote-ref-76)
77. Ibid., p. 348. IRR is also referred to as the discounted cash flow rate of return, rate of return, internal yield, marginal efficiency of capital, and the investor method. M. A. Mian, *Project Economics and Decision Analysis: Volume 1 Deterministic Models* (Tulsa: PennWell Corporation, 2010), p. 316. [↑](#footnote-ref-77)
78. The data used comes from a filature set up by James Wiss in Kasimbazar. The only exception is the price data, these are mean prices. [↑](#footnote-ref-78)