

Industries



Journey begins...



*...paper made...
...recycle...*

Have you ever given a thought to the fact that the note book you use for writing has come to you after a long process of manufacturing. It started its life as part of a tree. It was cut down and transported to the pulp mill. There the wood of the tree was processed and converted into wood pulp. The wood pulp was mixed with chemicals and finally changed into paper by machines. This paper found its way to the press where ink made from chemicals was used to print the lines on the pages. The pages were then bound in the form of a note book, packed and sent to the market for sale. Finally, it reached your hands.

Secondary activities or **manufacturing** change raw materials into products of more value to people. As you have seen pulp was changed into paper and paper into a note book. These represent the two stages of the manufacturing process.

The paper made from pulp and cloth made from cotton have had value added to them at each stage of the manufacturing process. In this way the finished product has more value and utility than the raw material that it is made from.

Activity

Trace the journey of your shirt from a cotton field to your wardrobe.



Industry refers to an economic activity that is concerned with production of goods, extraction of minerals or the provision of services. Thus we have iron and steel industry (production of goods), coal mining industry (extraction of coal) and tourism industry (service provider).

CLASSIFICATION OF INDUSTRIES

Industries can be classified on the basis of raw materials, size and ownership.

Raw Materials: Industries may be agro based, mineral based, marine based and forest based depending on the type of raw materials they use. **Agro based industries** use plant and animal based products as their raw materials. Food processing, vegetable oil, cotton textile, dairy products and leather industries are examples of agro-based industries. **Mineral based industries** are primary industries that use mineral ores as their raw materials. The products of these industries feed other industries. Iron made from iron ore is the product of mineral based industry. This is used as raw material for the manufacture of a number of other products, such as heavy machinery, building materials and railway coaches. **Marine based industries** use products from the sea and oceans as raw materials. Industries processing sea food or manufacturing fish oil are some examples. **Forest based industries** utilise forest produce as raw materials. The industries associated with forests are pulp and paper, pharmaceuticals, furniture and buildings.

Activity

Give some examples of agro based industries.



Size: It refers to the amount of capital invested, number of people employed and the volume of production. Based on size, industries can be classified into **small scale** and **large scale industries**. Cottage or household industries are a type of small scale industry where the products are manufactured by hand, by the artisans. Basket weaving, pottery and other handicrafts are examples of cottage industry. Small scale industries use lesser amount of capital and technology as compared to large scale industries that produce large volumes of products. Investment of capital is higher and the technology used is superior in large scale industries. Silk weaving and food processing industries are small scale industries (Fig 5.1). Production of automobiles and heavy machinery are large scale industries.



Fig 5.1: Stages in food processing of Gorgon nut (makhana)

Ownership: Industries can be classified into private sector, state owned or public sector, joint sector and cooperative sector. **Private sector industries** are owned and operated by individuals or a group of individuals. The public sector industries are owned and operated by the government, such as Hindustan Aeronautics Limited

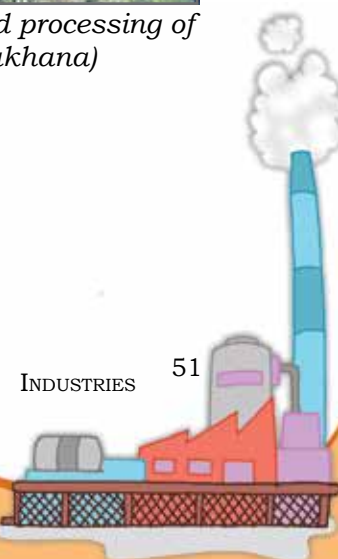




Fig 5.2: Sudha dairy in Co-operative sector

and Steel Authority of India Limited. **Joint sector industries** are owned and operated by the state and individuals or a group of individuals. Maruti Udyog Limited is an example of joint sector industry. **Co-operative sector** industries are owned and operated by the producers or suppliers of raw materials, workers or both. Anand Milk Union Limited and Sudha Dairy are a success stories of a co-operative venture.

FACTORS AFFECTING LOCATION OF INDUSTRIES

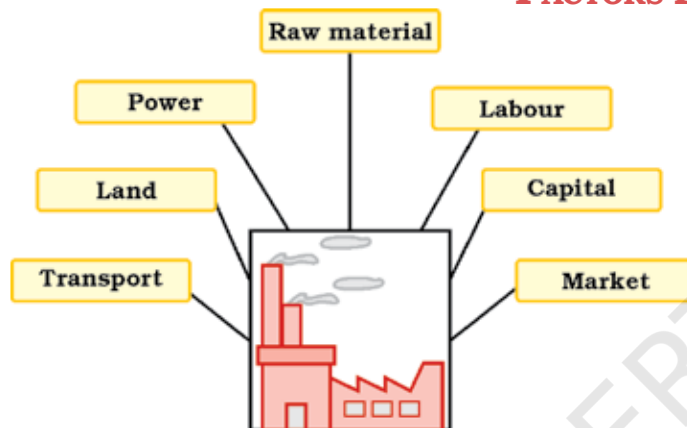


Fig 5.3: Locational factors for industries

The factors affecting the location of industries are the availability of raw material, land, water, labour, power, capital, transport and market. Industries are situated where some or all of these factors are easily available. Sometimes, the government provides incentives like subsidised power, lower transport cost and other infrastructure so that industries may be located in backward areas. Industrialisation often leads to development and growth of towns and cities.

INDUSTRIAL SYSTEM

An industrial system consists of inputs, processes and outputs. The inputs are the raw materials, labour and costs of land, transport, power and other infrastructure. The processes include a wide range of activities that convert the raw material into finished products. The outputs are the end product and the income earned from it. In case of the textile industry the inputs may be cotton, human labour, factory and transport cost. The processes include ginning, spinning, weaving, dyeing and printing. The output is the shirt you wear.

Activity

Find out the inputs, outputs and processes involved in the manufacture of a leather shoe.

INDUSTRIAL REGIONS

Industrial regions emerge when a number of industries locate close to each other and share the benefits of their closeness. Major industrial regions of the world are eastern North America, western and central Europe, eastern Europe and eastern Asia (Fig 5.4). Major

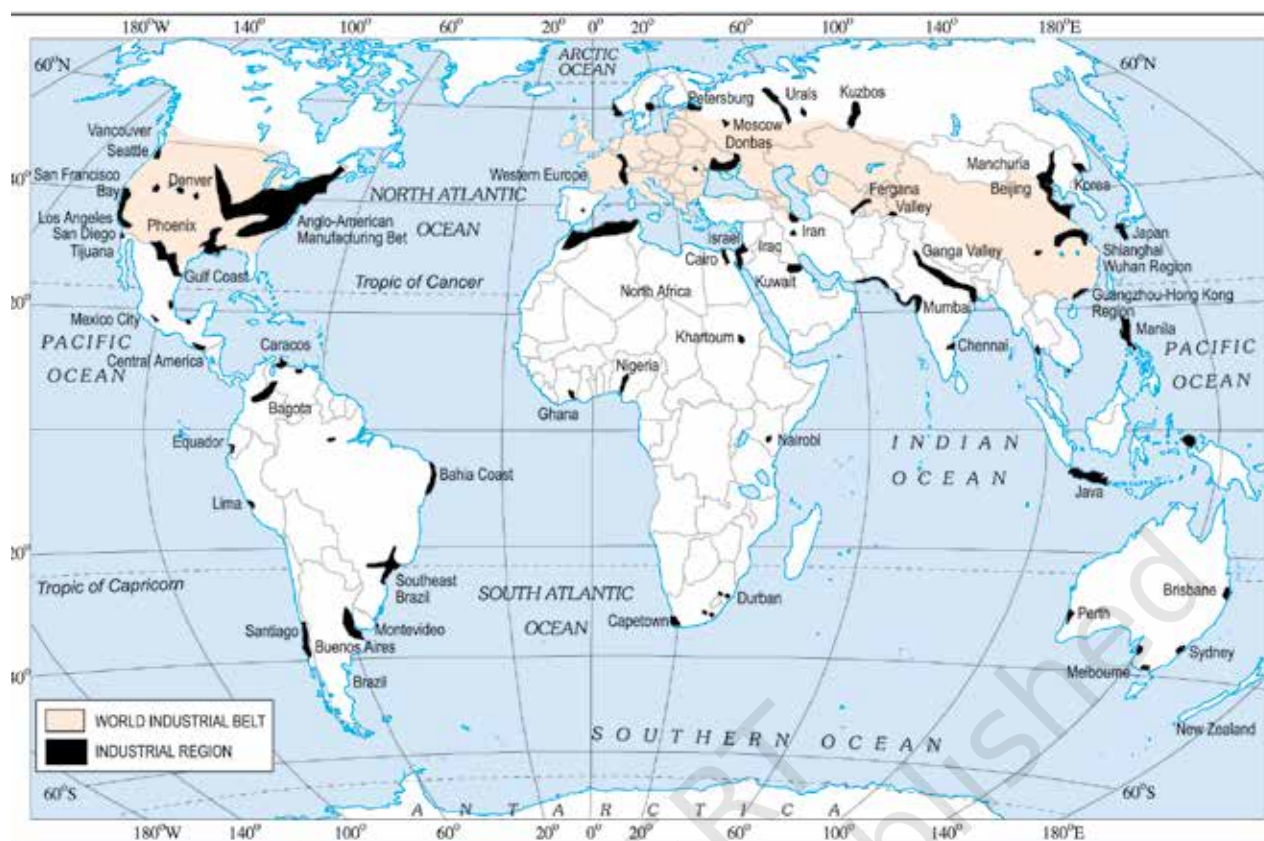


Fig 5.4: World's Industrial Regions

industrial regions tend to be located in the temperate areas, near sea ports and especially near coal fields.

India has several industrial regions like Mumbai-Pune cluster, Bangalore-Tamil Nadu region, Hugli region, Ahmedabad-Baroda region, Chottanagpur industrial belt, Vishakhapatnam-Guntur belt, Gurgaon-Delhi-Meerut region and the Kollam-Thiruvananthapuram industrial cluster.

Industrial Disaster

In industries, accidents/disasters mainly occur due to technical failure or irresponsible handling of hazardous material.

One of the worst industrial disasters of all time occurred in Bhopal on 3 December 1984 around 00:30 a.m. It was a technological accident in which highly poisonous Methyl Isocyanate (MIC) gas along with Hydrogen Cyanide and other reaction products leaked out of the pesticide factory of Union Carbide. The official death toll was 3,598 in 1989. Thousands, who survived still suffer from one or many ailments like blindness, impaired immune system, gastrointestinal disorders etc.



Union Carbide Factory

In another incident, on 23 December 2005, due to gas well blowout in Gao Qiao, Chongqing, China, 243 people died, 9,000 were injured and 64,000 were evacuated. Many people died because they were unable to run after the explosion. Those who could not escape in time suffered burns to their eyes, skin and lungs from the gas.



*Rescue operation
in Gao Qiao*

Risk Reduction Measures

1. Densely populated residential areas should be separated far away from the industrial areas.
2. People staying in the vicinity of industries should be aware of the storage of toxins or hazardous substances and their possible effects in case if an accident occurs.
3. Fire warning and fighting system should be improved.
4. Storage capacity of toxic substances should be limited.
5. Pollution dispersion qualities in the industries should be improved.

Do you know?

Emerging industries are also known as 'Sunrise Industries'. These include Information technology, Wellness, Hospitality and Knowledge.



DISTRIBUTION OF MAJOR INDUSTRIES

The world's major industries are the iron and steel industry, the textile industry and the information technology industry. The iron and steel and textile industry are the older industries while information technology is an emerging industry.

The countries in which iron and steel industry is located are Germany, USA, China, Japan and Russia. Textile industry is concentrated in India, Hong Kong, South Korea, Japan and Taiwan. The major hubs of Information technology industry are the Silicon valley of Central California and the Bangalore region of India.

Iron and Steel Industry

Like other industries iron and steel industry too comprises various inputs, processes and outputs. This is a feeder industry whose products are used as raw material for other industries.

The inputs for the industry include raw materials such as iron ore, coal and limestone, along with labour, capital, site and other infrastructure. The process of converting iron ore into steel involves many stages. The raw material is put in the blast furnace where it undergoes smelting (Fig 5.6). It is then refined. The output obtained is steel which may be used by other industries as raw material.

Glossary Smelting

It is the process in which metals are extracted from their ores by heating beyond the melting point



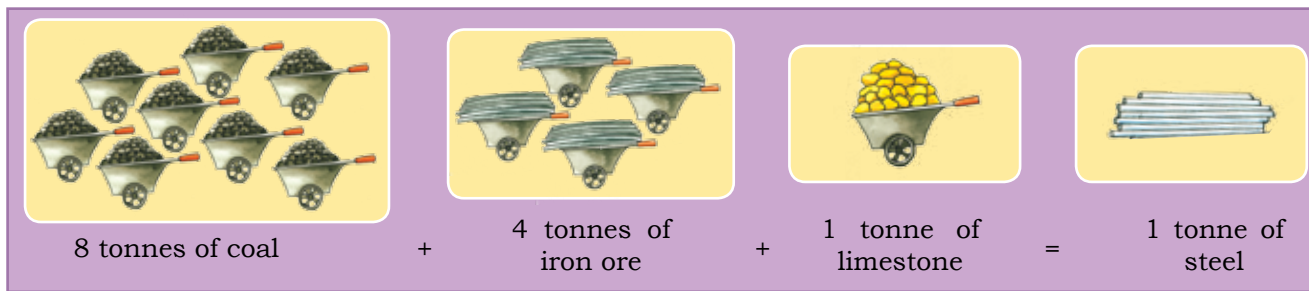


Fig 5.5: Manufacturing of steel

Steel is tough and it can easily be shaped, cut, or made into wire. Special alloys of steel can be made by adding small amounts of other metals such as aluminium, nickel, and copper. Alloys give steel unusual hardness, toughness, or ability to resist rust.

Steel is often called the backbone of modern industry. Almost everything we use is either made of iron or steel or has been made with tools and machinery of these metals. Ships, trains, trucks, and autos are made largely of steel. Even the safety pins and the needles you use are made from steel. Oil wells are drilled with steel machinery. Steel pipelines transport oil. Minerals are mined with steel equipment. Farm machines are mostly steel. Large buildings have steel framework.

Before 1800 A.D. iron and steel industry was located where raw materials, power supply and running water were easily available. Later the ideal location for the industry was near coal fields and close to canals and railways. After 1950, iron and steel industry began to be located on large areas of flat land near sea ports. This is because by this time steel works had become very large and iron ore had to be imported from overseas (Fig 5.7).

In India, iron and steel industry has developed taking

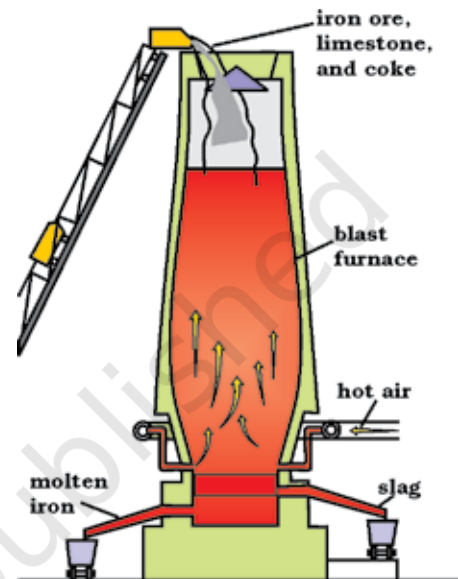
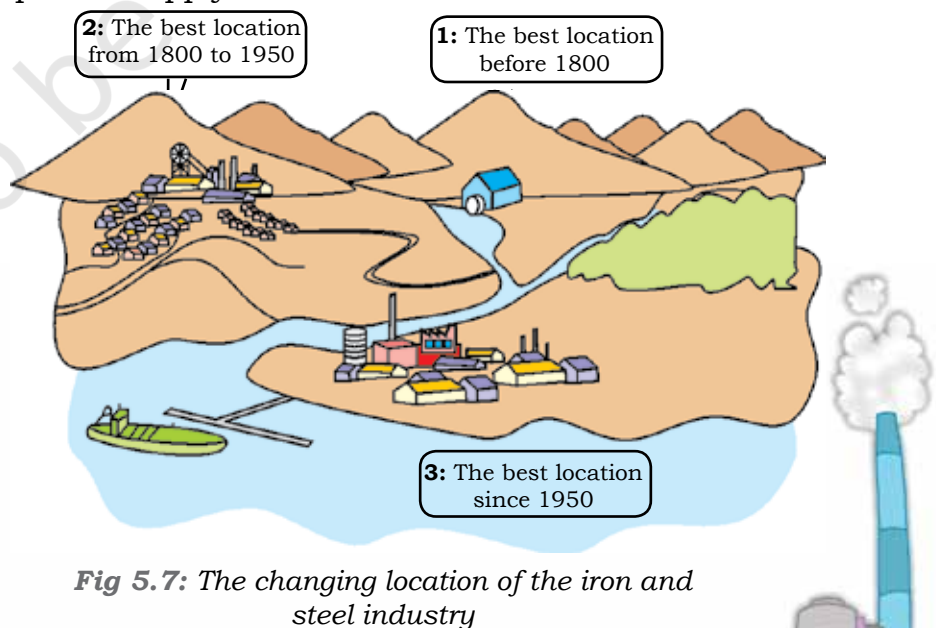


Fig. 5.6: From iron ore to steel in a blast furnace



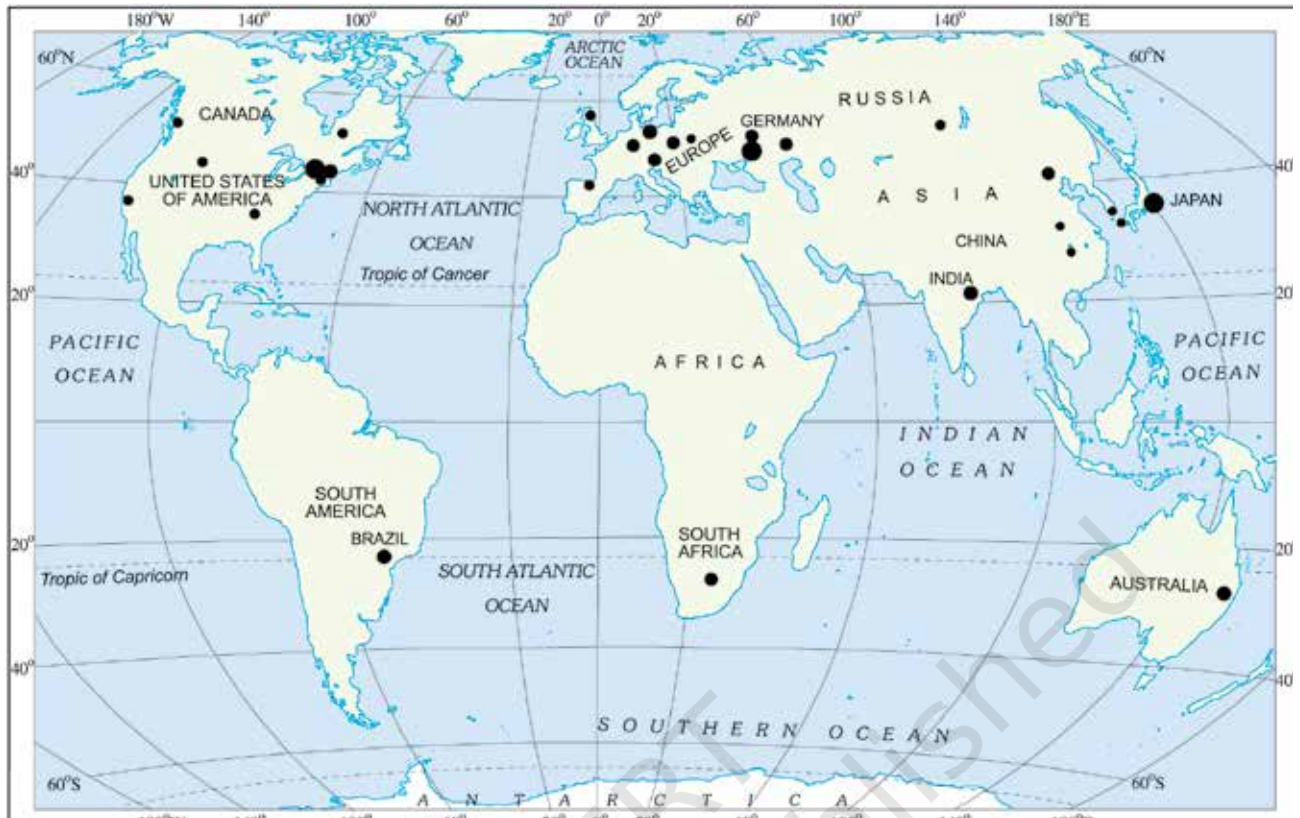


Fig 5.8: World: Major Iron Ore Producing Areas

advantage of raw materials, cheap labour, transport and market. All the important steel producing centres such as Bhilai, Durgapur, Burnpur, Jamshedpur, Rourkela, Bokaro are situated in a region that spreads over four states — West Bengal, Jharkhand, Odisha and Chhattisgarh. Bhadravati and Vijay Nagar in Karnataka, Vishakhapatnam in Andhra Pradesh, Salem in Tamil Nadu are other important steel centres utilising local resources.

JAMSHEDPUR

Before 1947, there was only one iron and steel plant in the country – Tata Iron and Steel Company Limited (TISCO). It was privately owned. After Independence, the government took the initiative and set up several iron and steel plants. TISCO was started in 1907 at Sakchi, near the confluence of the rivers Subarnarekha and Kharkai in Jharkhand. Later on Sakchi was renamed as Jamshedpur. Geographically, Jamshedpur is the most conveniently situated iron and steel centre in the country.



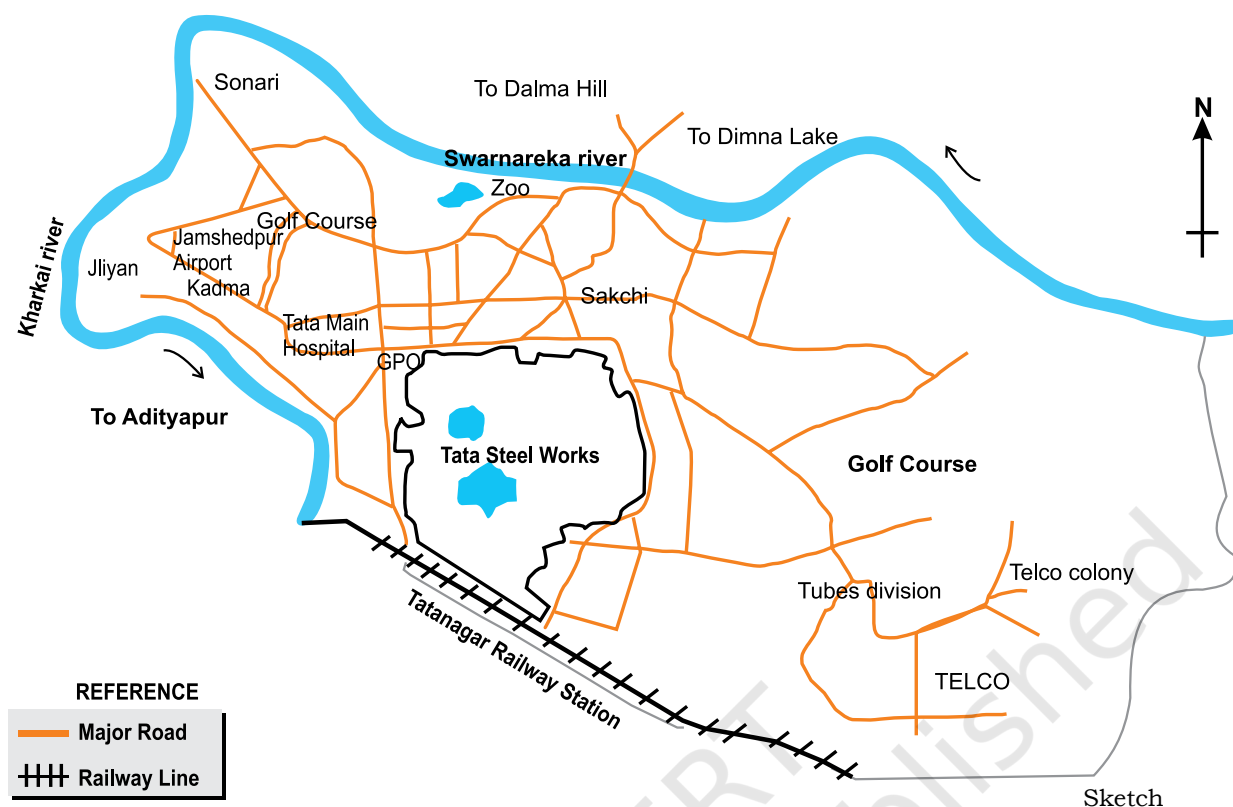


Fig 5.9: Location of iron and steel industry in Jamshedpur

Sakchi was chosen to set up the steel plant for several reasons. This place was only 32 km away from Kalimati station on the Bengal-Nagpur railway line. It was close to the iron ore, coal and manganese deposits as well as to Kolkata, which provided a large market. TISCO, gets coal from Jharia coalfields, and iron ore, limestone, dolomite and manganese from Odisha and Chhattisgarh. The Kharkai and Subarnarekha rivers ensured sufficient water supply. Government initiatives provided adequate capital for its later development.

In Jamshedpur, several other industrial plants were set up after TISCO. They produce chemicals, locomotive parts, agricultural equipment, machinery, tinplate, cable and wire.

The development of the iron and steel industry opened the doors to rapid industrial development in India. Almost all sectors of the Indian industry depend heavily on the iron and steel industry for their basic infrastructure. The Indian iron and steel industry consists of large integrated steel plants as well as mini

Let's do

With the help of an atlas identify some iron and steel industries in India and mark their location on an outline map of India.

steel mills. It also includes secondary producers, rolling mills and ancillary industries.

Pittsburgh : It is an important steel city of the United States of America. The steel industry at Pittsburgh enjoys locational advantages. Some of the raw material such as coal is available locally, while the iron ore comes from the iron mines at Minnesota, about 1500 km from Pittsburgh. Between these mines and Pittsburgh is one of the world's best routes for shipping ore cheaply – the famous Great Lakes waterway. Trains carry the ore from the Great Lakes to the Pittsburgh area. The Ohio, the Monogahela and Allegheny rivers provide adequate water supply.

Do you know?

The names of Great Lakes are Superior, Huron, Ontario, Michigan and Erie. Lake Superior is the largest of these five lakes. It lies higher upstream than others.



Today, very few of the large steel mills are in Pittsburgh itself. They are located in the valleys of the Monogahela and Allegheny rivers above Pittsburgh and along the Ohio River below it. Finished steel is transported to the market by both land and water routes.

The Pittsburgh area has many factories other than steel mills. These use steel as their raw material to make many different products such as railroad equipment, heavy machinery and rails.

COTTON TEXTILE INDUSTRY

Weaving cloth from yarn is an ancient art. Cotton, wool, silk, jute, flax have been used for making cloth. The textile industry can be divided on the basis of raw materials used in them. Fibres are the raw material of textile industry. Fibres can be natural or man-made. Natural fibres are obtained from wool, silk, cotton, linen and jute. Man made fibres include nylon, polyester, acrylic and rayon.

The cotton textile industry is one of the oldest industries in the world. Till the industrial revolution in the 18th century, cotton cloth was made using hand spinning techniques (wheels) and looms. In 18th century power looms facilitated the development of cotton textile industry, first in Britain and later in other parts of the world. Today India, China, Japan and the USA are important producers of cotton textiles.

India has a glorious tradition of producing excellent quality cotton textiles. Before the British rule, Indian

Word Origin

The term 'textile' is derived from the Latin word *texere* which means to weave.



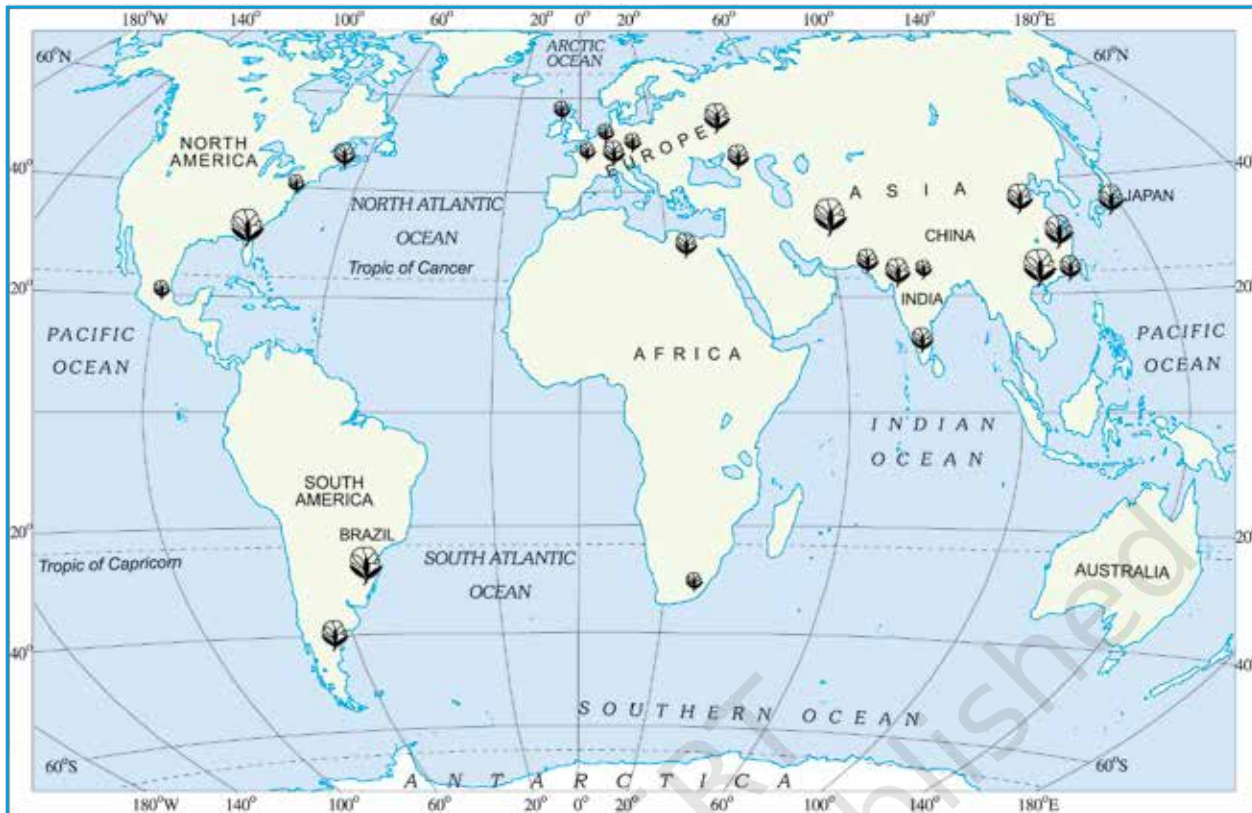


Fig 5.10: World : Major cotton textile manufacturing regions

hand spun and hand woven cloth already had a wide market. The *Muslins* of Dhaka, *Chintzes* of Masulipatnam, *Calicos* of Calicut and Gold-wrought cotton of Burhanpur, Surat and Vadodara were known worldwide for their quality and design. But the production of hand woven cotton textile was expensive and time consuming. Hence, traditional cotton textile industry could not face the competition from the new textile mills of the West, which produced cheap and good quality fabrics through mechanized industrial units.

The first successful mechanized textile mill was established in Mumbai in 1854. The warm, moist climate, a port for importing machinery, availability of raw material and skilled labour resulted in rapid expansion of the industry in the region.

Initially this industry flourished in the states of Maharashtra and Gujarat because of favourable humid climate. But today, humidity can be created artificially, and raw cotton is a pure and not weight losing raw material, so this industry has spread to other parts

Do you know?

The first textile mill in the country was established at Fort Gloster near Kolkata in 1818 but it closed down after some time.

Do you know?

About one-third of the Indian textile industry's total production is exported.

**Activity**

Collect different types of pieces of cloth from a tailor's shop and classify them under cotton, silk, synthetic and woollen. Find out the raw materials used in their manufacturing.

**Let's do**

On an outline map of the world mark the places which provide raw material to cotton textile industry of Osaka



of India. Coimbatore, Kanpur, Chennai, Ahmedabad, Mumbai, Kolkata, Ludhiana, Puducherry and Panipat are some of the other important centres.

Ahmedabad : It is located in Gujarat on the banks of the Sabarmati river. The first mill was established in 1859. It soon became the second largest textile city of India, after Mumbai. Ahmedabad was therefore often referred to as the 'Manchester of India'. Favourable locational factors were responsible for the development of the textile industry in Ahmedabad. Ahmedabad is situated very close to cotton growing area. This ensures easy availability of raw material. The climate is ideal for spinning and weaving. The flat terrain and easy availability of land is suitable for the establishment of the mills. The densely populated states of Gujarat and Maharashtra provide both skilled and semi-skilled labour. Well developed road and railway network permits easy transportation of textiles to different parts of the country, thus providing easy access to the market. Mumbai port nearby facilitates import of machinery and export of cotton textiles.

But in the recent years, Ahmedabad textile mills have been having some problems. Several textile mills have closed down. This is primarily due to the emergence of new textile centres in the country as well as non-upgradation of machines and technology in the mills of Ahmedabad.

Osaka : It is an important textile centre of Japan, also known as the 'Manchester of Japan'. The textile industry developed in Osaka due to several geographical factors. The extensive plain around Osaka ensured that land was easily available for the growth of cotton mills. Warm humid climate is well suited to spinning and weaving. The river Yodo provides sufficient water for the mills. Labour is easily available. Location of port facilitates import of raw cotton and for exporting textiles. The textile industry at Osaka depends completely upon imported raw materials. Cotton is imported from Egypt, India, China and USA. The finished product is mostly exported and has a good market due to good quality and low price. Though it is one of the important textile cities in the country, of late, the cotton textile industry of Osaka has been replaced by other industries, such as



iron and steel, machinery, shipbuilding, automobiles, electrical equipment and cement.

INFORMATION TECHNOLOGY (IT)

Imagine how much could be accomplished if companies could operate on a twenty-four hour workday. Some software companies in the United States of America and in Bengaluru, India have joined hands to achieve this. There are many ways in which this form of shift work across oceans. For example, two software professionals, Danny in Silicon Valley, California and Smitha in Bengaluru are working on a joint project. While Smitha in Bengaluru sleeps, Danny in California is working. At the end of his workday, he sends a message to Smitha, updating his progress. When she arrives at work in Bengaluru, a couple of hours later, she notices that a message awaits her. She gets to work on the project straight away. By the end of her workday she relays the results of her efforts back to California. By the way they communicate and work together, it is as if they were sitting in adjoining offices.



Fig 5.11: A View of an IT industry

The **information technology** industry deals in the storage, processing and distribution of information. Today, this industry has become global. This is due to a series of technological, political, and socio-economic events. The main factors guiding the location of these industries are resource availability, cost and infrastructure. The major hubs of the IT industry are the Silicon Valley, California and Bengaluru, India.

Bengaluru is located on the Deccan Plateau from where it gets the name 'Silicon Plateau'. The city is known for its mild climate throughout the year. Silicon Valley, is a part of Santa Clara Valley, located next to the Rocky Mountains of North America. The area has temperate climate with the temperatures rarely dropping below 0 degrees centigrade. The locational advantages of the Silicon plateau, Bengaluru and Silicon Valley, California are discussed on the next page. You may notice the similarities between the two cities.

There are other emerging information technology hubs in metropolitan centres of India such as Mumbai,

Activity

Bangalore has some important public sector industries and research institutions. Find out the full forms of the organisations listed below.
BEL, BHEL, HAL, NAL, DRDO, ISRO, ITI, IISc, NCBS and UAS

Do you know?

Why do high technology industries group together?

- They can be located near main road/highways for easy access.
- Firms can benefit from exchange of knowledge.
- Services and facilities such as roads, car parks and waste disposal can be organised efficiently.



Bengaluru has the largest number of educational institutions and IT colleges in India.

The city was considered dust free with low rents and low cost of living.



The state government of Karnataka was the first to announce an IT Policy in 1992.



The city has the largest and widest availability of skilled managers with work experience.



**Fig 5.12: Locational advantages
Silicon plateau - Bengaluru**



Close to some of the most advanced scientific and technological centres in the world

Pleasant climate with an attractive and a clean environment. Plenty of space for development and future expansion.



Located close to major roads and airports



Good access to markets and skilled work force



**Fig. 5.13: Locational advantages of
Silicon valley - California**

Interesting Fact

Being Bangalored... means to lose one's job to someone in the city of Bengaluru. A few years ago many IT jobs in the USA were outsourced to countries like India where equally skilled labour was available at lower salaries.

New Delhi, Hyderabad and Chennai. Other cities such as Gurgaon, Pune, Thiruvanthapuram, Kochi and Chandigarh are also important centres of the IT industry. However, Bengaluru has always had a unique advantage, as a city with highest availability of middle and top management talent.



Exercises

1. Answer the following questions.

- (i) What is meant by the term 'industry'?
- (ii) Which are the main factors which influence the location of an industry?
- (iii) Which industry is often referred to as the backbone of modern industry and why?
- (iv) Why cotton textile industry rapidly expanded in Mumbai?
- (v) What are the similarities between information technology industry in Bengaluru and California?

2. Tick the correct answer.

- (i) Silicon Valley is located in
 - (a) Bengaluru
 - (b) California
 - (c) Ahmedabad
- (ii) Which one of the following industries is known as sunrise industry?
 - (a) Iron and steel industry
 - (b) Cotton textile
 - (c) Information technology
- (iii) Which one of the following is a natural fibre?
 - (a) nylon
 - (b) jute
 - (c) acrylic

3. Distinguish between the followings.

- (i) Agro-based and mineral based industry
- (ii) Public sector and joint sector industry

4. Give two examples of the following in the space provided :

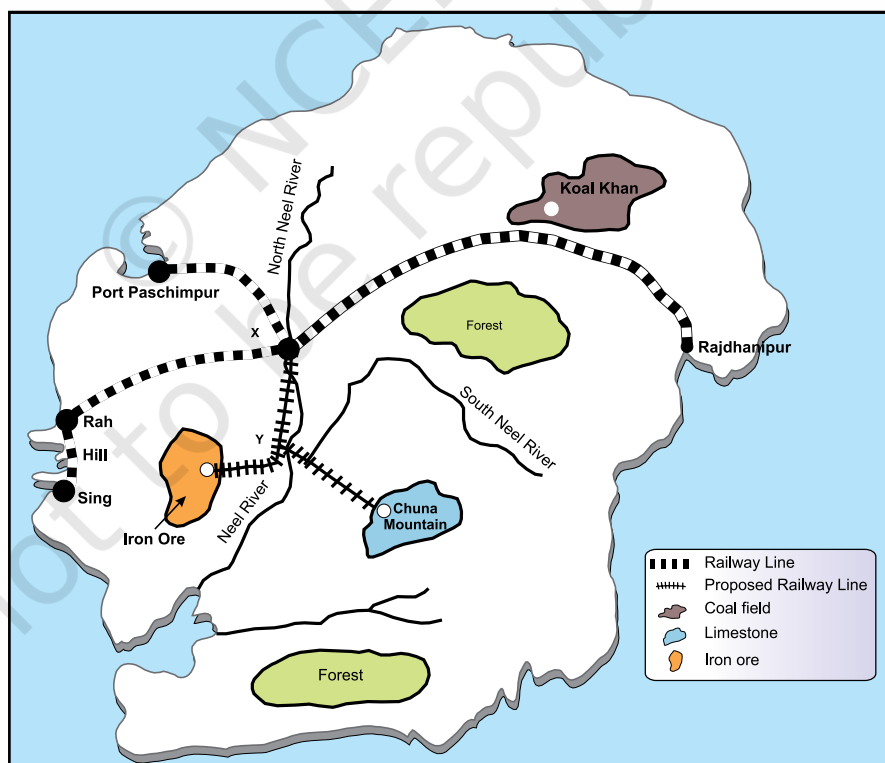
- (i) Raw Materials: _____ and _____
- (ii) End products: _____ and _____
- (iii) Tertiary Activities: _____ and _____
- (iv) Agro-based Industries: _____ and _____
- (v) Cottage Industries: _____ and _____
- (vi) Co-operatives: _____ and _____

5. Activity

How to identify a location for establishing an industry —

Divide your class into groups. Each group is a Board of Directors faced with the problem of choosing a suitable site for an iron and steel plant of Developen Dweep. A team of technical experts has submitted a report with notes and a map. The team considered access to iron ore, coal, water and limestone, as well as the main market, sources of labour and port facilities. The team has suggested two sites, X and Y. The Board of Directors has to take the final decision about where to locate the steel plant.

- Read the report submitted by the team.
- Study the map to find out the distances of the resources from each site.
- Give each resource a 'weight' from 1 to 10, according to its importance. The greater the 'pull' of the factor on the industry the higher the weight from 1 to 10.
- Complete the table on the next page.
- The site with the lowest total should be the most satisfactory site.
- Remember each group of directors can decide differently.



Report

Factors/Resources affecting the location of a proposed Iron and Steel Plant on Dooars Dweep.

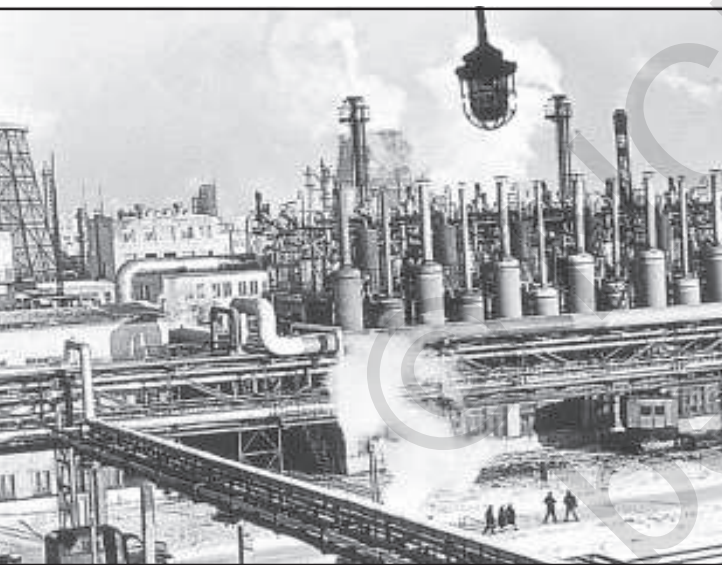
- **Iron ore:** This is a very large deposit of low grade iron ore. Long distance transportation of the ore would be uneconomic.
- **Coal:** The only coalfield contains rich deposits of high grade coal. Transportation of the coal is by railway, which is relatively cheap.
- **Limestone:** This is widely available over the island, but the purest deposits are in the Chuna Mountains.
- **Water:** Both the tributaries of River Neel carry sufficient water to supply a large iron and steel plant in all seasons. The sea water because of its high salt content is unsuitable.
- **Market:** It is expected that the chief market for the Plant's products will be the engineering works of Rajdhanipur. Transport costs for the products- mainly small steel bars and light steel plates would be relatively low.
- **Labour supply:** This will have to be recruited mainly from the unskilled workers in the 3 fishing villages of Hil, Rah and Sing. It is expected that most workers will commute daily from their present homes.
- **Port facilities:** These are at present minimal. There is a good, deep natural harbour at port Paschimpur developed to import metal alloys.

Resource	Distance from X	Distance from Y	Weighting* 1-10	Distance X weight for site X	Distance X weight for site Y
Iron ore					
Coal					
Limestone					
Water					
Chief market					
Labour supply					
			Total =		

* the larger the pull, the higher the weighting

Unit-III
Chapter-6

Secondary Activities



All economic activities namely primary, secondary, tertiary and quaternary, revolve around obtaining and utilising resources necessary for survival.

Secondary activities add value to natural resources by *transforming* raw materials into valuable products. Cotton in the boll has limited use but after it is transformed into yarn, becomes more valuable and can be used for making clothes. Iron ore, cannot be used; directly from the mines, but after being converted into steel it gets its value and can be used for making many valuable machines, tools, etc. The same is true of most of the materials from the farm, forest, mine and the sea. Secondary activities, therefore, are concerned with manufacturing, processing and construction (infrastructure) industries.

MANUFACTURING

Manufacturing involves a full array of production from handicrafts to moulding iron and steel and stamping out plastic toys to assembling delicate computer components or space vehicles. In each of these processes, the common characteristics are the application of power, mass production of identical products and specialised labour in factory settings for the production of standardised commodities. Manufacturing may be done with modern power and machinery or it may still be very primitive. Most of the Third World countries still 'manufacture' in the literal sense of the term. It is difficult to present a full picture of all the manufacturers in these countries. More emphasis is given to the kind of 'industrial' activity which involves less complicated systems of production.

Characteristics of Modern Large Scale Manufacturing

Modern large scale manufacturing has the following characteristics:

Specialisation of Skills/Methods of Production

Under the 'craft' method factories produce only a few pieces which are made-to-order. So the costs are high. On the other hand, mass



production involves production of large quantities of standardised parts by each worker performing only one task repeatedly.

'Manufacturing' Industry and 'Manufacturing Industry'

Manufacturing literally means '*to make by hand*'. However, now it includes goods '*made by machines*'. It is essentially a process which involves *transforming raw materials into finished goods of higher value for sale in local or distant markets*. Conceptually, an industry is a geographically located manufacturing unit maintaining books of accounts and, records under a management system. As the term *industry* is comprehensive, it is also used as synonymous with '*manufacturing*'. When one uses terms like '*steel industry*' and '*chemical industry*' one thinks of *factories and processes*. But there are many secondary activities which are not carried on in factories such as what is now called the '*entertainment industry*' and '*Tourism industry*', etc. So for clarity the longer expression '*manufacturing industry*' is used.

Mechanisation

Mechanisation refers to using gadgets which accomplish tasks. Automation (without aid of human thinking during the manufacturing process) is the advanced stage of mechanisation. Automatic factories with feedback and closed-loop computer control systems where machines are developed to '*think*', have sprung up all over the world.

Technological Innovation

Technological innovations through research and development strategy are an important aspect of modern manufacturing for quality control, eliminating waste and inefficiency, and combating pollution.

Organisational Structure and Stratification

Modern manufacturing is characterised by:

- (i) a complex machine technology
- (ii) extreme specialisation and division of labour for producing more goods with less effort, and low costs
- (iii) vast capital
- (iv) large organisations
- (v) executive bureaucracy.

Uneven Geographic Distribution

Major concentrations of modern manufacturing have flourished in a few number of places. These cover less than 10 per cent of the world's land area. These nations have become the centres of economic and political power. However, in terms of the total area covered, manufacturing sites are much less conspicuous and concentrated on much smaller areas than that of agriculture due to greater intensity of processes. For example, 2.5 sq km of the American corn belt usually includes about four large farms employing about 10-20 workers supporting 50-100 persons. But this same area could contain several large integrated factories and employ thousands of workers.

Why do Large-scale Industries choose different locations?

Industries maximise profits by reducing costs. Therefore, industries should be located at points where the production costs are minimum. Some of the factors influencing industrial locations are as under:

Access to Market

The existence of a market for manufactured goods is the most important factor in the location of industries. 'Market' means people who have a demand for these goods and also have the purchasing power (ability to purchase) to be able to purchase from the sellers at a place. Remote areas inhabited by a few people offer small markets. The developed regions of Europe, North America, Japan and Australia provide large global markets as the purchasing power of the people is very high. The densely populated regions of South and South-east Asia also

provide large markets. Some industries, such as aircraft manufacturing, have a global market. The arms industry also has global markets.

Access to Raw Material

Raw material used by industries should be cheap and easy to transport. Industries based on cheap, bulky and weight-losing material (ores) are located close to the sources of raw material such as steel, sugar, and cement industries. Perishability is a vital factor for the industry to be located closer to the source of the raw material. Agro-processing and dairy products are processed close to the sources of farm produce or milk supply respectively.

Access to Labour Supply

Labour supply is an important factor in the location of industries. Some types of manufacturing still require skilled labour. Increasing mechanisation, automation and flexibility of industrial processes have reduced the dependence of industry upon the labours.

Access to Sources of Energy

Industries which use more power are located close to the source of the energy supply such as the aluminium industry.

Earlier coal was the main source of energy, today hydroelectricity and petroleum are also important sources of energy for many industries.

Access to Transportation and Communication Facilities

Speedy and efficient transport facilities to carry raw materials to the factory and to move finished goods to the market are essential for the development of industries. The cost of transport plays an important role in the location of industrial units. Western Europe and eastern North America have a highly developed transport system which has always induced the concentration of industries in these areas. Modern industry is inseparably tied to transportation systems. Improvements in transportation led to integrated economic development and regional specialisation of manufacturing.

Communication is also an important need for industries for the exchange and management of information.

Government Policy

Governments adopt 'regional policies' to promote 'balanced' economic development and hence set up industries in particular areas.

Access to Agglomeration Economies/ Links between Industries

Many industries benefit from nearness to a leader-industry and other industries. These benefits are termed as agglomeration economies. Savings are derived from the linkages which exist between different industries.

These factors operate together to determine industrial location.

Foot Loose Industries

Foot loose industries can be located in a wide variety of places. They are not dependent on any specific raw material, weight losing or otherwise. They largely depend on component parts which can be obtained anywhere. They produce in small quantity and also employ a small labour force. These are generally not polluting industries. The important factor in their location is accessibility by road network.

Classification of Manufacturing Industries

Manufacturing industries are classified on the basis of their size, inputs/raw materials, output/products and ownership (Fig. 6.1).

Industries based on Size

The amount of capital invested, number of workers employed and volume of production determine the size of industry. Accordingly, industries may be classified into household or cottage, small-scale and large-scale.



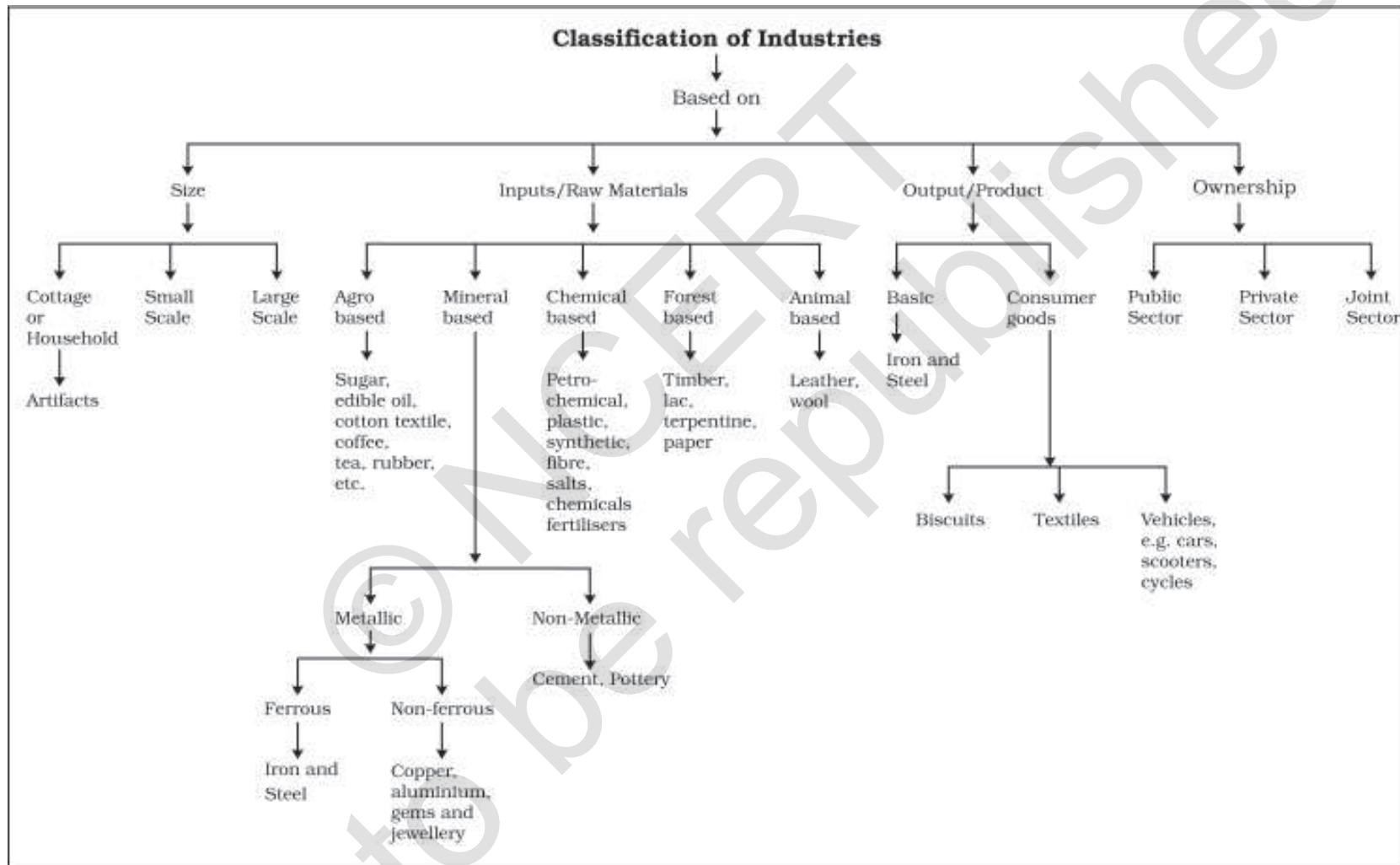


Fig. 6.1 : Classification of Industries

HOUSEHOLD INDUSTRIES OR COTTAGE MANUFACTURING

It is the smallest manufacturing unit. The artisans use local raw materials and simple tools to produce everyday goods in their homes with the help of their family members or part-time labour. Finished products may be for consumption in the same household or, for sale in local (village) markets, or, for barter. Capital and transportation do not wield much influence as this type of manufacturing has low commercial significance and most of the tools are devised locally.



Fig. 6.2 (a) : A man making pots in his courtyard- example of household industry in Nagaland



Fig. 6.2 (b) : A man weaving a bamboo basket by the roadside in Arunachal Pradesh

Some common everyday products produced in this sector of manufacturing include foodstuffs, fabrics, mats, containers, tools, furniture, shoes, and figurines from wood lot and forest, shoes, thongs and other articles from leather; pottery and bricks from clays and stones. Goldsmiths make jewellery of gold, silver and bronze. Some artefacts and crafts are made out of bamboo, wood obtained locally from the forests.

Small Scale Manufacturing

Small scale manufacturing is distinguished from household industries by its production techniques and place of manufacture (a workshop outside the home/cottage of the producer). This type of manufacturing uses local raw material, simple power-driven machines and semi-skilled labour. It provides employment and raises local purchasing power. Therefore, countries like India, China, Indonesia and Brazil, etc. have developed labour-intensive small scale manufacturing in order to provide employment to their population.



Fig. 6.3: Products of cottage industry on sale in Assam

Large Scale Manufacturing

Large scale manufacturing involves a large market, various raw materials, enormous energy, specialised workers, advanced technology, assembly-line mass production and large capital. This kind of manufacturing developed in the last 200 years, in the United Kingdom, north-eastern U.S.A. and Europe. Now it has diffused to almost all over the world.

On the basis of the system of large scale manufacturing, the world's major industrial regions may be grouped under two broad types, namely

- (i) traditional large-scale industrial regions which are thickly clustered in a few more developed countries.
- (ii) high-technology large scale industrial regions which have diffused to less developed countries.



Fig. 6.4 : Passenger car assembly hires at a plant of the Motor Company in Japan

Industries based on Inputs/Raw Materials

On the basis of the raw materials used, the industries are classified as: (a) agro-based; (b) mineral based; (c) chemical based; (d) forest based; and (e) animal based.

(a) *Agro based Industries*

Agro processing involves the processing of raw materials from the field and the farm into finished products for rural and urban markets. Major agro-processing industries are food processing, sugar, pickles, fruits juices, beverages (tea, coffee and cocoa), spices and oils fats and textiles (cotton, jute, silk), rubber, etc.

Food Processing

Agro processing includes canning, producing cream, fruit processing and confectionery. While some preserving techniques, such as drying, fermenting and pickling, have been known since ancient times, these had limited applications to cater to the pre-Industrial Revolution demands.



Fig. 6.5: Tea Garden and a Tea Factory in the Nilgiri Hills of Tamil Nadu

Agri-business is commercial farming on an industrial scale often financed by business whose main interests lie outside agriculture, for example, large corporations in tea plantation business. Agri-business farms are mechanised, large in size, highly structured, reliant on chemicals, and may be described as 'agro-factories'.

(b) *Mineral based Industries*

These industries use minerals as a raw material. Some industries use ferrous metallic minerals which contain ferrous (iron), such as iron and steel industries but some use non-ferrous metallic minerals, such as aluminium, copper and jewellery industries. Many industries use non-metallic minerals such as cement and pottery industries.

(c) *Chemical based Industries*

Such industries use natural chemical minerals, e.g. mineral-oil (petroleum) is used in petro-chemical industry. Salts, sulphur and potash industries also use natural minerals. Chemical industries are also based on raw materials obtained from wood and coal. Synthetic fibre, plastic, etc. are other examples of chemical based industries.

(d) Forest based Raw Material using Industries

The forests provide many major and minor products which are used as raw material. Timber for furniture industry, wood, bamboo and grass for paper industry, lac for lac industries come from forests.

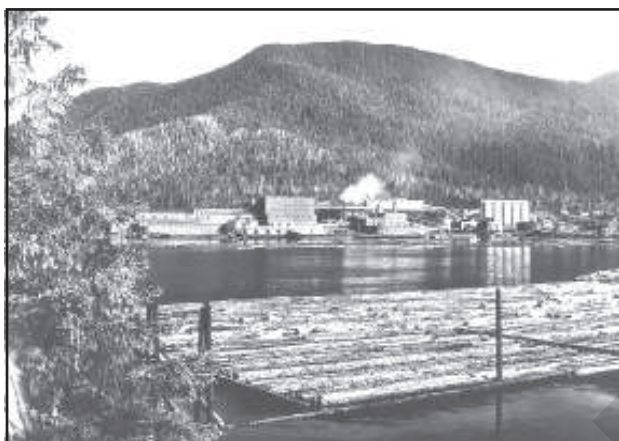


Fig. 6.6: A pulp mill in the heart of the Ketchikan's timber area of Alaska

(e) Animal based Industries

Leather for leather industry and wool for woollen textiles are obtained from animals. Besides, ivory is also obtained from elephant's tusks.

Industries Based On Output/Product

You have seen some machines and tools made of iron or steel. The raw material for such machines and tools is iron and steel. Which is itself an industry. The industry whose products are used to make other goods by using them as raw materials are basic industries. Can you identify the links? Iron/steel → machines for textile industry → clothes for use by consumers.

The consumer goods industries produced goods which are consumed by consumers directly. For example, industries producing breads and biscuits, tea, soaps and toiletries, paper for writing, televisions, etc. are consumer goods or non-basic industries.

INDUSTRIES BASED ON OWNERSHIP

- Public Sector Industries are owned and managed by governments. In India, there were a number of Public Sector Undertakings (PSUs). Socialist countries have many state owned industries. Mixed economies have both Public and Private sector enterprises.
- Private Sector Industries are owned by individual investors. These are managed by private organisations. In capitalist countries, industries are generally owned privately.
- Joint Sector Industries are managed by joint stock companies or sometimes the private and public sectors together establish and manage the industries. Can you make a list of such industries?

Traditional Large-Scale Industrial Regions

These are based on heavy industry, often located near coal-fields and engaged in metal smelting, heavy engineering, chemical manufacture or textile production. These industries are now known as smokestack industries. Traditional industrial regions can be recognised by:

- High proportion of employment in manufacturing industry.
- High-density housing, often of inferior type, and poor services.
- Unattractive environment, for example, pollution, waste heaps, and so on.
- Problems of unemployment, emigration and derelict land areas caused by closure of factories because of a worldwide fall in demand.

The Ruhr Coal-field, Germany

This has been one of the major industrial regions of Europe for a long time. Coal and iron and steel formed the basis of the economy, but as the demand for coal declined, the industry started shrinking. Even after the iron ore was exhausted, the industry remained, using imported ore brought by waterways to the Ruhr.

The Ruhr region is responsible for 80 per cent of Germany's total steel production.



Changes in the industrial structure have led to the decay of some areas, and there are problems of industrial waste and pollution. The future prosperity of the Ruhr is based less on the products of coal and steel, for which it was initially famous, and more on the new industries like the huge Opel car assembly plant, new chemical plants, universities. Out-of-town shopping centres have appeared resulting in a 'New Ruhr' landscape.

Concept of High Technology Industry

High technology, or simply high-tech, is the latest generation of manufacturing activities. It is best understood as the application of intensive research and development (R and D) efforts leading to the manufacture of products of an advanced scientific and engineering character. Professional (white collar) workers make up a large share of the total workforce. These highly skilled specialists greatly outnumber the actual production (blue collar) workers. Robotics on the assembly line, computer-aided design (CAD) and manufacturing, electronic controls of smelting and refining processes, and the constant development of new chemical and pharmaceutical products are notable examples of a high-tech industry.

Neatly spaced, low, modern, dispersed, office-plant-lab buildings rather than massive assembly structures, factories and storage areas mark the high-tech industrial landscape. Planned business parks for high-tech start-ups have become part of regional and local development schemes.

High-tech industries which are regionally concentrated, self-sustained and highly specialised are called technopolies. The Silicon Valley near San Francisco and Silicon Forest near Seattle are examples of technopolies. Are some technopolies developing in India?

Manufacturing contributes significantly to the world economy. Iron and steel, textiles, automobiles, petrochemicals and electronics are some of the world's most important manufacturing industries.

Iron and Steel Industry

The iron and steel industry forms the base of all other industries and, therefore, it is called a basic industry. It is basic because it provides raw material for other industries such as machine tools used for further production. It may also be called a heavy industry because it uses large quantities of bulky raw materials and its products are also heavy.

Iron is extracted from iron ore by smelting in a blast furnace with carbon (coke) and limestone. The molten iron is cooled and moulded to form pig iron which is used for converting into steel by adding strengthening materials like manganese.

The large integrated steel industry is traditionally located close to the sources of raw materials – iron ore, coal, manganese and limestone – or at places where these could be easily brought, e.g. near ports. But in mini steel mills access to markets is more important than inputs. These are less expensive to build and operate and can be located near markets because of the abundance of scrap metal, which is the main input. Traditionally, most of the steel was produced at large integrated plants, but mini mills are limited to just one-step process – steel making – and are gaining ground.

Distribution : The industry is one of the most complex and capital-intensive industries and is concentrated in the advanced countries of North America, Europe and Asia. In U.S.A, most of the production comes from the north Appalachian region (Pittsburgh), Great Lake region (Chicago-Gary, Erie, Cleveland, Lorain, Buffalo and Duluth) and the Atlantic Coast (Sparrows Point and Morisville). The industry has also moved towards the southern state of Alabama. Pittsburg area is now losing ground. It has now become the "rust bowl" of U.S.A. In Europe, U.K., Germany, France, Belgium, Luxembourg, the Netherlands and Russia are the leading producers. The important steel centres are Scun Thorpe, Port Talbot, Birmingham and Sheffield in the U.K.; Duisburg, Dortmund, Dusseldorf and Essen in Germany; Le Creusot and St. Etienne in France; and Moscow, St. Petersburg, Lipetsk, Tula, in Russia and Krivoy Rog, and



Donetsk in Ukraine. In Asia, the important centres include Nagasaki and Tokyo-Yokohama in Japan; Shanghai, Tienstin and Wuhan in China; and Jamshedpur, Kulti-Burnpur, Durgapur, Rourkela, Bhilai, Bokaro, Salem, Visakhapatnam and Bhadravati in India. Consult your atlas to locate these places/centres.

Cotton Textile Industry

Cotton textile industry has three sub-sectors i.e. handloom, powerloom and mill sectors. Handloom sector is labour-intensive and provides employment to semi-skilled workers. It requires small capital investment. Why did Mahatma Gandhi propagate Khadi as part of the independence movement? This sector involves spinning, weaving and finishing of the fabrics. The powerloom sector introduces machines and becomes less labour intensive

and the volume of production increases. Cotton textile mill sector is highly capital intensive and produces fine clothes in bulk.

Cotton textile manufacturing requires good quality cotton as raw material. India, China, U.S.A, Pakistan, Uzbekistan, Egypt produce more than half of the world's raw cotton. The U.K, NW European countries and Japan also produce cotton textile made from imported yarn. Europe alone accounts for nearly half of the world's cotton imports. The industry has to face very stiff competition with synthetic fibres hence it has now shown a declining trend in many countries. With the scientific advancement and technological improvements the structure of industries changes. For example, Germany recorded constant growth in cotton textile industry since Second World War till the seventies but now it has declined. It has shifted to less developed countries where labour costs are low.



EXERCISES

1. Choose the right answer from the four alternatives given below.
 - (i) Which one of the following statements is wrong?
 - (a) Cheap water transport has facilitated the jute mill industry along the Hugli.
 - (b) Sugar, cotton textiles and vegetable oils are footloose industries.
 - (c) The development of hydro-electricity and petroleum reduced, to a great extent, the importance of coal energy as a locational factor for industry.
 - (d) Port towns in India have attracted industries.
 - (ii) In which one of the following types of economy are the factors of production owned individually ?

(a) Capitalist	(c) Socialist
(b) Mixed	(d) None
 - (iii) Which one of the following types of industries produces raw materials for other industries?

(a) Cottage Industries	(c) Basic Industries
(b) Small-scale Industries	(d) Footloose Industries



- (iv) Which one of the following pairs is correctly matched ?
- (a) Automobile industry ... Los Angeles
 - (b) Shipbuilding industry ... Lusaka
 - (c) Aircraft industry ... Florence
 - (d) Iron and Steel industry ... Pittsburgh
- 2.** Write a short note on the following in about 30 words.
- (i) High-Tech industry
 - (ii) Manufacturing
 - (iii) Footloose industries
- 3.** Answer the following in not more than 150 words.
- (i) Differentiate between primary and secondary activities.
 - (ii) Discuss the major trends of modern industrial activities especially in the developed countries of the world.
 - (iii) Explain why high-tech industries in many countries are being attracted to the peripheral areas of major metropolitan centres.
 - (iv) Africa has immense natural resources and yet it is industrially the most backward continent. Comment.

Project/Activity

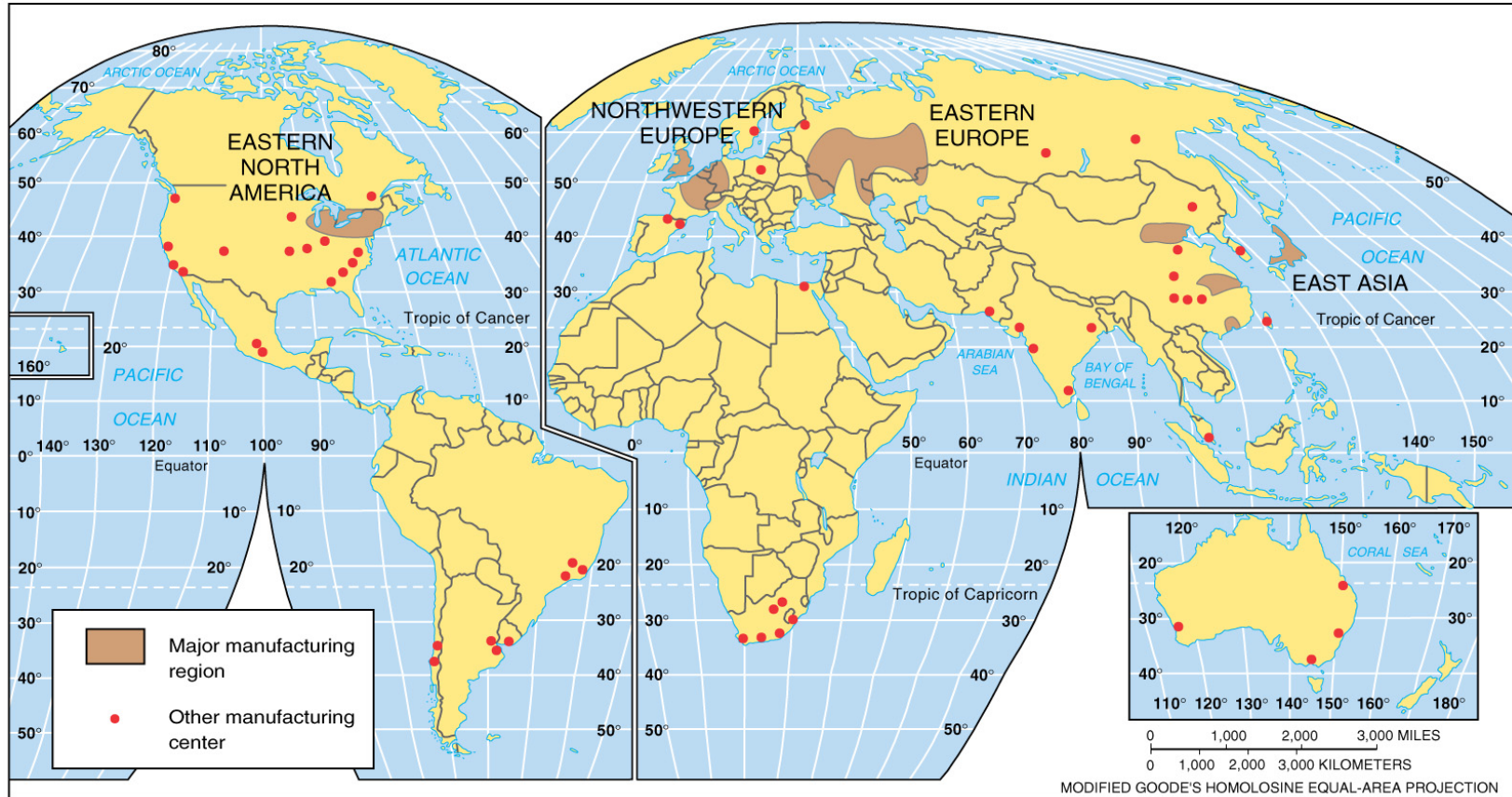
- (i) Carry out a survey in your school premises of the factory-made goods used by students and the staff.
- (ii) Find out the meaning of the terms bio-degradable and non-biodegradable. Which kind of material is better to use? Why?
- (iii) Look around and make a list of the global brands, their logos and products.



World Industrial Regions

- North America
 - Industrialized areas in North America
 - Changing distribution of U.S. manufacturing
- Europe
 - Western Europe
 - Eastern Europe
- East Asia

Manufacturing Regions

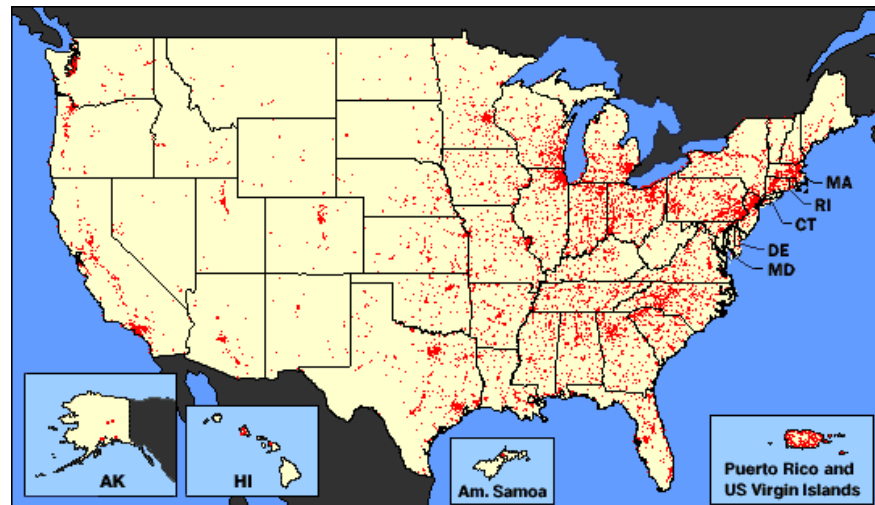


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Fig. 11-3: The world's major manufacturing regions are found in North America, Europe, and East Asia. Other manufacturing centers are also found elsewhere.

North America

- Manufacturing in North America is concentrated in the northeastern quadrant of the United States and in southeastern Canada.
- Only 5 percent of the land area of these countries.., contains one-third of the population and nearly two-thirds of the manufacturing output.
- This manufacturing belt has achieved its dominance through a combination of historical and environmental factors.

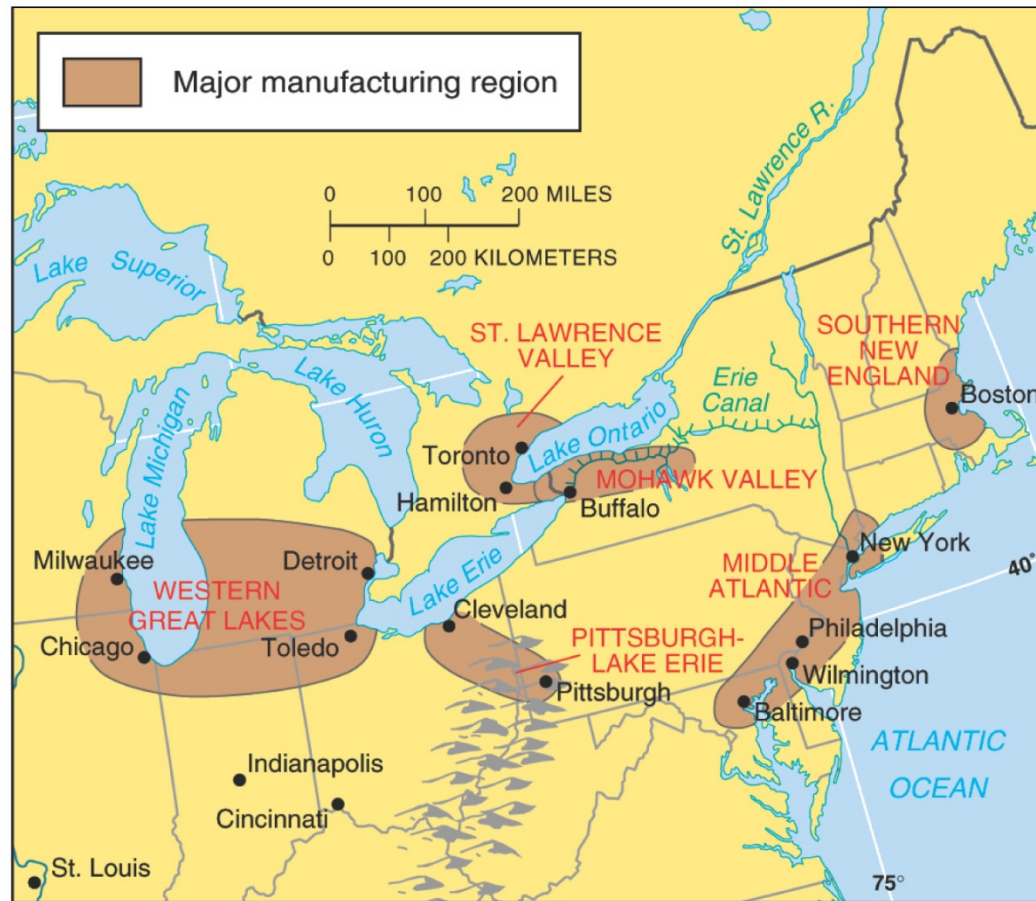


North America

Three Determining Location Factors:

- Population Proximity- Early settlement gave eastern cities an advantage to become the country's dominant industrial center.
- Access to Raw Materials- had essential raw materials (by waterway or natural resources).
- Transportation- The Great Lakes and major rivers were a early determining factor is waterway transportation.
- Access to fresh water and power- proximity to great lakes

Industrial Regions of North America



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Fig. 11-4: The major industrial regions of North America are clustered in the northeast U.S. and southeastern Canada, although there are other important centers.

Manufacturing Centers in Western Europe

Fig. 11-6: The major manufacturing centers in Western Europe extend in a north-south band from Britain to Italy.



Rhine—Ruhr Valley



—Transportation- This location at the mouth of Europe's most important river has made Rotterdam the world's largest port.

—Proximity to Raw Materials- Iron and steel manufacturing has concentrated in the Rhine—Ruhr Valley because of proximity to large coalfields. This has resulted in major automotive and machinery manufacturing plants.

—Labour Supply- proximity to large cities provides lots of available labourers



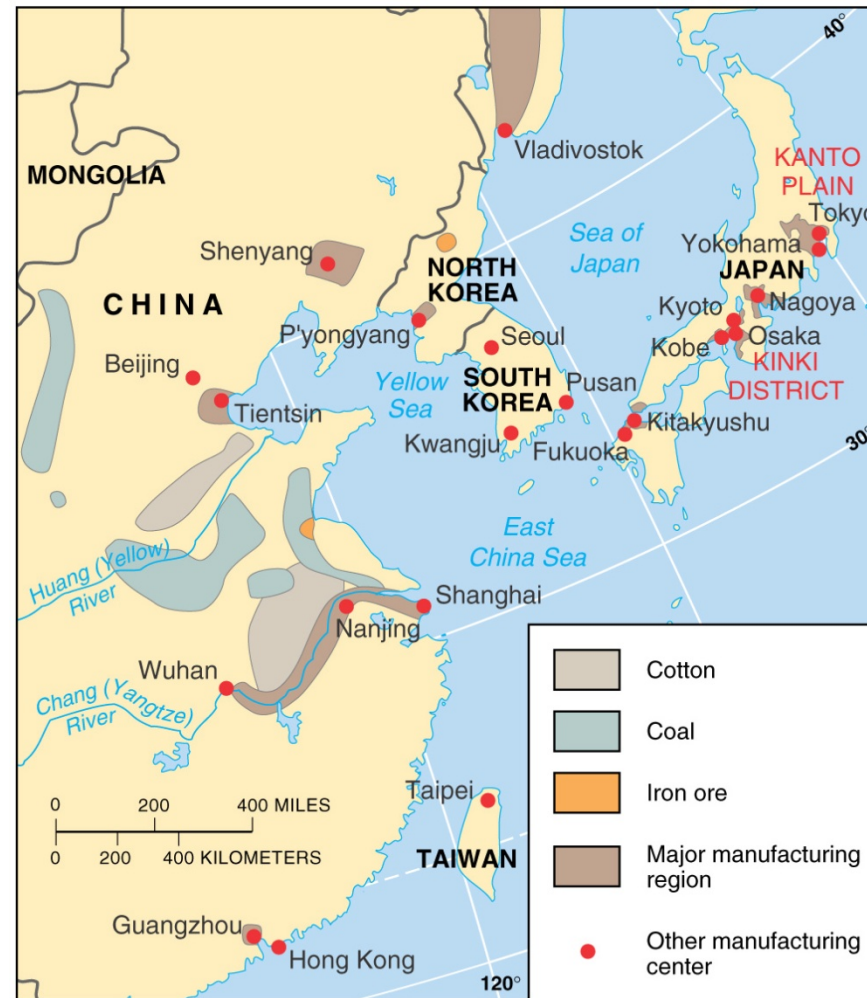
Manufacturing Centers in Eastern Europe and Russia



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Fig. 11-7: Major manufacturing centers are clustered in European Russia and the Ukraine. Other centers were developed east of the Urals.

Manufacturing Centers in East Asia



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Fig. 11-8: Many industries in China are clustered in three centers near the east coast. In Japan, production is clustered along the southeast coast.

Eastern Asia

- Access to Raw Materials- the Asia Pacific region is one of the major growing regions of natural fabrics such as cotton. Also has large coal and iron deposits
- Transportation- Near the oceans and waterways for transport
- Labour Supply- the Asian countries are some of the most densely populated areas of the planet meaning there are a lot of labourers available that also work for low wages