

MANUFACTURING INDUSTRIES

Manufacturing is a process, through which the utility of the product increases and at least some amount of value is added to the raw materials used. The essence of the manufacturing process is the conversion of raw material to a finished product and distribution of the final product to the consumer. According to E W Miller : "The term 'manufacturing' includes those activities by which man changes the form or nature of raw materials, converting them into more useful products. These transforming operations are conducted in factories, to which are brought raw materials from various source regions and from which go finished products to diverse market regions".

Last 200 years of world history had witnessed a tremendous growth of manufacturing industries throughout the world. The industrial revolution of Europe gave a fillip to the development of manufacturing industries. A keen competition is now on throughout the world to make the countries self reliant in manufacturing products. In fact, underdeveloped and developing countries are making tremendous strides for the over all development of the manufacturing industries. A decade-wise analysis of the contribution of manufacturing industries in the gross national product of different countries reveal a significant growth of manufacturing industries. The industrial sector constitutes nearly $\frac{1}{3}$ of the gross domestic product of the world. (Table 12.1)

Table 12.1
Distribution of gross domestic product (in percentage)
(1991)

<i>Countries</i>	<i>Agriculture</i>	<i>Industries</i>	<i>Services</i>
1. United States	2.0	29.3	68.7
2. Japan	2.5	42.0	55.5
3. China	28.4	38.8	32.8
4. Denmark	5.0	28.0	67.0
5. United Kingdom	1.7	36.3	62.0
6. Sweden	3.0	34.0	63.0
7. Italy	3.2	33.3	63.5
8. Brazil	10.0	39.0	51.0
9. Paraguay	27.8	23.1	49.1
10. Egypt	18.0	30.0	52.0
11. Tanzania	61.0	5.0	34.0
12. Nepal	59.0	14.0	27.0
13. India	31.0	27.0	41.0

Source : The World Bank Organisation for Economic Development.

From the table it is quite clear that, in advanced countries manufacturing secures predominant position whereas in the under-developed countries manufacturing is at its lowest. In the developing countries, depending upon the degree of development, the position of manufacturing industries varied widely. In general, the development of manufacturing industry is considered as a key indicator for overall economic growth. Even the development of tertiary activities, that is services, is also dependent on the development of manufacturing activities.

Regarding employment opportunities it provides one of the most important source to the labour force. At least, one quarter of the total labour force in the world are directly engaged in industrial sectors. In highly developed countries like USA, Japan, United Kingdom and Italy, labour force in industrial sectors exceeds the total rest labour force of the country.

This can be illustrated by the following table.

Table 12.2

Countries	Percentage of labour force and its change in different sectors					
	Agriculture		Industry		Services	
	1960	1991	1960	1991	1960	1991
1. United States	7	3	36	26	57	72
2. Japan	33	7	30	35	37	59
3. China	-	74	-	14	-	12
4. Denmark	18	6	37	27	45	67
5. United Kingdom	4	2	48	29	48	68
6. Sweden	14	3	45	28	41	68
7. Italy	31	9	40	32	29	59
8. Brazil	52	31	15	27	38	42
9. Paraguay	56	1	19	26	25	73
10. Egypt	58	42	12	21	30	37
11. Tanzania	89	86	4	5	7	10
12. Nepal	93	93	2	1	5	7
13. India	74	70	11	13	15	17

Source : United Nations Statistical Office, ILO and World Bank.

The Table 2 reveals that in the developed countries like, USA, Japan, Denmark, UK, Sweden, Italy, industrial sector provides employment to one-third to half of the labour force, while in developing countries like Brazil, Paraguay, Egypt and India industry provides only one-fifth to one-tenth of the total labour force. In underdeveloped economies in Nepal and Tanzania, industrial sector provides employment to merely a handful of persons. So, development of manufacturing is the key for the all-round prosperity of the country.

12.1 CLASSIFICATION OF MANUFACTURING

Since very early days of human civilization, manufacturing activities had undergone a massive transformation, both in the production process and of the products. The successive stages of economic development had witnessed the changing types of manufacturing process. According to the scale, production process and organisation, manufacturing activities may be subdivided into three broad categories. These are :

1. Primitive and cottage industries.
2. Labour intensive traditional and local industries.
3. Sophisticated modern technology based industries.

Among the industries, cottage industry is the oldest. Even in the early civilizations like Indus Valley, Egyptian, Sumer and Greek civilizations, Cottage Industry was moderately developed. These early industries mostly grew in items of silk, textile, ornaments, utensils etc. The age-old technique mostly concentrated more on individual skill rather than on scale of production. The self-sufficient economy in the remote past, in fact, forced the village communities or local clans to develop their indigenous methods of production.

Labour intensive traditional industries evolve from the growth of cottage industries. Any cottage industry after a certain period may attain fame, which attracts customers from distant places. The reputation of the product and specialization on single product often helps immensely for further growth of the industry.

Modern manufacturing industries are the product of last two hundred and fifty years. In fact, only after 'Industrial Revolution' of Europe, the real development of manufacturing industries occurred in large scale. Since the end of the 18th century, large scale exploitation of fossil fuels like coal, metallic ores like iron one, manganese, bauxite favoured immensely for the rapid growth of manufacturing industry, particularly in the Western Europe and USA.

The manufacturing industries vary widely according to its size, location, product, production process, techniques adopted, work force, total value of the product and social relevance. In recent periods, the nature of raw materials used in the manufacturing process and the effect of manufacturing process in the overall ecological system are also seriously considered. Size of a firm is a major factor that governs the output, sustained growth and ability to achieve economies of scale of a factory. A minimum size of the manufacturing units are required for its survival. The optimum size of a firm helps greatly to harness optimum profit.

According to the locations, manufacturing units may be sub-divided into several types. The coastal, roadside or port locations evolve for the ease of import of raw material or marketing and export of finished product. The break of bulk locations are another favourable place where industries generally develop.

Production process is another important factor in manufacturing industry, which determines the speed, quality and quantum of production. Depending upon the technology adopted in the manufacturing, the quality of the product is determined. Some of the industries use hi-technology while others use traditional and back-dated, even obsolete, technologies.

Some large industries, which employ enormous work force and produces very important product like Tata Steel in India and different watch factories in Switzerland, attain such a fame that besides manufacturing it became a integral part of the life of the region.

The role of manufacturing industry as employer is no less than its product, to human civilization. At present, manufacturing industry provides largest number of job to the people. At least one quarter of human population is now directly or indirectly engaged in manufacturing activities.

For growing consciousness of people about the depleting resource condition in the world and specially the scarcity of fossil fuel reserve, industries are earnestly trying to

transform the production process after adopting a fuel-efficient technology. The mounting price level of energy resources forced the manufacturing industries to use new raw materials, like scrap iron instead of iron ore, to save raw material cost as well as fuel cost.

For repeated caution of the scientists about the global warming through the emission of industrial effluents and large-scale burning of fossil fuels by the traditional industries, a world-wide uproar is now visible to curb the pollution into a standard level. The industries emitting fluoro-carbon, carbon monoxide are more and more facing stiff resistance from government, research institutions, media and even from general people.

12.2 CLASSIFICATION OF INDUSTRIES

The general difference between one industry and other measured according to the nature of the product, number of employees, value of the capital involved, quality of employees, wage rate, value addition of the product and nature of raw materials.

Numerous classifications are available, each quite different from another. One emphasized on raw materials, another on product and even on transport cost.

The Weberian model (see Chapter 11) introduced an industrial classification based on raw materials. According to his model, industries may be sub-divided into following categories –

- I. The industries based on ubiquitous raw material : This type of industries use raw materials available everywhere, e.g. air, water, soil, etc.
- II. The industries based on localized raw material : These industries use raw materials, confined within some selected region, e.g. coal, petroleum, iron ore, etc.

These industries are again sub-divided, according to weight loss ratio or material index :

A. Pure raw material based industries — The industries using non-weight losing raw materials fall within this category. Cotton textile industry, leather industry fall within this category.

B. Impure raw material based industries — The industries use weight losing raw materials are included in this division. Aluminium industry, iron and steel industry, sugar industry, heavy chemical industries all belong to this type.

- III. The industries based on light-weight, valuables : The sophisticated modern industries, adopting latest technology, generally use intricate, fine components fall under this category e.g. electronics, electricals, watch, television etc.

According to the weight of the raw material and finished product, industries are also divided into two broad types :

- I. Heavy industries — The iron and steel, aluminium, heavy chemical, textile, petro-refineries etc. are in this type.
- II. Light industries — The electronics, electrical, machine tool industries are included in this type.

Some of the industries are regarded as basic industries, others are ancillary industries. Some produces consumer goods, while others produce capital goods and construction materials.

According to the origin, production process and nature of uses, manufacturing industries are conveniently divided into several types :

1. The Metallurgical and Mining industries — The iron and steel, aluminium industry and mining of iron ore, bauxite, copper, lead and zinc, etc. are included in this type.

2. The Textile industries — The cotton textile, silk, woolen, jute, mesta manufacturing are note worthy.

3. The Chemical industries — The heavy chemical products, petrochemical, fertilizer, cement products are manufactured by these industries.

4. The Food and Beverages industry — All kinds of processed and packed food products are produced by these group.

5. Forest and Wood-based industries — The furniture and paper industries are notable among forest-based industries.

6. Machine Tools and Electrical industries — All kinds of engineering products and electrical appliances are produced by these industries. The automobile, machine tools, ship, railway wagon are produced in these manufacturing industries.

7. Construction material industries — The processing of matallic materials and its transformation of construction material is the basis of these industries. Important among the industries are building materials.

SELECTED BRANCHES OF MANUFACTURING

12.3 IRON AND STEEL INDUSTRY

Since last century, volume of steel production of a nation was taken as an index of industrial development. Among all the manufacturing industries, iron and steel industry holds an enviable position. The quality and quantity of the iron-steel production of a country greatly influences the nature and type of industrial development of the nation. It has been estimated that over 65 per cent of all machine tools, electricals, transports, utensils are manufactured solely by iron and steel. In fact, before the introduction of aluminium, it was used in nine-tenth of these products. In reality, no adjective will be an exaggeration when one estimates the role of iron and steel in the growth and development of human civilization. At almost every stage, be it transport, machines, roads, bridges or even kitchenware, iron and steel is indispensable today. Few basic properties of this metal which endeared it to the world-wide consumers are :

1. The durability and strength of the metal. In communication, construction and important strategic materials like armaments, use of steel is a must.

2. The ability to withstand stress and strain is one of the most unique properties steel possesses. No other metal in the world is so permanent as steel.

3. The ability to transformation gives it added advantage over similar metals. After casting in a high temperature, steel can be transformed into any shape.

4. The easy availability and cheap production cost is a comparative advantage of iron and steel over other metallic minerals. It is, though localised, available throughout the world at a cheap rate.

5. The property of easy mixing with alloy metals, like manganese, chromium improves the quality of the product and produces a wide range of materials.

6. The time-tested technology of steel-making is, at present, so developed that the unit prices of steel is one of the cheapest among the metals.

12.3.1 Processes of Iron & Steel Production

The basic process involved into the iron and steel production is the refinement of iron ore. Usually, coal and limestone is used for this refinement. The heat harnessed from coal is required to run blast furnaces. Limestone is used as fluxing material, which helps to remove impurities from iron ore. The product thus produced is widely known as pig iron. The further processing of pig iron produces cast iron, wrought iron and finally steel.

The iron ore refinement process had gone through a sea-change in last two hundred years. The first blast furnaces were perhaps created at the beginning of 15th century. Since then, various processes were developed in the conversion process. Notable among them are : the Open-hearth process, the Bessemer process, Electric Arc furnaces, Oxygen process including L.D. converter and Kaldo converter.

The Bessemer process was first introduced in the middle of 19th century. This process, named after Mr. Bessemer, are of two types — acid and basic. The impurities cannot be totally removed by this process.

To improve the problems of Bessemer process, Martin and Siemens introduced Open-hearth system. This costly process can produce more steel by using greater temperature. The raw materials varies widely in this process. Even scrap can be used to produce steel. The steel produced in this process is superior in quality than Bessemer process. The further improvement of this process has reduced the fuel consumption. In some cases, natural gas is used to get energy.

The scarcity of coal and its variation of grade forced to have a second thought about its efficiency. To avoid great transportation cost of the bulky raw materials, in the middle of 20th century, some steel producing countries started to use electric power, instead of coal. This change is generally regarded as revolutionary step, as far as volume and quality of production is concerned. The scrap became one of the major raw materials for the manufacture of steel. The cheap hydel power and nuclear power reduced the total expenditure of the steel production. The countries deficient in coal and iron ore, e.g. Japan, South Korea, were largely benefited through the process.

The invention of Oxygen converter process, however, is a further improvement in the steel-making process. The L.D. converter and Kaldo converters, developed in the middle of the century, further reduced the energy cost. The time consumed in the steel making process is far less than all the previous methods.

For the global energy crisis in the 70's and to reduce the processing period, continuous casting method was introduced. In this integrated manufacturing process, in a single continuous process pig iron is converted to steel.

12.3.2 Location of Iron and Steel Industry

At least two sets of factors are, one way or another, responsible for the location of iron and steel industry. The primary factor is, of course, initial reasons, which may be availability of raw material, market, energy supply and labour availability. The second type of factors may be regarded as survival factors, which is again sub-divided into two types — (i) establishment costs, e.g., taxes, duties, rent etc. (ii) production costs, e.g., labour wage, transport charge, sales tax, income tax, etc.

The initial factors, such as raw material (iron ore) location, energy source (coal region) and market, exerts tremendous influence on the locational pattern of iron and steel industry. The comparative distance between raw material (iron ore) location, energy source and market determines the location of the industry.

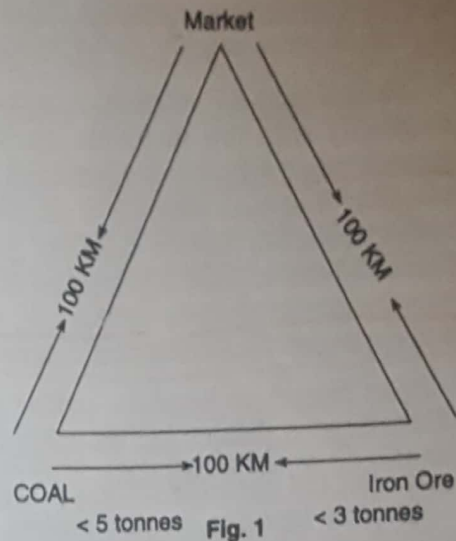
As suggested by 'least cost location' school headed by Weber, all the raw materials and energy resources used to manufacture iron and steel are localised and impure or weight-losing material.

In the early period of growth, to produce one tonne of finished steel the requirement of raw materials were 5 tonnes of coal and 3 tonnes of iron ore. The location triangle, as suggested by Weber, clearly reveals the maximum pull exerted by coal area. In the Fig. 1, if transport cost is one rupee per tonne per km., and distance between the places are 100 km., the total transport cost of the three region will be as follows :

1. If the industry is located at market, transport cost will be $-(3 \times 100) + (5 \times 100) = 800/-$.

2. If the industry is located at iron ore area, total transport cost will be $-(5 \times 100) + (1 \times 100) = 600/-$.

3. If the industry is located at coal area total transport cost will be $-(3 \times 100) + (1 \times 100) = 400/-$.



So, Weberian concept reveals that coal area is the most suitable location, as far as transport costs are concerned. Initially, iron and steel plants had a clear tendency towards coal areas. But, with the passage of time, new technologies were introduced which were, on the one hand, fuel saving, the other the requirement of iron ore volume also came down. The L.D. converters and Oxygen processes need very little fuel. In fact, the continuous casting and introduction of electric furnaces do not require coal as fuel, rather it uses electric energy, may be hydel or nuclear. The continuous casting method is the direct conversion of steel from iron ore. It reduces fuel cost drastically. In this way coal area has lost much of its pre-eminence in the localization of iron and steel industry.

In electric arc furnaces, scrap is now being used instead of iron ore. The large scale use of scrap was helpful for the all-round growth of industries, where iron ore is not found. The meteoric rise of Japanese steel industry was possible, without having any substantial iron ore reserve.

12.3.3 Early Localization

At the early period of the growth, location of iron-steel industry was entirely governed by the ratio of raw material assembly cost and distribution cost of finished product to the consumer. So, distance between the points had the maximum influence on the locational model.

A broad grouping of the locational pattern is possible, though their original spatial advantage may not be present. Generally, five types of location is distinguished :

- (a) At the source of iron ore.
- (b) At the source of fuel, e.g. coal, hydel power, nuclear.
- (c) At or near the market.
- (d) At the point in-between market, raw material and fuel source.
- (e) At the places where coal-iron ore, coal-market, iron ore-market or coal-market-iron ore coincide.

Iron ore based locations are not very rare phenomenon. They occur in Lorraine in France, Duluth in USA, Bhadrabati, Vishakhapatnam in India, Corby in UK.

Coal-based plant, in fact, at one time was most sought after locations. Due to high amount of weight loss during process, early steel plants were mostly coal based. The classical examples of coal based locations are : Ruhr valley in Germany, New Castle in UK, Donetz basin in CIS, Pittsburg region in USA, Bokaro, Durgapur, Jamshedpur in India.

Market based locations generally occur in the countries where coal and iron ore deposits are rare. As Japan is deficient in both iron ore and coal and almost all raw materials are to be

imported from overseas countries, Japanese steel plants are mostly market based. The great 'Tokyo-Yakohoma' and 'Osaka-Kobe-Hemeji' iron steel regions are all market based.

The intermediate location, in some cases, gets distinct advantages in terms of the accessibility with raw materials, market and transportation. The raw material based industries are now facing disadvantages because of depleting reserves of raw material. So, considering long-term survival of the industry, it is desirable for the industries to select a location which can provide sustained growth to the industry. Apart from this, the drastic reduction of coal use and development of fuel economy also attracted industries to the areas where transport is cheaper; for example, cheap water route or break of bulk location, where due to loading and unloading facilities, raw materials are available at a much cheaper rate.

Apart from these locations, another type of lucrative location may occur, where more than one factor is present, i.e., the combination of the three, iron ore, coal and market or the presence of any two among them.

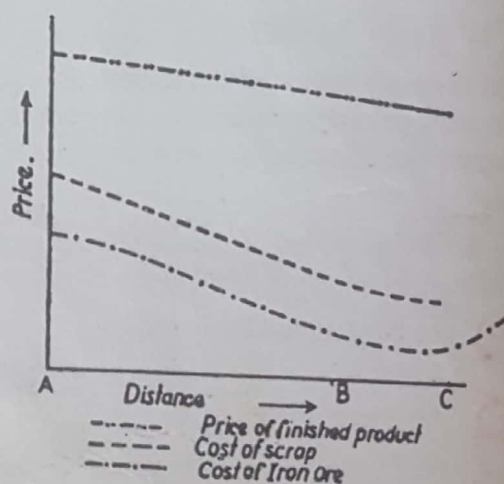
The most lucrative location evolves where coal, iron ore and market is present. This region offers maximum advantage from locational point of view. The iron-steel industries of Alabama have all the advantages.

In some cases, after the development of steel industries in coal mine regions, market also developed. The Ruhr valley in Germany and Donetz basin in CIS received this type of locational advantages.

The iron-steel industry having iron ore and market facilities evolved in Krivoy Rog of CIS. The presence of both iron ore and coal in a single area occurred in Adirondacks in USA and Nova Scotia in Canada.

The factors, other than these three, are socio-economic and governmental decisions. It may happen, particularly in the under-developed and developing nations, a place is selected to uplift the economy of the region, without having any locational advantage.

Certain developments in 20th century discouraged growth of iron and steel industry within market centre or at the source of raw material. From the following figure, it can be visualized that use of scrap as raw material and re-rollers used as raw material produces finished product without any considerable weight lose. The price of scrap determines the location. In the figure the total production cost at 'A' (market centre) is greater than 'B' i.e. intermediate point between market centre and iron ore source, is less. The region situated away from the market centre gets scrap and iron ore at a much cheaper rate. So, the production cost is also lower than market centre. The present-day steel factory loca-



- A - Market centre.
- B - Industry away from centre.
- C - Source of iron ore.

tions are controlled by a least cost equilibrium between raw material cost and the cost of finished product. The variation of labour cost and taxes influences to some extent. The old locations, with the passage of time, lost much of the initial advantages but are able to continue production because of the momentum gained from the early business. For

example Pittsburg iron and steel industry is no longer a advantageous location. Here, coal is cheaper but iron ore is costly. Besides, the out-dated technique made it a non profitable concern. But due to its long contribution, Govt. supported it through protective policies like 'Pittsburgh Plus'. Duluth, on the other hand, gets cheaper iron ore but costly coal.

Some years ago when the importance of coal had declined, the relative importance of iron ore increased substantially. The ore enrichment method increased the efficiency of the ore. The beneficiation methods also reduced the requirement of the quantum of iron ore. In most of the traditionally steel producing countries like UK, Germany, the reserve of iron ore declined considerably. So, industries gradually migrated towards coastal region for the easy accessibility of iron ore. The cheaper rate of finished product also encouraged the countries to set up plants away from the raw material source.

In some of the regions, due to the acquiring of new advantages, the plants were able to survive in spite of the loss of original advantages. In these cases, the areas started to convert in the manufacture of specialised items. The protective measures also discourage the growth of iron and steel industry in new regions, as old industries continue to get the advantages of early location. For example, 'Pittsburg Plus' and 'multiple basing system' equalled the selling price throughout USA. This system provides advantage to Pittsburg but disadvantage to other areas.

12.3.4 Early Growth

The history of iron smelting is as old as the human civilization. According to the available archaeological information, iron smelting was first started in India. The iron pillar in India and the wootz steel earned high reputation. At its initial phase, most of the steel plants were concentrated around the iron ore deposits. Charcoal was used as fuel. The modern steel making process was started when Mr. Henry Bessemer introduced his Bessemer converter in 1856. Great Britain was first developed as the most dominating producer of iron and steel. The production of USA, Germany, USSR gradually outpaced Great Britain and they emerged as dominant iron and steel producing nations. After Second World War, Japan also joined in the fray. In recent periods, China and India is also making rapid strides to be leading producers of iron and steel.

The great Industrial Revolution, in eighteenth century, prompted Great Britain to increase steel production rapidly. Within a span of 50 years, since 1775, production increased ten times. After 1825, significant development of iron and steel industry occurred in neighbouring West European countries, specially in Germany and France. At the beginning of 20th century, USA made a rapid stride in iron and steel production. During 1890, USA surpassed Great Britain in iron and steel production. Even, within the first decade of 20th century, Germany surpassed English production.

The CIS and Japan were late starters in the production of iron and steel. The Tsarist Russia merely had an agro-based economy. After revolution in 1917, under the stewardship of Joseph Stalin, CIS made a tremendous advancement in steel industry. During Stalin era, iron-steel industry received maximum importance in successive five year plans. The output increased at an astonishing rate. Following this, in 1973 CIS was able to secure first position in steel production, exceeding USA. Till 1988, CIS maintained this lead. But after fragmentation of USSR and formation of CIS the iron and steel industry received set-back.

The rise of Japan in steel production is a bewildering fact, as the country is deficient in all the required raw materials. After the massive devastation in Second World War, Japan touched its pre-war production level within 20 years. In 1973, it secured third position in the production of steel, next to USA and USSR. In 1983, it surpassed USA in steel production.

12.4 DISTRIBUTION

In the year 1992, the total production of crude steel in the world was 721.32 million tonnes. Out of this total production, 506.18 million tonnes or 72 per cent was produced by the top ten producing countries of the world. These countries are the Japan, USA, China, Russian Federation, Ukraine, Germany, Korea Republic, Italy, Brazil, India and Poland. Apart from these countries, other noted steel producing countries are Great Britain, Canada, Belgium etc. Some of the countries, which were leading and traditional iron and steel producing nations, like Great Britain, are now insignificant producers, as far as output is concerned.

12.4.1 Iron and Steel Industry—CIS

In the post-revolution period, the Soviet steel industry had achieved a remarkable expansion. From the early period of Stalin era, steel industry have experienced all-round government patronage. During the Second World War, however, the Soviet iron and steel industry were affected badly. Most of the large production centres were either destroyed or damaged in such a way that they required a thorough remodelling. However, within 1975, the country became the largest iron and steel producing nation in the world. Till now, the CIS has been able to maintain the performance in the same fashion.

The increase of the Soviet iron and steel output is indeed astonishing. In 1930, the output of pig iron was a mere 5 million tonnes, which went upto 10 million tonnes in 1934. In 1936, the output of pig iron and steel increased to 14 and 16 million tonnes, respectively. In 1935, the country had witnessed the production of 33 and 45 million tonnes of pig iron and steel. From this period onwards, the Soviet steel industry had witnessed an unprecedented growth. The growth rate can be noticed from the table –

Table 12.3

Annual Production [million tonnes]

	1930	1936	1955	1965	1973	1978	1983	1990
IRON ORE	5	14	33	–	216.0	244.2	245.19	236.0
CRUDE STEEL	4.1	7.5	50	91.0	131.46	151.44	152.52	154.0

The consistent increase of iron and steel production enabled the country to retain the top position among the iron and steel producing countries. In 1992, the major constituents countries of CIS namely Russian Federation and Ukraine jointly produced 109 million tonnes of crude steel. Russian Federation and Ukraine produced 80 and 67 million tonnes of steel respectively and secured third and fourth position among steel producing countries.

DISTRIBUTION

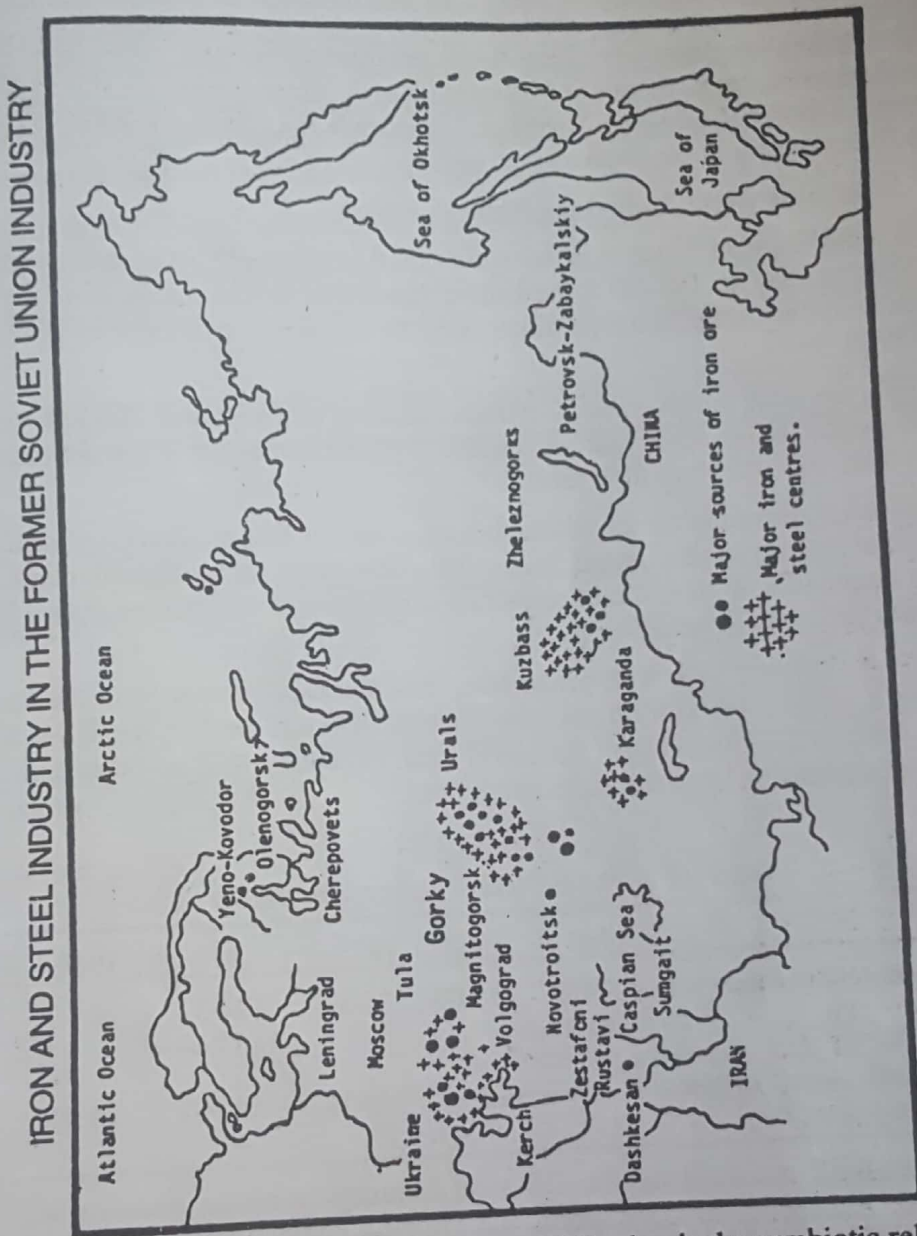
The industry first took its birth in Moscow region some 300 years back. After revolution, subsequent exploration of new iron ore and coal deposits encouraged the decentralization of the industry to the remote areas.

The location of Soviet steel industries are mostly controlled by raw material availability. In fact, the total transport cost for raw material assemblage in this country is often so high, that this may be regarded uneconomic in any country other than socialist economy.

The major iron and steel producing centres are –

1. The South District.
2. The Ural Region.
3. The Kuznetsk Basin.
4. The Central District.
5. The Other Centres.

1. **The Southern district**—This is one of the oldest iron-steel producing centre in the CIS. The existence of Krivoy Rog iron ore and Donbas coal fields within the region gave the industry a tremendous fillip. The Yelenovke limestone, Nikopol manganese, and Kirch iron ore were considered as added advantage of the area.



The iron-steel districts of both the Krivoy Rog and Donbas had a symbiotic relationship regarding raw material supply. According to this reciprocal relationship, Donbas coal is used in Krivoy Rog and after unloading coal, it collects Krivoy Rog iron ore for Donbas steel industry. Therefore, both the centres became mutually benefitted and overall transport cost is reduced.

2&3 **The Ural—Kuznetsk region**—This region was primarily based on nearby iron ore deposits. It was one of the oldest iron-steel districts in the CIS. The real development of the Ural region, however, began after the introduction of 'combine' system with Kuznetsk. In fact, during the middle of 20th century, two giant plants were erected, one each at the Urals and Kuznetsk. The iron ore based plants of Magnitogorsk in Ural and coal based plants of Novo Kuznetsk in Kuznetsk basin became an instant success, despite the great distance of 3,100 km between each other.

4. **The Central district**—This region is located around the capital city of Moscow. Perhaps this is the only market based iron and steel region in the CIS. The development of the Moscow-Tula industrial region forced the planners to set up iron and steel centres in this region. Due to the absence of any nearby iron ore deposit, scrap is now being used as raw material.

5. **The other regions**—Besides these traditional centres, new iron and steel producing centres have developed around Kursk magnetic anomaly, Electrostal, Cherepovets, Kolpino, Leningrad, Vertsilya, Liyapaya in the east and Yarmak, Kuzbass and Petrovsk-Zabaykalskiy in the south central region.

12.4.2 Iron and Steel Industry—United States

The United States of America is the world's third largest producer of iron and steel, next to the USSR and Japan. Till 1974, the United States was able to maintain its top position among the manufacturing countries. Since then, the CIS first surpassed it in 1978 and then Japan in 1983.

In 1992, the USA produced 84.32 million tonnes of crude steel or 11.65 per cent of the world production. In the same year the respective production of the CIS and Japan was 163 million tonnes and 105.68 million tonnes.

A general observation on the production chart reveals that production of crude steel is gradually decreasing in the United States. This downward trend of production was first visible in the middle of 70's, when production came down to 124 million from 132 million between the period 1973 to 1978.

However, keeping pace with production, the consumption volume in the country has also come down. In 1992, the total consumption of crude steel in the USA was 93.33 million tonnes or 13.7 per cent of the world total. Except the CIS no other country in the world consumes such a large amount of crude steel.

Table 12.4

Trend of Crude Steel Production in the USA

	1960	1967	1973	1978	1983	1992
Crude Steel production (in million tonnes)	107.00	115.00	136.8	124.3	76.76	84.32
Crude Steel consumption (in million tonnes)	—	—	144.12	145.01	94.01	93.33

The set-back received by the US steel industry in recent decades was not very unexpected. According to US exports, the growing competition among the developing countries to capture international market, protection and subsidies introduced to safe-guard their home market were the principal reasons for their unprecedented growth. On the other hand, because of historic reasons, the US steel industry have developed certain problems of their own. The unscientific 'Pittsburg plus' policy and later the introduction of 'multiple basing point system' restricted the spontaneous development of new industrial centres. According to that theory, to save Pittsburg from growing competition, law was enacted which enforced the rule that all steel centres had to sell their products at the rate fixed up by Pittsburg and some other base points or steel centres. So, naturally, Pittsburg steel industry survived, but the US steel industry, as a whole, suffered a lot in the absence of spontaneous growth.

Apart from these, most of the US plants are old, uneconomic and poorly managed. On the other hand, new entrants like Japan, using sophisticated, fuel and cost efficient production machinery largely reduced the cost of production. A strict vigil on quality and use

of scrap as raw material largely helped the countries like Japan to achieve a tremendous success and curb the US monopoly on the iron and steel industry.

DISTRIBUTION

After the construction of first iron and steel plant at Massachusetts in 1629, the US steel industry had undergone a sea-change through last 350 years or more and now placed in a cross-road. During this long history, distribution or spatial concentration of industries had also witnessed a massive change from one region to another. At this juncture, therefore, it is not the distribution but the tendency of dispersal is of greater importance. The major iron and steel regions in the USA may be classified as follows –

1. Youngstown-Wheeling-Johnstown iron and steel region.
2. Lower Great Lakes region.
3. Eastern region.
4. South-East region.
5. The Western region.

MAJOR IRON AND STEEL INDUSTRIAL CENTRES



1. Youngstown-Wheeling-Johnstown region — This region was once regarded as the world's iron-steel capital. At that time, Pittsburg iron-steel industry was unparalleled in the world. The nearby Pittsburg coal and Lake Superior iron ore, wonderful transportation network and excellent marketing facilities favoured the growth of this region. This region attained such a fame, that even after the decline of this industry, to protect the industry, US Government introduced the infamous 'Pittsburg Plus' policy.

Apart from Pittsburg, large concentration of iron and steel industry came into being around Mahoning and Shenango valley. A large steel plant is on production in the Youngstown. The steel centres developed in the adjacent Wheeling and Steubenville district around Ohio district mostly specialised in the production of high quality steel. The

Johnstown region, situated farther east earned reputation in steel making when famous Bethlehem steel plant constructed their giant plants.

2. Lower Great Lakes region — Gradually, with the passage of time, Pittsburgh lost its pre-eminence as a steel centre. From the early period of 20th century iron-steel industry in USA started shifting towards the southern part of Great Lakes. Besides Lake Erie, new steel centres developed at Buffalo, Erie, Cleaveland, Detroit and at Lorain.

To serve the western and southern markets, massive steel plants were developed in the Chicago-Gary district and at Duluth. The greatest advantage of this region is that it lies within the route of Lake Superior and Mesabi iron ore deposits and Appalachian coal.

This break of bulk situation or advantage of loading-unloading enabled the region to get both iron ore and coal at a much cheaper rate. The good transportation system either by water through lakes or trains were added advantage. Till recently, this industrial zone grew at a tremendous speed.

3. Atlantic Coastal region — Initially, iron-steel industry developed here, around the iron ore mines of the Adirondacks, and Cornwall area. Though the iron ore deposits were exhausted very soon, the steel industry continued to grow. The nearby large market provided excellent opportunity to grow vigorously.

The most important steel centre in this region are the Maryland, Sparrows Point and Pennsylvania. In Pennsylvania region, the Bethlehem steel plant constructed a giant steel plant at Bethlehem on Lehigh River. The Steelton is another steel town within Pennsylvania which produces large amount of special quality steel.

Sparrows Point and Maryland are two old steel plants, initially developed for the nearness of the Virginia coal.

Entire steel industry collects coal from Pennsylvania and Virginia mines and iron ore from Lake Superior, Adirondacks and Cornwall areas. The proximity of great valley limestone and cheap water transportation through Lehigh and Susquehanna river provided added advantage.

4. The South-Eastern region — This region extends from the Virginia on the east to Alabama on the south. From the early days of steel making, steel plants were developed around Kentucky, Virginia and Tennessee. This area, particularly the Alabama-Birmingham concentration have proximity of both iron ore and limestone deposits of Red Mountain and extensive deposits of good quality coal situated within the region. Among these deposits, Warrior coal deposits in the Birmingham region is notable. The cheap, abundant labour also gives this region a distinct advantage over its competitors. However, lack of market is a problem to this industry.

5. The Western region — This region extends from Colorado in the interior to the California on the West. Among the steel region in the USA, this region is new one. Only after Second World War, for strategic reasons, the government had set up steel mills. The pioneer attempt to construct a steel mill was made in 1882 at Pueblo. Later on, steel industries were developed at Fontana in California and Provo in Utah. Initially, iron ore was collected from Wyoming and coal from Colorado.

The Government-owned steel corporation constructed a steel plant at Geneva to manufacture machines for military purpose.

The plants situated at California collects coal from Sunny side in Utah and iron ore from Eagle Mountain.

12.4.3 Iron and Steel Industry — Japan

The steel industry in Japan had witnessed a complete metamorphosis in its not too long history. Like all other industries, the iron and steel industry was also devastated completely by Second World War. But, from the complete destruction, soon it was revived and touched the pre-war levels of production. After the complete destruction of plants in Second World War, production of Japanese steel industry came down to only 1 million tonne or even less. But, the patriotic zeal and hard labour of Japanese workers made a great deal to revive the industry. The growth rate increased in such a pace that, within a few years, it surpassed the production of Great Britain, Germany and France. This tremendous increase of steel production was made possible by the complete reformation of the industrial set-up.

Without having any of the required raw materials, the growth and expansion of Japanese steel industry is indeed a perplexing phenomenon. The year 1992, Japan secured first position in the production of steel and crude recording the production of 98.13 million tonnes. In the year 1973, this industry recorded an all-time high of 119 million tonnes. Compared to any other country, the per capita steel production in Japan is the highest in the world. Almost all of the Japanese steel manufacturing units are very large as well as integrated. There are at least 12-13 manufacturing units, each having the production capacity of more than 10 million tonnes of steel per year. Japan is having some of the highest steel producing units in the world, each producing more steel than the combined output of even some developed countries. At present, the Nippon-Kokan steel factory situated in the Okayama region is the biggest steel plant in the world. This plant is having more than 20 million tonnes of production capacity per year.

The beginning of the iron and steel industry in Japan dates back to the middle of 18th century. Though, the real development of the industry started only after the Meiji restoration in 1868. In that period, to curb the dependence on foreign steel, concerted efforts were given to raise the output and increase the production efficiency. At the very beginning of 20th century, giant steel producing centres were developed on Osaka, Kobe and Tokyo-Yokohama area. But till the middle of the century, production of steel per year remained within 10 million tonnes mark. During the World War and depression in 1930, the industry received a set-back and the production dropped to only 2 million tonnes per year.

The Sino-Japanese War and heavy military demands of the Second World War came as a blessing to the Japanese steel industry. To meet the growing demand from foreign countries, as well as in the home, the iron and steel industry in Japan had undergone a complete modernization and rapid expansion programmes. In this period, manufacturers started using scrap as a raw material. The iron ore was obtained from China, Australia and India at a much cheaper rate. Just before the on-set of Second World War, production recorded a new high of 8 million tonnes.

Second World War completely devastated the Japanese iron and steel industries. In the subsequent years, rapid recovery from war devastation was the priority of Japanese industry. The subsequent Korean war and increasing demand from other countries helped a lot and Japanese industry gradually struggled off the war obsession. The period between 1950-1970, Japanese industry was able to double its production. The overall industrial boom in the country and latest technology adopted in the steel manufacturing process, made Japan one of the leading steel producing country in the world.

The hard working labour force, national pride of the Japanese people, cost reduction in the manufacturing process and ready market in the third world countries helped Japan to secure an enviable position among the world's steel manufacturing circles.

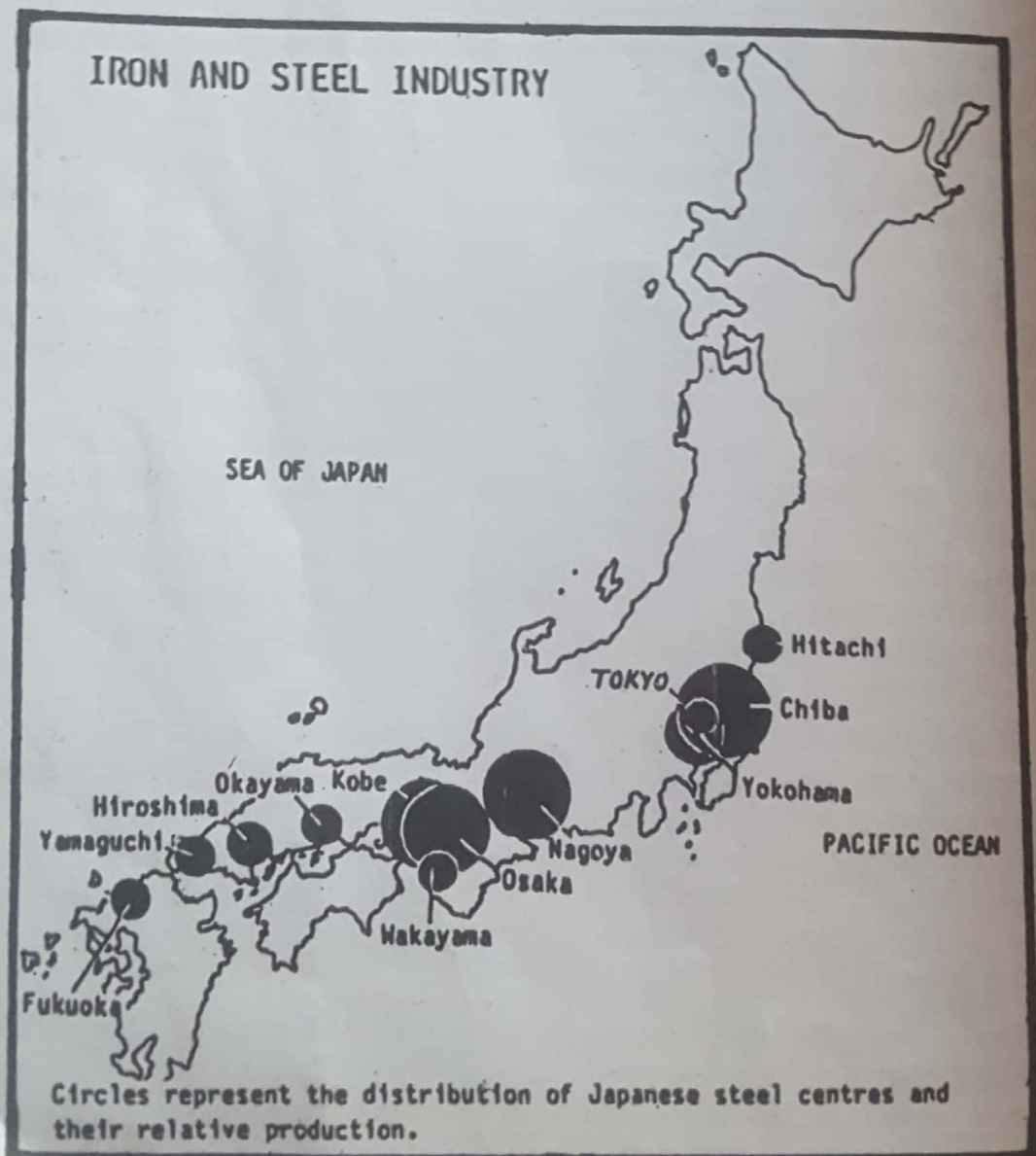
DISTRIBUTION OF IRON AND STEEL INDUSTRIES IN JAPAN

The first steel plant was constructed in Japan at the fag end of 19th century. This Yawata steel plant was the biggest in Asia at the time of installation. Within a span of 40

years, at least 10 other steel plants were constructed in Japan. Since then, Japanese steel industry never looked back. The leading steel producing companies are Fuji, Sumitomo, Nisshin, Kawasaki and Kobe steel plant. The spatial distribution of Japanese steel producing centres may be sub-divided into six principal regions. These are :

1. Tokyo-Yakohoma Area.
2. Nagoa Region.
3. Osaka-Kobe Region.
4. Fukuoka-Yamaguchi Region.
5. Oka-Yamaha Region.
6. Hokkaido Region.

1. **The Tokyo-Yokohoma Region** – Tokyo, the centre of politics, culture, economy, transportation and all other aspects of Japan, naturally attracted large iron and steel industries within its fold. Hitachi is another industrial area around. Tokai also provided all facilities to the iron and steel industries at the beginning. The reclamation of Tokyo Bay provided large extensive plane land for steel manufacturing units. The Tokyo-Chiba region grew very fast as a major iron and steel centre. In this zone, the largest agglomeration of iron and steel industry is found at Hitachi, north of Tokyo.



2. **Nagoa Region**—Nagoa region is now popularly known as the 'Detroit' of Japan. This region had witnessed a massive growth of industries within the period 1950-1960. At present, this region contributes nearly 20 per cent of the total value of shipments.

3. **Osaka-Kobe Region**—Osaka-Kobe is another large agglomeration of iron and steel industries. The combined output of Osaka and Kobe surpassed all other region's output. The largest steel plant in this region is located in the South-East of Osaka, at Wakayama. At least 70 per cent of the total output of this region is exported to the foreign countries.

4. **Fukuoka-Yamaguchi Region**—In the extreme south of Japan within Kyushu and western most end of Honshu, this region is located. The output of this region is not very large, though the growth rate of this region is very high. In the north of Kyushu, the famous Yawata steel plant was constructed under direct Government supervision in 1901. The initial advantage of this industry was the nearness of Chikulo coalfields. The Dokai bay situated very near, provided easy water transportation to import the iron ore from China and export of the products to the foreign countries. The railines connecting Fukuoka and Nagasaki also helped the industrial growth of the region. Kita-Kyushu is another notable iron and steel centre in this area.

5. **Oka-Yamaha Region**—Oka-Yamaha steel centre is one of the newest steel centres in Japan, situated in between Osaka-Kobe and Hiroshima. Though the present production is not very large, introduction of latest technology and government incentives made this industrial region one of the most up-coming steel producing centres in Japan.

6. **Hokkaido Region**—Hokkaido, which is not very famous for industrial developments, possesses the single iron and steel producing centre near Muroran. The coal fields of Ishikari, Kushiro and Romai initially attracted the entrepreneurs to set up iron and steel industry at Muroran. The fluxing material and manganese are collected from Kamino-Kuni region of Hokkaido.

The total Japanese production of crude steel in 1992 was 98.13 million tonnes, while consumption of steel in that period was 99.15 million tonnes. In production, Japan secures first position in the world, while in consumption it ranks second, next to CIS.

12.4.4 Iron and Steel Industry—China

The People's Republic of China is the third largest producer of iron and crude steel. The countries producing more steel than China are the Japan and United States. Regarding consumption China secures third position in the world, next to the Japan and United States of America. In 1992, China produced 80.0 million tonnes of crude steel. However, in that year, total consumption of steel was far lower i.e. 71.0 million tonnes.

Since 1973, growth of steel production in China was spectacular, within a span of 15 years China was able to increase its production of crude steel to 217 per cent. In that period consumption increased 300 per cent. This growth rate clearly reveals the rapid pace of industrialization, that is now going on in China.

In 1992, China contributed 11 per cent of the world production of crude steel. In the corresponding period, consumption was much lower (10.54 per cent).

Table 12.5
Trend of Crude Steel Production in China
[Production in million tonnes]

	1960	1970	1973	1978	1983	1992
Crude Steel production	18.5	17.0	27.26	31.78	39.95	80.0
Crude Steel consumption	—	—	25.98	42.51	51.91	71.04

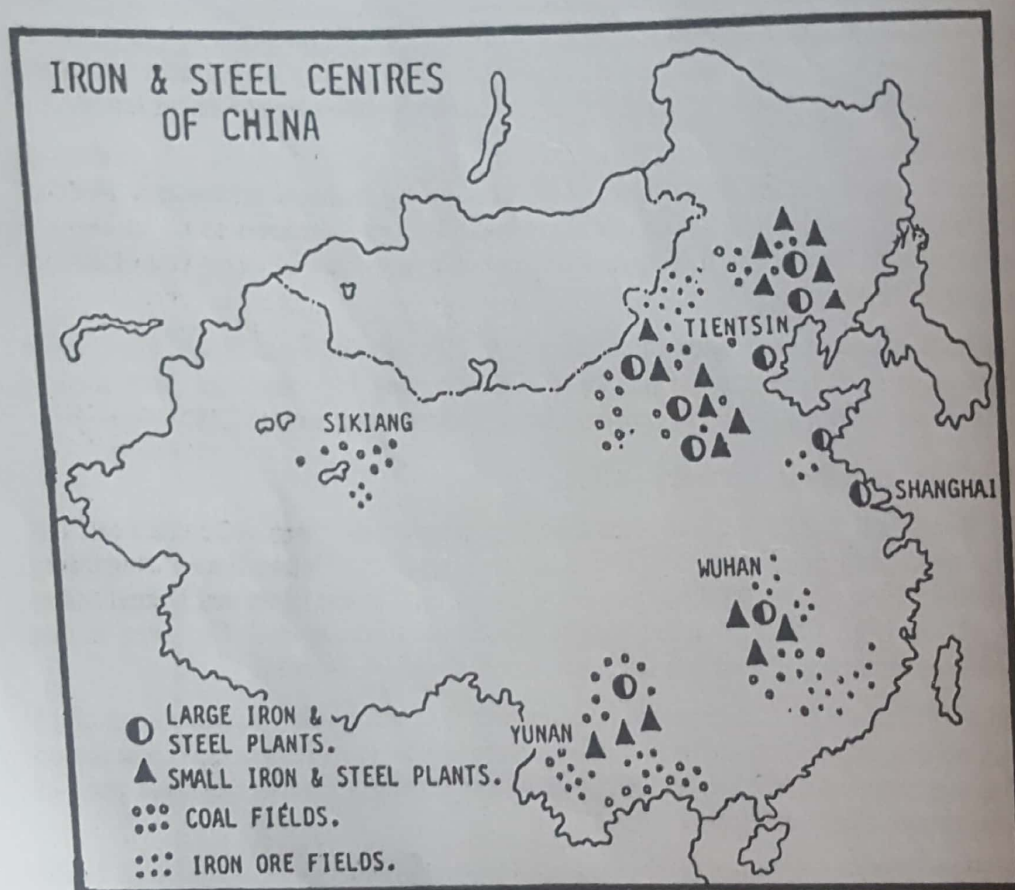
Source : US Bureau of Mines.

DEVELOPMENT

The history of iron and steel making in China is very old. The initial development was basically of cottage industry level. The indigenous technique of fabrication was highly developed. The scale of production was not very significant.

The modern blast furnace was erected in China only in 1890. In the first half of the 20th century, the political turmoil and repeated foreign aggression hindered the growth of small-scale steel furnaces. However, in this period, the Japanese established their control over Manchuria. To consolidate their economic position Japanese people started the construction of modern steel plants over Manchuria. These plants were short-lived. After Second World War, due to dearth of capital and raw materials, most of the factories were closed.

Meanwhile, isolated attempts were made to set up iron and steel plants at Yiangtze, Shantung etc. Some of these were able to survive and others failed. The surviving industries further suffered set-back when Russian Communist Revolutionaries of China destroyed most of the plants.



After the installation of Communist regime in 1949, serious efforts were made to make China self-reliant in steel production. Due to the implementation of various measures, production gradually increased. Within 1955, production exceeded 1.5 million mark.

Apart from pre-existing Anshan Steel Plants, several plants were constructed during five year plan periods. The new integrated iron and steel plants were set up at Tiensin, Shantung, Paotow, Taiyuan, Wuhan, Shanghai, Chungking, Canton and several other locations.

To make the country self-sufficient in iron and steel production, the famous "back yard" furnace policy were promulgated. The construction of thousands of unplanned furnaces

improved the production marginally. This ambitious project failed miserably to yield desired output. In spite of this failure, the overall production improved considerably within 1960, the country surpassed 18 million tonnes target of steel production.

DISTRIBUTION

The iron-steel centers in China are located in three separate regions. These are –

1. Southern Manchuria.
2. Northern China.
3. Yangtze Valley.

1. **Southern Manchuria**—This is the oldest steel producing area in China. The oldest steel plant is located at Anshan. This plant, which was destroyed by the Russians and Chinese Communists, was later revamped. The plant was first designed by Japanese colonialists. Considering the location of raw materials, this plant is ideally situated. Coal is supplied from Fushan coal deposits and iron ore and limestone is obtained locally. During the initial period, this iron-steel plant was regarded as the largest steel plant in China, though at present production is not very satisfactory. Old and obsolete machines and back-dated technology are the major problems of this steel plant.

2. **Northern China**—Northern China iron and steel producing region stretches from Paotow to Shantung. Large steel plants are located at Shantung, Beijing and Shensi. Coal is obtained from Yangku, iron ore is available in the vicinity. Two large steel plants came into being, one each near Anyang and Yellow river valley.

3. **Yangtze Valley**—Of late, this region became the undisputed leader of iron and steel production. This region stretches from Sanghi to Chungking. The major iron and steel plants are located at Chungking, Wuhan and Sanghi. Coal is obtained in the south of Nan-chang and Chungking. Several hydro-electricity plants in the region provide energy to the plants. The extensive deposits of iron ore in southern Yangtze river provides uninterrupted supply. Most of the plants in this region are integrated.

4. **Other Centres**—There are several other small isolated iron and steel centres located in Southern China. The steel mills near Canton now provides considerable amount of high quality steel.

The phenomenal growth of Chinese iron and steel industry after 1970 enabled the country to meet most of the domestic consumption. Considering the large reserves of iron ore, coal and domestic demand, the future of Chinese iron and steel industry seems to be very bright.

12.4.5 Germany

After the re-unification of East and West Germany in 1990, the country is now one of the major steel producing nations in the world. West Germany was, however, all along a dominant steel producing nation. In 1988, West Germany produced 41.02 million tonnes of crude steel and secured fifth place in the world. The production of steel in this part was very consistent. Till 1978, it was fourth largest producer of crude steel.

Table 12.6

Trend of Crude Steel Production and Consumption—Germany [In million tonnes]

	1940	1953*	1975*	1980*	1985*	1992
Crude Steel production	20	13	46.89	51.15	48.35	39.77
Crude Steel consumption	20.5	18	39.79	44.63	39.99	39.08

Source : US Bureau of Mines, World Bureau of Metal Statistics (UK)

*Data are for West Germany

Germany, as a whole, is rich in coal reserve. The vast coal deposits of Ruhr valley and upper Silesia and enormous iron ore deposits of Lahnsieg, Ergsburg provided excellent opportunities to develop iron-steel industry in the early period. Though the quality of iron ores is of inferior grade, coal deposits are very superior in quality. Apart from domestic iron ore, the country had every opportunity to import coal from neighbouring countries. Before the outbreak of the Second World War, German steel production went up to 20 million tonnes. The large-scale import of pig iron enabled the country to expand its steel industry very rapidly. Due to war compensation, Germany lost the control over Silesian coal deposits. The divided German steel industry between two countries suffered a temporary setback. The Western Germany was able to revive the industry very rapidly. Till 1955, East German production was below 5 million tonnes, in a sharp contrast West German production exceeded 15 million tonnes mark.

Most of the German steel output comes from the Great Ruhr industrial area. The extensive deposits of good quality coal within the region, presence of Ergsburg and Lahn-Sieg iron ore and excellent import facilities through good transportation network helped immensely for the rapid growth of Ruhr iron and steel industry.

12.4.6 France

Till 1973, France was the sixth largest steel producing nation in the world. Since then, though the position has slipped down to eighth, it still maintains a key role in the production of iron and steel.

In 1988, France was able to produce crude steel of 19 million tonnes. Since 1973, production of steel is gradually decreasing in France, because of the declining demand of crude steel in modern manufacturing industries. As scrap is used more and more in the manufacturing industries, decline of steel industry is not an unnatural phenomenon.

Table 12.7

Trend of Crude Steel Production and Consumption

[In million tonnes]

	1913	1929	1950	1960	1973	1978	1983	1990	1992
Crude Steel production	2.30	6.5	5.8	12.2	25.26	22.84	17.62	19.02	*
Crude Steel consumption	-	-	-	-	19.31	16.00	14.00	17.56	16.58

Source : US Bureau of Mines. World Bureau of Metal Statistics, World Resources - 1992-93

The large and very good quality Lorraine iron ore and imported coal from adjacent Ruhr basin of Germany prompted rapid development of iron and steel industry in France. At least three regions emerged as major iron and steel producing districts. These are -

1. The Lorraine Region.
2. The Denain-Anzin Region.
3. The Central France Region.

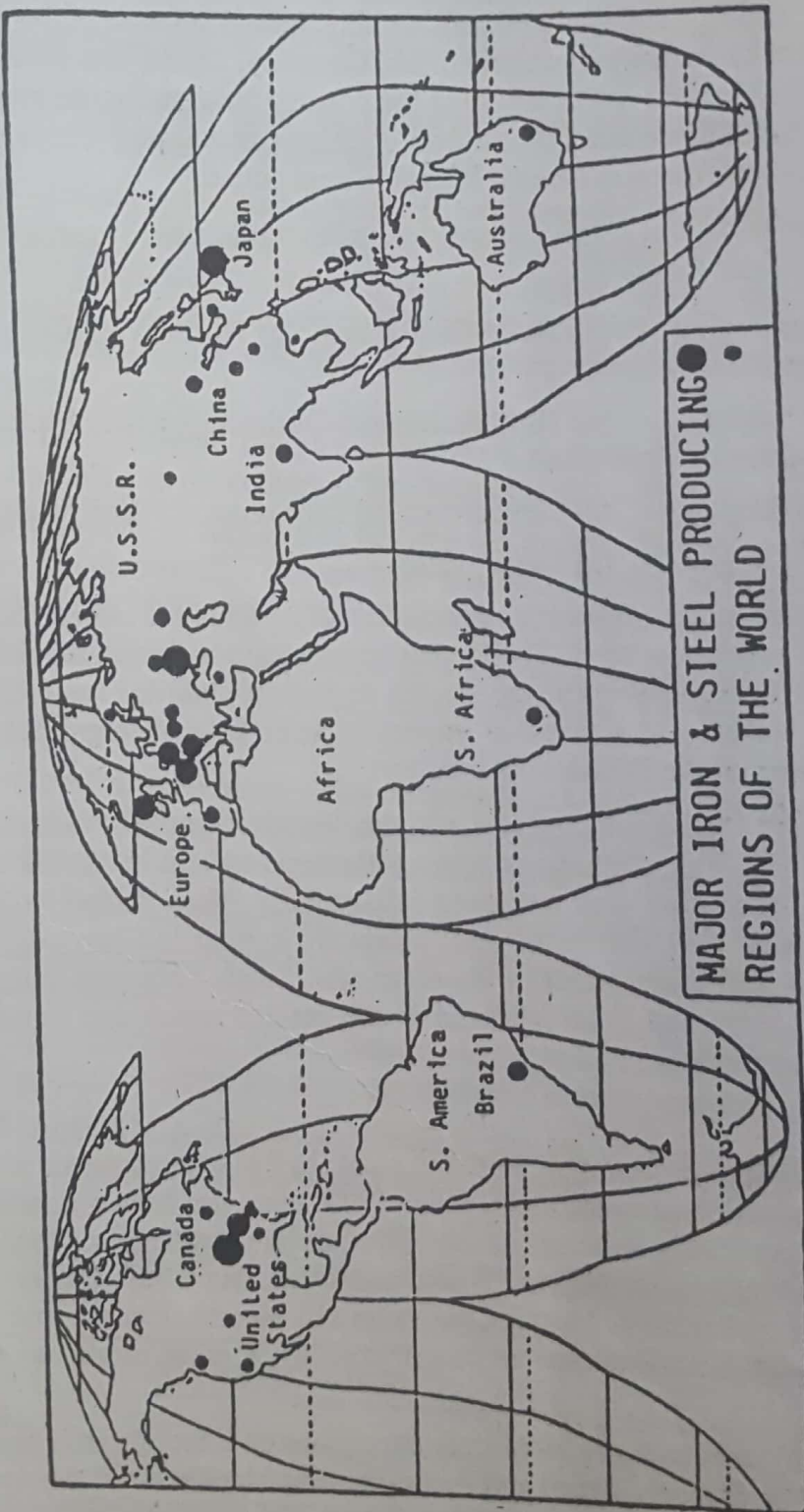
The Lorraine iron-steel region contributes most of the product. Here, Minette ore deposits are of very good quality. Coal is also obtained from nearby Moselle area. Though most of the coal is to be imported from neighbouring countries. The reduction of coal requirement in modern techniques adopted by the plants enabled the region to grow at a faster rate in the middle of the century. The major plants are located around Rombas, Knutange and Moselle.

The industries of Denain-Anzin region uses Lorraine iron ore and imported coal, either from Belgium or Poland.

The central district iron industry is comparatively small in volume. It was developed on local coal reserve. The industry developed here, around Lyons urban area.

12.4.7 Great Britain

Great Britain was the pioneer country in steel making. For centuries, the country achieved such a fame that at one time it alone contributed half of world's iron and steel production. The tragic decline of British steel dominance is one of the most spectacular events in the first quarter of 20th century. The country is now not able to retain herself within the list of top ten iron and steel producing nations in the world, though it secures 10th place in the world regarding consumption.



Since 80's, the production of United Kingdom fell short of 15 million tonnes. Its consumption, however, is greater than 15 million tonnes. The country is now deficient in iron and steel production. In 1988, the country produced only 15.01 million tonnes of crude steel and consumed 15.02 million tonnes.

During the early period of growth the industry used charcoal as fuel, but after the middle of 18th century the discovery of good quality coking coal helped to raise the production level. Within middle of 19th century the iron and steel industry in the country developed so much that output of the industry equalled three-fourths of world production. The industrial revolution and subsequent inventions of different new steel producing techniques, like Bessemer, Gilchrist-Thomas, enabled the country to raise its production rapidly. At the end of 19th century, though production of Britain gradually increased but the relative share of its production to the world's share declined considerably, mainly because of the rapid growth of production in other countries particularly USA, Germany, Japan. The production of USA exceeded Britain in the year 1890. By 1935 the country became fourth, lagging behind to USA, Germany and CIS. In the 70's several countries like Japan, China, Italy, France, Brazil, Korea and even Poland surpassed Britain in steel output.

Through most of the old plants are now not in the production. The original distribution of Great Britain were as follows –

1. Northern Region — (a) North-East Coast, (b) North-West Coast, (c) Scottish Lowland.
2. Eastern Region — (a) Northumberland-Durham, (b) East Midland, (c) North Lincolnshire.
3. Western Region — (a) Cumberland, (b) Lancashire, (c) West Midland.
4. Southern Region — (a) South Wales.

At present, most of the old, worn out manufacturing units are closed and only twenty-five odd units are producing steel. The largest among them is British Steel Corporation, a government owned company entrusted for the revival of steel industry. The large-scale retrenchment of workers and massive import of steel from foreign countries are the characteristic features of the British steel industry.

The depletion of the British coal and iron-ore deposits forced the industries to migrate near coastal regions. The continuous mining through several centuries exhausted the deposits and cost of mining also increased substantially. Now British coal and ores are costlier than imported ore. The major steel plants are located in Glasgow, Teeside in the North-West, Hartlepool and Consett in the north-east, South Yorkshire, South Lancashire, Stanton, Starely, Corby and West Midland in the central region and South Wales, Port Talbot in the south-west and London in the south-east.

12.4.8 Italy

Italy is a consistent producer of iron and steel. In 1988, the country secured seventh position in the production of crude steel. Since 1973, there has been a consistent output in Italy. The country is entirely deficient in raw materials like coal and iron ore. Almost entire industry is dependent on the imported iron and coals. As a late-starter, Italy got the advantage of high technology. Most of the mills use electric furnace and basic oxygen process. Half of the Italian output is contributed by a giant public sector company, 'Italsider'.

Italian iron and steel industry is entirely dependent on imported iron ore. The country imports iron ore from Sweden, Brazil and Australia. Nowadays most of the steel is produced from scraps. Formerly coal had to be imported from UK and Germany, now cheap hydel power substituted coal. The major industries are mostly located along the coast. Important industries are situated at Naples, Genoa, Aosta and Trieste.

Table 12.8
Trend of Crude Steel Production and Consumption
[In million tonnes]

	1913	1929	1950	1973	1978	1983	1986	1992
Crude Steel production	-	-	-	20.99	24.28	21.67	22.9	24.9
Crude Steel consumption	-	-	-	23.65	19.60	18.82	20.5	26.59

Source : US Bureau of Mines, World Bureau of Metal Statistics, World Resources-1992-93

12.4.9 Other Countries

EUROPE—The other major European steel producing nations are Poland, Belgium, Luxemburg, Spain, Holland, Sweden etc.

Poland—Poland is the 10th largest iron and steel producing country in the world. In 1988, the country produced 17 million tonnes of crude steel. In 1987-88, the total consumption of crude steel in Poland was 15.75 million tonnes. So, Poland is a surplus producing country. The vast Silesian coal help Poland to build up a massive steel plant near Nova-Huta and Krakow. The country is deficient in iron ore. It has to import iron ore from CIS and Sweden.

Czechoslovakia—Iron and steel industry is moderately developed in this country. The largest steel plant in the country is Skoda steel plant.

Sweden—Sweden is very rich in her iron ore reserve. Energy is obtained from cheap hydel-power. Swedish steel is of very high quality. The best quality steels are generally exported. This country is not self-sufficient in ordinary steel production.

Holland—This country is deficient in both iron ore and coal. As most of the steel plants are new, productivity rate is very high. The country has to import large amount of steel for domestic consumption.

Belgium and Luxemburg—The reciprocal relationship or symbiotic system of transportation of Luxemburg ore and Belgium coal helped both the countries mutually. The combined production of the two country exceeded 15 million tonnes of steel in 1990.

AUSTRALIA—Australia is very rich in coal deposits. Most of the steel plants are new in Australia. So, the productivity is very high. The important steel plants are New Castle and Port Keembla.

ASIA—Apart from Japan, China (discussed in Part -IV) and India (discussed in Part-C, Chapter-III) the other countries are not very developed in steel production.

SOUTH AMERICA—In South America, the major steel producing countries are Brazil, Mexico, Argentina, Chile, Uruguay and Venezuela.

Table 12.9
Trend of Crude Steel Production—Brazil
[In million tonnes]

	1913	1923	1950	1973	1978	1983	1992
Crude Steel production	-	-	-	7.15	12.11	14.66	24.0

Source : US Bureau of Mines, World Bureau of Metal Statistics, World Resources-1992-93

Table 12.10
Production and consumption of crude steel in different countries

Countries	Production (In million tonnes)					Consumption (In million tonnes)				
	1973	1977	1982	1987	1992	1973	1977	1982	1987	1992
Japan	119.32	102.4	99.6	98.5	98.13	78.98	63.2	69.5	75.7	99.15
United States	136.8	113.7	67.7	80.9	84.3	144.12	133.0	92.3	105.9	93.3
Russian Fed*	131.5	147.0	147.2	161.9	67.0	137.55	146.6	150.5	163.0	131.8
Ukraine	x	x	x	x	42.0	x	x	x	x	x
Germany	49.5	45.9	43.0	44.5	39.8	34.9	43.8	37.9	38.1	39.1
Korea, Republic	1.16	2.7	11.75	16.78	28.0	3.26	5.7	7.6	15.0	26.2
Italy	20.99	23.3	23.99	22.86	24.9	23.65	21.4	21.5	23.5	26.57
Brazil	7.15	11.05	13.0	22.2	24.0	x	x	x	x	x
India	-	9.9	10.7	12.88	18.0	-	9.3	13.9	17.6	20.3
Ten Countries—Total	-	483	454	516	506		492	466	541	539
World Total	697.70	673	644	734	721	704	679	657	744	732

*Before 1992, production refer to USSR, Source—World Resources -1994-1995.

Brazil—The development of the production of steel in Brazil is spectacular. Since 1973, production of steel has witnessed more than 300 per cent increase. The consumption of steel within the country is very low. Therefore, Brazil is able to export bulk of her steel production. Most of the steel industries are located around Sao-Paulo and Curumba. Brazil possesses vast amount of iron ore. The largest of these deposit is located near Minas-Geraes. Other large steel plant is located at Santa Catarina. Most of the mills obtain energy from hydel power plants.

Apart from Brazil, the other South American countries are not very developed in iron and steel production. The Hoa Chi Pato steel industry in Peru, San Nicolas iron and steel region in Argentina, Paz del Rio in Columbia, San Tome de Guayana in Venezuela are other large steel plants in South America.

NORTH AMERICA—Apart from United States, Canada and Mexico are two other noteworthy steel producing nations in North America.

Canada—The Canadian steel industry is not very old. Most of the iron and steel centres were developed around Lake Ontario, Sydney, Nova Scotia. Canada is self-sufficient in the production of iron ore and coal. Most of the coal reserves are located within Nova Scotia and iron ores are located around Sudney. Apart from that, steady supply of iron ore and coal from adjacent USA enable Canada to develop a large steel industry. Some of the major steel plants are, Hamilton, Sault Ste, Ontario, Sydney, etc.

Mexico—Mexican steel industry is as old as American steel industry. The largest steel plant is located at Mouterrey. The others are Monclova, Coahuila, Piebras Negras, and Colima. The Coal is obtained from Salivas area and iron ores from Durango.

AFRICA—Africa contributes insignificant amount of iron and steel. The largest producer in Africa is South Africa. The major producing centres are located at Transvaal and New Castle.

12.4.10 Present Production Trends

During last two decades the total steel output of the world increased considerably. In 1973, the world's production was 697.7 million tonnes, which increased marginally to 709.93 in 1978. There was a big production slump in 1983 when the production came down to 662.79 million tonnes and again registered a sharp increase and the production in 1988 became 721.32 million tonnes. The top ten producing countries namely, CIS, Ukraine, Japan, USA, China, Germany, Brazil, Italy, France, Republic of Korea, and Poland constituted bulk of the production. In 1973, these countries produced 76.4% of the total production which was slightly decreased to 73.06% in 1983, and again marginally dropped to 71% in 1988. So, it can be said that production of iron and steel is largely concentrated in some selected countries. Production of these countries are given in Table No. 12.10.

Though there has been steady increase of world production in the volume of iron and steel production, the production of crude steel in traditional countries like USA, Japan, Italy, Germany is gradually decreasing. Iron and steel industry is no longer considered the mainstay of the industrial economy. The use of scrap as raw material largely reduced the requirement of pig iron production. The technology oriented industries like automobiles, computers require very low amount of fresh steel. In developed countries of Western Europe and USA, the traditional industries suffered massive set-back. So, output of steel also declined, keeping pace with decreasing market. In fact, from the middle of the 70's the old traditional mills closed down their units.

The Third World countries, meanwhile, are advancing rapidly in the production of crude steel. Asian countries like South Korea, India and Brazil of South America are rapidly expanding their iron and steel industry.

INTERNATIONAL TRADE

USA is the traditional iron and steel exporting country. The other exporters are Japan, Germany, Netherlands, Italy, Belgium and Luxemburg. At present, Japan is the largest exporter of steel followed by Germany, France, Belgium, Luxemburg, Netherlands, South Korea, Italy, USA and Taiwan. These countries export more than 80 per cent of the international export.

12.5 COTTON TEXTILE INDUSTRY

Cotton textile industry is the oldest among all manufacturing activities. The history of cotton textile industry can be traced even in the early phase of human civilization. The sign of the existence of cotton textile industry was well established in all the early civilizations like Indus Valley, Egyptian, Vedic, Roman etc. In fact, since inception, textile industry in its varied form was highly diffused in character.

Even today, perhaps this industry is most widespread industry throughout the world. As far as capital involvement and labour participation is concerned, undoubtedly cotton textile industry is unmatched in the industrial world. Almost every country in the world is now engaged in the manufacture of textile products. This traditional industry had undergone a sea-change in its long history, but basic characteristics of the industry remain unaltered.

Cotton textile industry is a labour-intensive agro-based industry. Worldwide textile industry provides jobs to millions. Though the requirement of labour is entirely dependent on technological advancement of the country, compared to other industries labour involvement is very high in textile industry.

According to the nature of the products., textile goods may be subdivided into three principal groups. These goods are produced in different stage of manufacturing. These groups are :

- I. Textile and textile products.
- II. Apparel goods.
- III. Products for other use.

The textile and textile products cover a wide variety of goods. The production process are tier based. At least three tier production process is required for the manufacturing of textile goods, e.g. spinning, weaving and manufacture of piece goods.

The apparel production is the extension of textile industry. It produces commodity for direct consumption of the people.

12.6 LOCATION OF THE INDUSTRY

Any unplanned industrial concentration, in its advanced stages, has to face several socio-economic disadvantages. A scientific and planned location is only able to maximize profit by minimizing the cost. Cotton textile industry is no exception. To reduce the total expenditure of production and marketing, and sustainable growth in future, the industry has to find out the least cost location. Like other manufacturing industries, the cost of labour, market and transport plays pivotal role in the selection of industrial location.

According to Weberian terminology, cotton as a raw material is pure in nature. The ratio of raw cotton and finished product, i.e., cloth, is same. So, material index of raw material is unity. It has been estimated that weight loss of raw cotton during manufacture is negligible. For example, one tonne raw cotton produces one tonne of yarn. This amount of yarn also produces one tonne of cloth. As there is no weight loss of raw material in the manufacturing process, according to Weberian hypothesis, raw material cannot exert significant influence on the locational pattern.

In this case, cotton textile industry may be located either in market, raw material or in any intermediate location. Whatever be the location, transport cost would not change.

As transport cost is unable to exert any considerable pull, the other factors like wage rate of labour, market facilities, availability of raw material, climate, power and agglomeration of industries determine the location.

The general trend of the location of textile industry reveals that three types of location are preferred by the entrepreneurs. These are :

1. The textile centres located within market
2. The textile centres located within raw material source.
3. The textile centres developed between those two regions.

According to least cost location concept, the market location should be most preferred. If power and cheap labours are available within market, the production cost will be minimum. The market situated within cotton producing area will, of course, be most lucrative location. However, this is a rare combination. Bombay, Ahmedabad in India, Shanghai in China, Tashkent in CIS and Atlanta in USA represent this type of location.

Formerly, climate used to play dominant role in the location of cotton textile industry. Most of the industries in last centuries were developed in regions of mild and humid climate. In dry regions, breakage of thread was the major obstacle for both weaving and spinning. The classical example of climate guided locations were in Bombay in India and New England in USA

Textile goods, particularly demand of clothings, are always fashion-guided. In most of the cases, textile goods are conspicuous in nature. With the passage of time, fashion of the society and taste of the consumer changes markedly. To keep pace with the changing fashion and to be aware of the modified taste of consumer textile mills, which produce clothings, set up their units near the market. For example, in its early growth, US textile mills were established in New England, i.e., vicinity of the market; though the bulk of the cotton were produced in the southern states. Since Tsarist period, cotton is largely grown in the Asiatic CIS but textile mills were primarily concentrated in its European counterpart, mostly in the Moscow-Tula and Ukraine market region.

So, regarding the localization of cotton, the factors are complex. The factors of localization varies spatially. Even the social and economic conditions of the region controls the site selection. The reasons are also very dynamic in nature. Unlike other industries, locational factors are also not static. In fact, from time to time, locational pattern changes. For example, the New England State in USA is no longer an ideal location for the growth of the industry. It has lost much of its earlier advantages. The industry has been shifted towards the cotton growing tracts of southern USA. In Russia, a migratory trend of textile mills towards the Asiatic cotton growing tracts has been visible. In India, for instance, the Bombay-Ahmedabad textile centres are also loosing their previous significance and new centres are being set up around the local markets.

It can be said that, with the disappearance of original advantages, industries are showing a centrifugal tendency from the region. The new centres are taking the place of declining traditional centres.

A historical analysis of the locational pattern reveals that, at its earlier period of growth, textile mills were developed towards raw material source, because at that time transportation system was ill developed. Away from the cotton growing region, availability of raw cotton was also very low. Naturally, due to higher demand, prices of raw cotton was high at the distant places. But in its second phase of development, rapid progress of transportation system facilitated easy accessibility within the region. At that time, price of

raw cotton became same both near the raw material source and the market. Naturally, market became favourite for plant location. The importance of raw material gradually lost its previous importance.

The importance of power in the localization of cotton textile industry cannot be underestimated. At initial period of development, textile industries were mostly located adjacent to water source. But with the introduction of coal, water site was no longer important but the availability of coal continues to play an important role in the determination of location.

Basically, cotton textile industry was a labour intensive industry. The early history of localization in any country shows that development of cotton textile industry was a prerequisite. The need of clothings and requirement of low level of technology enabled the entrepreneurs to set up the industry. A least training was enough for the labourers to be acquainted with the production system. At that time, wage rate of the labours was also very low. The wage rate of the labour was an important consideration for the location. A slight hike of the wage rate made a lot of difference between one place and another. For example, New England textile centres in USA shifted towards Piedmont because of prevailing wage rate.

In some cases, specialization in a particular product and the general quality of the product helped a lot to sustain development. In these cases textile industry thrive for export market. The development of Lancashire region in England and Tokyo-Yokohama in Japan depended heavily on foreign market.

12.7 THE RECENT TREND IN LOCALIZATION

The recent trends in the development of textile industries are distinctly different in developed countries like USA, Japan, UK, and developing and underdeveloped nations like China, India, Bangladesh etc. But the general observations revealed that the basic trends in location of textile and apparel industry is diffusion.

In highly developed countries of Western Europe, Japan and USA, production of traditional goods is no longer important. These countries now concentrate on the production of quality goods rather than coarse fibre production. The import of primary products from underdeveloped countries are cheaper to produce it within the countries. These imported goods are treated as raw materials and used for quality production. The technical know-how of the developed countries are now acting as their capital. These restricted technology creates an advantage to the advanced nations. So, the role of underdeveloped countries are now considered to be a mere raw material supplier.

The automation and high wage rate of the labour forced the countries to adopt a capital intensive manufacturing activity, rather the former labour intensive activity.

But, compared to the other manufacturing activities, cotton textile still require comparatively low amount of capital. The traditional top-ranking nations in cotton textile industries, like USA and Japan, are now facing steep competition from the emerging countries like Taiwan and South Korea.

Textile and apparel industry is considered as a basic industry. All the developing countries are now trying to develop their indigenous industry, due to increasing competition in the international as well as in the home market from advanced textile producing nations. To resist the invasion of foreign products, textile industry is becoming more and more knowledge intensive. Least cost factor also plays a dominant role. The innovation of synthetic fibres are posing major problems for the growth of textile industry. To face this steep competition, improved variety of looms like shuttle less loom and air-jet looms were introduced for higher production.

The locational factors of cotton textile industry is so complex that it is very difficult to ascertain the reasons liable for concentration of industries in a particular region. The original factors are no more existing but the new factors are also ever changing. The factors responsible for location of her cotton textile industry in USA may not be applicable to India. The omnipresent market of cotton textile industries throughout the world is, perhaps, responsible for the dispersed or diffused nature of cotton textile industry.

12.8 DISTRIBUTION

12.8.1 United States

The United States of America is one of the front-runners among the textile manufacturing countries. Though the industry had to overcome several hurdles from the very early period of growth, the country maintained her lead position in textile production.

The first cotton mill was established within Rhode Island in 1790. Since then, numerous industries were set up in the USA.

The development of the US textile industry had gone through two distinct phases. The first phase of development had experienced the ascendancy of New England areas as a seat of cotton textile industry and the second phase was the tragic downfall of New England and rise of the southern states as textile producer. This shift of location was an unique event in the manufacturing history of the world.

Development during first phase :

In the late 18th century, New England and adjacent areas were developed at a very rapid pace. The areas bounded by the Merrimac river and Fall river grew at a faster pace. The adjacent areas of the Massachusetts, Providence attracted a large number of cotton mills within its territory.

Several factors proved advantageous for this massive growth of New England at that period. These were :

1. Development of water power from small, turbulent streams.
2. The skilled labourers were available in the vicinity. They had the traditional expertise of spinning and weaving. The local inhabitants collected and gained the knowledge from the emigrants of Great Britain.
3. The facilities of export and import of materials through the ports of Boston and Providence.
4. The humid climate of New England. The climate of New England was most suitable for spinning.
5. Large financial help from the local urban tycoons.
6. Cheap female worker from the surrounding regions.

Despite all these advantages, New England region gradually lost all of its glory. The industry started shifting from this region to the southern part of the country.

Development during second phase :

At the early quarter of 20th century, the New England region literally experienced a textile boom. The textile industry attained such a high degree of development that it was regarded as the 'textile capital' of the world. At that time, more or less 90 per cent of the textile goods was produced by New England.

The cotton was then largely imported from the southern cotton growing districts. In south, the absence of the advantages enjoyed by New England was liable for the poor growth of textile industry. But the supremacy of the New England area did not last long. The initial

advantages of low price of land, cheap labour and port advantages lost their significance with the passage of time. The machines became obsolete, cost-benefit ratio became unfavourable due to low productivity, the increasing rent of the land, high wage rate, housing problems, switch over to electric power from traditional water power and above all dearth of raw material supply posed obstacles to the New England textile mills. These mills became obsolete.

The decline of the New England mills and rise of the southern textile industry are closely related. The humidity factor which was regarded as the major obstacle for the development of textile mills in the south had no meaning when air-conditioning system was introduced.

From the very early periods, the southern Piedmont planes of Georgia, Florida, Carolina, Alabama, Virginia, Tennessee and Kentucky were the producers of most of raw cotton in the country. To ensure the steady supply, textile mills gradually shifted towards cotton-growing regions. The major reasons for migration of the textile mills to the southern states are as follows :

1. Easy access to abundant raw cotton within reach.
2. Relative advantage of transport facilities, due to proximity and assured availability.
3. Relative advantage of labour cost played a vital role in the development of the southern textile mills. The surplus agricultural labours were absorbed in the industry at a much cheaper rate than New England.
4. Development of electric power in the southern states also played a vital role in shifting the industry.
5. The new textile mills in the south adopted latest technology and sophisticated machines for the production. Therefore, quality of the product was superior than the New England counterpart.
6. The low trade union activity.

At present, the southern textile centres have a distinct superiority in the textile production. The textile plants in the Georgia and both the Carolinas are dominating the US. textile industry. Even in the case of synthetic fibre production, this region has an edge in production over other textile producing centres.

Present position :

In spite of the overall growth of the US industry, in recent years it is facing keen competition from the upcoming textile producing countries like Japan, Taiwan, Korea and India. The low production cost gives these countries distinct advantage over the US textile industry.

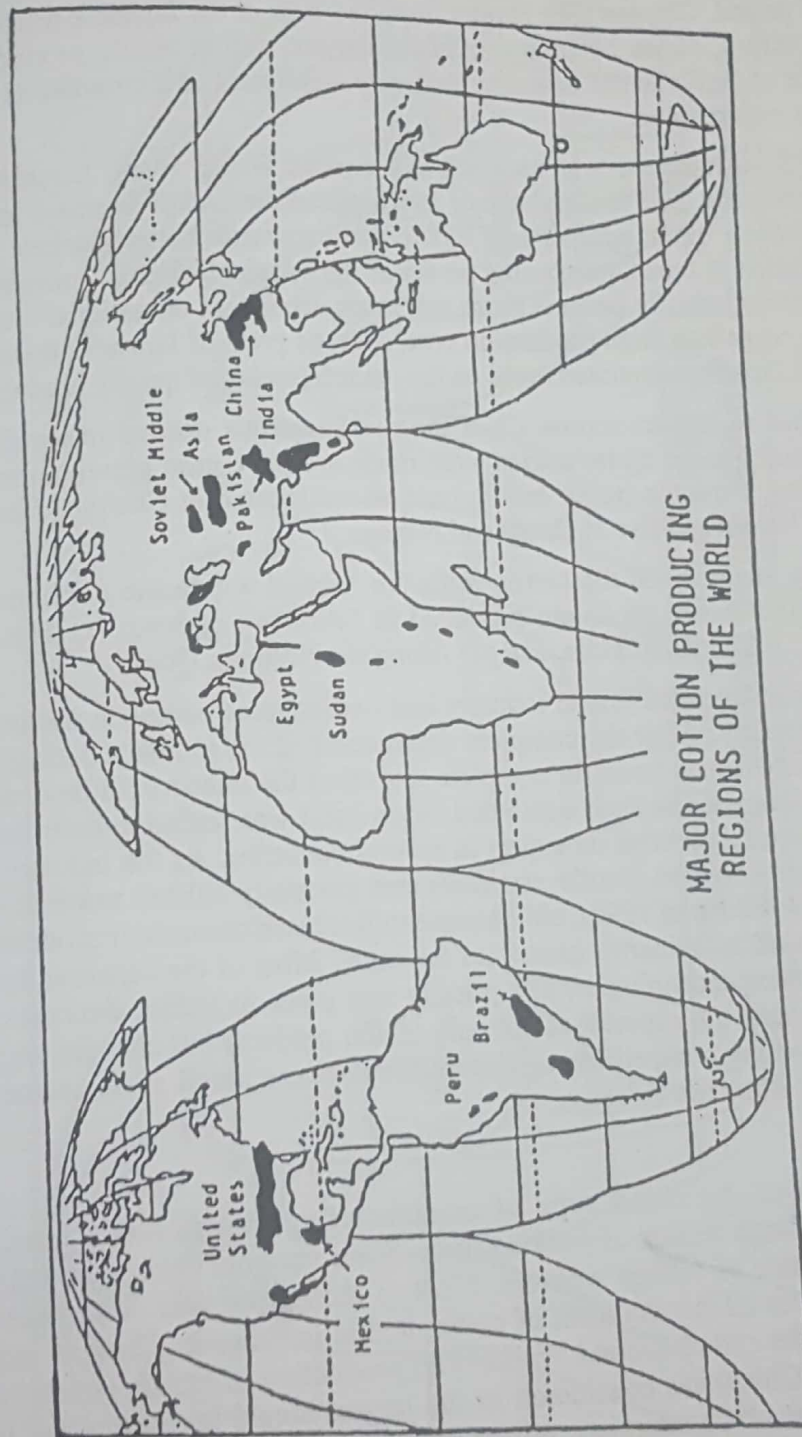
12.8.2 CIS

The first textile plant in the former Soviet Union was established in Ivanovo, near Moscow. Since then, the industry has undergone a sea-change in production. After the first quarter of the 19th century, after meeting the domestic requirement, the country started to export some of her surplus product.

After the downfall of Tsarist period, sound policy of Communist regime, large domestic market and excellent productivity rate per worker enabled the country to increase the existing capacity many more times. The decentralization policy of the new rulers forced the industry to disperse in the interior region from its former Moscow-Tula-Ivanovo-Oblast location.

The increased cotton production in the Ukraine, Caucasus, Kazakh Upland and Crimea attracted number of industries. The old industries were modernized and uneconomic plants were closed down. The age-old Moscow-Tula textile centres started to produce quality goods

instead of large-scale production. Apart from the old Ivanovo-Leningrad regions, new centres have developed near Tashkent, Stalinabad, Askabad, Kirovabad and Georgia. At present, there are 13 million looms working in the CIS with an annual production of more than 8,000 million square metre cloths.



12.8.3. Japan

Prior to the industrial boom after Second World War, cotton textile industry was the fore-runner among the various industries. Despite the loss of relative importance, textile industry still constitute more than 12 per cent of the value of total industrial production of Japan. Unlike the large textile mills of other countries, Japanese textile producing centres are still very small. Most of the yarn production comes from innumerable small centres, scattered all over the Japanese archipelago.

The beginning of textile industry in Japan dates back to 1867, when the first textile mill took its birth in the vicinity of S. Kyushu.

Till the outbreak of Second World War, Japanese textile industry grew at a much faster rate. The growth rate was so high that soon it surpassed the production of Britain. During the initial period, Chinese yarn market imported bulk of the Japanese product. At the middle of 20th century, Japan became one of the largest cotton textile producing nations. The importance of textile in her economy was very significant as it contributed more than 30 per cent of the export value.

After Sino-Japanese war and two subsequent World Wars, Japan lost much of her Chinese yarn trade. Due to shrinkage of international demand of Japanese textile product, the industry had no other options left but to look towards home market. Due to massive industrialization in Japan, purchasing power of the people decreased considerably. Gradually Japanese textile industry became more and more dependent on national market. Due to rise of workers, wage rate, high production cost, average price of Japanese textile products have gone up and Japan concentrated more on the manufacturing of quality products.

Japan has to import almost all of the raw materials needed in textile industry. The pioneer attempts to set up industries were made around cotton growing tracts of Nobi and Kanto regions. Now the major textile centres are located at Chukyo, Hanshin, Toyama, Kyushu and Keihin and also at Osaka and Nagoya.

Spatially, majority of the cotton mills are located within the northern half of Japan. The bulk of the textile goods are produced in following regions: (1) The Kwanto Plain, (2) Nagowa, (3) The Kinki Plain, and (4) Along the Northern Coast.

As a whole, Japanese textile industry had undergone a complete metamorphosis from that of 17th century. After the complete destruction of the industry during Second World War, it took only fifteen years for complete revival of the industry. In fact, within 1960, the textile export increased in such a rate that Japan itself was forced to curb the export. Later on, it had to face restrictions on export in several countries. As the industry became more and more export-oriented, textile establishment gradually shifted towards coasts. At the beginning of the decade of 1990s, old obsolete mills closed down their productions. The new mills with updated machineries came into the same. Most of the Japanese textile mills are now using the latest technologies. The priority was given to reduce the cost of production. Soon, Japan became the exporter of not only textile products but also the textile machines. At present, a healthy competition is discernible between small scale sectors and the big industrial estates of textile industry.

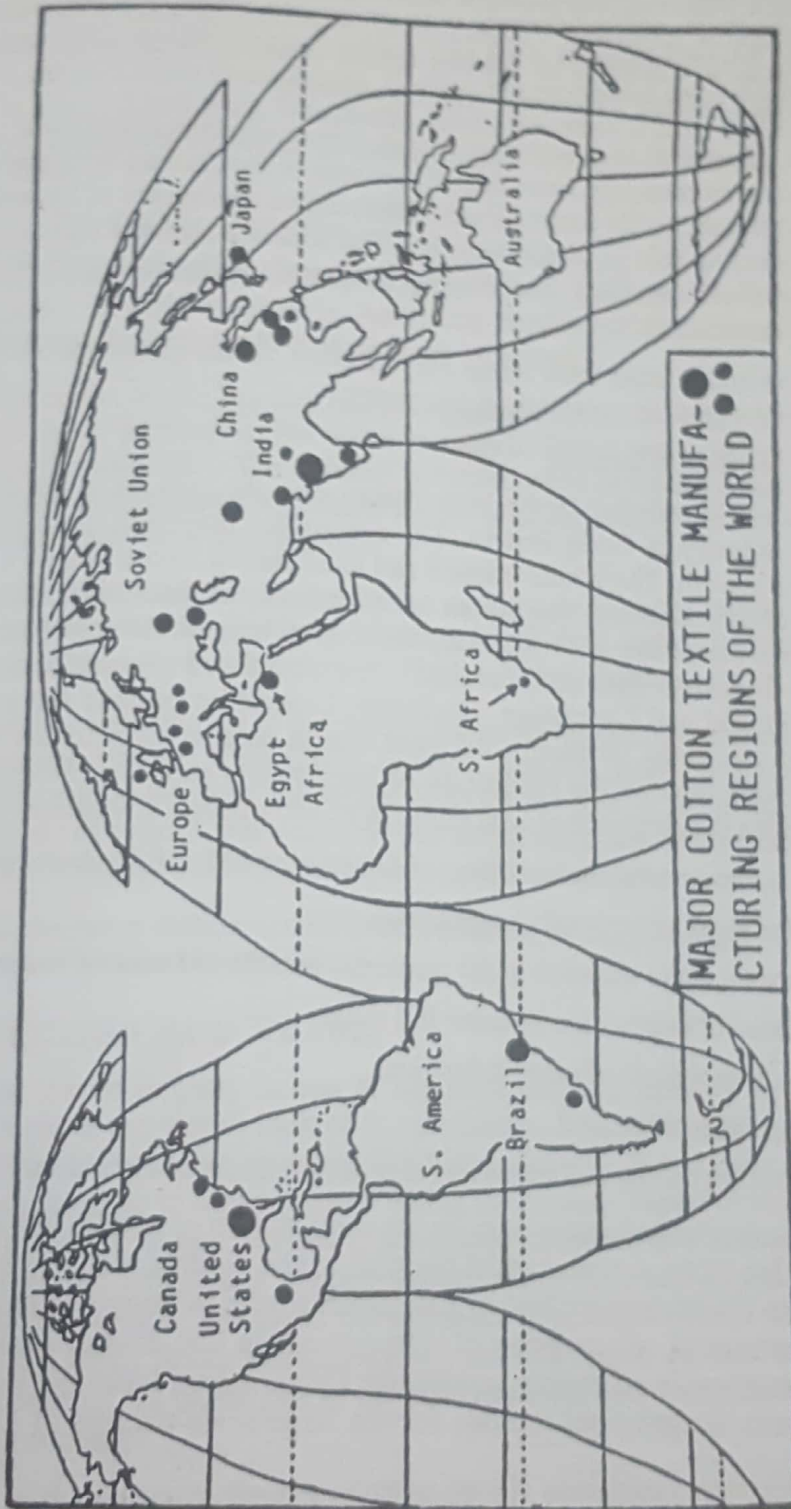
12.8.4 China

This is one of the oldest type of manufacturing industry in China. It provides employment to a large section of working force. Since very old days, weaving and spinning was normal practice of village weavers. Most of the output was contributed by cottage industries. The over-all development of cotton textile industry in China is indeed a recent phenomena. Till the end of Second World War, production of textile goods in China were insignificant and China was considered as the largest single textile market in the world. After the take over of Communists, proper efforts were taken to develop national textile industry. In the Five Year Plan period from 1953, priorities were laid down to achieve self-sufficiency in the production of textile goods. Even today, one quarter of the production is contributed by the village households. The communes introduced independent co-operatives for the development of textile goods.

DISTRIBUTION

The textile mills are distributed throughout China. The dominant centres are Shanghai, Manchuria, Tienshan, Beijing, Chuang, Nanchang and Lanchow.

Shanghai is the oldest centre. At its initial stage of development, foreign capital, technology and management were responsible for the growth. This centre was primarily constructed for the manufacturing of coarse variety goods.



The Manchuria textile units were mostly developed by the colonial Japanese. During Second World War and Communist Movement, most of these mills were destroyed.

During Five Year Plan period, stress was given for the development of smaller units. Several units were developed within Yangtze river valley. At present, more than 55 per cent of the mills are concentrated within the rectangle formed by Tientsin, Shantung, Shanghai and Kaiteng. In the southern Hwangho river valley, Honanfu is the major textile centre,

where quality goods are produced. In the Yangtze river valley, textile mills are concentrated within Chungking and Hankow.

Tientsin was one of the oldest textile producing centres of China. The textile mills and woollen factories, however, lost their pre-eminence after the initiation of Communist rule. The Beijing-Hankow industrial conurbation including the smaller towns of Paoting, Singtai, Chengchow, emerged as leading textile centres. Even today, these mills are operative. Tsingtao became famous for carpet production.

Of course, among all the textile-producing centres, Shanghai was most important. At one stage, this region produced more than 70 per cent of the Chinese textile production. The emergence of different textile centres lowered the relative importance of Shanghai, but it still maintains dominating role in textile industry. The adjacent Hankow region now produces huge amount of textile products. The Wushan integrated textile plants contribute significant amount of cotton products.

The Canton textile units were set up very recently. As the plants are modern, output of textile goods per worker is very high in this region.

12.8.5 The United Kingdom

The Industrial Revolution in the 18th century gave the impetus to the development of cotton textile industry in Great Britain. The subsequent invention of spinning machines encouraged the growth. The humid climate and local skilled labour helped a lot during the initial period of development. The cotton textile industry in the United Kingdom attained such a high fame that at end of 19th century the country became the undisputed leader of the cotton textile industry. The early centres were developed around Scottish lowlands, Nottingham, Ireland and Lancashire. Gradually, Lancashire became the most developed textile centre in the world. Gradually, the other centres became insignificant and Lancashire earned world-wide fame in the production of high quality products. Several factors were responsible for the development of Lancashire in its early phase. The factors were :

1. The optimum climatic condition of Lancashire with mild humid climate.
2. Skilled local labours and cheaper wage rate.
3. Abundant water resource in the proximity and the softness of water.
4. Presence of coal within Pennine hill range.
5. Low development of other industries.
6. Cheap price of the land.
7. Undulating rolling plain land and low development of agriculture.

All these factors helped immensely for the early growth of textiles in Lancashire region. Lancashire region alone contributed 50 per cent of the world's production till First World War. Since then, the relative position of Lancashire textile industry decreased considerably. The overall decrease of consumption of cotton goods in UK, loss of overseas market and emergence of new textile-producing nations like China, Japan, India and worn out condition of the mills were the principal reasons for the large-scale decline of Lancashire cotton industry.

The growing trade union activities, low productivity of the labour, outdated machines and use of substitute materials gave severe blow to Lancashire industry.

Since Second World War, the industry was able to revive some of its lost ground though the early dominance was gone for ever. At present, United Kingdom is not considered a major textile-producing nation. At least 15 other countries produce more textile goods than United Kingdom.

12.8.6 Germany

Germany is one of the leading producers of cotton textile. It is the seventh largest producer of textile goods. The history of cotton textile industry in Germany is quite old. Initially, the industry was set up depending upon imported cotton. Most of the industries were developed along the Rhine river valley. The Ruhr industrial region soon became a leading textile centre. Unlike Great Britain, German textile centres were dispersed in nature and smaller in scale. Apart from Westphalia, Ruhr, the other textile centres are situated within the urban markets of Frankfurt, Munich, Bremen, Zwickaw, Chemnitz, Hamburg and Wupper river valley.

12.8.7 Other Producing Countries

Among the other producing countries, Italy, France, Switzerland, Belgium, Poland, Spain in Europe, Brazil, Mexico in American continents and HongKong, Egypt, Bangladesh, Pakistan in Afro-Asian continents are important.

The French cotton textile industry had a long history. From the beginning, France was deficient in raw cotton production. The textile industry in France was developed on imported cotton, particularly from USA. The industry is concentrated in the north-eastern industrial regions. The major textile-producing centres are Belford, Kolman, Nansi etc. France is self-sufficient in the production of textile goods.

Italy is the other major textile-producing country in Europe. Italian industry was basically market-oriented. Ample cheap labour and sufficient hydro-electricity helped the industry to grow. The major textile centre are Naples, Milan, Bergamo etc.

In Switzerland, northern part of the country possesses some noted cotton textile centres. The most important centre is Saint Galen. In South America, Brazil is the most important textile-producing nation. Most of the textile factories are new. It is the major supplier of cotton piece goods in entire Latin America. The textile mills are located around the urban centres of Rio De Janeiro, Sao Paulo, Rio Grande and Minas Geraes.

Mexico is the other cotton textile manufacturing country. Larger textile units are concentrated around Mexico city and Orizaba.

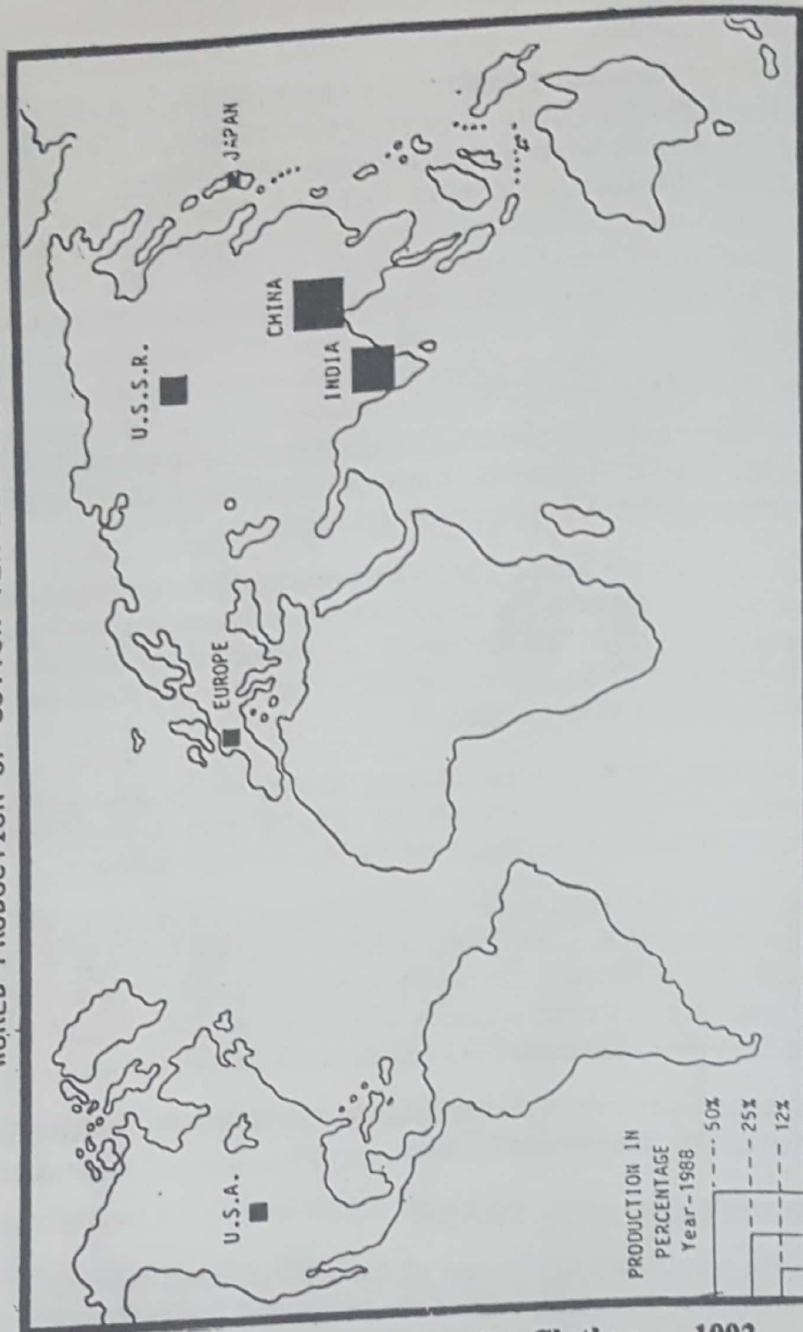
12.9 PRODUCTION AND TRADE

Though the textile industry is one of the most diffused industry in the world and developed throughout the world, bulk of the production comes from few countries in the world. The traditional producing countries like China, Japan, CIS and India contribute most of the production; but, due to heavy demand within the country, export of these countries are gradually coming down. In fact, the newly developed countries like Taiwan, South Korea, Hongkong, Singapore, Brazil and Mexico exports more than half of the total export of manufactured textile goods. The rapid development of synthetic fibres in the developed countries like USA, Japan, South Korea, Germany and CIS largely reduced the production of cotton textile products. The cheap rate of the products from new countries also reduced the export of leading countries.

According to the available figures of 1988-89, six countries comprising China, India, USSR, USA, Japan and Italy produced 73.26 per cent of the world's production in 1987. China secured first position in the production of cotton textile clothings followed by India, USSR, USA and Japan. The production of different countries are given in the Table on next page.

Japan is the leader of the export of cotton textile products. Nowadays Taiwan, Hongkong and South Korea also export substantial amount of textile products. India and Germany, after meeting their domestic requirement, export some amount of textile products.

WORLD PRODUCTION OF COTTON TEXTILE CLOTHES



Production of Cotton Textile Clothes - 1992

Countries	Production [million sq. mts.]	Percentage of Production
1. China	16,850	25.22
2. India	12,500	21.55
3. CIS	8,670	14.55
4. USA	3,220	8.66
5. Japan	1,470	3.28
6. Brazil	2,162	2.71
7. France	890	1.57
8. Poland	837	1.46
9. Czechoslovakia	450	1.40
10. Hong Kong	820	1.26

Source : Statistical Year Book - 1988

12.10 THE WOOLLEN TEXTILE INDUSTRY

The woollen manufacturing industry is perhaps older than cotton textile. Long before Industrial Revolution, woollen industry developed mostly at a local and cottage industry level. Since then, the industry had experienced a complete metamorphosis. The present day woollen factories mostly use sophisticated machines.

Location

Wool, as a raw material, is impure in nature. During process, weight loss ratio is quite high. So, the industry should be located, at least in theory, near raw material source. Though, the general distribution of woollen industry all over the world suggests that market exerts maximum influence on the locational pattern. Most of the highly productive woollen manufacturing units are located within the markets of Western Europe. On the other hand, the principal wool producing areas of southern hemisphere are not very developed in the manufacturing of woollen goods.

Raw wool is prepared in the temperate and sub-tropical areas. Though sheep rearing is a popular occupation in the sub-tropical countries, specially by nomadic herders, most of the woollen product is generally consumed by high latitude people. Most of the raw wools are produced in the regions of :

1. The Oceania region, comprising New Zealand and Australia.
2. The Latin American region, comprising Peru, Argentina, Uruguay, Colombia and Bolivia.
3. The South African region.

These three regions together contribute more than half of the raw wool requirement of the world. Though sheep rearing and wool production is highly developed in this region, woollen industry as such is not very developed in the region. Several geo-economic reasons are responsible for the poor development of woollen industry within the wool producing regions. The major reasons are :

- I. The countries like New Zealand, Australia, Argentina is situated in the sub-tropical region. The winter is not too harsh. The local consumption is, therefore, not very high.
- II. These countries are industrially ill-developed. The necessary infrastructure for woollen industry is absent.
- III. These sparsely populated countries cannot provide large market.
- IV. The manual labour is expensive and inadequate in these countries.

DISTRIBUTION

The bulk of the wool is produced by a handful of developed countries; e.g. Soviet Union, USA Japan, UK, Germany, China, France and Italy. Almost all the countries in Europe produce at least some amount of wool.

The major consumers are also the countries of Europe, USA and Canada. Europe alone consumed more than half of the wool products. Though Europe is moderately developed in her wool industry, it is a deficit country in wool supply, as demand exceeds the production. The harsh, chilly cold in the greater part of the year is the principal reason for the high demand of woollen goods. On the other hand, Asian countries, like Japan and China, possess milder climate and export sizable amount of woollen product. The leading woollen goods producing countries are : Soviet Union, Japan, United States, United Kingdom.

12.10.1 CIS

The CIS is having innumerable sheep and goat population. In 1988, the number of