

5

Manufacturing Industries

Manufacturing industries occupy a very important place among economic activities of man. Industries which produce both finished and semi-finished products with the knowledge of technology and skills of man, utilizing the raw materials and other factors of production are called manufacturing industries. "During this process goods are produced by using essential raw materials in such a way that a value is attributed to them, so that they would provide maximum utility".

With the dawn of the Industrial Revolution during the 18th century there was a revival in the field of industries in many countries of the world. During this period, certain industries which existed as cottage industries were transformed into factories producing high quality industrial goods using machinery and new technological methods.

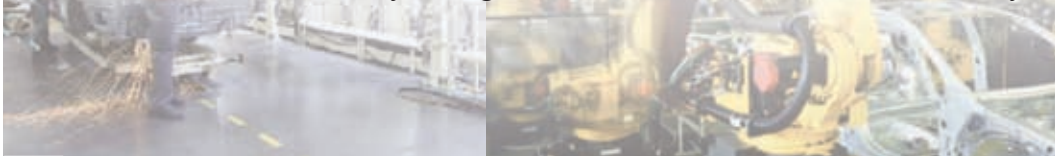
The objective of this chapter is to study the main manufacturing industries of the world, their distribution, production, trade and the modern trends.

Attention is paid on the following manufacturing industries for the purpose of this study.

- Iron and steel industry
- Automobile industry
- Ship building industry
- Electronic industry
- Cotton textile industry

The location of an industry is influenced by a few factors. Those factors are shown in Figure 5.1.

The factors depicted in Figure 5.1 influence different industries in various ways. The impact of these factors of production may change according to the nature of the industry, the technology utilized and also according to the period of time. In addition, other factors too may emerge to influence the location of an industry.



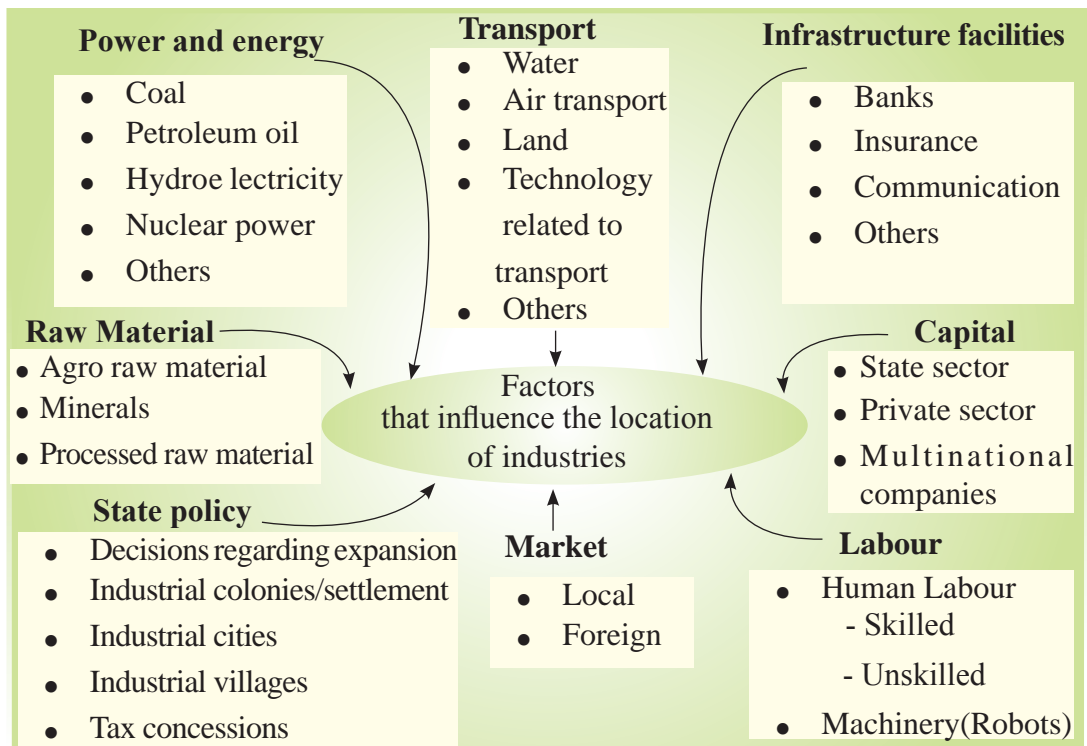


Figure 5.1
Factors that influence the location of industries

Iron and Steel Industry

The iron and steel industry is a very ancient industry. Due to the Industrial Revolution which began during the latter half of the 18th century, there was an accelerated development in the iron and steel industry. During the early stages, though this industry was located in countries where iron ore, coal and limestone deposits were in abundance, there are also countries where the iron and steel industry is maintained at a highly developed level using imported raw materials. As this industry is decisive in determining the technical strength of a country and in addition as iron and steel are used as a raw material for production of equipment, this industry has an important position. In this industry, basically iron ore is used to produce iron. Pig iron is mixed with other metals and seasoned further to produce steel. During the early stage of the Industrial Revolution, 90% of the raw material used, for production activities in the fields of machinery, electrical products and transport, was iron and steel. Later, when aluminium was discovered, the demand for iron and steel dropped to 65%. Iron and steel industry which is linked to different economic activities in the world is also important as a base industry for many other industries.

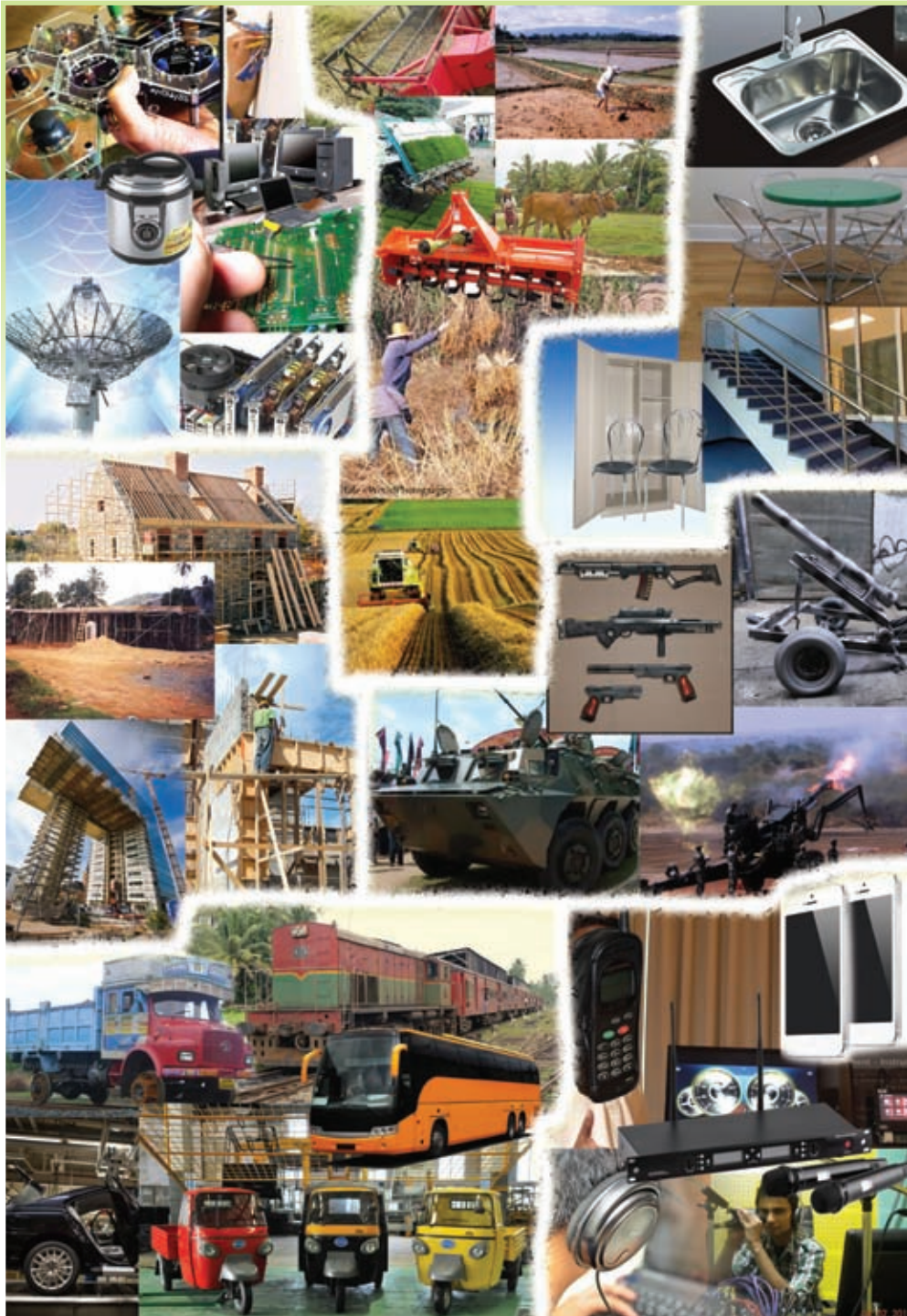


Figure 5.2
Other economic activities linked to iron and steel products

There is a continuous development in the iron and steel industry in the world. The iron and steel production which was around 70 million metric tons in 2000, has risen to 130 million metric tons by 2012 as shown in Graph 5.1.

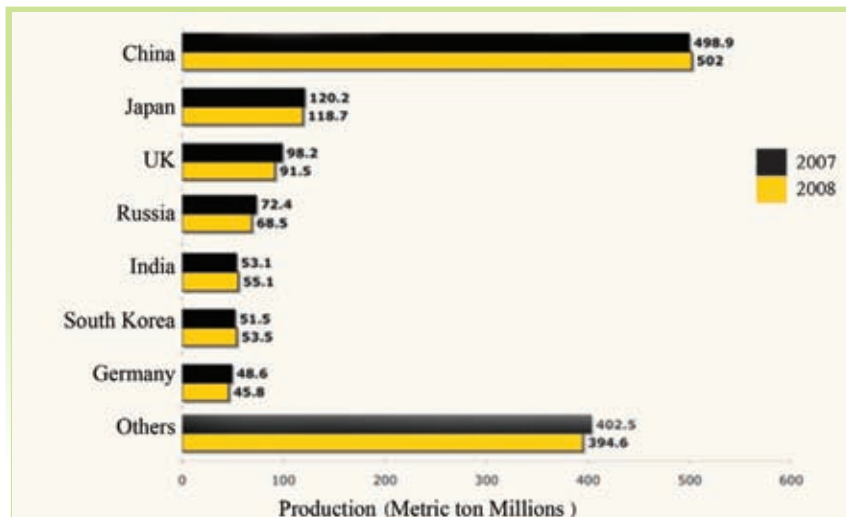


Graph 5.1

The present progress of world steel production

Source: [HTTP://WWW.wikipedia.org](http://www.wikipedia.org)
(2014.02.10)

The uneven distribution of mineral resources has also affected iron and steel production as shown in Graph 5.2. According to Graph 5.2, different countries have contributed to the production capacity of iron and steel in various amounts. China has made the greatest contribution.



Graph 5.2

Steel producing countries in the world

Source: <http://www.worldsteel.org/?action=newsdetaild=257> (2014.02.10)

Activity

Study Graph 5.2 and list the steel producing countries according to the continents in which they are located.

Although, the iron and steel industry was located in the regions where raw material was found in the past, there is a trend at present to locate the industry outside the places where raw material is available depending on other diverse facilities. Refer to Table 5.1.

Table 5.1

The factors that have contributed to locate the centres of iron and steel production in various countries

Country	Production centre	Important factors influencing location
China	Southern region of Manchuria, Beijing region, Shangshewan region.	Availability of iron ore on the surface of the earth.
Japan	Osaka, Kobe and Kyoto zones. Tokyo, Yokohama zone, North Kiyushu region, Nagoya industrial zone.	Availability of port facilities and market for import and export.
United Kingdom (UK)	Birmingham District, South Wales region, Lancashire region, North Eastern coastal region	Easy access to iron ore and coal and also port facilities to import iron ore.
Russia	Kuznetz zone, Moscow basin zone, Ural zone	Availability of iron ore which has a high content of iron.
India	Western industrial zone, Eastern industrial zone, Southern industrial zone.	Availability of coal and iron ore in the States of Orissa and Bihar and easy access to use river water.
United States of America (The USA)	Michigan Lake region, Pittsburgh region, Detroit industrial zone, New England region, South Appalachian region.	Lakes could be utilized for transport and the availability of raw material from areas around the lakes.

Source- Adapted from Human Geography Advanced level text book- part II (2009)

The steel producing regions in the world and the countries to which they belong are shown in Map 5.1.



Map 5.1

Iron and steel producing regions of the world

Source- Adapted from Geography Text Book- Grade-10(2006)

When you study the map you can get a general understanding of the regions which produce iron and steel. Information about leading countries in steel trade is shown in Table 5.2.

Table 5.2

The countries that were foremost in the steel trade in world (2012)

Export (Million Metric tons)			Import (Million Metric tons)		
Country	2011	2012	Country	2011	2012
China	44.4	51.2	USA	25.3	29.7
Japan	40.3	41.1	European countries	34.0	25.2
European countries	36.2	37.8	South Korea	22.3	19.9
South Korea	28.0	29.4	Thailand	12.3	14.9
Russia	24.6	26.5	China	15.9	13.8

Source - <http://www.issb.co.uk/global.html> (2014.02.10)

Activities

1. Study Table 5.2 and write down the countries that imported more steel in 2012 than in 2011.
2. Write down two reasons why more steel was imported by several countries in 2012 than in 2011 according to Table 5.2.

Features and trends of the Iron and Steel industry

- Diverse qualitative features of Iron and Steel (durability, capacity to bear weight, flexibility, ability to withstand shocks, profitable production)
- Ability to improve quality by mixing with other metals (Aluminum, copper)
- Ability to recycle after discarding (old iron, scrap iron)
- All the countries use iron and steel as a base metal for various products.
- Production activities have become modernized after moving away from traditional technology.
- Ability to smelt iron using alternative source of energy. For example; an electric furnace could be used as an alternative for smelting iron ore.
- Some countries which were prominent in production of iron and steel in the past have gradually receded from the market.
- As there is an increase in demand for steel from East Asian countries, a new market has been created (China, South Korea).
- With the development of electronic technology, various utilities are created.
- Certain countries export steel as well as import steel in the international trade. (For example China and South Korea).
- There is a tendency to locate industries based on factors such as capital and availability of a market rather than focusing on factors such as availability of iron-ore, raw materials and coal.



Figure 5.3
A furnace that smelts iron-ore

Activities

1. Mark and name three foremost iron and steel producing countries, three iron and steel exporting countries and three iron and steel importing countries on an outline map of the world.
2. Describe with examples the instances iron and steel are used by the people in the world.
3. Name three substitute products which can be used instead of iron and steel.
4. There is a daily increase in the demand for iron and steel. Explain this, citing two examples.

The Automobile Industry

The automobile industry in the world is changing fast. Automobiles which are required for goods and passenger transport are produced by the automobile industry. Further, at present, the automobile industry is showing a tendency to develop as an assembling industry as well. Various parts which are essential for a certain product are manufactured under specialization in different places or countries, are brought to one place and the final product is manufactured in an assembling industry. The basis for this system is the division of labour, specialization and technological advancement.

Automobiles manufactured for various requirements are shown in Figure 5.4. The internal structure, the strength to resist weight, size and the shape of the vehicle, will differ from one another depending on the type of goods expected to be transported.

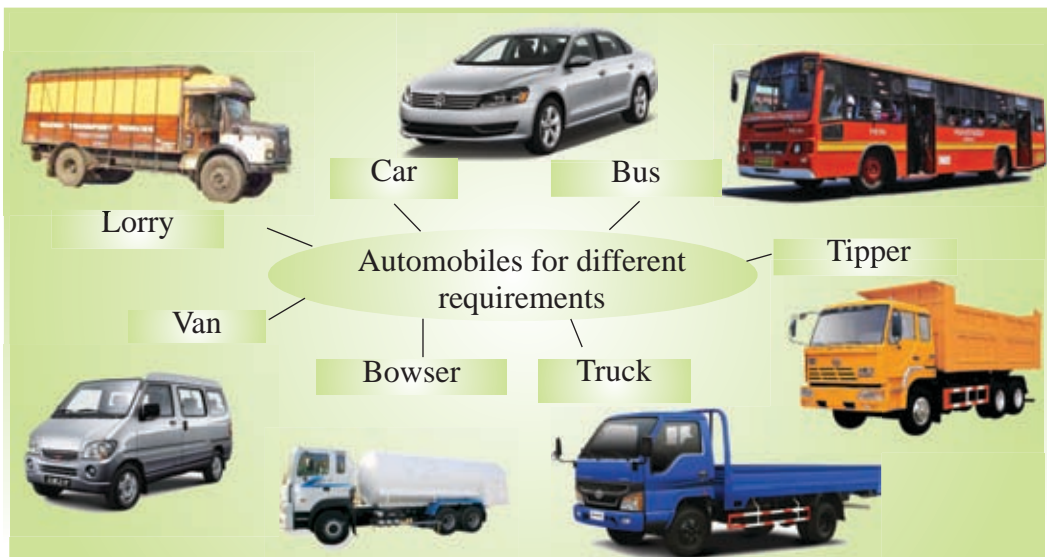


Figure 5.4
Automobiles of different models

Table 5.3 - The number of automobiles in the major automobile producing countries for a selected number of years from, 1950-2012

1950	1960	1970	1980	1990	2000	2010	2012
U.S.A 8 005 858	U.S.A 7 905 119	U.S.A 8 283 949	Japan 11 042 884	Japan 13 488 798	European Union 17 142 142	China 18 284 887	China 19 271 808
U.K 783 672	Germany 2 058 149	Japan 5 289 157	U.S.A 8 009 841	U.S.A 9 782 997	U.S.A 12 799 857	European Union 17 107 350	European Union 18 240 476
Canada 387 728	U.K 1 810 700	Germany 3 842 247	Germany 3 878 553	Germany 4 976 552	Japan 10 140 798	Japan 9 625 940	U.S.A 10 328 884
France 357 512	France 1 389 210	France 2 750 088	France 3 378 433	France 3 468 993	Germany 5 528 615	U.S.A 7 761 443	Japan 9 942 711
Russia 342 200	Italy 644 833	U.K 2 098 498	Russia 1 884 000	Italy 2 120 850	France 3 348 381	Germany 5 905 985	Germany 5 849 269
Germany 308 084	Russia 490 200	Italy 1 854 252	Italy 1 610 287	Spain 2 053 350	South Korea 3 114 998	South Korea 4 271 941	South Korea 4 557 738
Italy 127 847	Japan 481 551	Canada 1 159 504	U.K 1 312 914	Canada 1 947 108	Spain 3 032 874	India 3 538 783	India 4 145 194
Japan 31 597	Canada 397 739	Russia 737 300	Spain 1 181 859	U.K 1 585 957	Canada 2 981 638	Brazil 3 381 728	Brazil 3 342 817
Chek 31 000	Australia 204 000	Spain 539 132	Brazil 1 165 174	South Korea 1 321 630	China 2 089 089	Spain 2 387 900	Mexico 3 001 974
India 14 888	Brazil 133 041	Australia 475 000	Belgium 923 426	Belgium 1 248 290	Mexico 1 935 527	Mexico 2 345 124	Thailand 2 483 043

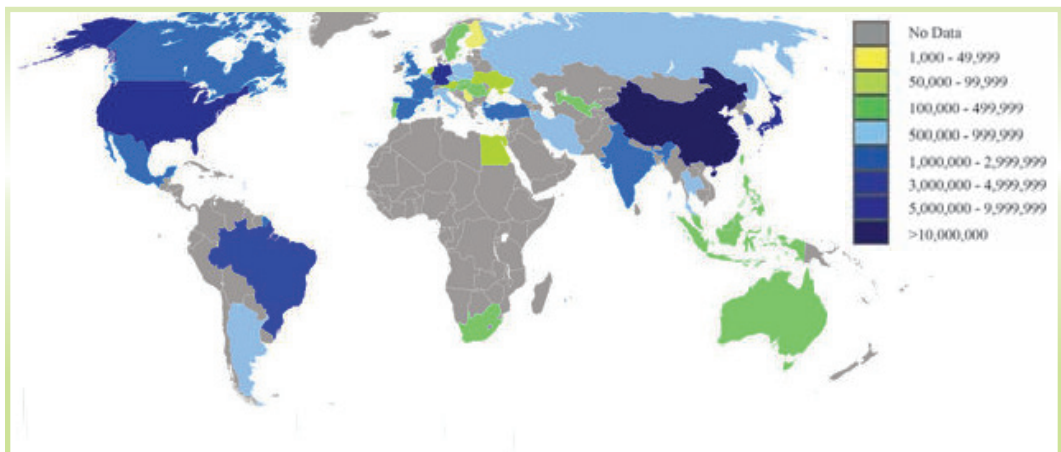
U.S.A -United States of America
U.K - United Kingdom

Source- <http://en.wikipedia.org/wiki>

In the past, the countries pioneered in automobile production were the developed countries. The main reason for this was the necessity to invest a large amount of capital for production. At present, a large number of countries manufacture automobiles. The models of motor vehicles change from time to time according to its utility and customer preferences. The number of automobiles produced in the selected years between 1950-2012 is shown in Table 5.3.

By studying the data given in Table 5.3, the following information related to automobile production is revealed.

- Although the contribution of China towards the production of automobiles during the early period was low, by 2012 China has become the foremost automobile producer in the world.
- Although, The United States of America was the most prominent automobile producer in 1950, by 2012 the position has changed.
- Though France was a major producer of automobiles during the period from 1950 to 2000, its position within the first ten producers was lost after 2010.
- Asian countries like China, Japan, South Korea, India and Thailand have shown a fast development in the automobile industry by 2012.



Map 5.2
Distribution of automobile production in the world 2009

Source – Adapted from <http://en.wikipedia.org/2014.02.10>

According to Map 5.2 countries like China, Japan, The USA and India are the pioneers in producing automobiles.

Mechanical labour like robots and automated machinery are used in abundance in automobile production at present. In addition, the popularity of being an assembling industry has also led to the rapid development of the modern automobile industry; Figure 5.5 shows the work inside a factory using mechanical technology.



Figure 5.5
Few scenes inside an automobile factory

Features and trends of automobile production

- It is becoming a fast changing industry.
- Maximum use of modern technological skills and mechanical labour (robot technology).
- Expansion as an assembling industry (like in Taiwan, South Korea, Singapore, Indonesia).
- Investment of a large amount of capital.
- Production Multi-national Corporations very often own the production rights.
- Large mergers and acquisitions by international companies (example - General Motors of USA incorporated with Shanghai Company, China).
- Production of ultra-luxury vehicles.

- Designing special automobiles to suit the goods being transported (eg :- fuel, milk and gas transport bowsers are vehicles that differ from one another).
- Producing vehicles that could ply both on land and water (hovercraft).
- Producing vehicles that could dive in water and vehicles which could change while travelling on land and be air-borne in the form of a light airplane.
- Factors like cheap labour, availability of raw materials, and the presence of foreign markets have led to the fast development of the automobile industry in countries such as Japan, India, South Korea , Singapore and Indonesia.
- Countries that did not produce automobiles in the past are now contributing towards this industry (Sri Lanka).
- Installing special electronic components and equipment (sensor) within the vehicle to maximize safety and ensure diverse facilities (for example GPS Technology, radio, television, air-conditioning, refrigerators flexible seats, automated doors and locks, side mirrors, manoeuvring facilities for the disabled, automated main lights , automatic starting and safety systems).
- Producing eco-friendly vehicles minimizing environmental pollution.
- Countries that have developed the automobile industry have started production factories in other countries.
- Japan has planned to manufacture mostly light and hybrid vehicles (using liquid fuel and electricity) after 2020.
- For the economic use of fuel, there is a tendency to produce smaller vehicles.

Activities

1. List five leading countries in the automobile production in 1950 and in 2012. Mark and name them on a world map.
2. Describe the changes that have been made in the modern vehicles according to the speciality in the goods that are being transported.
3. It is a prominent feature that almost all countries of the world have shown a tendency to contribute towards the production of light vehicles. Describe two reasons for this trend.
4. Name two strategies the automobile producing country that produce automobile use to be successful in the market.

Assignment

Study Table 5.3 with the help of your teachers and make a document including the trends in the automobile industry.

The Ship building Industry

The ship building industry which has a long history, progressed simultaneously with the development of the iron and steel industry and also with the exploration by the European nations in the latter half of the 18th century. There were a few factors that contributed to the development of the ship building industry in Europe.

- The high demand for ships due to explorations by European nations after the Renaissance in Europe and for trade, fishing and warfare activities.
- Availability of timber and steel required for ship building.
- Availability of indented coasts required to make shipping docks.
- State patronage

In the early stages, ships were built for transporting both passenger and goods. But, with the development of air transport the number of passengers using ships reduced and therefore more attention was directed towards building ships suitable for transporting goods (Cargo ships). However, even at present ultra luxury ships specified for transporting passengers are being built. Ship building industry has undergone several changes and it has gained a huge progress at present.

When we consider the ship building industry in the present world, it is clear that ships are being built, considering the types of goods that are transported. Eg: - Bulk carriers, Tankers, Container ships.

During the early period, only the developed countries paid attention on the ship building industry. The reasons being given are follows.

- The ability to invest a large sum of money as capital.
- The availability of iron and steel as raw materials.
- Having a great reputation and experience.

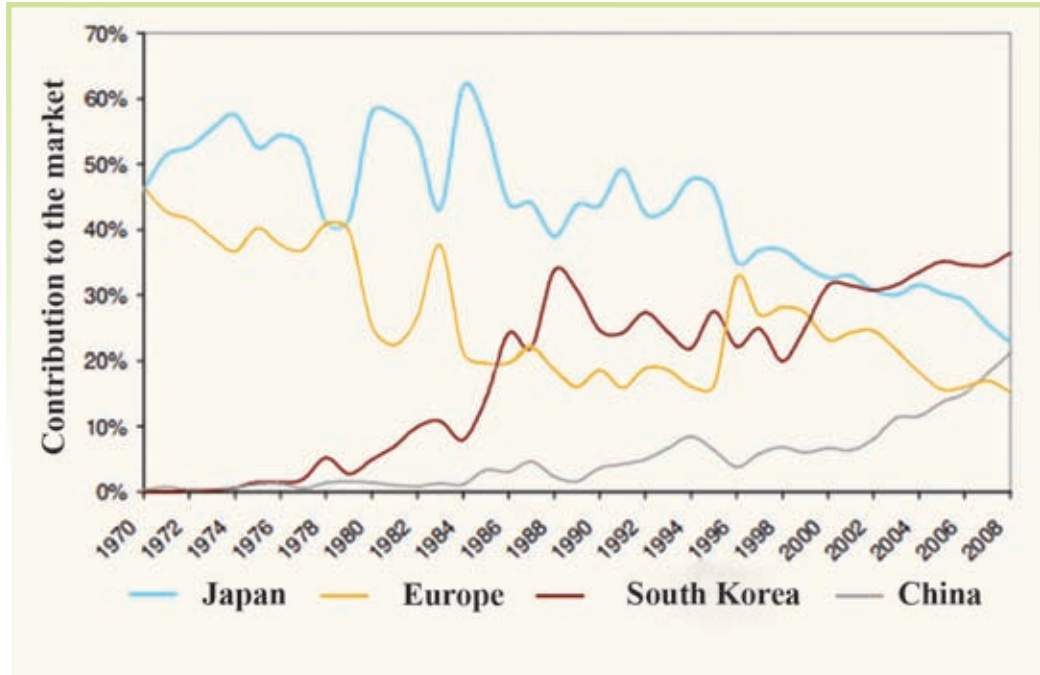
However, this situation has changed and Graph 5.3 makes it clear that today, countries like China, South Korea and Japan have come to the forefront in the ship building industry.

- Availability of cheap and skilled labour required for the shipbuilding industry.
- The presence of new technology.

- Presence of ice-free deep sea fronts to facilitate the dockyards, have contributed to that situation.

Recently, Sri Lanka too has begun boat and yacht building as an assembling industry.

When the ship building industry developed as an assembling industry, the countries that built ships in the past, lost the position they held as shown in Graph 5.3.



Graph 5.3
The contribution of the main ship building nations towards the market (CGT) between 1970-2008

*Source : <http://ec.europa> (2009)
(CGT - Compensated Gross Tons. A unit to measure ships capacity.)*

Activity

Observe Graph 5.3 and explain the current changes in the ship building countries

Utilizing the developed technology as a base, ship building industry at present has produced ships to suit varied requirements and has made a great progress. This fact can be well established by studying the pictures given in page 100.



Figure 5.6
A container ship



Figure 5.7
The world's first ship powered by natural gas (L N G Powered)



Figure 5.8
I Ultra – Luxury Private Tourist liner



Figure 5.9
The Queen Elizabeth Air craft carrier ship belonging to the British Royal Navy

Trends and features in the ship building industry

- Building special ships to carry passengers or varied commodities.
- Building large ultra- luxury passenger liners.
- Building small ultra- luxury yachts according to orders placed.
- Building ships for various purposes (like warfare, exploration of oceans, fisheries production factories and libraries).
- Though iron and steel were used as raw materials in the past, today light metals and different types of fibre and other substitutes are used to build lighter sailing vessels.
- Development as an assembling industry.
- Utilizing more mechanized labour (robots and machine technology) than human labour.

- Changes in the energy sources used in ship building (such as coal, mineral oil and nuclear power).
- Newly industrialized countries like China and South Korea have competed with the traditional ship building countries and come to the forefront.
- Developed technological systems like the GPS system have been added to the shipping sector.
- Though ships were used more for passenger transport in the past, they are used mostly for transporting goods at present.
- There is a rising demand for oil tankers, bulk carriers and container transport liners.

Activities

1. Explain how the modern technological development has contributed to the progress of the shipping industry.
2. Mention two reasons for considering naval transport as a profitable medium of transport.
3. Mark and name five main shipbuilding countries and five main ports in the Asian zone in a world map.

Assignment

Collect pictures of ships used for various purposes and write a brief description of them to show how they have changed according to current requirements.

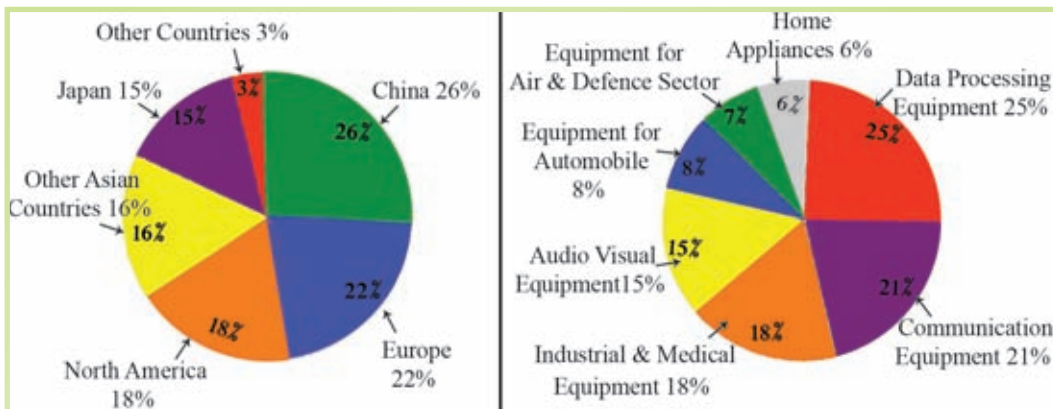
The Electronic Industry

Manufacture of commodities like radio, television sets, computers, transistors, communication equipment and electronic equipment come under the production of electronic goods.

According to Figure 5.10, You can understand that , most of the things produced in the electronic industry are found in the kitchen and the drawing room, our houses; In an office or in a vehicle. In addition, we may keep them in the pockets of our garments or even in our wallets.



Figure 5.10
Electronic goods used for daily human needs



Graph 5.4
World production of electronic equipment- According to zones and fields in which they are used (2008)

Source - www.decision.eu (2014.02.10)

According to Graph 5.4, we can identify the leading countries in the region that are in the forefront of the electronic industry and the fields for which the equipment are supplied. China, Japan and European Countries are in the forefront in this industry and the contribution of China in this field was 26% in year 2008. According to this graph it is clear that the production of data processing equipment and electronic communication appliances are the most important.

When considering the market for electronic equipment, it is a prominent feature that the countries that export such equipment are also importers.

When studying the information given in Table 5.4 regarding the world production and trade in electronic equipment between the years 2008-2013, it is possible to identify the progress that this industry had made during recent times.

- It is clear that North America and Europe are prominent in both the production, as well as in the contribution to trade in electronic appliances. In spite of that, it is seen that in both regions, the production in 2013 has decreased when compared to the year 2008.
- The same table clearly shows how the value of production as well as the contribution to the market by China, Japan and other Asian countries have increased.

Table 5.4

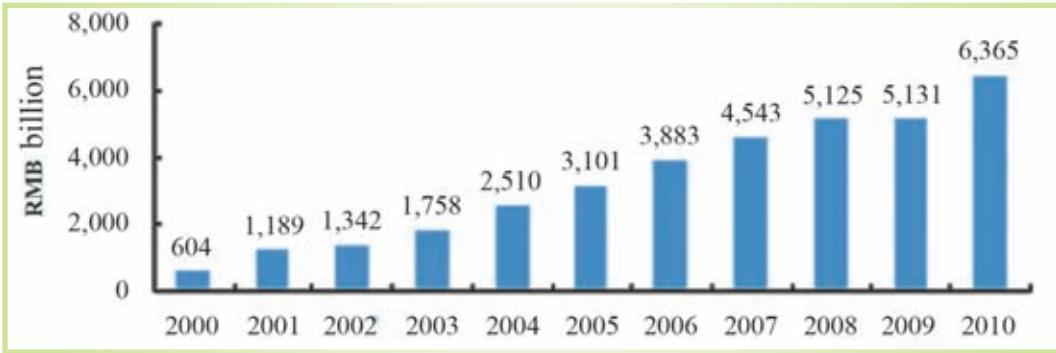
Production and trade in electronic equipment (In Euro-millions) 2008-2013

Zone	Production		Trade	
	2008	2013	2008	2013
Europe	251 124	246 724	241 229	260 489
North America	204 317	184 900	210 349	217 986
Japan	162 760	163 970	90 419	105 399
China	296 607	416 070	78 821	110 244
Other Asian Pacific Countries	184 383	244 075	81 192	114 248
Other countries	36 356	42 487	73 347	90 207

Source -prepared with reference to:- *www.decision.eu (2014.02.10)*

China has emerged as a powerful country in the Asian region in the field of electronic industry, within the period of 2000 – 2010. The income of china has risen from RMB billions 604 to RMB billions 6362 with the continuous development of the electronic industry during this period.

In addition to the information given above, a further study on Chinese electronic industry would show the direction of the world electronic industry. Table 5.5 shows the value in production of the various electronic appliances that China has earned in the year 2009.



Graph 5.5

The growth in the income of China in the production of electronic products 2000-2010

Source - (<http://www.hktdc.com> (2014.02.10)

(RMB = Renminbi) (RMB is the official currency used in official activities in China)

Table 5.5

Contribution of China to the production of electronic sub parts in the world (2009)

Electronic Products	Contribution of China in World production
Laser disk player	85.0%
Digital Cameras	80.0%
Computer component sets	60.9%
Mobile Phones	49.9%
Colour TV component sets	48.3%

Source - Adapted from <http://www.hktdc.com> (2014.02.10)

According to table 5.5, it is clear that China, as a supplier small as well as large electronic appliances like laser disk players, digital cameras, computers and mobile phones makes a high contribution to the market. Sri Lanka gives an important place to Chinese electronic products. At present, there is a tendency in Sri Lanka and in many other countries in the world to use such electronic tools.

Features and trends of the electronic industry

- A large amount of capital has been invested.
- Research continues till the final product is brought out and twice the amount of money is spent on production research linked to the industry rather than on the production itself.
- Most of the workers include scientists, engineers, skilled technicians, and research personnel.

- Half the personnel in the service industry are engaged in the fields of research and development.
- Contribution to the production and ownership mostly belong to Multi-national Corporations.
- Day by day, new products are launched to meet the competitive market.
(For example- mobile phones, television sets and cameras)
- Very complex subtle equipment and appliances are produced (Video equipment, chips and cameras)
- The same countries that export electronic appliances also import the same products from other countries.
- Maintained as an assembling industry.
- In addition to the production and trade of electronic equipment, a market for by- products too has been created . (For example- creation of virus for computers, virus guard systems and the necessity to update those systems, magnetic disks, magnetic discs like CDs and DVDs)

Activities

1. Describe how the electronic appliances in your house contribute in facilitating your day to day activities.
2. “Electronic tools have contributed a great deal to the advancement in the field of communication,” elucidate this statement with examples.
3. Mark and name five prominent countries of the world that produce electronic products on a world map.

Assignment

Examine the electronic items in your home and complete the table given below

Name of electronic item	Country of manufacturing	Qualities
Example- Television	Japan	Receives information 2 and 3 dimensional images, black and white and colour pictures, Can watch CDs and DVDs, Use of remote control for manoeuvring

The Cotton Textile Industry

With the 'Industrial Revolution' which occurred in Europe during the 18th century, production of cotton textiles, expanded as a formal and organized industry. At that time, Britain gained a monopoly over this industry. However later, the cotton textile industry expanded in countries like China, India, Japan and Egypt due to the following factors,

- Possibility of growing cotton easily.
- Possibility of importing cotton from other countries.
- Availability of cheap labour.
- Presence of modern technology.
- Availability of the market.



Figure 5.11
Some pictures related to the cotton production process

The Figure 5.11 above shows a few pictures related to the industrial process of manufacturing cotton textile.

The cotton growing regions in the world and the cotton textile producing countries are shown in the Map 5.3.



Map 5.3

Cotton growing countries and cotton textile producing countries in the world

Source - Prepared with reference to map in Gr . X Text Book (2006)

The features and trends of the cotton textile industry

- The cotton textile industry has a long history.
- Maintained on agro-based material.
- Though in the past, the cotton textile industry was carried out by importing raw material from cotton growing countries, at present cotton growing countries too have entered the industry.
- Though European countries were the pioneers of cotton textile producers in the past, by the second half of the 21st century, East Asian countries too have emerged as foremost producers.
- As the cotton textile industry has become fully mechanized, high quality textiles are being produced.
- Diverse textiles of high quality are produced by mixing cotton with other fibres (synthetic-fiber, wool and flax).
- Being an eco-friendly production.
- The emergence of a by-product industry which includes dyeing of textiles and production of garments.

Activities

1. Mark and name three cotton growing countries and three countries famous for cotton textiles on a world map.
2. Name two types of fibre that are mixed with cotton.
3. Textiles mixed with other fibres have been given different names in the market. Write down three such examples.
4. Explain two reasons for the high demand for cotton textiles in the tropical countries.

Problems related to world manufacturing industries

The manufacturing industries in the world have contributed a great deal to fulfil human needs. In the same manner, many problems that affect the entire earth and man in various ways are emerging. Those problems which have arisen in relation to manufacturing industries can be identified as related to the following fields.

Problems linked to raw material

- Exhaustion of raw material due to long term usage.
- Use of synthetic raw material in place of natural raw material (for example- synthetic rubber and synthetic fibre).

Problems related to labour

- Unemployment has resulted because there is a tendency for factories to be mechanized (for example- use of robotics).
- Shortage of skilled labourers.
- Rising cost of labour.
- Emergence of labour problems.

Environmental problems

- Pollution of land, air and ocean beds (due to mixing of dyes, various kinds of oils and toxic substances).
- The extinction of certain species of flora and fauna, and the birth of new species due to the use of chemical fertilizers, weedicides, insecticides and various hormones.



Figure 5.12
How chemical wastes
mix with water and air

- The emission of industrial wastes.
- The emission of heavy metal particles like mercury and lead into biological systems and creation of abnormalities in animal genes.
- Global warming, climatic changes, formation of acid rain and the pollution of ground water.
- The addition of electronic waste and equipment waste along with industrial development.
- Along with the development of bio-technology, the spread of disease carriers such as virus, fungus, bacteria which were non existing in the world before.



Figure 5.13

Collection and use of chemicals for diverse needs

Source - <http://www.waterencyclopeia.com> (2014-02-10)

Social, Economic and Cultural problems

- Arising conflict situations due to attempts made to expand the market for industrial raw material and the finished product.
- The addition of duplicates to the market under famous brand names.
- Become subject to the influence of Multinational Corporations.
- Profit making becomes the main objective rather than fulfilling consumer necessities.
- The sensors of electronic systems cannot be replicated, due to high cost of repairs.
- Threat to world peace because of the production of fire-arms.
- The appearance of slums and shanties which are unsuitable for living due to urbanization resulting from industrialization.
- Some social groups are persuaded to involve in burglary, crime and fraud.

Problems related to the market

- The market which had been a heritage of the West European countries in the past, shifting to the East Asian zone, has created economic crises in these countries.
- The rise in the cost of commodities with the addition of the cost of advertisements to the price of such goods due to competitive markets.
- Presenting substitutes to the market for various commodities.

Problems related to power and energy

- The fluctuations in the price of mineral oil.
- The exhaustion of power and energy resources.
- Countries possessing energy resources are eternally facing political conflicts (The political problems in the Middle East oil zones).
- Environmental problems caused by nuclear power (For example, the leaking of radioactive material from the nuclear power stations in Japan).
- Though nuclear power is important as a power resource, problems arise as it can be utilized for other purposes unlawfully.



Figure 5.14

A Nuclear experiment

Source - <http://atlanticsentinel.com>
(2014-02-10)



Figure 5.15

A Nuclear bomb

Source - [www.nuclear weapon archive.org](http://www.nuclearweaponarchive.org) (2014-02-10)

Problems related to capital

- Shortage of capital.
- Multi-national corporations becoming powerful since they have invested capital resulting in the inability of states to control such enterprises.

Activities

1. Explain how industrialization can influence the economic development of a country.
2. Describe how industrialization can give rise to environmental pollution.

Assignment

Prepare a document including the steps to be taken to minimize the environmental problems that have emerged in relation to manufacturing industries.

Bibliography and Sources

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Glossary

Manufacturing Industry	- திசீலாடன கர்லாநன	- உந்பத்தி கைத்தொழில்
Technical knowledge	- தாக்ஷணிக ஁தலச	- தொழிநுட்ப அறிவு
Materials	- அலுடலல	- மூலப்பொருள்
Utility	- ஁லலயர்஁லல	- பயன்பாடு
Revolution	- விசீலலல	- புரட்சி

Renaissance	- பூநர்ட்டு	- மறுமலர்ச்சி
Cottage Industries	- ஁஁ கர்஁஁஁	- குடிசைக்கைத்தொழில்
Iron and steel	- ஁஁஁ ஁஁ ஁஁஁	- இரும்புருக்கு
Electricity	- வீட்டு஁஁஁	- மின்சக்தி
Automobile	- ஁஁஁஁஁஁	- ஁஁஁஁஁஁ வாகனம்
Cotton textile	- க஁஁ ஁஁஁	- பருத்தி ஁஁஁஁
Energy	- ஁஁஁஁஁஁	- சக்தி
Infrastructure facilities	- ஁஁஁஁ ஁஁஁஁஁஁	- ஁஁஁஁஁஁஁஁஁஁஁஁ வசதிகள்
Capital	- ஁஁஁஁஁஁	- ஁஁஁஁஁஁
Transport	- ஁஁஁஁஁஁	- ஁஁஁஁஁஁஁஁஁஁஁஁
Coal	- ஁஁஁ ஁஁஁஁஁	- ஁஁஁஁஁஁஁
Limestone	- ஁஁஁஁஁஁	- ஁஁஁஁஁஁஁஁஁஁஁஁
Iron Ore	- ஁஁஁஁	- இரும்பு஁஁஁஁஁஁
Aluminium	- ஁஁஁஁஁஁஁஁஁	- ஁஁஁஁஁஁஁஁஁஁஁
Scrap Iron	- ஁஁஁஁஁஁஁஁஁	- ப஁஁஁஁஁஁஁஁஁஁஁஁
Electrical equipment	- வீ஁஁஁஁஁஁஁஁஁	- மின்சார ஁஁஁஁஁஁஁஁஁஁஁஁