
UNIT 2 INDUSTRIAL REVOLUTION

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2.0 OBJECTIVES

This unit will give you an idea of :

- the conditions in pre-Industrial England that were conducive to Industrial Revolution
- the main features of the Industrial Revolution
- the relation between commercial policies and rapid growth during the Industrial Revolution.

2.1 INTRODUCTION

The period which we are going to study, that between 1760 and 1840, is generally described as the period of the Industrial Revolution. The term was coined by Jerome Adolphe Blanqui in 1837, but the credit for the general currency it has been enjoying for more than a century must go to Arnold Toynbee. It was his "Lectures on the Industrial Revolution" (1884) that firmly affixed the words 'Industrial Revolution' to the events in the British social and economic experience of those years. A revolution implies change and the period under discussion saw significant changes in many aspects of British life. To the contemporaries, Blanqui and Toynbee for example, the changes seemed dramatic. To us, made blasé by the knowledge and experience of many other revolutions since then the British history of those years might seem less startling. But it is unlikely to be entirely unimpressive, and no amount of de-dramatisation, thought by many as an inevitable product of the 'march of time' can take away the following attributes of the Industrial Revolution: it was the first, in some ways classic and for some time the only example of industrialisation. Little wonder then that the Industrial Revolution has been one of the most frequently and extensively studied periods. Not every one among its students were favourably disposed towards the results of the Industrial Revolution, but few failed to notice its pivotal role in influencing British and Western economic and social life. To the Industrial revolution goes the 'credit' for laying the foundations of one of the most influential socio-economic systems of our time, industrial capitalism. To it also goes

the distinction of providing the material for the most effective and influential critique of that system, Karl Marx's critique of industrial capitalism.

The period of the Industrial Revolution was not only one of accelerating industrial and economic growth but also of social and economic transformation. The foundation for such quantitative and qualitative changes was neither built suddenly nor isolated; it built up over time and was spread across many factors. We now turn to examine these factors, which can be described as the preconditions for the Industrial Revolution.

2.2 PRELUDE TO INDUSTRIAL REVOLUTION

The story of British Industrialisation is one of capitalist industrialisation i.e. industrial expansion was carried out in a system where the industrial population was divided into a relatively small group of owners of the means of production, the capitalists and a larger group of workers who sold their labour power (i.e. capacity to work) to their capitalist employers in return for wages. The capitalists' aim is to make a profit. Production is organised with this primary aim and most of the decisions regarding the production process is subordinated to this aim. The industrial Revolution, as we have noted, was a period of great transformation. The fact that private pursuit of profit by numerous capitalists led to such a transformation implies that certain conditions existed in Britain, which made profit making through production a viable activity. Few things are more important for sustained generation of profits than markets. The major precondition for the Industrial Revolution was the existence of markets for British products. Linked to this economic precondition is a political one, the existence of a government which puts its considerable and numerous powers firmly at the disposal of the business of profit making. Also important are certain institutional arrangements and social and economic features, most of them being products of gradual change over centuries, which provided Britain with a congenial framework for the expansion of private enterprise led industrialism. We will now discuss each of these preconditions in turn.

Both export market and domestic markets were important in the genesis of the Industrial Revolution. They played different roles in creating the conditions for industrialisation: the domestic market was larger and more stable while the export market was the more dynamic if more fluctuating component.

2.2.1 The Domestic Market

Population growth was not a major source of domestic purchasing power in Britain during the pre-industrial days. Population as an issue of scholarly inquiry has raised many difficult questions and protracted disputes but there is near unanimity over the proposition that the significant growth in population came with the Industrial Revolution not before it. The home market in the immediate pre-industrial decades was a result of long periods of economic growth which had created rising incomes, especially in the first half of the eighteenth century. It was also bolstered by the fact that during this time the composition of population changed in the favour of younger adults and against children (this change typically creates more demand for products which are not necessities). The specific and the most important effect of the home market was felt in three sectors: transport, food and coal.

The existence of a nationwide market for many of Britain's manufactured products necessitated the creation of cheap and reliable means of transport. In a country crisscrossed by numerous waterways, it was not surprising that river and canal transport were to undergo the most important improvements. However roads too were not left out of this 'transport revolution'. Canals cut the cost of transport by as much as eighty per cent.

This well developed transport system created during the pre-Industrial Revolution days meant that British Industrialisation when it came did not have to face the problem which bedevilled many later efforts: the problem of an adequate transport system.

The home market also boosted the demand for coal, which later became a major component of the expansion in capital goods industries. The increasing urbanisation gave coal its market and well before the revolution its production were already in millions of tonnes. When it was called upon to play a pivotal role in the age of the railways and iron and steel, the coal producing sectors comfortably rose to the occasion. That it did so was in no small way because of the sound base created during the pre-industrial years.

A large home market also meant substantial demand for food (and drinks), especially with urbanisation. Food and beverages in early eighteenth century Britain were the industries where the application of mechanical and engineering knowledge was pioneered. While they did not transform the economy, they created important examples: none more ubiquitous and easily (also perhaps fondly) remembered than the beer handle, whose application vastly improved the efficiency with which the thirst of the patrons of Britains' proliferating public houses could be met.

The home market had another important role, that of creating the basis for a generalised industrialisation. In its size and stability lay the assurance that the process of industrial expansion once started would not fizzle out. Thus, even though the Industrial Revolution was primarily a one sector led transformation (cotton textiles, as we shall see later) its import and message was effectively passed through the already existing market of national dimension. Furthermore the domestic market also provided the safely valve against the sudden disappearance of export markets, which tended to coincide with wars and upheavals.

2.2.2 The Export Market and External Sources of Raw Materials

The export market, in contrast to the home market provided the spark and the dynamism required for a radical transformation like the Industrial Revolution.

Table 2.1 : Percentage increase in home market and export market

<i>Period</i>	<i>Home Market</i>	<i>Export Market</i>
1700-1750	7	76
1750-1770	7	80

It was this phenomenal increase in export markets that ignited the fuse of industrial expansion. Cotton textiles, the prima donna of the Industrial Revolution was largely dependent on exports. Moreover, raw cotton was a raw material which could not be grown in European climatic conditions and was entirely imported. Trade effected substantial improvements in sea transport which inturn stimulated a whole range of practical innovations and a number of practical men, with an eye for the profits; many of these groups were to later be important components of the Industrial Revolution. It is certainly not entirely accidental that Henry Cort, who brought about great changes in iron manufacturing, started his professional life as a naval agent.

What led to such mammoth increase in the export market and external access to raw materials for British products? For the developing economies of today, many of whom are trying to follow an export led model of development, the answer will be of little help. For despite the economic superiority and internal dynamism which Britain possessed then, the principal reason why export markets could be secured and maintained was not due the application of the harmless doctrine of comparative advantage, but the relatively more eventful and ruthless doctrine of war and colonisation. War helped to snatch away the export markets of competitors and colonisation was a wonderfully effective way of obtaining valuable raw materials and of destroying internal competition in manufactures within particular countries. In the more lax standards of international conduct which prevailed in those days, Britain was not the only country to have the ability to practise such aggressive internationalism. But it certainly was the only one with the determined and fully committed political will to put this doctrine into practice. This point brings us to the role of the government, to which we now turn.

Check Your Progress 1

1) What are the preconditions for an Industrial Revolution through capitalist path?

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2) What determines the size of the domestic market?

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3) What led to a dramatic increase in the export market for British products?

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2.3 STATE POLICIES AND MERCANTILISM

International policy in eighteenth century Britain was completely dominated by economic priorities. Governments were ready to wage war for the interest of domestic industry. Britain's dominance in this respect is to be attributed largely to the fact that more than a century before France's famous Revolution of 1789, England had overthrown the feudal political order during the Civil War of 1640-1660 and embarked on a nationalist and expansionist policy. To this end British Navy was transformed into the greatest naval force in the world. The might of the imperial navy which had the blessings of the government on its head and the interests of British trade and commerce in its heart helped create the biggest and the most secure source of valuable food and raw materials and the largest export market any country in the world has ever known. On the national plane the British ruling groups were more amenable to and later on increasingly indistinguishable from manufacturing interests, in contrast to commercial and financial ones. British governments also effectively produced some of the important conditions of capitalist industrialisation: it protected private property and maintained internal law and order. Also in the early years of industrialism it was not always unduly moved by the plight of the not so fortunate participants in the revolution and thus did not interfere in the process of private pursuit of profit by those who had the means and the inclination to do so.

2.3.1 The Rule of Protectionism, 1649-1846

One of the commonly held misconceptions regarding the Industrial Revolution and the rise of large scale capitalist manufacturing production is that it was associated

with 'free trade'. On the contrary in reality a very prolonged period of intense protectionism marked the adolescence, flowering, and maturity of industrial capitalism in England. This period of protectionism started with the victory of the capitalists in the Cromwellian Civil War in 1649 and ended only in 1846, nearly 200 years later, long after the capitalist system was firmly established.

The mercantilist theory of the 17th century envisaged the addition to the wealth and well-being of a country in terms of a combination of increasing the export surplus from the country and keeping the terms of trade (ratio of export prices to import prices) in favour of the country. Now normally if export prices are raised to benefit the exporting country, importers in other countries might reduce their demand and hence net export earnings might fall if demand is price elastic. The Mercantilists however did not consider this a problem because the country to which goods were exported was brought under coercive colonial domination and had no choice in the matter of demand.

The Mercantilist policies were executed through a combination of colonisation by armed force and legal decree. Ireland was the nearest colony which was conquered by England, its land divided into large estates among English landowners with the Irish reduced to tenants. Ireland was forbidden to export meat, wool and butter. These prohibitions were enforced by a strict naval blockade.

The Navigation Act of 1651, amended in 1655, laid down that all English colonies were to be subordinated to Parliament and that all trade was to be monopolised by English ships. Thus a coherent national imperialist policy was formulated in England before any other country.

The North American colonies were forbidden to manufacture a single item which might compete with British exports, ranging from hats and pins to textiles and iron manufactures by a series of Act from 1691. They had to import all these items from England as well as pay for the freight of English-owned ships. Similarly manufacture was forbidden in the Caribbean colonies and every item of clothing as well as the chains and shackles used on the slaves had to be compulsorily imported there from England. Although raw sugar was produced in Jamaica the refining was done in Bristol.

Within England there were a series of Acts protecting British manufactures against the competition of cheaper foreign goods while allowing the free entry of raw materials necessary for manufacturing. Thus when the activities of the East India Company in importing calicoes and fine printed textiles from India and Persia, created a growing demand within England, the wool industry fearing a loss of part of its market by substitution of cotton for wool, demanded and obtained from Parliament in 1700 an absolute ban on use of these textiles within England. Smuggling continued and there was another very strict Act in 1721 which imposed heavy fines on individuals found wearing Indian cottons and on merchants found to be dealing in imported cottons. This prohibition had an important effect in later stimulating import substitution through the growth of an English Cotton Textiles industry which symbolised Industrial Revolution, (as we will see in Section 2.4).

It is clear that these policies had a consistent aim, of encouraging manufacturing within England by every means possible, and in colonies of destroying any existing manufacturing industry or making it impossible for a new industry to come up, in order to ensure a ready market for British exports which had to be compulsorily absorbed by the colony.

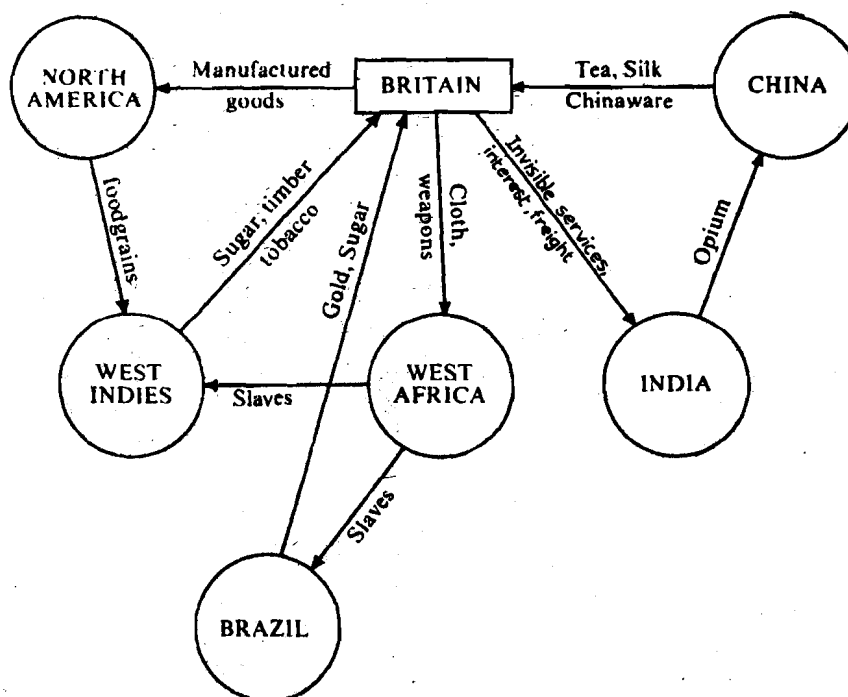
Where colonies were settled by emigrating English and other Europeans, they eventually revolted and acquired Independence, as for example the N. American colonies which fought their War of Independence against England in 1776. The tropical colonies however in Asia and the West Indians remained subjugated until the middle of the 20th century. Over this long period they were forbidden to protect their own manufacturing in any way while being made captive markets for British exports. The third quarter of the 18th centuries was certainly marked by a demand for 'free trade' by the manufacturing capitalists in Britain and their theorists such as David Ricardo and Adam Smith, but that demand had to do with freedom to import foodgrains, (which had been restricted by the landlords who wished to maintain high

food prices within the country to maximise their own gains) and therefore concerned abolition of the Corn Laws restricting corn imports. This demand for free trade had nothing to do with abolishing protection to English manufacturing. Varieties of machine made English cloth continued to be protected by high tariffs against Indian handloom cloth upto as late as 1846 when tariffs were done away with finally because Britain no longer needed them.

2.3.2 Trilateral Trade Patterns and Contribution to Capital Formation

The consumption pattern of ordinary people in Northern Europe before the European domination of world trade, was restricted to a rather narrow range of locally produced goods. The cold climate and short growing season permitted only one crop and a restricted range of fruit and vegetables, whose supply ceased completely during winter. Clothing was mainly of leather and wool. By the early 19th century however the consumption pattern had become highly diversified and balanced owing to the inclusion of a large range of tropical goods used for eating, drinking, wearing or building furniture, housing and other durables—such as tea, coffee, cocoa, cane sugar, rum, mahogany, teak, raw cotton for textiles, indigo, jute, citrus fruits, tropical vegetables and fruits, spices, tobacco, rubber, and various minerals among others. None of these are producible within Europe (except citrus fruits in a restricted region on S. Europe). The high dependence of European (and N. American) living standards on import of tropical goods continues to this day.

In the 17th and 18th centuries Europe had nothing much to offer to the ancient civilisations like India or China to balance the growing imports of tropical goods which had a potentially large and elastic demand. These imports had to be paid for in bullion (precious metals) and this fact itself restricted the trade. The solution was sought through acquisition of political control over the tropical territories, and either direct production through imported slave labour of the valuable commodities (as in the W. Indies) or acquisition of those commodities from existing producers by taxing them as in India. Thus, the English East India Company's problem of balancing the trade with India was 'solved' when in 1765 Clive acquired the Diwani of Bengal. For the land revenue collected from the peasants could then be used to purchase Indian goods for export to England. Moreover these goods, obtained 'free' (as the commodity—equivalent of tax) could be re-exported to other European countries (where they were in great demand) to pay for English imports of strategic goods like Swedish bar iron, timber, pitch and tar for the Navy. After 1765 England's trade with Asia grew very rapidly owing to colonisation, and between 30 to 35 per cent of all tropical imports were re-exported to other countries, 80 per cent of re-exports going to Europe to pay for imports from there.



Note : The opium triangle with India and China developed to a maximum during a later period, 1820-1870, compared to the triangular trade with W. Africa and various parts of America which flourished throughout the 18th century.

The control over territories and Mercantilism permitted England to follow highly flexible patterns of triangular balancing of trade. This means that if England wished to acquire goods from a sovereign country A but country A had no reciprocal demand for English goods, England would then use the products of its colony C to pay for its own net imports from A, while not having to pay anything herself to colony C since taxation in the colony financed purchase of exportables from C. Such a triangular pattern was the India-China-Britain opium triangle. Britain had a large trade deficit with China (which it did not control politically in the sense of imposing taxes). It therefore expanded the production of opium in India and forced China to import the opium after prosecuting the opium wars in 1842-44 which opened the Chinese ports. Exports of Indian opium paid for England's trade deficit with China, but this Indian opium, being purchased out of Indian tax revenue did not involve any obligation on England vis-a-vis India, to supply an equivalent value of goods. (The yarn and cloth which India was obliged to import from U.K. from 1813 had to be paid for by Indian exports of goods to U.K.).

Another trade triangle was the W. Africa-W. Indies-England slave triangle. Arab Slave traders kidnapped W. Africans from their hinterland village communities and sold them to the English at the ports in exchange for weapons and cloth. The slaves were transported in English ships to the Caribbean (also to Brazil, and the southern part of N.America) under conditions so inhuman that many died, and sold at five to six times the purchase price to English plantation owners. There they were given a bare subsistence and set to work to produce sugar, tobacco, cotton and other commodities which were then imported into England partly for internal consumption and partly for re-export.

The profits from these trading patterns (each involving at least one element of costless acquisition), were very high and they formed the bedrock of the rise of large urban centres like Liverpool and Bristol, led to the establishment of a range of industries in England from sugar refining, rum distilling and shipping to the manufacture of leg irons, handcuffs and shackles for the hapless slaves, and the establishment with slaving profits of famous banking houses like Barclays. Adam Smith who is generally regarded as the theoretician of free trade and laissezfaire, described the slave trade in his *Wealth of Nations*, as one which 'raised the Mercantilist system to a pinnacle of glory'. Smith was not opposed to the slave trade or to Mercantilism in the 17th and early 18th Century, but thought that with ongoing Industrial Revolution the need for those policies was over and unrestricted trade was best suited to new conditions.

In Unit 15, we will study in more detail the difficult question of what was the magnitude of one-way (unilateral) transfer from the tropical colonies to England during the Industrial Revolution. Here we may simply briefly note that the magnitude was in fact quite substantial; for England was a small country then with hardly 10 million population, which through aggressive commercial wars and colonisation had acquired control over ten times more populous and resource-wise much richer territories. A pioneering estimate by S. Habib of the percentage of combined transfers from Asia and W. Indies to the British gross national product puts it at 4.8 per cent in 1801, which constituted as much as 70 per cent of estimated British domestic capital formation at that date.

We have already studied the way in which the enclosures within England had helped to create one essential prerequisite, the labour-force required for expanding industry. Another prerequisite of the rise of industrial capitalism is the prior accumulation of capital in the hands of people able and willing to put it to profitable use in production employing hired labour. This 'prior' or 'primary' accumulation was greatly aided by the network of monopoly trading and shipping rights which we have described above, which yielded fabulous profits over many decades.

2.3.3 Institutional Aspects of the Society

Britain was the first country where feudalism broke down and capitalism, with its

division of the economic population into property owners and workers, developed. In contrast to other European countries where serfdom also disintegrated, in Britain there was enough concentration of land in the hands of a group of land owners which perverted the strengthening of a body of free peasants. Thus in Britain capitalist agriculture could flower relatively early and not be hindered by state power using the peasants as a bulwark against agrarian capitalism. The spirit of economic individualism, the hall mark of Industrial entrepreneurs had been present in England perhaps as early as the 12th and 13th centuries and had developed to the extent by the mid 18th century, that making money from trade and industry was seen by people who were influential in matters of state, to be a perfectly legitimate and desirable action.

By the 1750s Britain was also a relatively well developed economy, ready to take the forward leap of industrialism. It had a flourishing traditional manufacturing industry supplying to a national market and a growing economy. There was little shortage of capital, relative or absolute and a growing band of theorists for the free market system, the most notable being Adam Smith. The notion that private pursuit of happiness also resulted if left unhindered by such clumsy interventionists as the State, in social good was an attractive one for capitalism. The Smithian 'invisible hand' (and later the Ricardian 'Iron law of wages') were used by many propagandists and practitioners of the profit-motive to bolster the case for capitalism. In the early years of the industrial revolution, when the privations of large masses of the population were great, such intellectual tools could be used (and misused) to try and placate both one's conscience and one's less fortunate compatriots (though the latter was done with noticeably less success than the former).

Check Your Progress 2

- 1) Was Britain's Industrial Revolution associated with 'free trade'? Discuss.

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- 2) How did the pattern of trade of Britain with tropical countries change after their colonisation by the former?

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- 3) Explain the concept of triangular pattern of trade. How did Britain benefit from this kind of trade?

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The typical production unit in industrial capitalism was the factory. The factory was a combination of specialised human labour with specialised machines. It gave rise to a new rhythm of work, where the pace set by the engine was continuous and inhuman; and where the extent to which the individual worker needed to use her strength and intelligence was considerably reduced. It also subjected the workers to the unrelenting discipline of mechanisation. In the telling phrase of Marx, "in manufacture and handicrafts, the worker uses a tool; in the factory he serves the machine."

In a later section we shall see the social consequences of these new forms of society and organisation of work. The remaining part of this section is devoted to the study of the two principal industries of the Industrial Revolution, cotton and iron.

2.4.2 The Cotton Industry—Origins

Cotton was by far the most important industry in this period of British industrialisation. For a major part of this period fluctuations in British industrial growth and balance of payments were tied to the cotton industry. The quarter century following the battle of Waterloo, saw the zenith of cotton industry; it was also the boom years for British industrialisation. When cotton plummeted to a 0.7% growth rate in the last quarter of 19th century, so did industrial growth rate.

Table 2.2 : Percentage growth rate of Industrial Production : ten year periods

Year	Growth Rate	Year	Growth Rate
1800-10	22.9	1850-60	27.8
1810-20	38.6	1860-70	33.2
1820-30	47.2	1870-80	20.8
1830-40	37.4	1880-90	17.4
1840-50	39.3		

Let us briefly look at the origins of this industry before considering the reasons for growth. The fact that it was cotton textiles which was the fastest expanding 'leading sector' of the Industrial Revolution in Britain is surprising at first sight for at least two reasons: firstly woollen textiles, not cotton, was the traditional manufacturing industry catering to mass demand in England for centuries, with skilled workers as compared to no tradition of skills to speak of in working with cotton. Secondly, raw cotton cannot be grown in Britain or indeed in most of Europe at all and had to be entirely imported into Britain.

It is not possible to understand why despite this it was cotton and not woollen textiles which was associated with fast-growing factory production, unless we refer to the activities of the East India Company. It was the import into England of the calicoes and muslins, the printed and painted textiles from Asia (mainly India but also Persia) which created a growing demand within England for these fabrics. They were used for furnishing, curtains and clothing and became fashionable with both the aristocracy and gentry and popular with ordinary people owing to their comfort in wear and washability compared to woollen fabrics. The nearest rival made in England to the fabrics imported from India was *fustian*, a very coarse cloth made from a mixture of domestically grown flax fibre (linen) and thread from imported cotton.

We have already seen that the powerful woollen industry had demanded, and obtained a ban on the use of Indian and Persian fabrics, in order to keep a monopoly of the cloth market in Britain. But ultimately this ban of 1700 and 1721 had precisely the effect of stimulating import substitution and the growth of a domestic cotton industry protected from Indian imports. For as long as there was a pent-up, unsatisfied demand for the banned cotton fabrics within England, anyone who could imitate those Indian fabrics had the prospect of making a great deal of profit from the large potential market which already existed. In short, the potential profitability of domestic cotton cloth production was raised greatly by the banning of India imports.

Table 2.3 : Cotton in the Industrial Revolution

A. Imports Raw Cotton. (By volume)	
(1780 = 100)	
1770	60
1780	100
1800	800
B. Exports of Cotton Textiles. (% of total British home produced)	
1760	18
1815	40
1830	52
C. Exports of Cotton Textiles (By volume). (1760 = 100)	
1760	100
1780	350 (approx.)
1810	3500
1830	10500
D. Percentage of National Income accounted by Cotton	
1802	4 to 5%
1812	7 to 8%
1830	7 to 8%
E. Prices of Cotton Yarn (per lb.)	
1786-87	38s.
1800	10s.
1807	6s.9d.
1832	11 1/4d.

Sources : Phyllis Deane and B.R. Mitchell: *Abstracts of British Historical Statistics*. (1962). Eric Hobsbawm: *Industry & Empire*. (1968). Karl Marx: *Capital*, Volume I (1928).

The problem for the English however was that although they could import raw cotton, there was no centuries old tradition of spinning and weaving cotton such as Asia had. The fineness and strength of the thread spun with crude spindles and the colour and variety of design of the fabrics woven on simple looms by Indian artisans, could not be matched despite their best efforts, by English artisans, whose product was very poor in quality. Where human artisan skills are deficient, mechanical skills are sought to be substituted. This is the underlying reason for the relentless search, under the goad of the prospect of high profit, of mechanical means of substituting for missing human skills in cotton textile production in England. Of course, if a certain minimum level of mechanical skills had not already developed, such a search would have been perhaps fruitless.

It so happened however that the long maritime tradition in England had fostered mechanical skills to a high degree. Instruments for measuring latitude, for determining the position of ships at sea from astronomical observation, and for determining balance, had to be developed. Artisans familiar with clockwork mechanisms and cabinet makers were some of the people who pioneered the first mechanical innovations in weaving and spinning cotton. It was these mechanical innovations which permitted at last after 30 years of effort thread to be produced which had both fineness and strength and fabrics to be woven at lower cost than that produced by the handloom weaver of Asia. (Nevertheless specific finer varieties of Indian fabrics faced high tariffs in England as late as the 1830s).

2.4.3 The Cotton Industry: Technical Innovations and Expansion

There is a certain dialectical (to-and-fro) movement observable in the sequence of innovations in cotton textile production. The inability of weavers to rapidly absorb even the little yarn produced by the first clumsy efforts of the spinners in England, led to the invention of the 'flying shuttle' by Kay in 1733 in which the shuttle was mechanically thrown from one end of the loom to the other. This both speeded up weaving and also freed the maximum width to which cloth could be woven, from the arbitrary limitation of the length of the weaver's arms. Now the spinners could not keep pace, and methods of speeding up spinning as well as improving the quality of hand-spun yarn (which was very coarse and weak compared to Asian yarn) became necessary.

After a number of abortive efforts (by Wyatt and Paul among others) Hargreaves finally, over 30 years later in 1765, succeeded in producing a mechanical spinning device which he called a 'jenny'. This had eight spindles which could be set in motion at the same time by one worker and spun a tolerably fine thread. Jennies got progressively bigger and in Hargreaves' own lifetime jennies with upto 80 spindles each were being used. But the thread still broke easily, and subsequent modifications were concerned with giving a twist to the thread to increase its strength. Arkwright's water-frame substituted water-power for the human hand in operating the spindles while Crompton's 'mule' (a cross between the jenny and water-frame) finally produced a thread which was both fine and strong. The mule spindle reigned supreme for over a century after its invention.

These mechanical devices, though simple wooden ones using little iron, were nevertheless too expensive to be owned by individual artisans. Their widespread adoption in production was accompanied by a) an enlargement of the scale of operation, with small workshops and manufactories giving way to larger ones where the capitalist supervised workers operating dozens of machines; b) it also saw a shifting location of the factories as the motive power changed from the human hand to the force of running water to finally the application of steampower. The small-scale dispersed nature of traditional production gave way first to concentration of factories near fast-flowing streams, with the widespread adoption of the water-frame. Indeed the term 'mill' for factory still survives from the time that water-power was used. Finally the location shifted to near the northern English port of Lancashire where a combination of damp climate and easy access to imported cotton favoured the industry.

These simple mechanical innovations raised labour-productivity tremendously. With a 80 spindle jenny a single worker could spin 80 times more thread than, say, an Asian spinner working with the traditional spinning-wheel. The unit cost of production of yarn, and therefore of cloth, fell drastically. Every such labour-displacing innovation was at first bitterly opposed by the spinners, who attacked the inventors and broke the machines, fearing unemployment. But the very rapid expansion of the market ultimately led to an increase in employment—first the domestic demand was saturated, then English machine-made yarn and cloth displaced imports from Asia by Europe and other countries, and finally invaded the Asian market itself.

2.4.4 Other Factors Behind the Rise of Cotton Industry

Several additional factors help to explain the rise of the cotton industry. Colonial economic links, forged aggressively over the years, provided both the source of cheap raw material and vast export markets. In the peak of the cotton industry's growth, during 1830s, raw cotton made up to 20% of all net imports and cotton exports accounted for over half the value of total exports. For raw materials it relied on the plantations of Africa and later those of Southern USA. For markets it had the free run of the markets of Africa and when the East India Company lost its hold over the policy makers the markets of India and the far East. The success of cotton also depended upon the fact that it was a consumer item, with a ready demand (requiring no prior industrialisation or radical change in taste) and made relatively easy demands on the factors of production in the British economy. It was labour (women's and children's labour) intensive and required capital investments within the reach of the economy.

But by far the single most important domestic factor which explains the prodigious growth of the industry is the extremely favourable position in which the capitalist employer operated in this period. The Industrial Revolution has been described as the result of unplanned activities of small manufacturers. These men for their success depended on this ability to respond to economic opportunities without any hindrance and to shift the pains of adjustment to others. They were given ample space to do both of these in this period. The work force predominantly comprised women and children who were mostly unskilled and unorganised. The employer could hire and fire and change the working time at will. Factory workers then worked upto 16 hours a day for subsistence wages. Handloom weavers, as their situation got desperate worked for longer hours and lesser returns. Wage rise always remained

below output rise and even when the export prices fell profits were maintained. It is this ability of the employer to extract high rates of profit which enabled the manufacturers to plough back a large proportion of their earnings into more investment. This not only created economies of scale but also increased the efficiency by replacing older machines with new ones. Had this sustained profit level not been maintained private investors would not have risked their capital in large scale factory production. High levels of profit gave cotton industry the cloak of business respectability and helped attract ambitious men. These together with the pliant workforce and markets make up the story of the first sector to undergo modern industrialisation.

Cotton definitely set the striking example of large scale factory production to other industries. It also stimulated the chemical and engineering industries. The cotton factories were the first examples of the new 'iron-frame' construction and adoption of gas lighting. Counterbalancing these is the fact that cotton did little to stimulate directly the strategic sectors of any industrialisation: capital goods, in this case coal, iron and steel. It was certainly the most prominent and fastgrowing industry of the industrial revolution. But the development of other industries during this period and later had little to do directly with the development of the cotton industry, other than through the redirection of profits made in the latter.

2.4.5 The Iron Industry

Unlike cotton, large parts of the iron industry were already operating on capitalistic lines before the Industrial Revolution. The industry itself was relatively small and the demand was mainly from shipbuilding, munitions and related activities. It was only with the industrialisation of Britain and other countries that the industry saw a steady expansion of domestic and export markets. It was with the coming of the railways in mid-19th century that the industry saw a real quantum leap in production.

While the industry was waiting to come into its own, a series of innovations helped raise the capacity. The important ones among them were: replacing of charcoal with coke from iron smelting purposes, the invention of puddling and rolling and Nielsen's hot blast. The first meant the freedom from the dwindling supply of one kind of fuel, charcoal and the switch to a more abundant and less fragile (hence easily transportable) fuel source, coke. The second, invented by Henry Cort, enabled the large scale production of bar iron with coal fuel and also the production of quality wrought iron. The third involved the heating of the air used in the blast which resulted in much lower coke consumption and substantially increased output.

Iron, unlike cotton, is a producers' good and has both backward linkages (i.e. linkages with those sectors which supply the industry) and forward linkages (i.e. linkages with those sectors which the industry supplies). Iron created demands for **British** raw materials like coal, iron ore and limestone. These inturn generated a demand for the transport industry, especially those of canals. On the supply side it produced one of the most vital raw materials for industrialised economies at a cheap rate. Continuing industrialisation required that iron amongst other things, be supplied inexpensively and abundantly. The second phase of British industrialisation owes its success to a large extent to the progresses made in the iron industry during the Industrial Revolution.

Check Your Progress 3

1) Why is Industrial Revolution a revolution?

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2) What is Capitalism? What is Industrial Capitalism?

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3) How did the cotton industry play a leading role in Britain's industrialisation?

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4) What role did innovations play in the development of the cotton textiles and the iron industry?

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2.5 GOVERNMENT AND THE INDUSTRIAL REVOLUTION

The *'laissez faire'* view of the role of government saw it as one of non-interference with the functioning of the free enterprise market system. Beyond creating the political conditions of suitable rights and laws and abolishing hindrances to free pursuit of profit and free trade the government, it is argued, did little to help the Industrial Revolution. This view has been turned into an article of faith by many commentators. But the real character of the role of the government was quite different, certainly much more complex than the simple hands-off role described by the above view.

Firstly, as we have already noted, it actively created the conditions in which British products could find markets i.e. through war and colonization. Once the market was secured and then maintained by the strong arm of gunboat diplomacy it was easy to preach the virtues of free trade. Selective amnesia prevented many observers from noting that it really was, in the words of Rajni P. Dutt, 'one-way' free trade. Secondly the government in the form of 'Poor Laws' promoted, or thought it was promoting (for in some cases the reasonings were wrong) capitalist industrialisation. It made the 'Poor Law' (the law governing the provisions to be made for the

destitutes) as cheap as possible, to force the poor into the labour market and discourage the growth of population (which it was argued leads to general impoverishment). That the arguments were far from sound and the effect of the Poor Law to produce cheap labour far from certain do not detract from the fact that this was the example of the government trying to influence social parameters so as to achieve the goal of industrialisation. A similar role was played by the numerous laws enacted to foster discipline amongst 'errant workers' and vagrants. These were examples of active involvement in trying to create a pliant and disciplined work-force necessary for the harsh years of early industrialisation.

Thus any evaluation of the role of government in Industrial Revolution must take into account its active part in fostering capitalist development. Private pursuit of profit was the chief force behind this development but it could not have done what it did without the willing and the visible hand of the government. The latter did not interfere in the profit making of capitalists, but it made sure that territories and peoples not willing to fall in line did so, sometimes with the might of the sword, at other times through the power of its laws.

2.6 HUMAN RESULTS OF THE INDUSTRIAL REVOLUTION

As it should be expected the Industrial Revolution affected different groups in different ways. The gentry and the aristocracy did well, with the rents increasing on the lands they owned (due to larger demands of agricultural produce and the mines and railways which passed through their lands). Their social standing remained unimpaired. The more affluent among the rising group of industrialists were absorbed within the nobility. A great majority of this new group however formed the bedrock of the new 'middle class'. They were politically vocal and increasingly well represented and drew their intellectual inspiration from the doctrines of liberal economics, which not surprisingly flowered during this period. The greatest disorganisation, indeed, disruption happened in the lives of the workers. They were now dependent only on wages for their livelihood. They had to adjust, often under pressure and always with difficulty to the regularity and the monotony of industrial work. Their lives were for the most part spent in the Dickensian Squalors of the new cities which produced frequent epidemics. It was not until well into the 19th century that some recognition was given to the grotesquely unequal position of workers in the new system and legislations made to lessen their privation. The waves of protest and discontent which was witnessed during this period was an expression of the desperate dissatisfaction of the majority of the people with the new way of life. For them the Industrial Revolution had taken away the moorings of the old ways and given precious little in exchange. We can do no better to understand this than to quote from a contemporary observer, "wretched, defrauded, oppressed, crushed human beings lying in bleeding fragments all over the face of the society." The first army of industrial workers unsurprisingly found the first Industrial Revolution callously unmindful of their needs.

That the industrial revolution led on to another and more comprehensive phase of industrialisation is a fact. To many contemporary observers, robbed of the benefits of hindsight, such a profusion seemed far from inevitable.

The poverty of the masses placed a limit on the expansion of home markets and when the fast pace of industrial production had saturated the vast colonial markets, industry faced a demand crisis. The most eloquent testimony of this is in the fact that the only notable exporter of industrial goods, Britain, was unable to maintain an export surplus in the 1830s and 1840s. Profits rates fell too, even in colonies. Tragically the prevalent economic orthodoxy did little to help the situation. With its insistence on the maximum possible diversions of incomes to profits and the law of subsistence wages the benefits of higher wages, in form of higher mass demand and higher productivity were overlooked. The workers had not enough to eat and the industrialists not enough profits to justify reinvestment. The deep discontent this

vicious circle produced is reflected in the various demands for changes, both from middle classes and the labouring poor. They were together in demanding Parliamentary Reforms and fought against the landed interest to repeal the Corn Law. But thereafter their interests and movements diverged with working class movement finding independent expressions in Chartism and Ludditism and culminating in an organised political party in form of the Labour Party. That however was much later. In the 1840s real income per head, in the world's first modern nation, was falling. Such an alarming statistic made the possibility of social revolution quite real. That it did not happen was in large measure due to a second phase of industrialisation, based on coal, iron and railways, which soon followed the first phase.

Check Your Progress 4

- 1) Was it possible for the 'Poor Law' to promote capitalist development?

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- 2) Why did the interests of the working class and the capitalists converge to a certain extent during the initial phases of the industrial revolution? Why did it diverge later on?

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2.7 LET US SUM UP

In this unit we discussed the roles of the domestic market and the external market in England's industrial revolution. The domestic market was larger and more stable while growing at a slower rate. The external market, on the other hand, was more dynamic although having a fluctuating rate of growth. Population, per capita income, distribution, tastes, etc. determine the size and composition of the domestic market. Not only comparative advantage, but the strong mercantile tradition and military prowess determined, in case of mercantilist England, its composition and growth of international trade. England had colonies across the globe. Even the comparatively more developed colonies like India were converted from an exporter of manufactures to that of raw materials and importer of British manufactures by the early 19th century. 'Drain of Wealth' from colonies to the metropolis (England) was accentuated by the triangular pattern of trade. Mercantilist England's active state policies fostered her dominance in the sphere of international trade. The State pursued protectionist policies through imposition of steep tariff barriers and quotas against imports of final manufactured textiles from India and other countries. Since the mid-nineteenth century, British foreign trade policy tended to be guided more by the doctrine of laissez faire. But by then England had emerged as the only industrial and internationally most competitive country of the world. Hence she could do away with protectionist policies at least as long as other competing nations like Germany had not emerged.

In this unit, you have also read the prominent role cotton textiles played in Britain's industrialisation. Hence cotton textiles has often been described as the 'leading sector' in fostering the world's first industrial revolution. However, cotton, being a consumer good has fewer backward and forward linkages than iron, a capital (and a

producer's) good. The iron industry, it may be noted, contributed to Britain's industrialisation only since the mid-19th century when railways came in a big way.

In Britain's capitalist development, the poor were oppressed and exploited. The State sided with the capitalists and passed anti-poor laws, so as to generate a reserve army of 'free labour readily available for employment by capitalist at a low wage rate. It shows that Britain was not having a 'laissez faire' policy after all.

Note that with sole emphasis on maximising profits, the demand side was completely neglected. Domestic wages, kept at subsistence level, could not promote demand for industrial goods. Hence Britain faced industrial stagnation in the 1830s and 1840s and rising political discontent since the mid-nineteenth century.

2.8 KEY WORDS

Labour Power : Capacity to do work.

Leading Sector : A term coined by W.W. Rostow to denote the sector that plays a dominant role in country's industrial revolution. In case of Britain it was cotton industry, a light consumer goods industry. In case of USSR the heavy industry was the leading sector.

Primary Accumulation : Accumulation is the addition to the stock of capital. Primary accumulation is accumulation—in case of Britain, through coercive external trade and forced enclosures—prior to the development of industrial capitalism. It is a necessary condition for a country's industrialisation.

Revolution : A structural and a drastic change as contrasted with a systematic and continuous change.

2.9 SOME USEFUL BOOKS

Deane Phyllis, 1967. *First Industrial Revolution*, Cambridge University Press, London.
Hobsbawm, E.J. 1968. *Industry and Empire*, Penguin Books, London. Chapters 2, 3 and 4.

2.10 ANSWERS/HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) Read Section 2.2 and answer.
- 2) Read Sub-section 2.2.1 and answer.
- 3) Read Sub-section 2.2.2 and answer.

Check Your Progress 2

- 1) Read Sub-section 2.3.1 and answer.
- 2) Read Sub-section 2.3.2 and answer.
- 3) Read Sub-section 2.3.2 and answer.

Check Your Progress 3

- 1) Read Section 2.4 and answer.
- 2) Read Sub-section 2.4.1 and answer.
- 3) Read Sub-section 2.4.2 and 2.4.3 and answer.
- 4) Read Sub-sections 2.4.3 and 2.4.5 and answer.

Check Your Progress 4

- 1) Read Section 2.5 and answer.