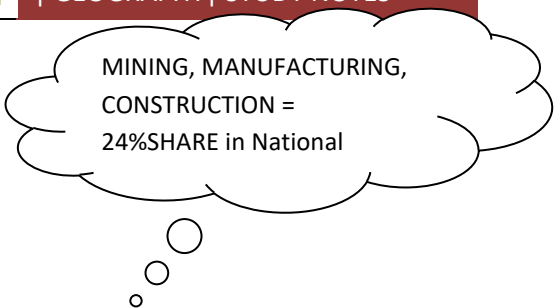


Chapter- 6

Manufacturing Industry



MINING, MANUFACTURING,
CONSTRUCTION =
24%SHARE in National

STUDY NOTES

MANUFACTURING: - Production of goods in large quantities after processing from raw materials to more valuable products is called manufacturing. Ex- paper is manufactured from wood, sugar from sugarcane, iron and steel from iron ore and aluminium from bauxite.

SECONDARY SECTOR- Manufacturing and Industry **sector** known as the **secondary sector** or the production **sector**, includes all branches of human activities that transform raw materials into products or goods. The **secondary sector** includes **secondary** processing of raw materials, food manufacturing, textile manufacturing and industry.

The economic strength of a country is measured by the development of manufacturing industries.

India is the **world's third largest economy** and has emerged as a **global growth engine**.

India has become a **major exporter** of **information technology, business outsourcing, and software expertise**.

Importance of Manufacturing: Manufacturing sector is considered the backbone of development in general and economic development because

- Manufacturing industries help in modernizing agriculture.
- They reduce the heavy dependence of people on agricultural income by providing them jobs in secondary and tertiary sectors.
- Helps in eradication of unemployment and poverty.
- Helps in bringing down regional disparities by establishing industries in tribal and backward areas.
- Exports of manufactured goods expand trade and commerce and bring much-needed foreign exchange.

1. Increase of employment	9. Specialization
2. Increase in GNP	10. Strong defence
3. Raise in living standards	11. Market expansion
4. Increase in government revenue	12. Agricultural development
5. Increase in social welfare	13. Utilization of raw material
6. Increase in investment	14. Resource development
7. Multi sector development	15. Foreign exchange
8. Favourable exports, improvement in balance of payments	16. Economic stability

Agriculture and Industry go hand-in-hand.



We can compete with international markets, if our manufactured products are at par in quality with international products. Our industry needs to be more efficient and competitive.

Contribution of Industry to National Economy:

- Share in the GDP (Gross Domestic Product) - 17% over the last two decades.
- Total contribution- 27%, 10% contribution comes from mining, quarrying, electricity and gas.
- Growth rate has been 7% in last decade whereas desired growth rate for industry is 12% in the coming decade.
- Compared to East Asian countries our contribution is low (expected 25-35%)

The National Manufacturing Competitiveness Council (NMCC)

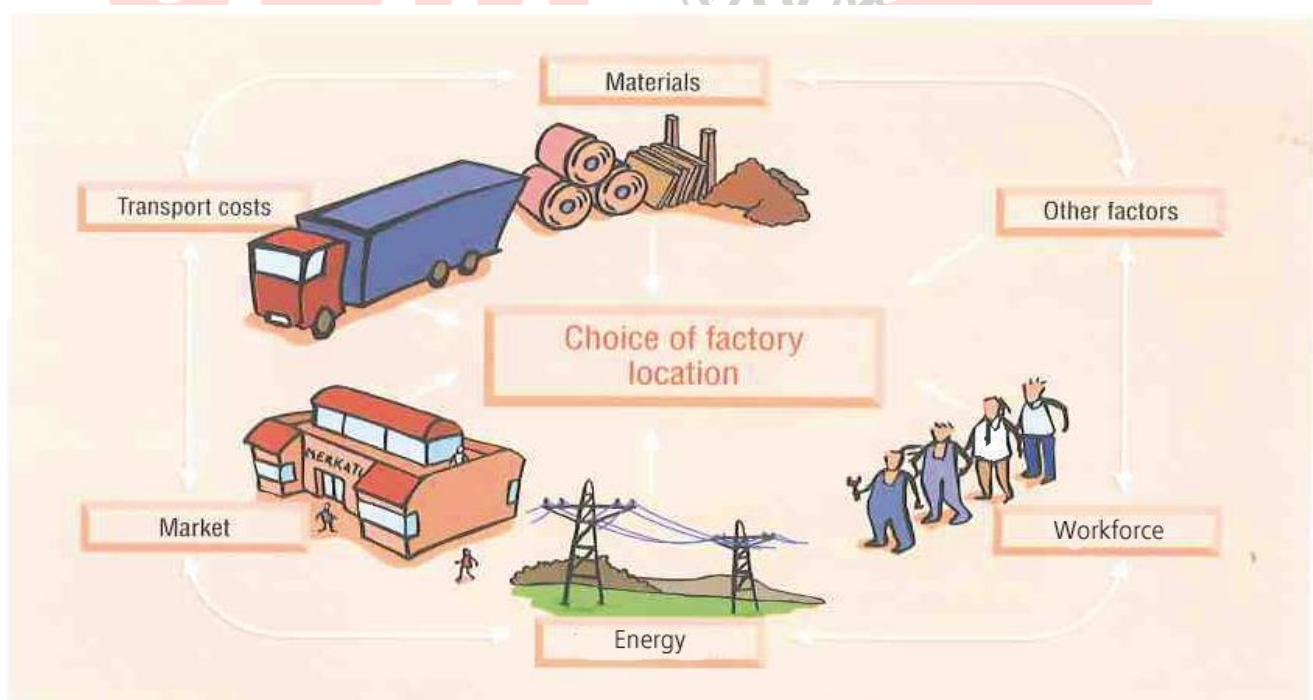
- Established in 2004
- Objective: To achieve desired growth rate in manufacturing with government policy interventions and renewed efforts by the industry for productivity.

The **Delhi–Mumbai Industrial Corridor** is the **country's first** and most **advanced economic corridor**. It is 1,483 kilometres long and links the country's two most populous cities.

In line with the **Make in India** initiative, the government is also developing the **Vizag–Chennai Industrial Corridor**, which is part of the **East Coast Economic Corridor**, the country's **first coastal economic corridor**.

INDUSTRIAL LOCATION

Industries are not found everywhere. They are located at certain places only where they get favorable conditions to thrive.



Industrial Location is governed mainly by the following factors:

Raw Materials- Finished product of one industry may will be the raw material of another. For example, pig iron, produced by smelting industry, serves as the raw material for steel making industry. Industries which use heavy and bulky raw materials in their primary stage in large quantities are usually located near the supply of the raw materials.

Source of Energy/Water- Regular supply of power is a pre-requisite for the localisation of industries. Coal, mineral oil and hydro-electricity are the three important conventional sources of power. Most of the industries tend to concentrate at the source of power.

Availability of Capital and Finance- Modern industries are capital-intensive and require huge investments. Capitalists are available in urban centers. Big cities like Mumbai, Kolkata, Delhi, and Chennai are big industrial centers, because the big capitalists live in these cities.

Market- The entire process of manufacturing is useless until the finished goods reach the market. Nearness to market is essential for quick disposal of manufactured goods. It helps in reducing the transport cost and enables the consumer to get things at cheaper rates.

Skilled Laborers and Workers- Labour supply is important in two respects (a) workers in large numbers are often required; (b) people with skill or technical expertise are needed.

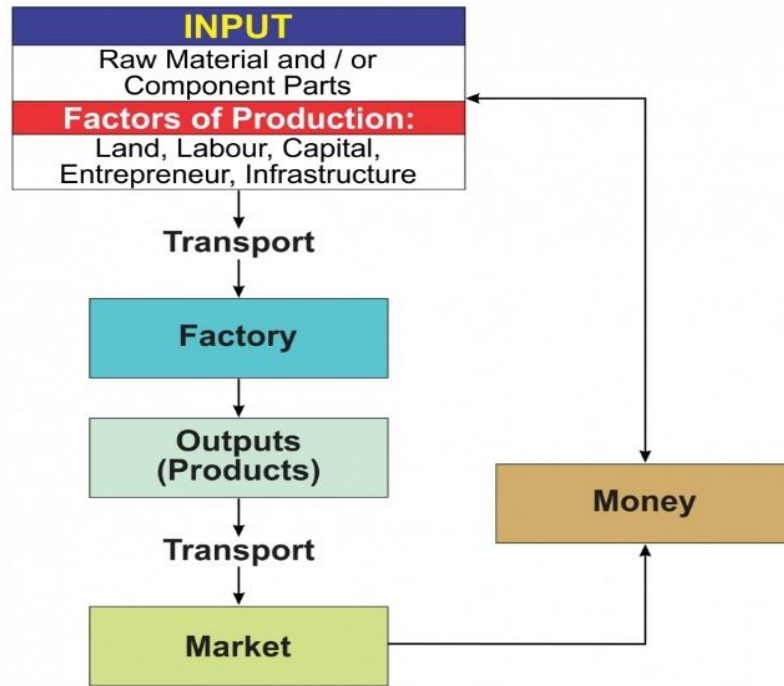
Banking and Insurance- Establishment of industries involves daily exchange of crores of rupees which is possible through banking facilities only. So the areas with better banking facilities are better suited to the establishment of industries. There is a constant fear of damage to machine and man in industries for which insurance facilities are badly needed.

Transport and Communication- Transport by land or water is necessary for the assembly of raw materials and for the marketing of the finished products. The development of railways in India, connecting the port towns with hinterland determined the location of many industries around Kolkata, Mumbai and Chennai.

Many industries come together at urban centers to make use of the advantages. These are known as "**AGGLOMERATION ECONOMIES**".

INDUSTRY-MARKET LINKAGE

Manufacturing activity tends to locate at the most appropriate place where all the factors of industrial location are either available or can be arranged at a lower cost. The figure below shows the industry market linkage.



IDEAL LOCATION OF AN INDUSTRY

The key to decision of the factory location is the least cost.

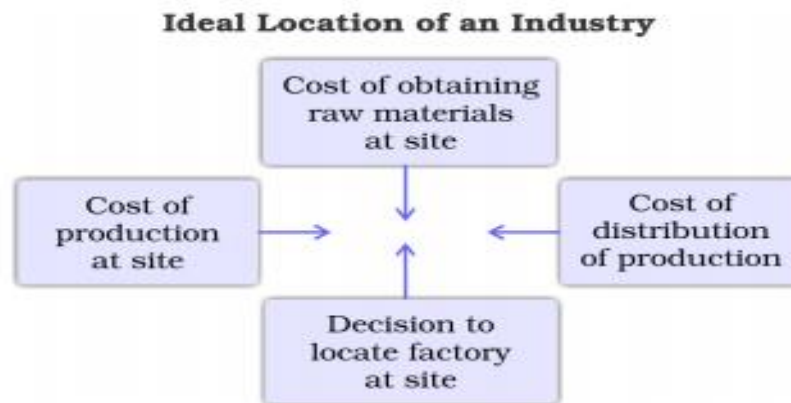
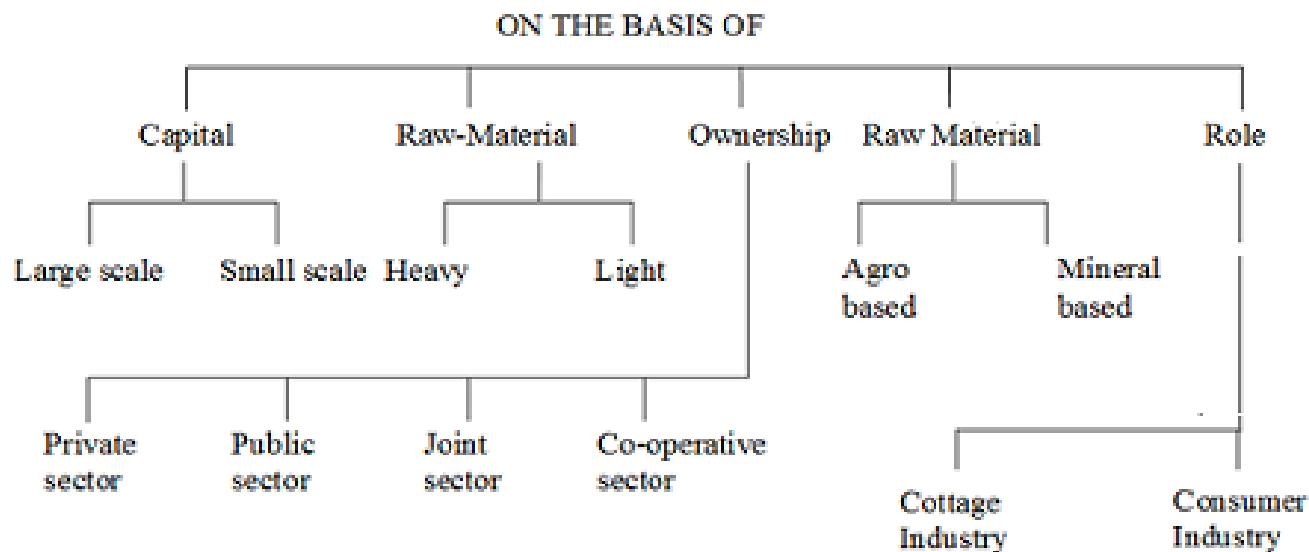


Fig. 6.2

CLASSIFICATION OF INDUSTRIES**ON THE BASIS OF RAW MATERIALS**

1. **Agro Based:** Those industries where raw materials come from agriculture, e.g. Cotton, Woolen, Jute, Silk Textiles, Sugar, Tea, Edible Oil
2. **Mineral Based:** Those industries where minerals are used as raw materials, e.g. Iron & Steel, Cement, Aluminum, Machine Tools etc.

ON THE BASIS OF MAIN ROLE

1. **Basic Industries:** Those industries which provide raw material to other industries are called basic industries. These industries help the development of other industries, e.g. Iron and Steel, Copper and Aluminum Smelting
2. **Consumer Industries:** Those industries which produce goods for consumers are called consumer industries. Finished goods of these industries are directly sold in the market for consumers, e.g. Sugar, Toothpaste, Soap, Bread, Paper etc.

ON THE BASIS OF CAPITAL INVESTMENT

1. **Small Scale Industries:** Those industries where investment of capital is less than Rupees one crore are called as small scale industries, e.g. Mat, Furniture, Toys, Bread, Tools etc.
2. **Large Scale Industries:** Those industries where investment of capital is more than Rupees one crore are called as large scale industries, e.g. Iron & Steel, Petrochemicals, Cotton Textiles etc.

ON THE BASIS OF OWNERSHIP

1. **Public Sector:** These industries are owned, operated and maintained by Govt. e.g. BHEL, SAIL, IISCO
2. **Private Sector:** These industries are owned, operated and maintained by individual or group of individuals, e.g. TISCO, Bajaj Auto Ltd., etc.
3. **Joint Sector:** These industries are jointly run by Govt. and group of individuals. It is mixture of public and private sector, e.g. Oil India Ltd. [OIL].
4. **Cooperative Sector:** These industries are owned, operated and maintained by supplier of raw materials and workers of the industries, e.g. Sugar industries in Maharashtra, Coir industries in Kerala.

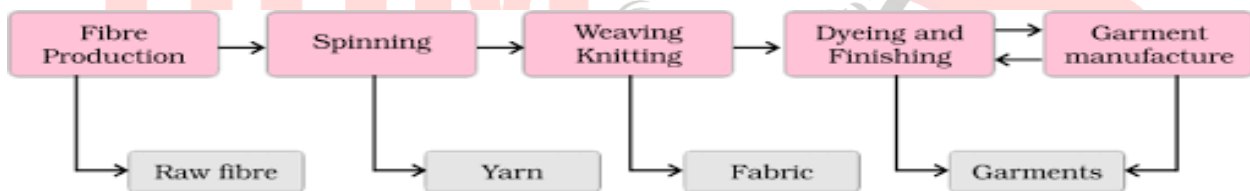
ON THE BASIS OF BULK AND WEIGHT

1. **Heavy Industries:** Those industries which use heavy and bulky raw materials and produce heavy goods in large quantity are called heavy industries, e.g. Iron and Steel, Copper Smelting.
2. **Light Industries:** Those industries which use light and small raw materials and produce light goods are called light industries, e.g. Electrical, Toys, Tools, Utensils etc.

AGRO BASED INDUSTRY

TEXTILE INDUSTRY: COTTON TEXTILE (MAP), JUTE TEXTILE, SUGAR INDUSTRY

- It is the only industry in the country, which is **self-reliant** and **complete in the value chain** i.e., from raw material to the highest value added products.
- Value addition in the textile industry: -

**QUICK FACTS: -**

- The oldest cotton threads in India date back to circa 4000 BC. This was preserved for more than 6000 years.
- The oldest fabric that was naturally dyed, goes way back in time to 2500 BC.
- In the world of Indian Handloom Fabric, indigo happens to be one of the oldest dyes, that was made with plants. In India, blue indigo is the most prized possession, since India is a home of *Indigofera Tinctoria* plant that produces an enormous amount of blue dye.
- Khadi is not a new textile but it came into existence during the British era. The fabric holds utmost importance since it was Mahatama Gandhi who made Khadi a way of living.

Cotton Textile Industry: It is an agro-based and the oldest industry in India. First cotton mill was established in 1854 in Mumbai.

At present, it the largest industry in our country. There are about 1600 cotton textile mills in our country. Cotton textile mills are mainly **concentrated in Maharashtra and Gujarat** due to favorable conditions like: -

- Availability of raw cotton
- Market
- transport including accessible port facilities
- Labour
- moist climate contributed towards its localization.

This industry has close links with agriculture and provides a living to farmers, cotton boll pluckers and workers engaged in ginning, spinning, weaving, dyeing, designing, packaging, tailoring and sewing. The industry by creating demands supports many other industries, such as, chemicals and dyes, mill stores, packaging materials and engineering works.

Important centers are Mumbai, Pune, Ahmedabad, Surat, Rajkot, Indore, Coimbatore etc. Other centers are Agra, Kanpur, Hugli, Chennai, Madurai etc.

Cotton textile is produced by three methods in India:

a) Handloom (A 'handloom' is a loom that is used to weave cloth without the use of any electricity. Hand weaving is done on pit looms or frame looms generally located in weavers' homes. Fabrics woven out of hand spun yarn on **handlooms** are **called** "khadi", while mill spun yarn woven on **handlooms** are **called** "**handloom**" fabrics.)

b) Power-looms (The **power loom** is a mechanized device used to weave cloth powered by water, steam or electricity.)

c) Mills (A **textile mill** is a manufacturing facility where **textiles**, or types of **cloth**, are produced or processed into finished products, such as clothing.)

India exports yarn to Japan and readymade garments to USA, UK, France, Russia, Nepal, Singapore, Sri Lanka and African countries etc.

Cotton textile industries are facing many **problems** such as:

- scarcity of good quality cotton, b) old machinery, c) erratic power supply, d) low productivity of labour e) tough competition from synthetic fibers.



Jute Textiles: India is the largest producer of raw jute and jute goods. First jute mill was setup in Rishra [Kolkata] in 1859.

There are 69 jute mills located in a 2 km broad belt along Hooghly River. Most of the **jute mills are located along Hugli River in West Bengal** due to favorable conditions like: -

- proximity of the jute producing areas
- inexpensive water transport
- supported by a good network of railways, roadways and waterways to facilitate movement of raw material to the mills
- abundant water for processing raw jute
- cheap labour from West Bengal and adjoining states of Bihar, Orissa and Uttar Pradesh.
- Kolkata as a large urban center provides banking, insurance and port facilities for export of jute goods.

Jute is used in making rope, bags, carpets etc. Bihar, UP, Assam and Tripura also have jute mills.

Jute industries are facing problems like:

- a) main jute producing area went to Bangladesh
- b) high production cost
- c) declining demand of jute in international market
- d) tough competition from synthetic fiber industry and from other competitors like Bangladesh, Brazil, Philippines, Egypt and Thailand.

Due to the Government policy of mandatory use of jute packaging the internal demand has increased. To stimulate demand, the products need to be diversified. In **2005, National Jute Policy** was formulated with the **objective** of increasing productivity, improving quality, ensuring good prices to the jute farmers and enhancing the yield per hectare. The main markets are U.S.A., Canada, Russia, United Arab Republic, U.K. and Australia. The growing global concern for environment friendly, biodegradable materials, has once again opened the opportunity for jute products.

Sugar industry: India stands second as a world producer of sugar but occupies the first place in the production of gur and khandsari.

Where should the mills be ideally located?

The raw material used in this industry is bulky, and in haulage its sucrose content reduces. This industry is seasonal in nature so; it is ideally suited to the cooperative sector.

There are over 460 sugar mills in the country spread over Uttar Pradesh, Bihar, Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Gujarat along with Punjab, Haryana and Madhya Pradesh. Sixty per cent mills are in Uttar Pradesh and Bihar.

There is a tendency for the mills to shift and **concentrate** in the southern and western states, especially in **Maharashtra**, because: -

- Per hectare production of sugarcane is higher in southern India. Black soil is quite suitable for cultivation of sugarcane.
- Sucrose content in the sugarcane is higher in Maharashtra and Karnataka. It means more sugar can be produced for less sugarcane.
- Mills and machines are new in southern states. New and modern machines increase the productivity.
- Crushing season for sugarcane is longer in southern states. The cooler climate also ensures a longer crushing season.
- Cooperative sugar mills are running successfully in southern states.

Major **challenges**: -

- the seasonal nature of the industry
- old and inefficient methods of production
- transport delay in reaching cane to factories
- the need to maximize the use of baggase.

MINERAL BASED INDUSTRY: Industries that use minerals and metals as raw materials are called mineral based industries.

IRON AND STEEL INDUSTRY (MAP)

The iron and steel Industry is the basic industry since all the other industries — heavy, medium and light, depend on it for their machinery. This industry is called as basic industry because it provides raw material to many other industries such as machine tools, transport equipment, construction material etc. It is also called as heavy industry because raw materials [iron ore, coal, limestone] are bulky in nature.

Steel is needed to manufacture a variety of engineering goods, construction material, defence, medical, telephonic, scientific equipment and a variety of consumer goods.

Production and consumption of steel is often regarded as the index of a country's development. Iron and steel is a heavy industry because all the raw materials as well as finished goods are heavy and bulky entailing heavy transportation costs.

Iron ore, coking coal and lime stone are required in the ratio of approximately 4:2:1. Some quantities of manganese, are also required to harden the steel. India ranks ninth among the world crude steel producers. It is the largest producer of sponge iron. In spite of large quantity of production of steel, per capita consumption per annum is only 32 kg. It is low because India has low economic and industrial development. Important integrated steel plants are Jamshedpur, Durgapur, Bokaro, Bhilai, Burnpur etc.

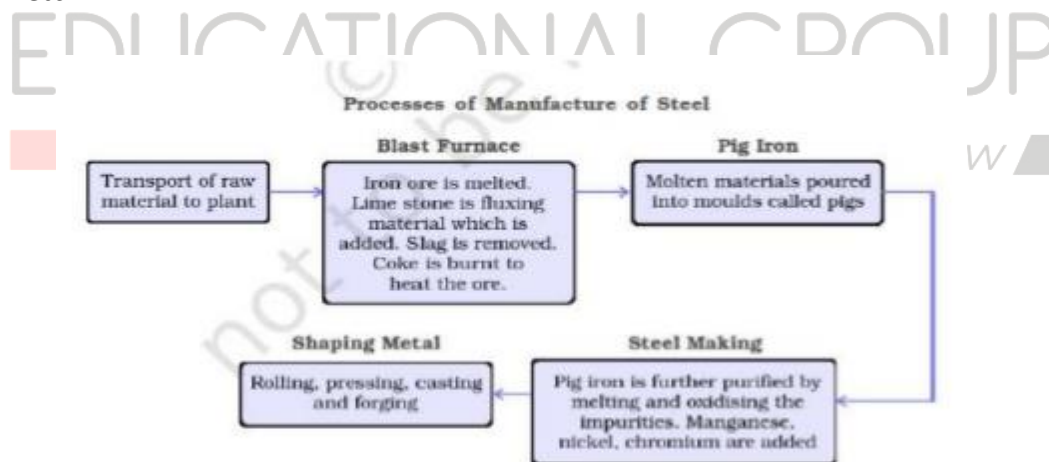


Fig. 6.4

All public sector undertakings market their steel through, Steel Authority of India Ltd. (SAIL) while TISCO (Tata Iron and Steel Company) markets its produce through Tata Steel. In the 1950s China and India

produced almost the same quantity of steel. Today, China is the largest producer. China is also the world's largest consumer of steel.

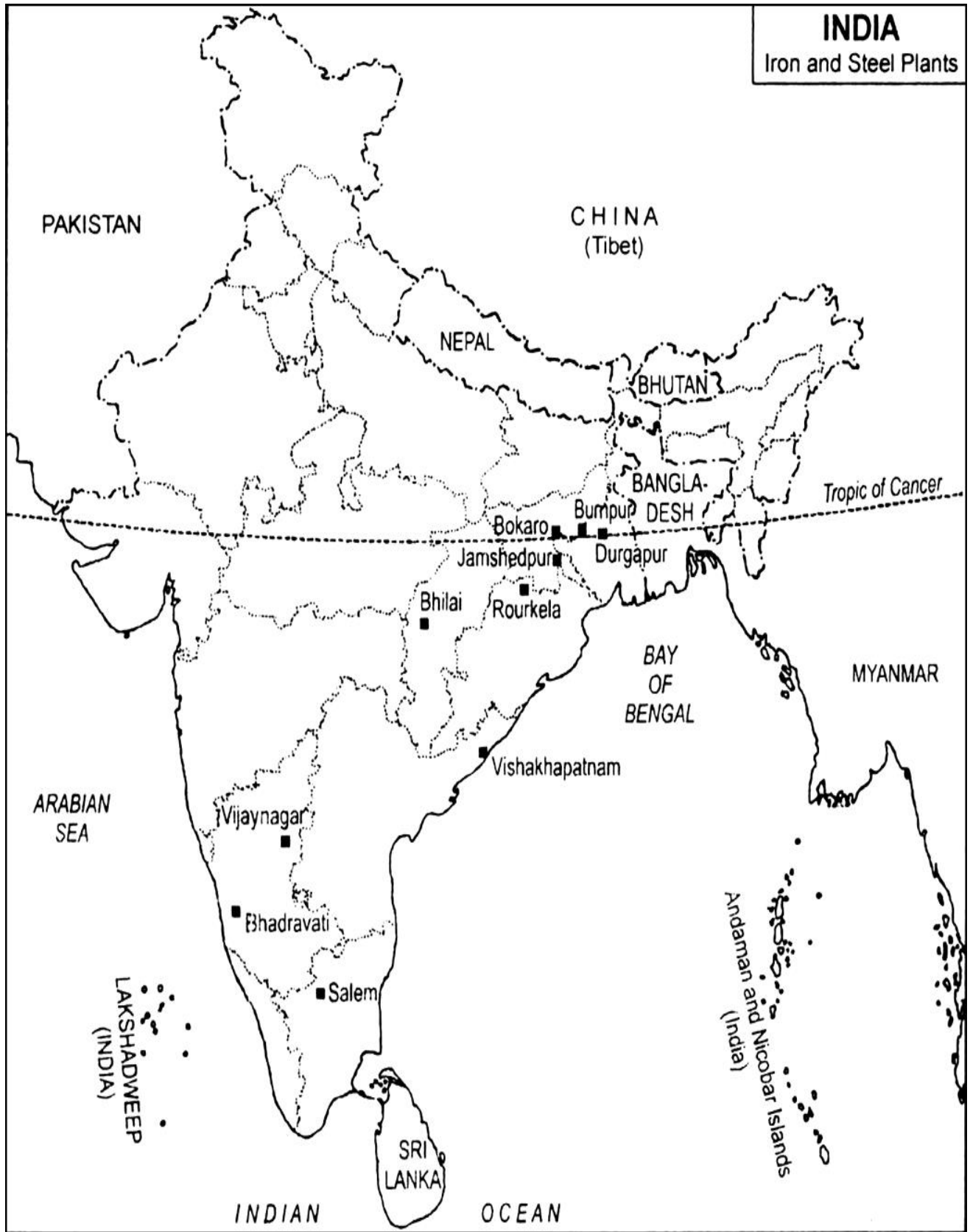
Integrated Steel Plant	Mini Steel Plant
(a) These are larger steel plants.	(a) These are smaller steel plants.
(b) These plants use basic raw material for making steel.	(b) These plants use steel scrap and sponge iron for making steel.
(c) These plants use blast furnaces.	(c) Mini steel plants have electric and induction furnaces.
(d) They are usually concentrated near the sources of raw materials and market and also cater domestic and international demands.	(d) They are decentralised secondary units scattered across the country to meet local demands.

Chotanagpur plateau region has the maximum concentration of iron and steel industries. It is largely, because of the relative advantages that includes: -

- low cost of iron ore, high grade raw materials in proximity
- cheap labour
- vast growth potential in the home market.

India is an important iron and steel producing country in the world yet, we are not able to perform to our full potential largely due to:

- (a) High costs
- (b) Limited availability of coking coal
- (c) Lower productivity of labour
- (d) Irregular supply of energy
- (e) Poor infrastructure like transport and communication etc.
- (f) Raw materials are found in a certain pockets of India only



ALUMINIUM SMELTING, CHEMICAL INDUSTRY, FERTILIZER AND CEMENT INDUSTRY

Aluminum Smelting: It is the second most popular metallurgical industry in India. The raw material used is a bulky dark reddish rock known as bauxite. It is used to manufacture aircraft, utensils and wires. It has gained popularity as a substitute of steel, copper, zinc and lead in a number of industries.

Aluminium Smelting has gained popularity as a substitute for steel, copper, zinc and lead in a number of industries. It exhibits the following properties:

- Light in weight
- Resistant to corrosion
- A good conductor of heat
- Malleable
- Becomes strong when it is mixed with other metals

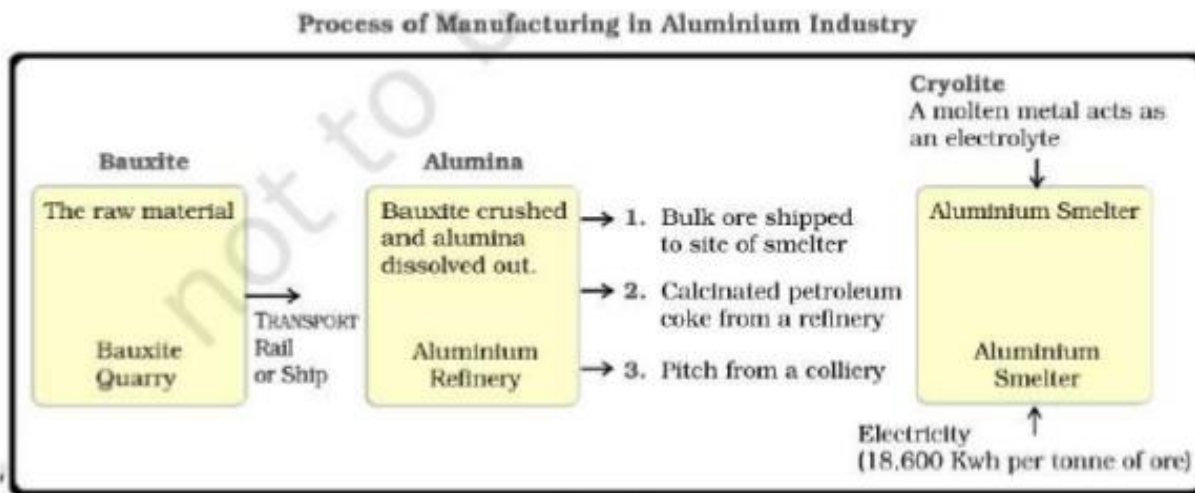


Fig. 6.8

There are 8 aluminium smelting plants in the country located in Orissa (Nalco- NATIONAL ALUMINIUM COMPANY LIMITED and Balco- BHARAT ALUMINIUM COMPANY), West Bengal, Kerala, Uttar Pradesh, Chhattisgarh, Maharashtra and Tamil Nadu.

Chemical Industry: Contributes approximately 3 percent of annual GDP. In terms of size, it is the third largest industry in Asia and the twelfth largest in the world.

Organic and inorganic sectors of the industry are rapidly growing.

Organic chemicals include petrochemicals, which are used for manufacturing of synthetic fibers, synthetic rubber, plastics, dye-stuffs, drugs and pharmaceuticals. Organic chemical plants are located near oil refineries or petrochemical plants.

Inorganic chemicals include sulphuric acid (used to manufacture fertilizers, synthetic fibers, plastics, adhesives, paints, dyes stuffs), nitric acid, alkalis, soda ash (used to make glass, soaps and detergents, paper) and caustic soda.

The chemical industry is its own largest consumer. Basic chemicals undergo processing to further produce other chemicals that are used for industrial application, agriculture or directly for consumer markets.

Fertilizer Industry: India is the third largest producer of nitrogenous fertilizers. Fertilizer industry is centered around the production of nitrogenous fertilizers, phosphatic fertilizers and ammonium phosphate and complex fertilizers. Complex fertilizers have a combination of nitrogen (N), phosphate (P) and potash (K).

Potash is entirely imported because India does not have any reserves of commercially viable potash or potassium compounds.

India is the third largest producer of nitrogenous fertilizers.

There are 10 public sector undertakings and one in cooperative sector at Hazira in Gujarat under the **Fertilizer Corporation of India**. Green Revolution boosted the growth of this industry in our country.

Cement Industry: Cement industry requires bulky raw materials like limestone, silica, alumina and gypsum. Cement is essential for construction activity such as building houses, factories, bridges, roads, airports, dams and for other commercial establishments.

The industry has strategically located plants in Gujarat for: -

- Suitable access to the market in the Gulf countries (Middle East), East Asia, Africa and South Asia.
- Proximity to ports.
- Coal and electric power
- Rail transportation

The first cement plant was set up in Chennai in 1904.

AUTOMOBILE INDUSTRY, INFORMATION TECHNOLOGY AND ELECTRONIC INDUSTRY (MAP)

Automobile Industry: Automobiles provide vehicle for quick transport of good services and passengers. Trucks, buses, cars, motor cycles, scooters, three-wheelers and multi-utility vehicles are manufactured in India at various centers. 15 manufacturers of cars and multi-utility vehicles, 9 of commercial vehicles, 14 of two and three-wheelers.

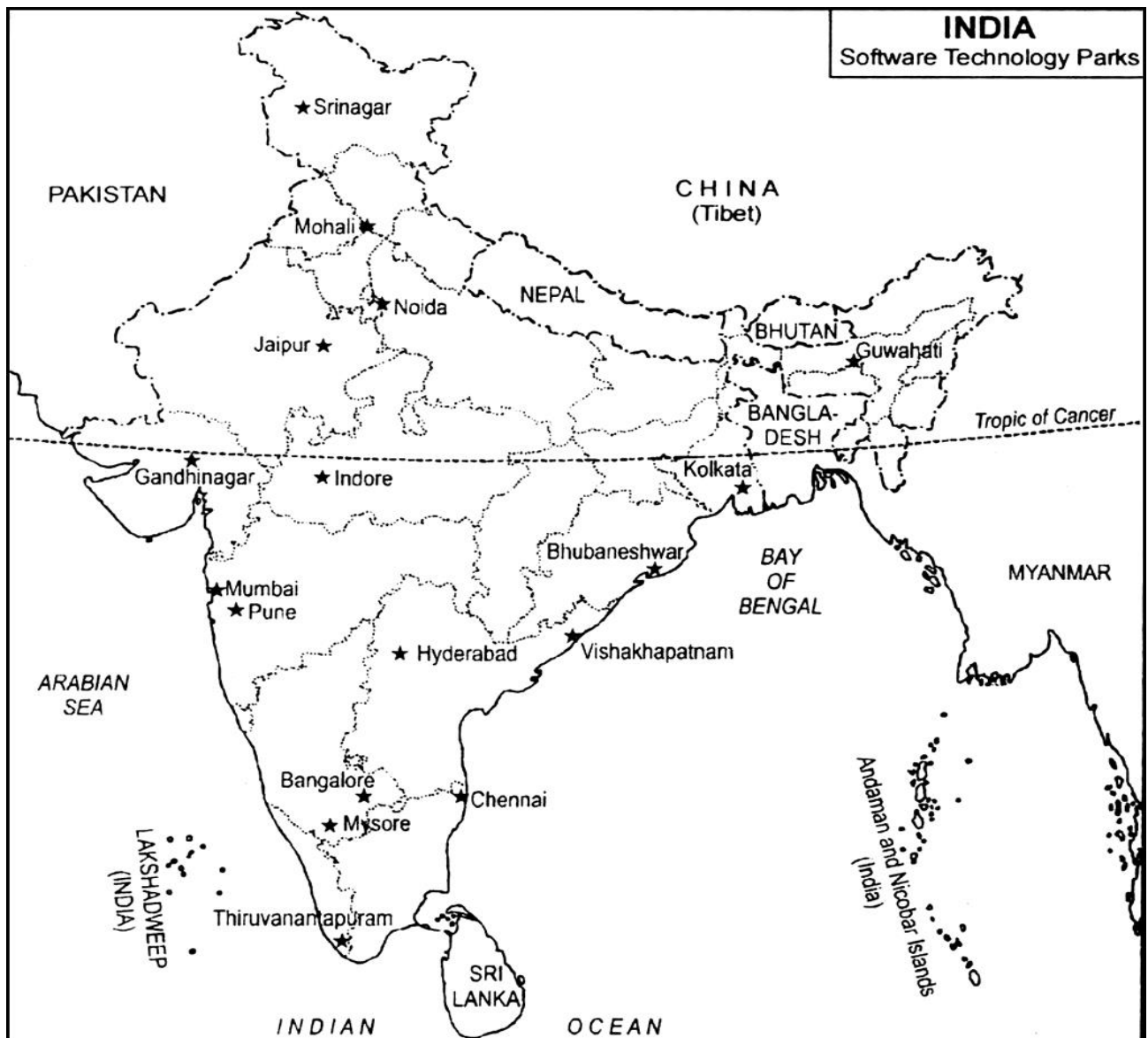
After the liberalization, the coming in of new and contemporary models stimulated the demand for vehicles in the market, which led to the healthy growth of the industry. Foreign Direct Investment brought in new technology and aligned the industry with global developments.

Major centers of Automobile Industry: - Delhi, Gurgaon, Mumbai, Pune, Chennai, Kolkata, Lucknow, Indore, Hyderabad, Jamshedpur, Bangalore, Sanand, Pantnagar, etc.

Information Technology: There are 18 software technology parks in the country and they provide single window service and high data communication to software experts. This industry had generated a large number of employment, over million persons were employed in the IT industry. Because of fast growth of **BPO (Business Process Outsourcing)**; this sector has been a major earner of foreign exchange. It is encouraging to know that 30 per cent of the people employed in

this sector are women. The continuing growth in the hardware and software is the key to the success of IT industry in India.

Electronics Industry: The electronics industry covers a wide range of products from transistor sets to television, telephones, cellular telecom, pagers, telephone exchange, radars, computers and many other equipment's required by the telecommunication industry. **Bangalore** is often termed as the **electronic capital** of India. Other important centers for electronic goods are Mumbai, Delhi, Hyderabad, Pune, Chennai, Kolkata, Lucknow and Coimbatore.



INDUSTRIAL POLLUTION AND ENVIRONMENT DEGRADATION

- a) **Air pollution** is caused by the emission of CO₂, Carbon Monoxide, Sulphur Dioxide etc. Chimneys of the industries produce heat leading to Global Warming and Green House Effect. The use of CFC in various industrial products depletes ozone layer which filters ultraviolet rays of the sun.
- b) **Water Pollution**, dumping of organic and inorganic industrial waste into water bodies pollutes the water. Industries which produce paper, pulp, chemical, leather, acids, dyes, fertilizers etc. generate lots of toxic waste which kills the aquatic life.
- c) **Noise Pollution**, High intensity sound generated by running machines, sirens, drilling, fans etc. leads to noise pollution. It causes irritation, hearing impairment, heart attack etc. among the nearby residents.
- d) **Mining activity** to get raw material for industries also degrades the environment. Land degradation, deforestation, soil erosion, water logging etc. are the results of mining activities.
- e) **Thermal pollution** of water occurs when hot water from factories and thermal plants is drained into rivers and ponds before cooling.

CONTROL OF ENVIRONMENT DEGRADATION

- a) Industries should be located with careful planning and better design.
- b) Quantity of smoke can be reduced by using oil instead of coal. Particulate matter in the air can be reduced by fitting smoke stacks to factories with electrostatic precipitators, fabric filters, scrubbers and inertial separators.
- c) Non-conventional sources of energy should be used instead of fossil fuels.
- d) Modern equipment should be used which controls, filters and separates harmful materials from the waste.

- e) Waste water should be properly treated before discharging into rivers.
- f) Land filling method should be adopted for dumping of waste.
- g) Polluting industries should be located away from towns and cities.
- h) Overdrawing of ground water reserves by industry where there is a threat to ground water resources also needs to be regulated legally.
- i) Machinery and equipment can be used and generators should be fitted with silencers. Almost all machinery can be redesigned to increase energy efficiency and reduce noise. Noise absorbing material may be used apart from personal use of earplugs and earphones.

Every liter of waste water discharged by our industry pollutes eight times the quantity of freshwater.

Q. How can the industrial pollution of fresh water be reduced?

Some suggestions are-

- (i) Minimizing use water for processing by reusing and recycling it in two or more successive stages.
- (ii) harvesting of rainwater to meet water requirements
- (iii) treating hot water and effluents before releasing them in rivers and ponds.

Treatment of industrial effluents can be done in three phases

- (a) Primary treatment by mechanical means. This involves screening, grinding, flocculation and sedimentation.
- (b) Secondary treatment by biological process
- (c) Tertiary treatment by biological, chemical and physical processes. This involves recycling of wastewater.

NTPC shows the way (Case Study)

NTPC (National Thermal Power Corporation Limited) is a major power providing corporation in India. It has ISO certification for EMS (Environment Management System) 14001.

The corporation has a pro-active approach for preserving the natural environment and resources like water, oil and gas and fuels in places where it is setting up power plants. This has been possible through-

- (a) Optimum utilization of equipment adopting latest techniques and upgrading existing equipment.
- (b) Minimizing waste generation by maximizing ash utilization.
- (c) Providing green belts for nurturing ecological balance and addressing the question of special purpose vehicles for afforestation.
- (d) Reducing environmental pollution through ash pond management, ash water recycling system and liquid waste management.
- (e) Ecological monitoring, reviews and online database management for all its power stations.

END