



Industries

KEY CONCEPTS

- * Need for industries in the world.
- * Types of industries.
- * Factors related to establishment of an industry.
- * Important industries of the world.
- * Pollution due to Industries and its prevention.

The term 'industry' refers to any economic activity that converts raw materials into goods for sale in local or distant markets or provides useful services. These raw materials are obtained from primary activities like agriculture, mining and lumbering. The processing of these materials such as sugarcane into sugar, iron ore into steel, mineral oil into petrochemicals and wood pulp into paper and wood into furniture is known as *manufacturing*. A single industry is named after a principal product manufactured in it or services provided by it. Thus, we have different types of industries like sugar industry, textile industry, paper industry, iron and steel industry, shipping industry, entertainment industry, banking, tourism, hotel, railways, etc.

On the basis of finished product, industries are of three types:

- 1. Primary Industries:** Industries that derive their products directly from nature, through activities like farming, mining or lumbering. These products called *primary products* include vegetables, fruits, cereals, grains, spices, minerals, wood, dairy products and meat.
- 2. Secondary Industries:** Industries that process primary products into other useful products. For example, fruit is a primary product that is processed to form secondary products like

juices, jams and jellies. Similarly, cotton in the boll has limited value till it is transformed into yarn for making clothes. Since processing increases the utility and value of secondary products, they are also called *value-added* products. In everyday routine, when we talk about an industry we usually refer to a secondary industry.

- 3. Tertiary Industries:** Industries that do not involve manufacturing of goods but provide services such as education, banking, information, healthcare, tourism, entertainment, etc.

NEED FOR INDUSTRIES IN THE WORLD

Industries form an important component for the economic growth and development of a country. The need for industries in the world are due to the following reasons:

- * Industries provide us with almost all the products that we use in our daily life from



Industries are needed for the economic growth of a country



Automobiles Industry: Assembly-line mass production

food, clothing, machines, tools, medicines, books to means of communication and transportation.

- * Industries support other services like banking, health care, education, communications, trade and transportation.
- * Industries generate jobs for people. They employ both skilled and unskilled people to do different kinds of work and thereby, reduce dependence on agricultural sector.
- * Industries process raw materials into finished products. Thus, they help in better utilisation of resources.
- * Industries produce goods and equipment required by other sectors like agriculture, infrastructure, defence, communications, and trade. Thus, they promote other industries and help in the growth and development of a nation.
- * Industries help us to keep pace with the fast moving world in terms of advanced technology and know-how.
- * Industries produce surplus goods that are sold in other countries and help to earn foreign exchange and thus, strengthen a country's economy.
- * Industries provide people with variety of goods and services. This increases the competition and the number of industries. More industries create more of employment opportunities and thereby, more money in the hands of people. Therefore, industries

help to increase the income and thereby improve the lifestyle of the people.

TYPES OF INDUSTRIES

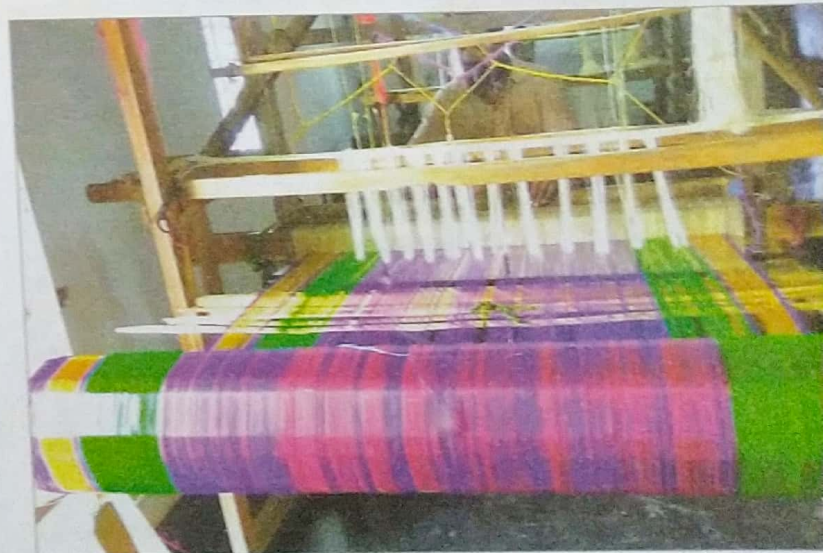
Industries can be categorised into different types on the basis of their size, ownership, raw material used and the nature of products.

Size

Size refers to the amount of capital invested, the number of people employed and the volume of production.

(a) **Large-Scale Industries** are the industries that have huge infrastructure and capital investment, use heavy power-driven machinery, advanced technology, assembly-line mass production and employ large number of workers including specialised workers. They procure raw material from distant places and sell the finished products in the local as well as distant markets. They include iron and steel industry, textile industry, ship building industry and automobile industry.

(b) **Small-Scale Industries** are the industries managed mostly by private individuals. They do not require huge capital investment and employ only a few workers, who work in a factory outside the home/cottage of the producer. This type of manufacturing uses local raw material, simple power-driven machines and semi-skilled labour. They include weaving industry, food processing industry, electrical goods industry, etc.



Small-Scale Industry

(c) **Cottage Industries** are also known as household industries. These are organised by individuals with private resources and with the help of members of the household. The craftsmen or artisans use local raw material and simple hand tools to produce everyday goods in their homes. Finished products are used in the same household or for sale in local markets. They are found mostly in rural areas. The products produced by this sector include foodstuffs, fabrics, mats, tools, furniture, pottery, sculptures, crafts made out of bamboo, wood, cane, etc.

Ownership

On the basis of ownership industries can be classified into the following categories:

(a) **Public Sector Industries** are owned and managed either by the Central Government or the State Government. They include public utility industries like railways, post and telegraph, oil refineries, heavy engineering industries, defence establishments, etc. Some of the significant industries in India are Bharat Heavy Electricals Limited (BHEL), Gas Authority of India Limited (GAIL), Indian Oil Corporation (IOC), Steel Authority of India Limited (SAIL), Indian Railways, etc.

(b) **Private Sector Industries** are owned and managed by an individual or group of individuals. They include industries like Tata Steel, Hindustan



Textile Mill

Motors, Reliance India Limited (RIL), Infosys, Wipro, etc.

(c) **Joint Sector Industries** are owned, managed and controlled jointly by the private firms and the government agencies. For example, Automobile Corporation of Goa Ltd. and Ipitata Sponge Iron Ltd. have been established with TELCO and TISCO of the Tata House as private promoters, respectively.

(d) **Co-operative Sector Industries** are owned and run by a group of people, who produce or supply raw materials for the industry. For example, Anand Cooperative Society in Gujarat is a cooperative jointly owned by 3.6 million milk producers, who sell their dairy products under the brand name 'Amul'.

(e) **Multinational Corporations** are the corporations set up in collaboration by members of two or more countries. For example, Maruti Suzuki India Limited, Apollo Tyres, Coca-Cola, LG Electronics, etc.

Raw Material

Industries, on the basis of raw material utilised, can be divided into the following categories:

(a) **Agro-Based Industries** are group of industries that use plant and animal based products as their raw materials. The products comprise mostly consumer goods. The major agro-based industries are cotton, jute and textile industries, sugar, tea,



Anand Cooperative Society, Gujarat

coffee industry, vegetable oil, food processing industry, leather industry, etc.

(b) **Mineral-Based Industries** use minerals, both metallic and non-metallic, as raw materials. The major mineral based industries include iron and steel, heavy engineering and machine tools, cement, basic and light chemicals, fertilisers, etc.

(c) **Forest-Based Industries** utilise forest resources like wood, rubber, lac and resin to produce products like paper, cardboard, rayon and furniture.

(d) **Animal-Based Industries** utilise the raw materials provided by animals like wool, silk, dairy products, hides, ivory, poultry, etc.

(e) **Marine-Based Industries** get their raw material from oceans and seas. They include manufacturing of fish oil and processing of sea food.

Nature of Products

On the basis of nature of products, industries can be divided into:

(a) **Heavy Industries** produce capital goods and consumer durables which are quite bulky and are therefore, known as heavy industries. They require huge capital, large quantity of raw material, scientific knowledge and sophisticated machinery.

(b) **Light Industries** produce goods which are light in weight like cycles, sewing machines, electronic goods, etc. They require less capital and less number of workers than the heavy industries.

Factors Affecting the Establishment of Industries

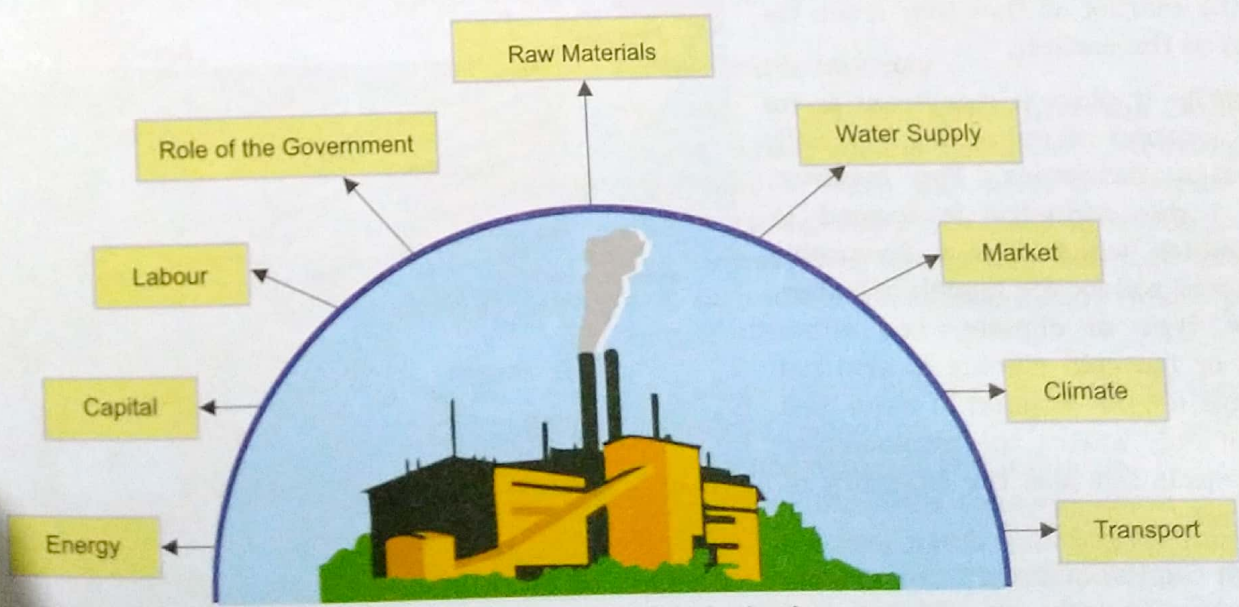
Industries are established in certain areas which become centres of industrial activity. The establishment of an industry depends on the following factors:

1. Raw Materials: Location of industries depends on the nature and availability of raw material. Industries based on bulky and weight losing material are located close to the sources of raw material. For example, the textile mills of Mumbai get the supply of cotton from Gujarat and the jute mills of Hooghly region get the raw material from the delta region of the Ganga. Similarly, the iron and steel industry is located in the region where iron ore, limestone, manganese and coal are available nearby.

The nature of raw material also decides the location of industries. For example, the perishable raw materials have to be processed without loss of time before manufacturing. That is why sugar mills and dairy product manufacturing industries are located close to the sources of the raw material.

2. Water Supply: All industries depend heavily on the availability of water for one purpose or the other. These include iron and steel (for cooling), textile (for bleaching and washing), paper and pulp, chemical, food processing, jute, leather, nuclear power, etc. Therefore, these industrial units are located at places where water is easily available.

3. Energy: Energy is required to process raw materials into manufactured goods. That is why



Factor Affecting Location of Industries

iron and steel industries are usually located near the coal resources, as they use coking coal for fuel. Similarly, electro-chemical industries which require power are located where electricity is easily available.

4. Transport: Transport is an essential requirement for industrial development as transport facilities are required to carry raw materials to manufacturing units and finished products to the markets. The availability of transport facilities has led to the development of the industries near the port towns that are linked with rail and road to the hinterland.

5. Labour: The availability of both skilled and unskilled manpower is an important factor in the location of industries. It is because of the mobility of cheap labour from the surrounding areas to Delhi and Mumbai, that a large number of industries are located in these metropolitan cities. Some of the small scale industries, traditionally associated with labour are glasswork (Ferozabad), brasswork (Moradabad), utensils (Yamunanagar in Haryana), silk sarees (Varanasi), carpets (Mirzapur), etc.

6. Market: The existence of market is the ultimate requirement of every industry because whatever is produced needs to be sold. For example, heavy chemical industries or machine industries are located in industrial areas because their products are required by other industries of the region. Similarly, industries which produce perishable goods are located near the market so that they reach the market at the earliest.

7. Climate: It plays a significant factor in the location of industries especially agro-based industries. For instance, cotton textile industry is located in Maharashtra which has a favourable climate and soil for the growth of cotton. Extreme type of climate, i.e., either too hot or too cold climate is also not favourable for the location of industries as it not only affects the availability of raw materials but also the efficiency of the workers.

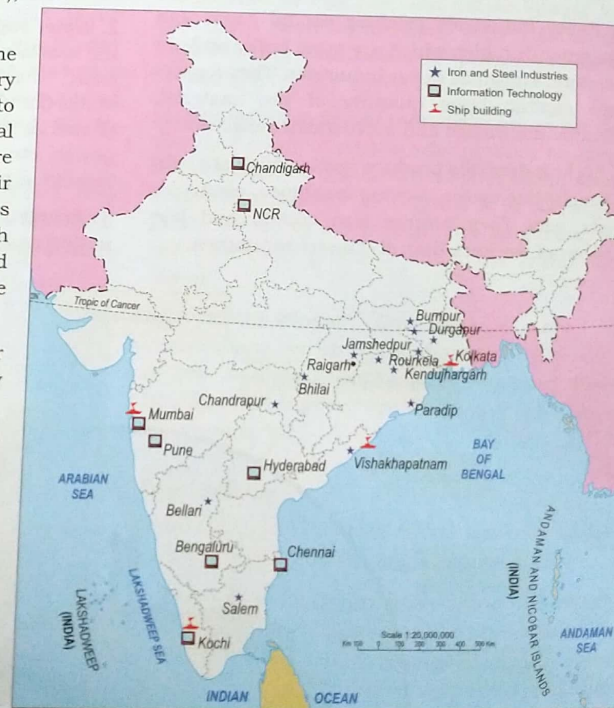
8. Capital: Capital or money is required at every stage of setting up and running

an industrial concern. It is needed for buying land, machinery, raw material, power and for paying wages and other expenditure. Industries are set up in areas, where finances are easily available.

9. Role of the Government: The Government has a very significant role in the industrialisation process, especially in the developing and under-developed countries. The big industries which require large infrastructure and capital are set up by the government. The government makes rules and regulations for running the industries and also provides the basic facilities like land, water and electricity. Further, it is the government which makes policies and takes decisions to protect and encourage indigenous industries.

MAJOR INDUSTRIES OF THE WORLD

The world's major industries are the iron and steel industry, textile industry, information technology industry, sugar industry, ship building industry, fishing industry and automobile industry. Let us study the distribution of these industries.



India: Distribution of Iron and Steel, IT and Ship Building Industries

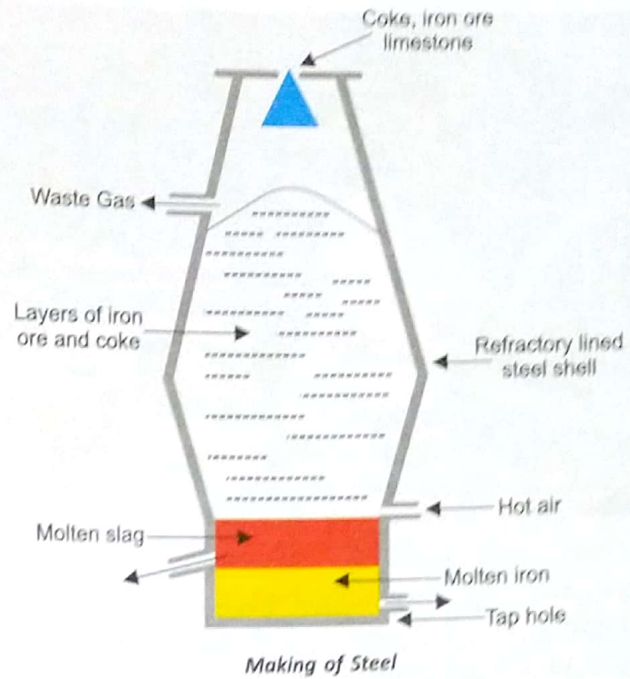
Iron and Steel Industry

The iron and steel industry forms the backbone of modern industry. It is also called the 'basic industry' because it provides raw material, i.e., steel for other industries such as machine tools, automobile and shipbuilding industry. Steel is stronger than iron, more resistant to rust and can be easily shaped, cut or made into wires. Special alloys of steel can be made by adding small amounts of other metals like aluminium, copper and nickel.

Everything we use in our daily life is either made of iron or steel or has been made with tools and machinery made of these metals. Steel is used in the construction of buildings and for manufacturing ships, trains, trucks, buses, autos. The utensils, cutlery, scissors, pins and needles are all made of steel. Minerals are mined with steel equipment. Oil wells are drilled with steel machinery and oil is transported using steel pipelines.

The iron and steel industry is a mineral based industry. The main raw materials used for the production of steel are iron ore, limestone, manganese, silica and coal. These raw materials are put in a blast furnace, where they undergo smelting, i.e., they are heated beyond their melting point. Molten iron is collected at the base of the furnace and the product so obtained is called pig iron. It is then refined by removing the impurities. After that, it is hardened by adding strengthening material like manganese to get the desired quality of steel.

Distribution: The largest producers of steel in the



world are China, Japan, India, the USA, Russia, South Korea, Germany, Brazil, Turkey, Ukraine and Italy.

The Indian iron and steel industry consists of large integrated steel plants as well as mini steel plants. All the important steel producing centres in India are spread over four states, namely, West Bengal, Jharkhand, Odisha and Chhattisgarh. These include *Durgapur* and *Burnpur* (West Bengal), *Jamshedpur* and *Bokaro* (Jharkhand), *Rourkela* (Odisha) and *Bhilai* (Chhattisgarh). *Bhadravati* and *Vijayanagar* in Karnataka, *Vishakhapatnam* in Andhra Pradesh and *Salem* in Tamil Nadu are other important steel producing centres in India.

Cotton Textile Industry

The word 'textile' is derived from the Latin word 'texere' which means 'to weave'. Weaving cloth from fibre or yarn has been in practice since ancient times. The fibres used in textile industry are natural fibres like cotton, silk, jute, flax, wool and man-made fibres like nylon, rayon, polyester and acrylic.

Cotton textile industry consists of three sub-sectors i.e., *handloom*, *powerloom* and *mill sectors*. Till the beginning of the Industrial Revolution in England in the 18th century cotton cloth used to be made using hand spinning techniques like spinning wheels and handlooms. In the 18th century, power looms replaced the hand spinning



Finished product from Iron and Steel Plant



Handloom Industry

techniques as they were expensive and time consuming. Gradually, mills were established, employing large numbers of workers. These mills not only increased the volume of production but also produced fine cloth in bulk.

Distribution: Cotton textiles are manufactured in the USA, China, India, Russia, UK, Japan, Brazil and Italy.

The cotton industry is one of the most widely distributed industries in India. India has the proud heritage of producing good quality cotton textiles.

The first textile mill was established in Mumbai in 1854. In the early years, the cotton textile industry remained concentrated in the states of Maharashtra and Gujarat due to availability of raw cotton, market, transport, easily accessible port facilities, skilled labour and warm moist climate. All these factors resulted in rapid expansion of this industry in the region. But now the cotton textile industry has spread to other centres as well like Coimbatore, Chennai, Ahmedabad, Mumbai, Kanpur, Kolkata, Ludhiana, Puducherry and Panipat.

There are a large number of cotton mills in India. These include *spinning mills*, that produce yarn; *weaving mills* that use either handlooms or *powerlooms* to produce cotton cloth

from yarn; and *composite mills* that produce both yarn and cloth. An important handspun, both woven, cotton yarn is *khadi* or *khaddar*.

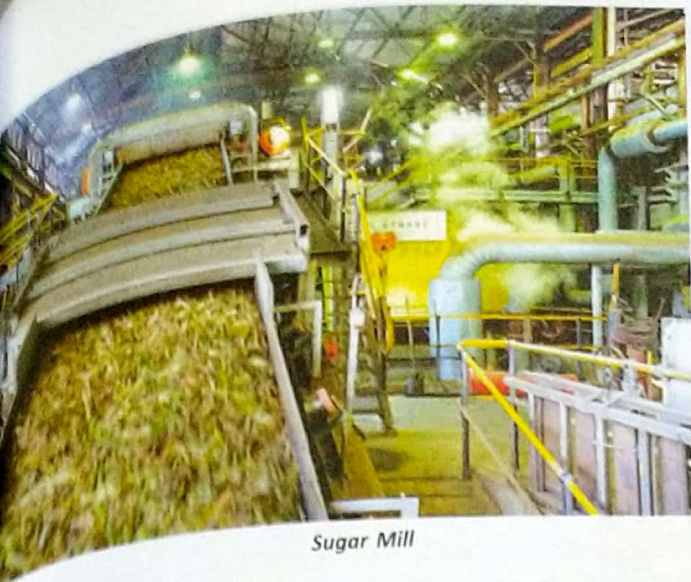
India exports yarn to Japan. Other importers of India's cotton goods are the USA, the UK, Russia, France, East European countries, Nepal, Singapore, Sri Lanka and African countries.

Sugar

Sugarcane is an important cash crop which is crushed in the factories to produce sugar. A fairly large amount is also used to make *gur* and *khandsari*. Besides providing sugar, *gur* and *khandsari*, it also supplies *molasses*, *bagasse* and *press mud*. Molasses is obtained in the process of sugar manufacture. It is used in the alcohol industry for the distillation of liquor (rum), power alcohol, etc. It is also used in the production of certain chemicals and synthetic rubber.



India: Distribution of Cotton Textile and Sugar Industry



Sugar Mill

Bagasse, the left over cane after crushing, is used for producing steam which is used as a source of power for sugar industry. It is also used for making cardboard, paper and insulation board. Press mud is utilised for making wax, carbon paper and shoe polish.

Sugar mills are usually located in the regions where sugarcane is grown. This is because the sugar content (sucrose) in sugar cane goes on decreasing with time. So it has to be transported to the sugar mills for processing as soon as it is harvested.

Distribution: Sugarcane is grown in the tropical and sub-tropical countries of the world. The leading producers of sugarcane and sugar in the world are Brazil, India, China and Thailand.

In India, the leading producer states of sugar is Maharashtra followed by Uttar Pradesh, Karnataka, Tamil Nadu and Andhra Pradesh.

Information Technology

Information Technology (IT) refers to the use of computers, software and different devices like modems, telephone services, etc. to create, store, process, secure and exchange information in a digital form. Although IT industry is a relatively new industry yet it has become one of the most important industry worldwide.

Computers, the main components of IT industry, during its initial phase were quite expensive and large. However, the invention of a small electronic device called *integrated circuit* (IC)

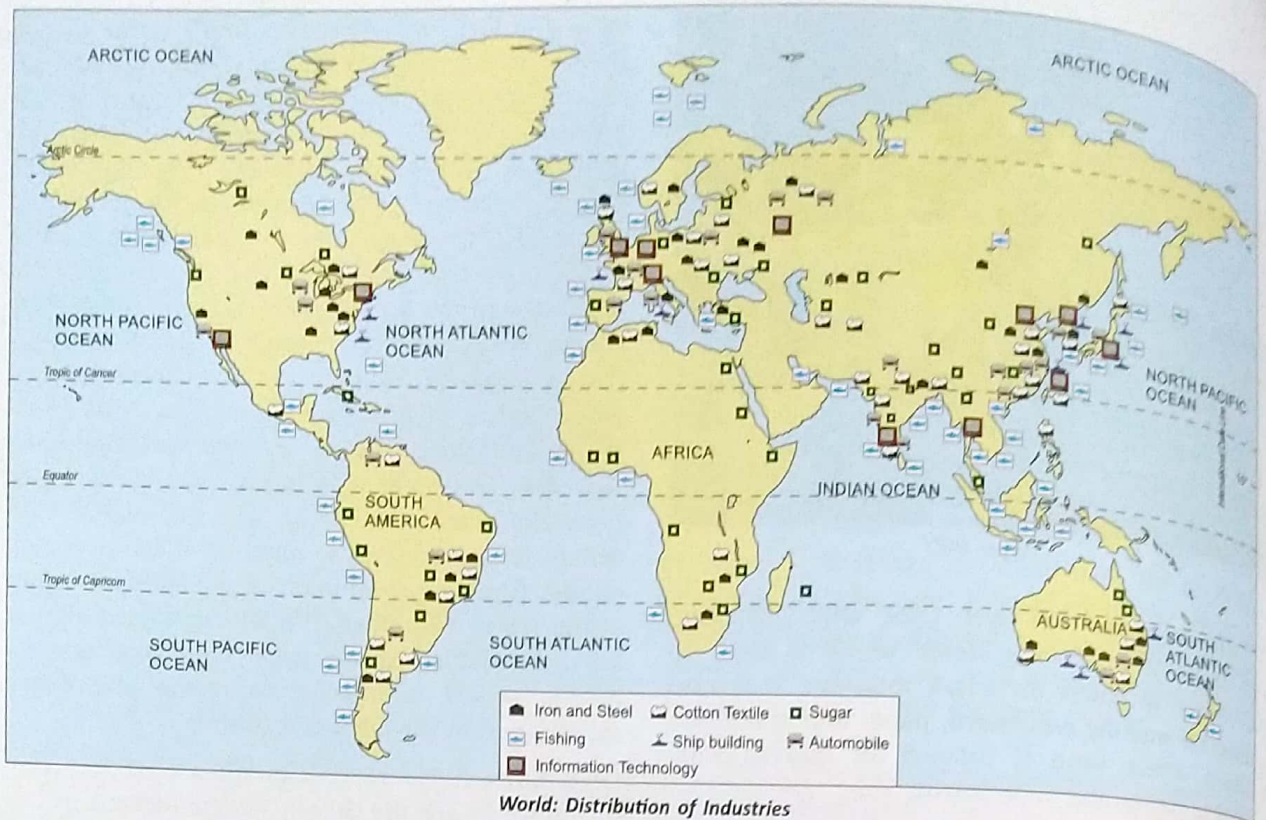
or a *chip* has revolutionised the IT sector. Since their origin in the 1960s, the size, speed and capacity of chips have progressed enormously. At present a chip may have several billion transistors in area of the size of a human fingernail. These chips are now used in almost all the electronic equipment, computers, mobile phones and other digital appliances. The invention of chip led to the development of small, powerful and affordable computers and related equipment. Major leap in the IT industry happened when computers got connected to each other via *Local Area Networks* (LAN) and long distance network via *Wide Area Network* (WAN) using *ethernet*. These computer networks made the entire process digital and drastically increased the amount of data created and stored, transferred and consumed. The invention of the *World Wide Web* (WWW), digitalised almost all the activities in our lives. It allowed anyone having access to internet to create and share information at the click of a button.

Distribution: The two major hubs of IT industry in the world are the *Silicon Valley*, located in the Santa Clara Country in the state of California in the USA and in *Bengaluru in India*. China, South Korea, Japan, Taiwan, Thailand, Switzerland, Germany and Canada are the countries where IT hubs have been established.

In India, besides Bengaluru, the other important IT hubs are in the metropolitan centres like Mumbai, New Delhi, Chennai, Hyderabad, and cities such as Gurugram, Kochi, Thiruvananthapuram, Pune and Chandigarh.



Infosys, an IT based company's office in Bengaluru



World: Distribution of Industries

Automobile Industry

Automobile industry refers to the industry which designs, develops, manufactures, markets and sells motor vehicles like cars, buses, trucks, scooters, bikes, etc.

Distribution: The leading producers of motor vehicles in the world are the USA, China, Japan, Germany, France, South Korea and India.

Some of the famous automobile manufacturing companies in the world include Toyota, Nissan, Honda and Suzuki of Japan, Volkswagen of Germany, Hyundai of South Korea, General Motors and Ford of the USA, Fiat Chrysler Automobiles of Italy and Renault of France.

India has a large automobile industry. It is also a major exporter of automobiles. There are three main regions of automobile-manufacturing in India — (i) National Capital Region, including Delhi, Gurugram and Manesar in Haryana and Noida in Uttar Pradesh; (ii) Mumbai, Pune, Nasik, Aurangabad in Maharashtra; and (iii) Chennai in Tamil Nadu. Maruti Suzuki, Mahindra and Mahindra, Tata Motors are the leading automobile producers in India.

Ship building Industry

Ship building industry is the one which is associated with the construction of ships and other floating vessels like *yachts*, *military vessels*, *cruise liners* and other *cargo* or *passenger ships*. The place where ships are constructed is called a *shipyard*.

Ship building Industry is a heavy engineering industry which requires the support of various other industries to procure a number of components like machinery, engines, boilers, propulsion units, etc. However, big ship building plants have their own units to manufacture different components required for ship building. The factors that favour the development of ship building industry are the following:

1. Since ship building industry is a heavy industry which requires bulky raw materials, it has to be located near the source of raw materials.
2. It is a sophisticated industry which requires highly skilled labour force.
3. Deep waters which could be used for navigation, either on the coast or in a river.
4. A huge tract of level land.

Distribution: China is the world's largest ship building country in the world. Other leading ship building countries are Japan, South Korea, India, Germany, France, the Netherlands, Sweden, Ukraine, the USA and Brazil.

In India, the main shipyards are — *The Hindustan Shipyard Limited*, Vishakhapatnam in Andhra Pradesh, *the Cochin Shipyard*, Kochi in Kerala, *The Garden Reach Workshop*, Kolkata in West Bengal and *The Mazagaon Dock Limited*, Mumbai in Maharashtra.

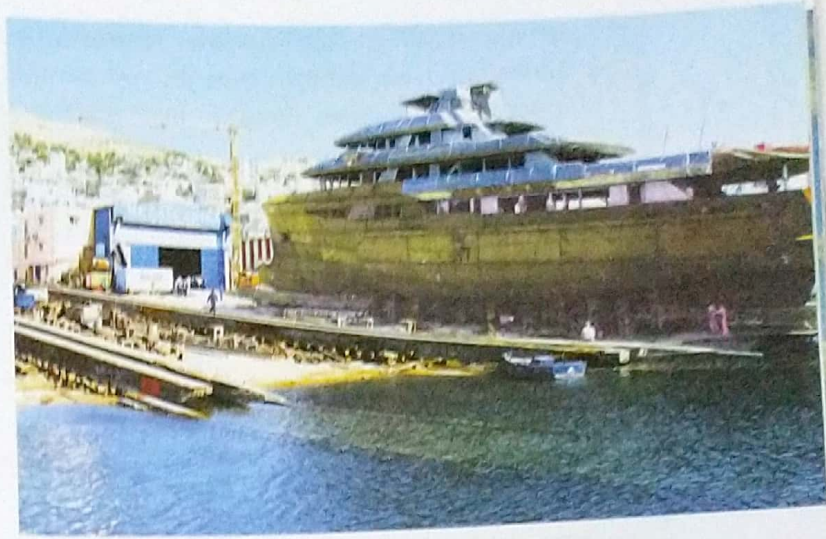
Fishing Industry

Fishing industry is the industry concerned with catching, breeding, processing, preserving, storing, transporting, marketing or selling fish and fish products.

Fish and fish products are consumed as food all over the world. Fisheries are estimated to provide 16% of the world population's protein. After processing the fish, the main products obtained are fish oil, fish glue, fish sauce, fish meal and fish emulsion. Pearls and mother-of-pearl are used as decorative items and to make jewellery.

Distribution: The world's leading countries in fishing are China, Peru, Japan, the USA, Chile, Indonesia, Russia, India, Thailand, Norway and Iceland.

Due to its many rivers and a long coastline, India has a huge potential for both inland and



Shipyard

marine fish. India's freshwater resources such as rivers, canals, ponds, lakes, and other water bodies provide a good catch of fish.

The leading fishing States in India are West Bengal, Andhra Pradesh, Gujarat, Maharashtra, Uttar Pradesh, Bihar and Karnataka.

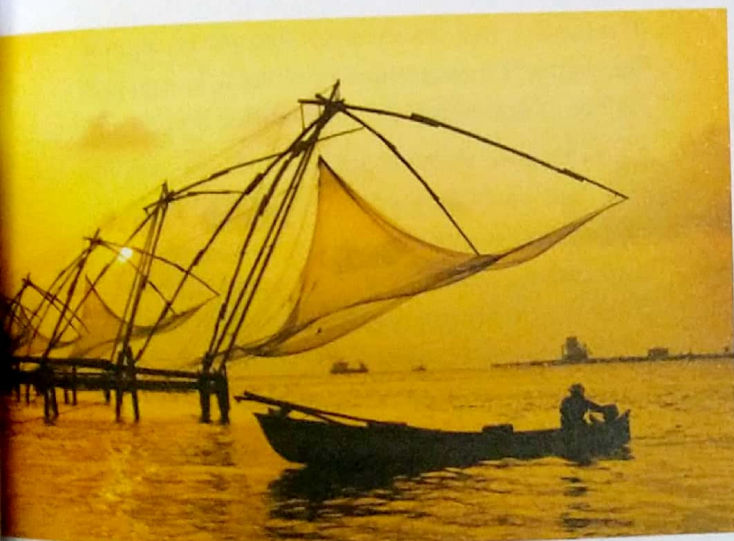
INDUSTRIAL POLLUTION

Industries form an important component of the growth and development of a nation. But there is also a flip side to it. Industries discharge their harmful by-products and wastes into the environment in the form of gases, liquids and solids and thereby, pollute the air, water and soil. This is known as the *industrial pollution*. Some of the highly-polluting industries are the iron and steel, oil refineries, paper, sugar and textile industries, chemical industries, leather industries, cement factories and thermal power plants.

Causes of Industrial Pollution

Industries discharge lots of waste that is rendered useless during the process of manufacturing various products. These result in industrial pollution. The main causes of industrial pollution are the following:

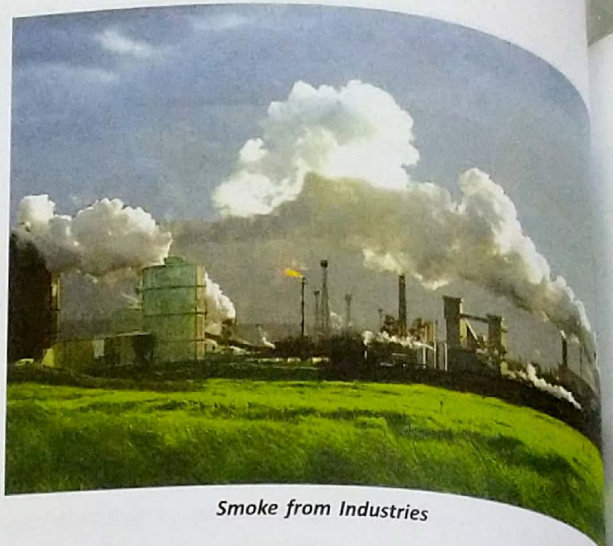
1. *Smoke* is emitted by chemical and paper factories, brick kilns, refineries and smelting plants, and burning of fossil fuels in big and small factories that ignore pollution



Fishing

norms. This smoke contains undesirable gases, such as sulphur dioxide and carbon monoxide, nitrogen dioxide, hydrocarbons and organic acids.

2. *Accidental toxic gas leaks* cause air pollution and can be very hazardous with long-term effects.
3. Paper, pulp, chemical, textile and dyeing, petroleum refineries, tanneries and electroplating industries let out *dyes, detergents, acids salts and heavy metals like lead and mercury, pesticides, fertilisers, synthetic chemicals with carbon, plastics and rubber, etc.* into the water bodies and pollute them.
4. Thermal pollution of water occurs when *hot water* from factories and thermal plants is drained into rivers and ponds before cooling.
5. Wastes from nuclear power plants, nuclear and weapon production facilities release *radioactive substances* in the environment which are harmful for living beings and can cause cancers, birth defects and miscarriages.
6. *Dumping of wastes* specially glass, harmful chemicals, industrial effluents, packaging, salts and garbage make the soil useless. Rain water percolates to the soil carrying the pollutants to the ground and the ground water also gets contaminated.



Smoke from Industries

7. Industrial and construction activities, machinery, factory equipment, generators, saws and pneumatic and electric drills *make a lot of noise*. Noise pollution not only causes irritation and anger, it also causes hearing impairment, increased heart rate and blood pressure among other physiological effects. Unwanted sound is an irritant and sources of stress.

Preventive Measures

1. Indiscriminate cutting of trees should be stopped and green belts should be established around industries as trees reduce dust, smoke and other pollutants from the air.
2. The industrial waste and hot water should be properly treated in waste treatment plants before it is discharged into water bodies.
3. Smoke and dust from industries can be reduced by fitting smoke stacks to factories with electrostatic precipitators, filters and scrubbers. The government should take strict action against those industries which discharge their pollutants into the environment without treating them.
4. Smoke can be reduced by using oil or gas instead of coal in factories.
5. Machines should be fitted with silencers to reduce noise pollution.



Industrial Waste being discharged into Water bodies