

CHAPTER III

Jute Mills At Dundee:

The Archrival Of Bengal Mills

From the early nineteenth century, there were frequent changes in the global fibre-manufacturing scenario. While, on the one hand, newer fibres replaced the older ones from the basket of the industry's raw materials, newer countries invaded the market place, on the other, defeating the old. The present chapter seeks to detail out the courses of these dramatic changes in the packaging world with a definite emphasis on the emergence of India (particularly Bengal) in the global packaging market with jute as the major raw material. Section I of this chapter discusses the historical course of the use of new fibres at Dundee mills. The subject-matter of Section II is the downfall of the modern jute industry at Dundee. Section III analyses why the industry developed in Bengal during the second half of the nineteenth century despite the stronghold of Dundee mills. The discussion here is based on the comparative advantages of jute manufacturing between Calcutta and Dundee. Major findings of this chapter are contained in Section IV.

I

Dundee, a Scottish town in Great Britain, was an old centre of the packaging industry. By the end of the eighteenth century, it earned

reputation for producing coarse fabrics made of both flax and hemp¹. It never seriously ventured for linen manufacturing which concentrated at Belfast, Leeds and Inverness, using finer varieties of linens. Dundee's excellence in this market was further strengthened when it was discovered at the beginning of the nineteenth century that the use of whale oil softened hemp and other fibres so that their market accessibility was enhanced². After this discovery Dundee got special advantage because the supply chain of that oil was easily accessible from there. The basic raw materials like flax and hemp that were imported in the United Kingdom from Russia and the Baltic, were put into use in the mills that dotted over this region. Once manufactured, their end-products like flax yarn, hemp bagging and so on were despatched across the globe, particularly in the U.S.A, West Indies, Mexico and South Africa, in addition to the domestic market that had been expanding very fast in the wake of the British industrial revolution.

The Dundee linen industry entered into a difficult phase because of the French Revolutionary Wars (1793-1801) when the supply of raw material became very uncertain³. The difficulty was further perpetuated during the Napoleon wars (1804-1815) in view of the 'European blockade' by France. These events flared up the flax price, and hence a decline of its profitability, compelling Dundee merchants to begin searches for new fibres to substitute flax. Around that time, particularly from the late eighteenth century onwards, they had been

¹ Chapman, The establishment of the jute industry, p. 35

² Hartley, Research report on the jute industry, p. 3

³ Chapman, The establishment of the jute industry, p. 39

using tow, a waste product of flax that was short and broken, for manufacturing rope. But the fibre could not be conveniently processed on flax machines. Therefore, when the import of flax yarn was disturbed because of wars, for processing tow, Dundee mill-owners largely replaced the existing machinery by new ones that could accommodate slightly modified technology. Indeed, the new machine could process tow into finer fabrics in such a way that the profitability soared up remarkably. It is reported that Dundee tow mills earned higher profit by about 30 - 40 percent for some years⁴. The use of tow in the manufacturing process was definitely a landmark in the industry's history in Great Britain.

A crisis scenario also prevailed in the business of hemp bagging. As the Napoleonic wars progressed enabling France to successfully blockade the movement of manufactured goods from Great Britain and its colonies, the global hemp market began to suffer from unusual symptoms. While the price of hemp bags nosedived for the want of market, the price of raw hemp skyrocketed for the break in the supply chain. What emerged in the process was that the price of hemp bags ruled below that of the raw hemp! The industry's loss became thus inevitable. In view of such losses, a London-based manufacture, introduced sun-hemp for the first time in 1816 for manufacturing bags at Dundee⁵. Sun-hemp was the vernacular name of a kind of hemp that Dundee imported from India. This new fibre spread very quickly across Dundee mills because of its easy availability as well as higher implication

⁴ Ibid. p. 43

⁵ Ibid, p. 44

of profit. Moreover, sun-hemp bags could be offered for sale at about 16 percent less in price compared to the price of bags made of Russian hemp so that its competitiveness was never questioned⁶. This fibre dominated the global packaging market during 1816-26.

The global market also began to turn against this fibre also since 1826, and by the next quinquennium, a severe slump came to prevail over its trade. Profitability was dragged to the bottom, and so also the rate of wage, causing rampant industrial unrest across the industry. It was reported that in 1827, 350 hecklers organised a strong agitation at Dundee demanding higher wages; the management put them under lock-up for 13 days, and substituted their service by 150 unskilled workers on worn-out machines⁷. In this depressed phase of hemp bagging, the use of tow took its firm root and achieved a spectacular headway.

On the part of the East India Company, however, efforts had already been on the offing since 1791 to introduce jute in the British packaging industry. In that year, a Company's letter from Bengal informed, 'We are continuing our searches for new Article for Export to Great Britain....We sent a Number in the Packet, Samples of clean Hemp of this country, one of rough Hemp and one of *Jute* (we know no English name for this) the material of which Gunnies and the Ropes used in cording Bales is made'⁸ It appears that the term 'jute' thus entered in the English vocabulary for the first time. Two year's later, however. the

⁶ Ibid, p. 44

⁷ Warden, The linen trade, p. 612

⁸ Masrani, International Competition and Strategic, p. 110

Botanical Garden of Calcutta sent 100 tons of jute to England for experimental purposes⁹. Those efforts could not, however, yield any success. In 1822, further attempts were made to introduce jute in British packaging. This time two British merchants, Thomas Neish and one Rowan, imported jute from Bengal for sale to flax mills at Dundee but the mill-owners refused to use it, possibly because of their confusion that it was a kind of Indian fibre, particularly sunn hemp. Indeed, sun hemp was difficult to be spun under the contemporary technology and also its strength was lost when it was wet. Later, some Dundee manufacturers experimented with jute on their flax and hemp machine but until the year 1833, no significant success was achieved to smoothen its roughness.

A break-through took place in the contemporary experiments when a Dundee merchant, one Watt by name, discovered in 1833 that jute could be used in the place of hemp provided it was spun on tow machine¹⁰. It is learnt that Rowan obtained the first batch of manufactured jute yarn and cloth from Abington in England in 1833.¹¹ This sample evidently encouraged the local spinners and weavers to use jute as a substitute packaging material. However, since this innovation could not ensure perfection, Dundee mills did not go for pure jute materials. They rather began to adulterate tow with jute from 1834 onwards when the supply of Russian flax abated in the global market¹².

⁹ Sethia, *The Rise of the Jute Manufacturing Industry in Colonial India*, p. 74

¹⁰ Warden, *The linen trade*, p. 612

¹¹ Masrani, *International Competition and Strategic*, p.100

¹² Cited in Chapman, *The establishment of the jute industry*, p. 45

The packaging industry, however, disliked this practice, and it went a long way against the good-will and further potential of Bengal jute as a packaging material. Plenty examples are available in Dundee Advertiser, a local news paper's pointing out to 'jute and other rubbish in Dundee materials'¹³. Even the scope of its use as an adulterant was, however, lost when the power-loom began to rapidly replace the handloom technology in Great Britain since it could not be mechanically woven. Table 3.1 presents the data on how it entered into the Dundee market in the early 1830s.

Table 3.1: Imports of flax and jute at Dundee in the early 1830s

Year	Imports (in ton)		Price (in £ per ton)	
	Flax	Jute	Flax	Jute
1833	19,942	300	42-42.10	14.10
1834	17,326	828	54	12 - 14
1835	18,484	1,222	45 - 49	13 - 15
1836	39,274	16	47- 48	22- 23

Source: Chapman, Establishment of the Jute Industry, p. 46.

This table provides certain insights into the contemporary packaging market. Firstly, an upward trend is visible underlying Dundee's import of jute. From 300 tons in 1833, it escalated to 1,222 tons in 1835, exhibiting more than a 150 per cent rate of growth per annum. This was, indeed, a remarkable achievement on the part of Bengal jute since it captured this market entirely at the nascent stage. In contrast, a stationary state is seen to prevail over Dundee's import of flax. It was about 19,940 tons in 1833 sliding down to 17,326 tons and 18,484 tons in the following two years. Presumably, the lower price of

¹³ Watt, the dictionary of the economic products of India, p. 409

jute, compared to that of flax, might have been the driving force behind the upward trend of jute import in England. Whereas flax was priced in 1833 at about £ 42 per ton, jute was available only at £ 14.10 per ton in the same year. In the next year, the price of the former increased to £54 per ton but the later clearly reversed the course and became £13 a ton on average. Although the difference reduced subsequently, the former stood at about 127 per cent higher than the latter in 1836.

Import figures for 1836, however, generate a curiosity. Whereas the import of flax rose to 39,274 tons in that year, the trade of jute slumped to 16 tons. We may identify certain factors to explain this abrupt change. Firstly, the average price of jute was £14 per ton in 1835 but rose to £22.5 per ton in the next year. This represents a hike of more than 60 per cent in one year. A product's price increases either i) when its demand rises with its supply remaining same, ii) when its supply falls with its demand remaining same, or iii) when a rise in demand and a fall in supply take place simultaneously. Given the trend of British demand for jute in the early 1830s, a more plausible speculation is that its demand might have remained constant or marginally increased but a shortfall in supply should have led to the price rise. In other words, a supply-side bottleneck presumably caused the rise in price and the fall in import in 1836. Secondly, as against a 50 per cent rise in jute price the average price of flax increased from £44.5 per ton in 1835 to £47.5 per ton in 1836, that is an increase of 6.7 per cent. For this rise in the relative price of jute vis-à-vis its substitute good, the in-take of jute fell in

Dundee in 1836. Thirdly, huge imports of jute in 1835 (that was almost 50 per cent higher than that in 1834) might have remained largely unutilized and stocked at warehouses so that there was little necessity for its further import in the following year. Thus, the setback of British jute import in 1836 might be explained by the supply-side bottleneck and/or an overstock in the market in the previous year, both of which were short-run problems. For the long-run potentiality of Bengal jute, however, the real concern was that the prevailing technology was not compatible to process jute fibers.

The year 1836, however, marked the final milestone for the success of jute packaging because of an epoch-making innovation in the field of jute technology. It was that if raw jute was softened in a proper mixture of whale oil and water, it could be smoothly spun in tow machines and also woven on a power-driven machine. Once these became technically feasible, the cheapness of raw jute and its abundant supply from the colonial hinterland converted Dundee's flax mills into jute empires. Very promptly, indeed, these conversions took place from the late 1830s. The following table shows how quickly jute replace other fibres from Dundee's import basket of packaging materials.

Table 3.2: Imports of packaging fibres into Dundee

Year	Hemp and Hemp cedilla Quantity Share		Jute Quantity Share		Quantity of Total fibre import (in ton)
	(in ton)	(in %)	(in ton)	(in %)	
1830	3,691	18	Negligible	Negligible	20,696
1840	1,311	4.6	2,745	9.8	27,980
1850	1,104	1.9	14,080	25.2	55,718
1860	987	1.4	36,965	52.1	70,896

Source: Chapman, Establishment of the Jute Industry, p. 49

Table 3.2 illustrates that in 1830 Dundee imported hemp by 18 per cent of its total import of fibres, which stood at 20,696 tons. No record was, however, available for the importation of jute fibre in that year. However, in 1840, hemp import fell sharply to 1,311 tons, and that cut its market share of only 4.6 per cent. In the same year, Dundee manufacturers imported 2,745 tons of jute. It amounted to a share of 9.8 per cent in Dundee's total fibre trade. Indeed, this upward trend started in 1838 when an order was received from the Dutch government for the packaging of coffee beans in jute bags for their East Indian trade¹⁴. This event surely gave recognition to the use of jute in the packaging world. Also, the psychological fear of war that arose at the instance of the Afghan War (1838-42) played an important role behind the expansion of Dundee's jute industry from the late 1830s. Table 3.3 shows that Britain's import of raw jute from Calcutta increased from 11,972 cwt in 1828-33 to 63,055 cwt in 1834-9 on an average. It rose further to 109,728 cwt in 1839-44. It rose further to 216,649 cwt in 1844-49 (table 3.3). In value terms, Table 3.8 shows that the increase was from Rs. 28,929 in 1828-33 to Rs. 151,929 in 1834-9 and Rs. 222,691 in 1839-44 and further to Rs. 475,571 in 1844-49 on an average.

¹⁴ Warden, *The linen trade*, p. 612

Table 3.3: Five years average quantity of export of raw jute from Calcutta during 1828-1872. (in cwt)

Year	Great Britain	United States	France	Bombay*	Madras**	Cylon	Others	Total
1828/29-1832/33	11,972	575	-----	1,103	-----	-----	1	12,873
1834/35-1838/39	63,055	4,055	1,690	2,658	1,194	32	123	68,569
1839/40-1843/44	109,728	5,658	974	288	1,804	-----	229	117,046
1844/45-1848/49	216,649	1165	24,653	537	838	171	489	233,844
1849/50-1853/54	402,218	15,116	8,986	-----	817	-----	247	427,335
1854/55-1858/59	572,818	85,018	47,909	61	1,309	1,959	1,804	710,175
1859/60-1863/64	1,044,395	47,226	62,140	40,595	3,172	4,768	5,623	1,199,802
1864/65-1868/69	2,081,282	272,554	20,942	213,312	13,999	2,584	3,298	2,607,971
1869/70-1872/73#	3,916,368	797,383	42,785	110,429	16,829	2,709	12,838	4,899,332

N.B. *indicates Malabar coast, ** indicates Coromondal coast, (---) indicates a very insignificant amount or even nil. # Four years average.

Source: Estimated from the Kerr's report on the cultivation of jute, PP, lx-lxix

The introduction of a jute-spinning machine in 1848 and the beginning of direct railway communication between Dundee and London around that year boosted the use of jute as a packaging material, and hence the demand for raw jute from Bengal¹⁵. Dundee's average import of raw jute from Calcutta is seen to have rose from 402,218 cwt in 1849-54 to 572,818 cwt in 1854-59 in quantity (Table 3.3), and from Rs.1,221,979 to Rs. 2,080,591 in the respective years, in value (Table 3.8). Its demand reached at the peak during the Crimean war (1854-56)

¹⁵ Deninis Chapman, The establishment of the jute industry, p. 49

when the supplies of Russian flax and hemp were fully dislocated¹⁶. In those two years, Great Britain imported Bengal raw jute by 565,749 cwt and 765,639 cwt (valued at Rs. 1.84 million and Rs. 2.85 million), respectively (see annexure 3.1 for quantity and 3.2 for value). That war also boosted the demand for sandbags using jute as a substitute of flax.¹⁷ These circumstances explained why jute came to occupy more than 50 per cent market of Dundee's fibre import in 1860 (vide Table 3.2). In that year, Dundee manufacturers imported 36,965 tons of jute out of its total fibre import of 70,896 tons. Annexure 3.1 indicates that Dundee's industry grew steadily for a couple of years thereafter. From 923,668 cwt in 1860-61, its import of raw jute from Bengal increased to 2,392,780 cwt in 1863-64, 3,257,091 cwt in 1870-71, and 5,426,514 cwt in 1872-73 (see Annexure 3.1). In the respective years, the values of its import were Rs. 3.46 million, Rs. 14.49 million, Rs. 22.90 million, and Rs. 35.02 million (see Annexure 3.2). These figures indicate the industry's average average rate at 36.29 per cent per annum during the 1840s, 8.70 per cent per annum during the 1850s, 33.33 per cent per annum during the 1860s and 27.85 per cent per annum during 1869/70-1872/3. In the corresponding periods, its value series annually grew at 45.84 per cent, 21.63 per cent, 58.45 per cent and 31.67 per cent. The export of jute goods from U.K during 1875-1904, as shown in

¹⁶ The observation from the report of Board of trade, " Its prosperity dates from the time of the American civil war. The war had stopped the cotton supplies which America sent to Lancashire mills and the utility of jute, which could be cheaply produced, was recognised for many purposes for which cotton has hitherto been used. Dundee took advantage of the favourable opportunity and began its world trade" as cited by R. Chowdhury, Evolution of Indian industries, p. 140.

¹⁷ Martin, The rise and fall of jute as a commercial crop, p. 15

Table 3.4, establishes a rapid growth for Dundee's jute industry in the following period.

Table 3.4: Exports of jute manufactured from U.K

Year	Piece goods Quantity Value		Price (£ per yard)	Year	Piece goods Quantity Value		Price (£ per yard)
	(in million yards)	(in '000£) per million			(in million yards)	(in '000£) per million	
1875	101.2	1405	13.88	1890	273.8	2626	9.59
1876	12.8	1558	12.89	1891	283.7	2535	8.93
1877	116.8	1547	13.24	1892	266.2	2562	9.62
1878	123.0	1589	12.91	1893	265.0	2352	8.87
1879	164.1	1963	11.96	1894	233.4	2048	8.77
1880	183.2	2256	12.31	1894	254.7	2169	8.51
1881	204.3	2363	11.56	1896	257.1	2270	8.82
1882	212.5	2391	11.25	1897	233.8	2102	8.99
1883	227.3	2502	11.02	1898	211.1	1796	8.50
1884	242.8	2460	10.13	1809	213.3	1903	8.92
1885	215.1	1904	8.851	1900	174.0	1875	10.77
1886	216.1	1807	8.36	1901	215.5	2144	9.94
1887	244.2	2058	8.42	1902	195.8	1908	9.74
1888	231.5	2081	8.98	1903	211.0	2040	9.56
1889	265.1	2730	10.29	1904	197.0	1953	9.91

Source: Report of tariff commission, 1905, vol-2, p. 3765

The articles of jute that Dundee manufactured were used not only in the British domestic market, but catered also to many countries across the globe, especially in Europe and North America (vide Table 3.4). Dundee thus exported 101.2 million yards of jute piece goods in 1875, which earned a bill of £1.41 million. These suggest that by the beginning of the fourth quarter of the nineteenth century jute became an undisputed global packaging material, and also that Dundee got a large chunk of share in it. Since Dundee exclusively catered also to the British domestic market around that period, the extent of its contemporary jute industry is fairly comprehensible. What was more, the industry had still

been expanding. From 101.2 million yards in 1875 their export rose to 183.2 million yards in 1880, 242.8 million yards in 1884, and further to 283.7 million yards in 1891. In value terms, the rise in export was from £1.41 million to £2.26 million, £2.46 million and further to £2.54 million in corresponding years. On average, an annual growth rate of 12.02 per cent prevailed in the quantity series, and 5.30 per cent in the value series during 1875-91. Obviously, a falling trend in price must have explained this growth differential. We will shortly return to a discussion on this falling trend.

Of Dundee's export consignments, the lion's share went to the U.S. market. Table 3.11 displays that it absorbed more than a half of jute good exports from Dundee in most of the years during 1885-92. In 1891, its share touched a level of 56 per cent. The United States apart, Germany in Europe and Argentina in South America were important buyers of those articles. During 1885-93, the former imported about 7-10 per cent of it, and the latter 6-14 per cent. Other buyers included Holland, Belgium, France and Italy in Europe, Brazil in South America, as well as Australia and New Zealand in Oceania, but their in-takes were less than one per cent during 1885-92.

There is no denying the fact that a significant part of Dundee's jute market grew up as a substitute of other packaging materials like hemp, flax and tow. But surely it conquered the traditional market domain of Bengal handloom jute as well. To demonstrate how Dundee jute competed away Bengal handlooms from the latter's foreign market,

we present in Table 3.5 the export values of gunnies and gunny bags from Calcutta during 1852-66. Though the modern jute industry began to grow from 1855, we will see in the next chapter that its output is not included in this series. The absolute series of handloom jute exports from Calcutta is seen to have attained the peak of £392,424 in 1859, and then it fell gradually to £ 102,858 in 1865¹⁸. But both in the upswing and downswing of the series, rapid oscillations are predominant, causing certain degree of confusion about any firm conclusion. In view of this, the series is represented by 5-year moving averages.

Table 3.5: Value of exports of gunny bags and gunnies from Calcutta (in £)

Year	Value	5 year moving average	Year	Value	5 year moving average
1852	287,411		1860	333,977	297,957
1853	231,159		1861	359,343	280,843
1854	174,790	242,207	1862	186,845	224,600
1855	215,335	259,975	1863	131,628	178,376
1856	302,338	257,182	1864	111,207	168,870
1857	376,252	300,709	1865	102,858	
1858	217,194	324,437	1866	311,813	
1859	392,424	335,838			

Source: Statistical abstract, p.p, H.C. 1867-68, Vol.71, p. 1

There is a steady trend in the series of moving averages. From £ 242,207 in 1854, the series climbed at the peak of £ 335,838 in 1859, and fell steadily thereafter through 1864 when the average figure was as low as £ 168,870. The rate of decline in the series was 9.94 per cent per

¹⁸ This observation goes against the opinion of Gadgil that the industry declined from 1830, Gadgil, Industrial evolution of India, p. 61

annum during 1859-64 as against an annual growth rate of 7.73 per cent during 1854-59.

The setback of Bengal's cottage jute products in various foreign market is understood from Table 3.6. Since the series starts here from 1863-64, it can not be ascertained when those markets began to shrink¹⁹. But it does indicate when those markets seriously collapsed. The table, however, shows that major export outlets for Bengal jute products, were the U.K., North America, Strait Settlements and Ceylon, which absorbed in 1866-67 about 91 per cent of Bengal's aggregate consignments.

¹⁹ (Table 3.5 establishes that Bengal's export market met setback from 1860 onwards).

Table 3.6: Export value of gunnies, cloth, twine and rope from Calcutta to foreign ports, 1863-1873 (in Rs.)

Year	U.K	North America	Aden	France	West Indies	Java	China	Australia and other ports	Cape of Good-Hope	Strait Settlement	Ceylon	Other countries	Grand total
1863-4	20,876	5,72,453	5,536	-----	9,990	33,950	22,722	60,785	21,895	271,175	72,718	17,399	1,309,499
1864-5	40,552	4,61,780 ²⁰	5,707	549	22,300	12,125	47,256	73,182	12,575	131,708	108,150	182,866	1,098,750
1865-6	241,779	21,06,758	11,156	34,525	9,600	89,265	2,230	107,589	18,744	179,374	129,844	63,839	2,994,703
1866-7	227,170	27,85,872	7,842	3,766	5,170	-----	30,335	220,146	23,540	197,822	107,415	3,819	3,585,897
1867-8	268,248	21,48,401	19,982	600	5,640	54,294	28,181	68,839	26,286	214,421	56,202	3,499	2,894,599
1868-9	1,875	6,90,589	13,460	-----	-----	31,205	83,646	177,321	26,948	596,735	130,127	1,835	1,751,906
1869-70	16,310	7,47,604	8,597	-----	-----	25,347	9,535	124,503	12,540	645,308	207,441	8,503	1,797,185
1870-1	1,474	27,99,716	6,789	-----	2,283	20,275	16,325	139,717	25,100	269,342	74,014	11,397	3,355,035
1871-2	55,517	10,68,689	8,599	12,525	-----	32,516	37,160	188,075	14,320	336,144	114,056	9,156	1,867,601
1872-3	8,072	5,44,836	13,330	-----	-----	9,000	54,868	380,567	50,288	547,226	175,125	88,137	1,783,312

Source: Kerr, Report on the cultivation of jute, Appendix L
 N.B: (---) indicates a very insignificant amount or even nil.

²⁰ It is included the export value of South America, Rs. 8187

In the United Kingdom, the market was curtailed drastically from Rs. 268,248 in 1867-68 to Rs. 1,875 in 1868-69, and in North America from Rs. 21,48,401 to Rs. 690,589 in the same period. Setbacks took place in other two countries in the following year. It fell from Rs. 645,308 in 1869-70 to Rs. 269,342 in 1870-71 in Strait Settlements, and from Rs. 207,441 in 1869-70 to Rs. 74,564 in 1870-71 in Ceylon. In certain markets, however, Bengal's export took an upward turn in later years. Our deliberations in the following chapter will show that those should be the consignments from Bengal's emerging modern jute mills.

Not only did Dundee oust Bengal jute products (especially handlooms) from the latter's external markets, but it became very competitive in Bengal's domestic market also. Table 3.7 presents the trends of Bengal's import of jute products during 1871-85. There are, indeed, rapid volatilities in the series, which are ironed out in 3-year moving averages, as shown in the table.

Table 3.7: Quantity of imports of bags in Bengal in (cwt)

Year	Quantity (cwt)	3-year moving average (cwt)	Year	Quantity(cwt)	3-year moving average (cwt)
1871	3,454,120		1879	4,759,363	4,546,880
1872	4,041,081	4,040,040	1880	4,638,896	4,775,688
1873	4,624,918	4,312,054	1881	4,928,805	5,168,514
1874	4,270,164	4,103,900	1882	5,937,842	6,083,892
1875	3,416,617	3,837,347	1883	7,385,028	6,134,741
1876	3,825,259	3,630,584	1884	5,081,353	6,063,285
1877	3,649,877	3,905,839	1885	5,723,4751	
1878	4,242,382	4,217,207			

Source: Statistical Abstract, P.P, H.C, 1886, Vol-68, p. 373.

The series of moving averages shows that Bengal imported jute bags weighing 4.04-4.31 million cwt during 1871-74. For three subsequent years, it fluctuated below the amount of 4 million cwt but surged upwards steadily thereafter. It became 4.55 million cwt in 1879, 5.17 million cwt in 1881 and 6.13 million cwt in 1883. The actual import figure was indeed 7.39 million cwt in 1883. The moving average series, however, shows that insofar as the losses of Bengal's foreign market during 1863-72 were concerned, those involved largely the markets of jute handlooms. But Dundee's intrusion in Bengal's domestic market during 1876-85 involved its competition with both handloom and powerloom products of Bengal since the latter had steadily been emerging in that period. This issue will be discussed at length in the following chapter.

II

Though Dundee's jute industry was dominant in the global market till around 1890, its monopoly began to be threatened from the second half of the 1850s onwards when the various countries had been gradually venturing into the industry. The pioneer in this field was the United States of America where jute goods were first manufactured in 1848 using jute yarns imported from Dundee²¹. Two years afterwards, the first spinning mill was set up there using raw jute directly imported from India. The next in this series was India where the first jute mill was established in 1855 to

²¹ Report of the marketing of the jute products, p. 12

initiate a long-standing growth of an industry that subsequently occupied a monopoly in the world jute market²². We detail its development process in the following chapter. This was followed by the opening up of the industry in France in 1857, in Germany in 1862, in Belgium in 1865 and in Austria in 1870²³. Certain facets of this development should be emphasized here. First, since major jute good importing countries entered into this development process, Dundee's interest was severely hampered. This was true for the countries like the United States of America and Germany which, as we have already pointed out, consumed substantial amount of Dundee products. There was substantial demand for jute bags in Carolina, Georgia and Virginia for the transshipment of cotton from the fields, especially after the Civil War (1861-65)²⁴. The US jute mills targeted this market, and also the market of carpet yarns and cordage. France was also a major importer of hessian and jute goods from Dundee till 1870²⁵. Dundee's interest suffered in that country also. This was also true for Belgium and Austria where the developed agricultural markets made substantial use of jute packaging materials from Dundee²⁶.

The growth of the jute industry in the USA and France is learnt from Table 3.3, which shows the export of raw jute from Bengal to different countries. Although the series appears to be fluctuating in the Annexure

²² Chattopadhyay, A socio economic survey of jute labour, p. 4

²³ Report of the marketing of the jute products, pp. 12-14

²⁴ Ibid, p 12

²⁵ Report of tariff commission, vol-2, p. 3656

²⁶ Report of the marketing of the jute products, p. 14

3.1, the five-yearly average series (Table 3.3) shows a steady upward rise. 47,226 cwt per year during 1859/60-1863/64, it increased to 272,554 cwt per year during 1864/65-1868/69, and further to 797,383 cwt per year during 1869/70-1872/73. The value series of jute import, as shown in Annexure 3.2 and averaged in Table 3.8 also demonstrates a steady progress for the US market. In the respective periods, it rose from Rs. 188,956, Rs.387,745, and Rs. 3,386,160. In the case of France, Table 3.3 shows that there was steady import of raw jute from Calcutta, although the trend of import was quite volatile there. In fact, France's jute industry began to grow steadily only a few years afterwards. We should note in this connection that Bengal raw jute was also transshipped to the provinces of Bombay and Madras, as well as Cylon, to some extent. On average, their imports were 46,123 cwt, 4,995 cwt and 2,036 cwt respectively during 1828/29-1872/73. Since modern jute mills did not come up in these places during this period, the imported raw jute must have been used in their own handloom jute products.

Table 3.8: Five years average value of raw jute export from Calcutta during 1828-1872 (in Rs.)

Year	Great Britain	United States	France	Bombay*	Madras**	Cylon	Others	Total
1828/29-1832/33	28,929	785	-----	-----	2,030	-----	7	22614.4
1834/35-1838/39	151,651	7,813	606	200	6,344	407	674	164,973
1839/40-1843/44	222,691	12,686	1,823	-----	1,349	3,857	742	239,342
1844/45-1848/49	475,571	2,713	49,433	492	1,968	2,689	1,961	512,255

1849/50-1853/54	1,221,979	44,266	29,256	-----	-----	2,195	797	1,298,334
1854/55-1858/59	2,080,591	305,239	192,597	7,495	250	4,124	8,812	2,596,584
1859/60-1863/64	4,539,987	188,956	246,865	18,463	218,059	19,180	27,700	5,215,598
1864/65-1868/69	10,544,810	387,745	101,586	12,839	1,125,850	71,175	15,133	12,259,138
1869/70-1872/73	25,529,988	3,386,160	258,410	17,572	650,707	82,716	126,973	30,052,527

N.B. *indicates Malabar coast, ** indicates Coromondal coast, (---) indicates a very insignificant amount or even nil.

Source: Estimated from Kerr's report on the cultivation of jute, PP, lx-lxix

The price series of Bengal's raw jute in the global market, derived from Tables Annexure 3.1 and 3.2 (see Annexure 3.3) and presented average series in Table 3.9 from it, also signify a spurt of modern jute mills in certain countries. The price of exported raw jute from Bengal is seen to have started rising from the second half of the 1830s. From Rs. 1.77 per cwt its average price rose to Rs. 2.28 per cwt during 1835-39, and fluctuated around it during the 1840s. Presumably, this spell of rise in the series was due to the emergence of jute mills at Dundee. The next spell started in the 1850s when the industry took its root in the USA. The table shows that the average price increased from Rs. 2.11 per cwt during 1845-49 to Rs. 3.38 per cwt during 1850-54, and further to Rs. 5.22 per cwt during 1860-64. The emergence of the industry in other countries since the early 1870s, especially France, further hiked the global price of Bengal raw jute to Rs. 6.43 per cwt. during 1870/71-1872/73. It is interesting to note that for the period 1828-72 as a whole, the average price of Bengal raw jute was higher in the provinces of Bombay and Madras, and also Ceylon- namely above Rs.

4 per cwt- than what ruled in Great Britain, the USA and France. In the latter countries it is seen to be Rs. 3.39 per cwt, Rs. 3.25 per cwt and Rs. 3.93 per cwt respectively.

Table 3.9: Five years average price of raw jute export from Calcutta during 1828-1872 (in Rs.)

Year	Great Britain	United States	France	Bombay*	Madras**	Cylon	Others	Total
1828/29-1832/33	1.59	1.20	1.90	-----	-----	-----	8.75	1.61
1834/35-1838/39	2.43	2.61	2.35	3.58	4.30	2.21	5.29	2.43
1839/40-1843/44	1.98	2.14	3.28	2.08	-----	1.87	3.53	1.99
1844/45-1848/49	2.19	2.29	3.66	3.47	2.56	1.95	6.18	2.19
1849/50-1853/54	2.95	2.90	-----	3.02	-----	2.84	3.48	2.94
1854/55-1858/59	3.6	3.59	4.1	3.57	3.85	3.98	11.28	3.62
1859/60-1863/64	4.28	4.24	-----	4.52	4.91	3.91	4.45	6.24
1864/65-1868/69	5.01	4.05	4.88	5.36	5.05	4.81	5.14	4.77

N.B. *indicates Malabar coast, ** indicates Coromondal coast, (---) indicates a very insignificant amount or even nil.

Source: Calculated from Kerr, Report on the cultivation of jute, PP, lx-lxix.

Data relating to the price and quantity of sales give an insight into the growth performance of the industry till 1872-73. To draw inferences in this respect, we regress the price variable (P) in double-logarithmic scale on the quantity of export (Q) in aggregate and also for individual destinations (vide Table 3.9). From the view point of F-statistics the price-quantity relationship is found significant for the export destinations of Great Britain, France, Bombay and Cylon. While the significance level is 77 per cent for Cylon, it is more than 95 per cent for other three destinations. The relationship in aggregate has also been found highly significant, viz.

more than 99 per cent. Statistically insignificant relationship has been observed for export destination of the U.S.A and Madras.

Table 3.10: Estimated Price-Quantity Relationships and Their Relevant Statistics

No	Regression Equation	R ²	F (sig. level)
1	$\ln Q_{UK} = 9.581 + 2.751 \ln P_{UK}$ (S.E=0.445) (S.E=0.306) t=21.409 t=7.577 (0.0001) (0.0001)	0.572	57.411 (0.0001)
2	$\ln Q_{USA} = 8.894 + 0.907 \ln P_{USA}$ (S.E=0.580) (S.E=0.445) t=15.335 t=0.049 (0.0001) (0.049)	0.099	4.153 (0.49)
3	$\ln Q_{Bombay} = 3.619 + 3.920 \ln P_{Bombay}$ (S.E=1.533) (S.E=1.080) t=2.361 t=3.630 (0.027) (0.0001)	0.375	13.178 (0.0001)
4	$\ln Q_{Madras} = 5.778 + 1.240 \ln P_{Madras}$ (S.E=0.816) (S.E=0.593) t=7.081 t=2.090 (0.001) (0.044)	0.114	4.370 (0.440)
5	$\ln Q_{Cylon} = 4.898 + 1.409 \ln P_{Cylon}$ (S.E=1.742) (S.E=1.140) t=2.811 t=1.236 (0.010) (0.230)	0.065	1.527 (0.230)
6	$\ln Q_{France} = 6.557 + 2.144 \ln P_{France}$ (S.E=0.954) (S.E=0.702) t=6.876 t=3.005 (0.0001) (0.005)	0.237	9.331 (0.005)
7	$\ln Q_{Total} = 9.728 + 2.563 \ln P_{Total}$ (S.E=0.513) (S.E=0.409) t= 18.958 t=6.270 (0.0001) (0.0001)	0.478	39.316 (0.0001)

Our estimated relationships indicate a positive value for all slope parameters. Those imply that all estimated equations represent supply function. That is, the price variable in the export market is largely determined by the quantity of supply. The significance of these statistical findings is as follows: the contemporary jute industry had been growing at

such a rapid pace in the global context that the yearly supply of raw jute from Bengal lagged behind its demand so that the quantity of sale represented the amount of supply in the market. The other important inference is from the values of supply elasticity in these estimations. The supply elasticity of export is found to be greater than one in all the cases, excepting for the USA which is almost unit elastic. The elastic supply of export implies that as the price was increased its supply was increased more than proportionately. Possibly the higher export price was able to attract additional flows from the domestic market. Also, as the modern jute industry grew in other countries, the market of domestic handloom industry was squeezed, gradually leading to the decline of the industry. As a result, larger quantities of raw jute were made available for export.

It needs to be emphasised here that the industry's development in these various countries was patronised by their respective governments by way of providing tariff protections and bounties. Thus, for example, Germany imposed 11-12 per cent tariff in 1879 on yarn and 24 per cent on woven goods in addition to a five per cent subsidy in freight charges on the lines of steamer²⁷. Similarly, on the strength of tariff barriers the French jute manufacturers enjoyed 24 per cent margin and the Austrian manufacturers 29 per cent over Dundee manufacturers²⁸. By way of tariff cordons, these countries nourished their domestic jute interests.

²⁷ Report of tariff commission, p. 3660

²⁸ Ibid, p. 3656 and p. 3666

Because of these developments in various countries , Dundee's jute exports naturally suffered significantly. Table 3.4 shows that its export fell steadily from 283.7 million yards in 1891 to 197 million yards in 1904 in quantity and from £2.54 million to £ 1.95 million, in value during the same period. These series thus fell by 30.56 per cent and 23.23 per cent respectively during 1891-1904. It should be noted that although both the quantity and value series started declining from about 1892, the competitive pressure against Dundee had already started mounting from the mid-seventies, which was evident in the price series. Table 3.4 points out that from £13.88 per yard in 1875, their average price fell to £12.91 per yard in 1878, £11 per yard in 1883, £8.55 per yard in 1885 and £8.42 per yard in 1887. Dundee's supremacy thus began to erode from around 1875 although it became manifest only in the early 1890s.

Table 3.11: Exports of jute products from Dundee to different foreign countries

(in thousand £)

Year	Germany	Holland	Belgium	France	Italy	U.S.A	Brazil	Argentina	Australia	New Zealand	Canada	Others countries	Total
1885	174 (9.14)	32	56	61	67	842 (44.22%)	146	129 (6.77)	-----	-----	52	345	1904
1886	126 (6.97)	23	28	45	41	906 (50.13%)	118	148 (8.15)	-----	-----	57	315	1807
1887	173 (8.57)	24	31	44	31	951 (46.91%)	120	214 (10.56)	-----	-----	94	345	2027
1888	221 (10.6)	21	27	30	15	1063 (51.08%)	122	132 (6.34)	-----	-----	86	364	2081
1889	267 (9.78)	25	15	40	12	1334 (48.86%)	162	289 (10.59)	-----	-----	89	497	2730
1890	180 (6.85)	27	35	94	7	1337 (50.91%)	116	248 (9.44)	48	17	90	427	2626
1891	268 (10.5)	27	25	93	5	1419 (55.97%)	65	140 (5.52)	61	21	105	306	2535
1892	195 (7.61)	24	19	38	2	1295 (50.54%)	153	358 (13.97)	48	17	112	301	2562
1893	176 (7.48)	29	31	16	1	1097 (46.64%)	67	326 (13.86)	39	20	135	415	2352
1894	77	30	28	22	-----	860 (41.99%)	82	439	45	21	97	347	2048

1895	17	31	22	19	-----	997 (45.96%)	75	446	83	23	97	359	2169
1896	125	35	24	20	-----	1101 (48.50%)	34	404	92	29	150	256	2270
1897	17	35	27	19	-----	1253 (59.60%)	65	134	89	29	124	310	2102
1898	19	40	20	17	-----	841 (46.82%)	71	207	71	27	133	350	1796
1899	8	36	19	11	-----	890 (46.76%)	23	337	83	34	112	350	1903
1900	8	20	9	8	-----	888 (47.36%)	15	321	88	46	139	333	1875
1901	7	19	6	5	-----	1124 (52.42%)	31	326	78	51	158	339	2144
1902	6	28	8	5	-----	1075 (56.34%)	19	147	68	44	183	325	1908
1903	17	29	8	-----	-----	1003 (49.16%)	5	332	36	47	220	343	2040
1904	14	37	7	-----	-----	978 (50.07%)	5	207	55	43	201	406	1953

Source: Report of tariff commission, 1905, vol.2, p.3769.
N.B: (---) indicates a very insignificant amount or even nil

Dundee's setbacks in different markets are, however, demonstrated in Table 3.11. By 1885 the French market is seen to have already gone almost into oblivion since in that year it imported only £61,000 from Dundee, and accounted for less than one per cent share of its market during 1885-1904. The US market which had once been the strong-hold of Dundee shrank from £1.42 million in 1891 to £1.29 million in 1892, and then almost steadily to £0.89 million in 1900. Similarly, as against £268,000 in 1891, Germany took only £195,000 in 1892, £77,000 in 1894 and £8,000 in 1900. The market in Argentina fell belatedly, notably from 1896 on wards. Its market was £446,000 in 1895 but £404,000 in 1896 and £134,000 in 1897. The series fluctuated thereafter in a slightly higher range. The Australian market also squeezed belatedly. It fell from £92,000 in 1886 to £36,000 in 1903. The markets in Holland and Belgium had, however, begun to suffer from 1885 itself. From £32,000 in 1885 the former fell to £19,000 in 1901 and the latter from £56,000 to £6,000 in the same duration. We add in this context that Dundee's setback in different markets was not only due to the industry's developments in their respective domestic economies, but because of the fact that other countries also started to export their end products to those countries. This was especially true for Bengal mills, which we elaborate in a latter chapter. Also in this category was included Germany who imported raw jute from India through London on equal terms with Dundee, and definitely enjoyed price advantages because of her domestic tariff and bounty structure. It grabbed the markets of Turkey, Greece and Romania from Dundee. Similarly, Belgium largely took

over the markets of Australia and South America from the Scottish manufacturers²⁹.

III

We have adumbrated above that the development of jute industry in Bengal since 1855 was so robust that in the late nineteenth century it monopolised the global packaging market. While the industry's early stage of development will be discussed in the next chapter, this section seeks to explain on what scores did Bengal get predominance over Dundee during the second half of the nineteenth century. Surely an industry gets localised in the neighbourhood of its source of raw materials when its finished goods are lighter than the raw materials. But this logic was not true for the localisation of the jute manufacturing industry in Bengal since the raw jute does not reduce much in weight after processing. Therefore, some other factors must have been responsible for this industry's localisation.

To search for the explanation of localisation of jute industry in Bengal, we at first seek to compare the prices of raw jute between Bengal and Dundee in the mid-nineteenth century.

²⁹ Ibid, p. 3665

Table 3.12 : Time series of raw jute price in Bengal during 1828-72

Period	Price (Rs. per maund)
1828/29 -1832/33	1.96
1833/34 -1837/38	1.81
1838/39 - 1842/43	1.50
1843/44 -1847/48	1.62
1848/49 -1852/53	2.19
1853/54 -1857/58	2.69
1858/59 -1862/63	4.00
1863/64 -1867/68	3.38
1868/69 -1872/73	4.56

Source: Kundu *et al.* Jute in India, p. 316

Time series of average raw jute price at Calcutta, as presented in Table 3.12, shows a mild falling trend from Rs. 1.96 per maund during 1828-42; but, as jute manufacturing geared up at Dundee, its price soared up steadily. The table shows that the average price rose from Rs. 1.50 per maund during 1838-42 to Rs. 4.56 per maund during 1868-72. The price level was, however, much lower than this in the interior of the province; the handling and transshipment costs as well as profits at intermediate transactions must have bid up the price. Table 3.13 presents the district-wise price of raw jute in Bengal in 1872.

Table 3.13: District-wise price of raw jute in Bengal in 1872

District	Price (Rs. per maund)	District	Price (Rs. per maund)
Rungpore	1.75 - 2.75	Manbhoom	2.50
Pubna	1.25- 3.00	Singbhoom	2.25
Shylet	1.50-2.00	Bhagolpur	2.00
Mymensigh	1.50-2.00	Sonthal Pergunnahs	2.0-2.50
Faridpur	0.75-2.00	Barasat	2.0-2.50
Backergunj	0.50-1.12	Alipore	1.12-2.25
Dacca	1.00-2.00	Baripore	2.0-2.12
Burdwan	2.25-2.50	Nowgong	2.50-5.00
Hooghly	1.60-2.90	Goalparah	2.50-2.75
Howrah	2.50		

Source: Kerr, Report on the cultivation of jute, p. 36

Jute prices were relatively low in the districts of Faridpur, Mymensing and Sylhet, which now belong to Bangladesh. Its average price was as low as Rs.1.37 per maund in the first district, and Rs.2.12 per maund in the latter two. In three other districts of the present-day Bangladesh it ruled above Rs.2 per maund, notably at Rs.2.12 per maund in Rungpur and Pubna, and Rs.3.75 per maund in Nowgaon. In almost all the districts of present-day West Bengal, the price ruled at a higher bracket. It was Rs.2.50 per maund in Howrah, Rs.2.37 per maund in Burdwan, and Rs.2.25 per maund in Hoogly and Barasat (or 24 Parganas). It should be noted that while the quality of jute fibre was certainly a key factor for regional variations in the price level, it was not always the deciding factor. For, although the quality of fibre was superior in the districts of present-day Bangladesh, a number of such districts witnessed a lower price range. In fact, the demand for raw jute from local handlooms was an important factor to this end. Thus, inspite of substantial supply of raw jute in Pubna and Rungpur, where 14.07 per cent and 6.25 per cent of total area were cultivated respectively under jute, its price ruled at a higher level of Rs.2.12 per maund. In contrast, the price was as low as Rs.1.50 per maund on average in Dacca, although the supply of raw jute was limited there on account of only 2.73 per cent of total land under this crop. In the districts of Burdwan, Hoogly, Howrah and 24 Parganas, the price level was high, notably perhaps because of lower acreages under jute, viz 0.22 per cent, 5.00 per cent, 1.20 per cent and 1.60 per cent of their respective areas of land, as also for the burgeoning demand for fibre by the cottage industry. However, the prices in

Table 3.12 give an average of Rs.2.14 per maund as representing the price level of raw jute in the interior province in Bengal.

To derive the price of raw jute that a modern jute mill in the neighbourhood of Calcutta might be required to pay, we should add their transshipment and handling costs from the interiors of the province. We have estimated in the previous chapter that the average transportation cost from the interior province to Calcutta was 42 paises per maund in the direct route while an additional 20 paises were involved in the circuitous route on average. An average transportation cost of 52 paises per maund are taken up in this case. This apart, transactions in the internal trade involved the services of brokers, weighmen, porters, inspectors etc, but Table 2.10 has estimated such costs at about one paise per maund . Thus, the spot price of raw jute at Calcutta comes to Rs.2.67 per maund in 1872. Table 3.4, however, shows it at Rs.4.56 per maund during 1868-72. The difference, notably 1.89 per mound, should have been the profit margin at various stages of transaction in the interior trade. Since the previous one represents the prices at the hat, a 32 per cent profitability at the following two stages of transaction explains this price difference. In fact, a jute mill in Calcutta is expected to obtain raw jute at about Rs. 3.52 per maund as a source reports that many European buyers purchased raw jute at Bamunghata³⁰.

³⁰ Kerr, Report on the cultivation of jute, p. 67

The British Tariff Commission (1905), however, informs us that Great Britain imported 171,000 tons of raw jute in 1875, worth of £2,576,000, and 199,000 tons per annum on the average during 1875-79, worth of £2,961,000³¹. From these figures we estimate that the raw jute price in England was Rs. 5.58 per maund in 1875 and Rs. 5.51 per maund on average during 1875-79 (at £1 = Rs. 10 and 1 ton = 27 maund). If the Calcutta price is taken to be Rs. 3.52 per maund, the price difference of raw jute between Calcutta and Dundee comes to Rs. 2.06 per maund, or £ 5.56 per ton in 1875. Thus, a Dundee manufacturer was required to pay more than 50 per cent higher price for raw jute than what a Calcutta manufacturer paid. Even if we consider the Calcutta price at a higher side of Rs. 4.56 per maund, the difference comes to Rs. 1.02 a maund, i.e. slightly above £ 2.75 a ton, in 1875 so that the Dundee mills paid about 22.37 per cent higher price for imported raw jute from Bengal. This estimation appears to be a close approximation of the reality since the contemporary jute mills at Dundee frequently pointed out that due to the proximity to the raw material sources the Calcutta mills enjoyed a cost advantage of £3 per ton (i.e. Rs. 1.11 per maund) against Dundee mills.

Low cost of labour was another source of comparative advantages for Bengal jute mills. We have already discussed that for a long time in the past Bengal artisans were exposed to jute culture and its processing. The modern jute industry indeed came in and around the district of Hoogly near Calcutta,

³¹ Report of tariff commission, 1905, vol.2, p. 3721

which had experienced a robust development in the handloom jute industry. We have seen in the previous chapter that Hoogly had been the second largest concentration of jute handlooms in Bengal making industrial use of 120,000 maunds of raw jute. It was only after the district of Dinajpur where 233,514 maunds of raw jute were processed. Modern jute mills along the banks of the river Hoogly could readily obtain the supply of labour from the workforce who had earlier been engaged in the handloom jute industry. Also, a large number of workers flocked at factory gates from the surrounding districts like 24 Parganas, Burdwan, Birbhum and Murshidabad as the handloom jute industry had also been extinguishing there. In fact, the modern jute industry got the labour supply from within the province in its initial phase of development, especially till about 1885³².

Not only did the industry get a secured supply of skilled and unskilled workforce locally, their wage rate were also astonishingly low, generating the industry's comparative advantage at the global level. The cross-country wage rates in the contemporary jute industry were not directly comparable in view of their variations in working hours. Because of the stringent factory act, the length of working hours was lowest in the UK among the contemporary jute manufacturing countries. It was 55 hours per week in the UK as against 63 hours per week in Germany and France, 66 hours per week in Austria, and 69 hours per week in Belgium³³. Bengal jute mills, however, surpassed these all.

³² Foley, Report on labour, p. 14

³³ Ibid, p. 4019

Here the working hours were 90 hours per week. A Dundee jute interest thus pointed out that one of most important advantages of Calcutta mills was 'very notably the long and continuous working hours at the Calcutta factories, extending without stoppage of machinery from 5 a.m. till 8 p.m. for six days in each week, equal to 90 hours [per week], while the more extended application of this system admits of 132 working hours per week [certainly after the introduction of electricity in 1895], as against 55 hours in the United Kindom.'³⁴ Indeed, such an extended working schedule could be enforced in the emerging jute mills on account of abundant labour supply that the downfall of handloom jute industry gave rise to. Had jute manufacturing not been a traditional livelihood in Bengal, the Calcutta mills found it difficult to obtain the workforce from the local populace since the division of labour was strictly based on a rigid caste system in Bengal's contemporary society. Given the developed status of the cottage jute industry during the first half of the nineteenth century, the caste-based division of labour in this province did not allow a large number of retrenched workers around the mid-1850s from the handloom sector to work in an altogether different job. As soon as the modern jute mills began to develop around Calcutta, they rendered their services to them. This explains why in the initial phase of the industry's development, the Calcutta mills enjoyed the buyers' control in the labour market, enabling the management to vastly extend the working hours. A contemporary source reveals, 'The working hours of Calcutta are 90 per week. It has been proved

³⁴ Ibid, p. 3927

that the real advantage to the producer is in having the larger output and longer working period. They justify it on the ground that they have great control of labour.³⁵ In fact, under certain circumstances, longer working hours gave rise to lower rate of wage, which we will shortly discuss. But it also ensured lower overhead costs, generating another source of comparative advantage. Victor Fraenkl, a Dundee jute exporter, thus calculates, 'That continuous running [of machinery 'day and night'] may mean a low 12 per cent advantage in cost of production, for Calcutta is manufacturing about 33 per cent cheaper than Dundee.'³⁶ Many interested in Dundee jute considered this as an unfair competition. Thus, according to Fraenkl again, 'India being our own country, we feel the manufacturing competition of Calcutta to be unfair.' And they felt such an unfair competition to have emerged out of the laxity in India's contemporary factory act, which should be amended in the interest of Dundee's jute industry. According to Longair, 'There is a reasonable expectation and strong probability, however, that this great disparity between the Factory Acts of India and Great Britain may be gradually lessened.'³⁷ But it continued and certainly gave a great stimulus to the development of modern jute industry in Bengal.

It should, however, be noted that in view of various witnesses in Foley's report (1905), it appears doubtful whether a system of 90 working hours a week (i.e. 15 hours in a day for six days in a week) prevailed in Bengal.

³⁵ Ibid, p. 3931

³⁶ Ibid, p. 3943

³⁷ Ibid, p. 3927

It is true that the working period at Calcutta mills spanned from 5 a.m. till 8 p.m. for six days in each week. But there were breaks in the work schedule when the workers used to take rest. In certain mills, there were resting places also. The report of Foley observes, 'His [worker's] hours were 5 A.M. to 8 P.M. with changes at 7.30 A.M., 10 A.M., 12.30 P.M., 3, and 5 P.M., each shift working 10 hours a day and not more than 5 hours at a time.'³⁸ It thus appears that the working hours were 10 per shift. But from the following observation in the report it follows that the workers worked for more than one shift, and for more than 12 hours: 'The reduction of the hours to 12 would not solve the labour difficulty, since the same number of shifts would be necessary. If Government insisted on a 10-hours' day, one shift could be used, the mill might be closed two hours in the middle of the day, and one-third of the labour would be thrown on the market: the out-turn would however be reduced by one-third.'³⁹

However, for the sake of comparison, we calculate wage rates of jute mills in different jute processing countries including Calcutta for the working hours of 55 per week. The wage rates of spinners were as follows.

Table 3.13: Contemporary wage rate for spinners in different countries

Country/Place	Rate per 55 hours		
	s	d	Rupees
France	8	5	4.25
Austria	7	0	3.50
Belgium	8	0	4.00
Dundee	9	0	4.50
Calcutta	-	-	1.21

Source: Report of tariff commission, 1905, vol.2, p 4019

³⁸ Foley, Report on labour, p. xxvi

³⁹ *ibid*

Among the European jute manufacturing countries Dundee thus provided the highest rate of wage to spinners. For 55 working hours in a week, it was Rs. 4.50 at Dundee in contrast to Rs. 3.50 in Austria, Rs. 4 in Belgium, and Rs. 4.25 in France. The variation in weekly wage rates was thus 28.57 per cent. The variation was greatly extended if the ruling wage rate at Calcutta mills is considered. A source reveals it at Rs. 2 Annas 10 for ordinary spinners and Rs. 3 Annas 7 for skilled spinners per week, giving an average of Rs. 3.02. Even if a shorter working hours of 60 per week (instead of 90 hours, as we have pointed out above) are considered, the weekly wage rate for spinners comes to Rs. 2.77 per week of 55 hours. At this estimation, the wage variation for spinners between Dundee and Calcutta mills is worked out at 53.43 per cent. The variation would be much greater than this if the working hours are taken to be 90 hours per week for Calcutta mills. It should be emphasized here that in the spinning branch lower cost of labour generated very significant comparative advantages since wages constituted two-thirds of the weekly expenses in this activity while the other one-thirds consisted of expenditures on coal, oil, furnishing, railway carriage, taxes etc., leaving raw material costs out of account. In respect of the weaving branch, however, a wider variation was noticed in the wage structures between Dundee and Calcutta. The British Tariff Board (1905) revealed that the weekly wage rate at Dundee was 23s. 3d. for a male weaver and 16s. for a female weaver⁴⁰. The average wage rate of a Dundee weaver thus comes to about 19.5s, or Rs. 9.75, per week. This was

⁴⁰ Report of tariff commission, 1905, vol.2, p. 3908

inclusive of factory overheads. Exclusive of factory overhead costs, the average wage rate of a Dundee weaver was reported at 15s. 6d⁴¹. per week, or about Rs. 7.50. In Foley's report, however, the wage rate at Calcutta was reported at Rs. 4 per week for an ordinary weaver and Rs. 6.50 per week for a skilled weaver⁴². The average wage rate for weavers at Calcutta mills was thus Rs. 5.25 per week. Even if we consider the working hours of 60 per week in Calcutta, it comes to Rs. 4.81 per week of 55 hours. The variation in the weavers' wage rate (exclusive of factory overheads) between Dundee and Calcutta thus appears to be about 56 per cent. Our estimation thus suggest that compared to Dundee mills the wage rate in Calcutta was cheaper at least by 53 per cent for spinners and 56 per cent for weavers.

Bengal jute products also enjoyed comparative advantages over Dundee articles in many markets because of lower transportation costs. Such advantages predominantly occurred in Far East countries (i.e. the countries lying farther east from India) such as Japan, China, Philippines, Malaysia, Indonesia etc. where jute products were extensively required for the conveyance of grain, flour, seeds, coffee, sugar etc. Freight charges for raw jute from Bengal to England is reported at 80s. a ton (or Rs. 1.48 per manund)⁴³. Taking raw material from Bengal and sending it back here after processing thus involved about Rs. 2.96 a maund (since raw jute does not significantly

⁴¹ *ibid*

⁴² Foley, Report on labour, p. 9

⁴³ William Longair, a Dundee jute spinner and manufacture, however, gave witness before the British Tariff Commission (1905) that the freight charge from Calcutta had earlier been 80s per ton (i.e. Rs. 1.48 per maund), which should have generated a higher cost differential. Report of tariff commission, 1905, vol. 2, p. 3927

reduce in weight after processing). At least by this sum of Rs. 2.96 a maund the freight cost of Bengal jute products should be less than that of Dundee goods in Far East markets. On the same logic, Bengal products waged formidable competition in India's domestic market. Even in the British market, Calcutta's mills could dominate in point of transportation costs because of a high freight rate between London and Dundee. It is learnt that Dundee mills could send jute goods at a cheaper rate to New York than to London. The conveyance cost was about 19s. a ton between Dundee and New York as against 26s. 6d. a ton (i.e. about Rs. 0.49 a maund) between Dundee and London⁴⁴. Hence, the cost price of Bengal jute products involved a freight of Rs. 1.48 per maund for one-way transportation cost at London whereas that of Dundee products bore one-way transshipment of raw jute upto London (viz. Rs. 1.48 a maund) and the to-and-fro freight rate between London and Dundee (viz. Rs. 0.98 a maund), aggregating to Rs. 2.46 per maund. On account of the conveyance cost the Calcutta mills had then surely an advantage over Dundee mills for the British market that was supplied from London. Also, the foreign and colonial markets that Dundee mills accessed through the port of London became more favourable to Calcutta mills owing to the high freight rate in the London-Dundee sector. Indeed, several witnesses before the British Tariff Commission (1905) lamented against this drawback. The Commission's report notes, 'Some firms state that the freight rates they have to pay are a greater drawback to their trade in yarns than foreign tariffs. This opinion is by no

⁴⁴ Report of tariff commission, p. 3911

means general, but there is practical unanimity as to the severe burden under existing conditions both of the railway and shipping rates on all branches of the industry⁴⁵.

Last, but not the least, the question of tariff in some jute manufacturing countries also gave better market environment to Calcutta mills, compared to their Dundee counterparts. Since most of the jute manufacturing countries imported raw materials from Bengal, they in many cases dared not to impose prohibitive tariff against Calcutta's manufactured jute lest Bengal also retaliated. But in no such countries the articles from Dundee were relieved. Thus, for instance, in 1892, there was an imposition of a duty at £4 15s. on foreign jute articles in France which imported jute goods earlier from Dundee since the early 1860s. According to a Dundee firm, 'We were sending a quarter of our products to France till the duty in 1892 made our trade dwindle away.'⁴⁶ But the jute goods sent from Calcutta to any port in France directly was admitted duty free. If, however, it was sent via England, 'it pays a surtax' even if it was not landed in England⁴⁷. Surely it was a boon to Calcutta mills in competition.

IV

We thus find that in view of import dislocations for flax and hemp, Dundee mills experimented with several alternative fibres and finally found solutions in

⁴⁵ Ibid, p. 3695

⁴⁶ Ibid, p. 3656

⁴⁷ Ibid

the use of jute. This study has shown on the basis of raw jute consumption and the sale of finished goods abroad that there was a rapid growth of the modern jute industry at Dundee from the early 1840s through the late 1880s. This rapid growth was explained by certain supply side factors like the easy availability of raw jute from Bengal at cheaper prices, and the development of railway network between Dundee and London, as also by a series of demand side factors like the Crimean war which accelerated the demand for sand bags. We have concluded that Dundee mills took away significant market share from Bengal's handloom jute industry in U.K, North America, Strait settlement and Ceylon. They also significantly penetrated into India's domestic market like Bombay and Madras including Bengal.

Dundee could not, however, retain its jute monopoly for long as the industry was subsequently developed in the U.S.A, Germany, Belgium and Austria. Those developments were, however, explained by the patronage in those countries. But the industry's development in Bengal was not nurtured under any state patronage. It was explained by the fact that Bengal enjoyed enormous comparative advantages in this time of production. We have found a) that in respect of raw jute prices Bengal had cost advantage of Rs. 1.89 per maund, b) that the labour cost was cheaper by 58 percent as compared to Dundee, c) that in respect of transportation cost Bengal enjoyed a cost advantage of Rs. 1.48 per maund in India's domestic market and also in the markets of the Far East. It had also cost advantages in those British domestic and foreign markets where Dundee supplied via London.

Anexture3.1: Quantity of Exported Jute in Calcutta during 1828-1872

(in cwt.)

Year	Great Britain	United States	France	Bombay*	Madras**	Cylon	Others	Total
1828-29	397	-----	-----	-----	-----	-----	-----	397
1829-30	1,834	101	-----	-----	-----	-----	1	1,936
1830-31	7,642	734	-----	-----	-----	-----	-----	8,375
1831-32	23,684	1,459	-----	876	-----	-----	-----	26,019
1832-33	26,306	6	-----	1,330	-----	-----	-----	27,642
1833-34	49,051	-----	-----	440	-----	-----	-----	49,491
1834-35	25,062	-----	-----	-----	-----	-----	-----	25,062
1835-36	10,576	1,579	-----	-----	232	15	24	12,426
1836-37	147,349	8,084	3,072	5,574	1,468	70	83	165,700
1837-38	83,235	2,503	309	1,960	1,883	12	264	90,166
1838-39	101,023	3,941	2,009	-----	531	-----	70	107,574
1839-40	78,824	-----	832	268	1,419	-----	362	81,705
1840-41	60,770	536	-----	26	2,398	-----	22	63,752
1841-42	105,400	9,508	81	-----	1,580	-----	536	117,105
1842-43	202,624	8,648	-----	572	3,093	-----	157	215,094
1843-44	211,829	201	-----	-----	2,290	-----	676	214,996
1844-45	256,437	2,180	-----	-----	220	-----	278	259,115
1845-46	199,403	2,058	9,708	537	578	275	848	213,407
1846-47	169,431	851	21,048	-----	263	67	157	191,817
1847-48	246,144	536	43,203	-----	0	-----	0	289,883
1848-49	328,948	7,231	37	-----	1,454	-----	82	337,752
1849-50	364,906	24,465	1,690	-----	648	-----	185	391,894
1850-51	564,967	6,790	10,234	-----	439	-----	428	582,858
1851-52	439,506	18,986	16,738	-----	117	-----	-----	475,347
1852-53	312,764	18,109	16,231	-----	1,428	-----	293	348,825

1853-54	369,944	96,729	39,815	-----	1,357	-----	790	508,635
1854-55	565,749	93,700	34,560	-----	3,221	1,077	4,065	702,372
1855-56	765,639	53,698	55,539	-----	-----	686	3,360	878,922
1856-57	492,543	112,170	64,610	61	381	2,254	139	672,158
1857-58	670,217	68,791	45,020	-----	276	3,817	666	788,787
1858-59	1,275,106	84,396	108,605	80	268	2,762	926	1472,143
1859-60	682,304	23,777	50,086	-----	525	4,004	290	760,986
1860-61	923,668	57,005	100,031	2,133	1,764	5,600	3,152	1,093,353
1861-62	1,120,994	49,790	38,351	72,520	5,445	7,324	15,902	1,310,326
1862-63	1,219,903	21,163	13,626	87,650	7,859	4,152	7,847	1,362,200
1863-64	2,392,780	53,266	56,395	139,212	6,891	1,071	10,496	2,660,111
1864-65	2,024,497	42,601	23,833	569,231	18,467	4,553	260	2,683,442
1865-66	2,226,055	1,011,145	4,286	92,840	37,059	3,281	1,319	3,375,985
1866-67	1,612,286	132,377	5,887	83,085	536	2,678	2,461	1,839,310
1867-68	2,150,790	123,382	14,308	182,193	7,040	1,339	1,954	2,481,006
1868-69	2,977,495	362,251	5,304	214,980	46,950	5,282	565	3,612,827
1869-70	2,956,401	338,228	49,225	76,673	11,527	3,683	3,737	3,439,474
1870-71	3,257,091	477,448	4,039	16,499	609	1,921	6,628	3,764,235
1871-72	4,964,337	1,342,374	6,889	85,918	3,163	959	30,890	6,434,530
1872-73	5,426,514	1,466,613	148,466	158,073	21,898	1,664	22,368	7,245,596
Average	935,387	139,305	22,090	39,838	4,339	1,301	2,279	2,717

N.B. *indicates Malabar coast , ** indicates Coromondal coast, (---) indicates a very insignificant amount(or even nil)

Source: Kerr, Report on the cultivation of jute, PP, lx-lxix

Anexture 3.2: Value of Exported Jute in Calcutta during 1828-1872

(in Rs.)

Year	Great Britain	U.S.A.	France.	Cylon.	Bombay .	Madras	Others.	Total.
1828-29	621	----	----	----	-----	-----	-----	621
1829-30	3,970	191	-----	-----	-----	-----	7	4,168
1830-31	20,109	2,111	-----	-----	-----	-----	-----	4,220
1831-32	56,323	54	-----	-----	1,917	-----	-----	38,294
1832-33	63,626	-----	-----	-----	2,143	-----	-----	65,769
1833-34	115,263	-----	-----	360	1,128	-----	-----	116,751
1834-35	53,915	11	-----	-----	-----	-----	35	53,961
1835-36	31,479	4,732	-----	47	-----	585	106	36,949
1836-37	387,081	20,794	-----	335	14,006	6,628	216	429,060
1837-38	170,519	5,716	606	60	3,899	5,003	2,339	188,142
1838-39	189,282	8,381	3,760	-----	-----	1,095	369	202,887
1839-40	147,530	-----	1,558	-----	501	2,657	678	152,924
1840-41	115,698	1,008	-----	-----	48	4,489	47	121,290
1841-42	227,682	20,851	152	-----	-----	3,459	1,835	253,979
1842-43	433,264	20,502	-----	-----	3,499	7,584	783	465,632
1843-44	535,412	512	-----	-----	-----	6,895	1,737	544,556
1844-45	569,625	4,823	-----	-----	-----	561	616	575,625
1845-46	423,366	5,399	17,362	848	1,968	2,044	2,890	453,877
1846-47	344,564	1,740	42,826	137	-----	1,257	2,599	393,123
1847-48	504,886	1,094	88,113	-----	-----	-----	-----	594,093
1848-49	671,838	14,766	77	-----	-----	2,970	437	690,088
1849-50	823,835	61,901	3,779	-----	-----	1,323	377	891,215
1850-51	1910,686	22,825	34,414	-----	-----	1,350	1,440	1,970,715
1851-52	1689,741	63,792	56,230	-----	-----	540	-----	1,810,303
1852-53	1013,795	58,044	51,780	-----	-----	4,794	935	1,129,348
1853-54	1178,138	304,516	126,565	-----	-----	4,066	2,504	1,615,789

1854-55	1845,884	304,318	122,801	3,417	-----	9,724	12,937	2,299,081
1855-56	2854,990	200,750	207,050	3,020	-----	-----	20,448	3,286,258
1856-57	2011,223	458,031	263,830	9,293	250	1,557	5,570	2,749,754
1857-58	2512,719	258,580	242,740	14,250	-----	1,150	2,600	3,032,039
1858-59	4515,880	309,081	405,460	10,311	300	1,000	3,458	5,245,490
1859-60	2605,437	88,711	186,990	14,950	-----	2,500	3,240	2,901,828
1860-61	3463,644	213,769	375,116	16,800	8,000	6,600	18,324	4,102,253
1861-62	4897,612	208,083	180,072	28,495	316,235	25,591	61,252	5,717,340
1862-63	7217,362	125,138	86,687	21,757	547,701	60,209	52,225	8,111,079
1863-64	14,488,364	292,806	234,584	6,429	862,998	47,765	47,329	15,980,275
1864-65	12,617,102	289,096	142,490	27,907	3,029,911	108,407	1,972	16,216,885
1865-66	7,293,524	389,998	15,970	12,250	240,601	154,790	5,281	8,112,414
1866-67	6,168,483	409,700	21,980	10,000	321,570	2,000	10,931	6,944,664
1867-68	12,156,579	557,125	92,906	7,609	1,174,171	42,911	10,150	14,041,451
1868-69	17,110,150	1,584,828	32,822	31,557	1,288,525	193,221	4,458	20,245,561
1869-70	17,835,168	1,555,616	325,921	24,032	465,338	75,170	25,539	20,306,784
1870-71	22,903,187	2,740,342	28,273	13,176	109,309	4,159	57,347	25,855,793
1871-72	35,016,615	5,533,823	52,858	7,292	532,258	24,947	346,385	41,514,178
1872-73	34,784,821	5,516,189	852,175	11,803	858,107	116,085	201,138	42,340,318

N.B. *indicates Malabar coast, ** indicates Coromondal coast, (---) indicates a very insignificant amount(or even nil)

Source: Kerr, Report on the cultivation of jute, pp. lx-lxix

Anexture3.3: price of raw jute export from Calcutta during 1828-1872
(in Rs.)

Year	Great Britain	U.S.A	Bombay	Madras	Cylon	France	Others	Average
1828-29	1.56	-----	-----	-----	-----	-----	-----	1.56
1829-30	2.16	1.89	-----	-----	-----	-----	8.75	2.15
1830-31	.28	2.88	-----	-----	-----	-----	-----	.50
1831-32	1.53	.04	2.19	-----	-----	-----	-----	1.47
1832-33	2.42	.00	1.61	-----	-----	-----	-----	2.38
1833-34	2.35	-----	2.56	-----	-----	-----	-----	2.35
1834-35	2.15	-----	-----	-----	-----	-----	-----	2.15
1835-36	2.98	3.00	-----	-----	3.13	-----	4.42	2.97
1836-37	2.63	2.57	2.51	4.51	4.79	2.47	2.60	2.59
1837-38	2.05	2.28	1.99	2.66	5.00	1.96	8.86	2.09
1838-39	1.87	2.13	-----	2.06	-----	1.87	5.27	1.89
1839-40	1.87	-----	1.87	1.1.87	-----	1.87	1.87	1.87
1840-41	1.90	1.88	1.85	1.87	-----	-----	2.14	1.90
1841-42	2.16	2.19	-----	2.19	-----	1.88	3.42	2.17
1842-43	2.14	2.37	6.12	2.45	-----	-----	4.99	2.16
1843-44	2.53	2.55	-----	3.01	-----	-----	2.57	2.53
1844-45	2.22	2.21	-----	2.55	-----	-----	2.22	2.22
1845-46	2.12	2.62	3.66	3.54	3.08	1.79	3.41	2.13
1846-47	2.03	2.04	-----	4.78	2.04	2.03	16.55	2.05
1847-48	2.05	2.04	-----	-----	-----	2.04	-----	2.05
1848-49	2.04	2.04	-----	2.04	-----	2.08	5.33	2.04
1849-50	2.26	2.53	-----	2.04	-----	2.24	2.04	2.27
1850-51	3.38	3.36	-----	3.08	-----	3.36	3.36	3.38
1851-52	3.84	3.36	-----	4.62	-----	3.36	-----	3.81
1852-53	3.24	3.21	-----	3.36	-----	3.19	3.19	3.24
1853-54	3.18	3.15	-----	3.00	-----	3.18	3.17	3.18
1854-55	3.26	3.25	-----	3.02	3.17	3.55	3.18	3.27
1855-56	3.73	3.74	-----	-----	4.40	3.73	6.09	3.74
1856-57	4.08	4.08	4.10	4.09	4.12	4.08	40.07	4.09
1857-58	3.75	3.76	-----	4.17	3.73	5.39	3.90	3.84
1858-59	3.54	3.66	3.75	3.73	3.73	3.73	3.73	3.56

1859-60	3.82	3.73	-----	4.76	3.73	3.73	11.17	3.81
1860-61	3.75	3.75	3.75	3.74	3.00	3.75	5.81	3.75
1861-62	4.37	4.18	4.36	4.70	3.89	4.70	3.85	4.36
1862-63	5.92	5.91	6.25	7.66	5.24	6.36	6.66	5.95
1863-64	6.06	5.50	6.20	6.93	6.00	4.16	4.51	6.01
1864-65	6.23	6.79	5.32	5.87	6.13	5.98	7.58	6.04
1865-66	3.28	.39	2.59	4.18	3.73	3.73	4.00	2.40
1866-67	3.83	3.09	3.87	3.73	3.73	3.73	4.44	3.78
1867-68	5.65	4.52	6.44	6.10	5.68	6.49	5.19	5.66
1868-69	5.75	4.37	5.99	4.12	5.97	6.19	7.89	5.60
1869-70	6.03	4.60	6.07	6.52	6.53	6.62	6.83	5.90
1870-71	7.03	5.74	6.63	6.83	6.86	7.00	8.65	6.87
1871-72	7.05	4.12	6.19	7.89	7.60	7.67	11.21	6.45
1872-73	6.41	4.44	5.43	5.30	7.09	5.74	8.99	5.98
Average	3.39	3.25	4.22	4.04	4.68	3.93	5.16	

N.B. *indicates Malabar coast, ** indicates Coromondal coast, (---) indicates a very insignificant amount(or even nil)

Source: Calculated from Kerr, Report on the cultivation of jute