

Changes in Technology

Technology is something we see and use everyday. Whenever you talk on your mobile phone, or switch on the TV, or work on your computer, you are using the latest technology. Technology is the practical application of knowledge in our everyday lives that leads to a new product or an improvement in the way something works, or how something is done. Even when you sharpen your pencil, use instruments for cutting and chopping, cook in different vessels, you are using technology. From simple instruments and equipment to all the complicated machinery that we use is part of technology. It could be at home or a factory or for communication and transport.

Think of all the complicated machinery and technology used nowadays – in space explorations, in factories, in transport, and so on. These have developed over time. You have also learnt about the industrial revolution, and how there was a tremendous change in the method of production during the 18th, 19th centuries.



Fig 8.1: A woman weaver

- Who were the contributors to this industrial revolution?

The steam engine changed many production processes in factories. Later on with a new source of energy such as electricity, factories that we see today emerged. When a new machine or method of production is created for the first time, it is called an invention. However, practical application of these ideas takes a long time and depends on many factors. These could be improvements to make the technology effective, reducing cost of new techniques, acceptance of a new way or product. Technical developments or technical improvements can be due to completely new types of machinery (X ray machines, power looms), or changes in types of raw materials used (plastic instead of rubber), or reorganisation of production processes.

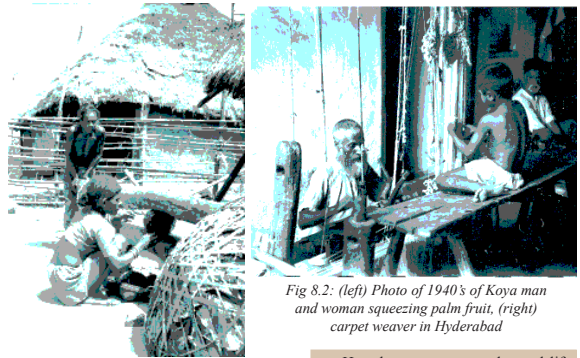


Fig 8.2: (left) Photo of 1940's of Koya man and woman squeezing palm fruit, (right) carpet weaver in Hyderabad

For example, Henry Ford of USA, started the Assembly Line method of production to produce more cars quickly. This led to mass production in factories, and huge increase in output. The internal combustion engine, new materials and chemical products, communication technologies such as radio, computers etc are some other examples where a vast range of practical application has been made. Technical change can lead to a new product or a new way of producing the same good or a service. More jobs are created for those who have to supply raw materials (such as iron, coal, etc.) for the production of these new machines. Also, using these machines leads to more jobs; for example cars and buses are produced with iron and steel, and there is demand for drivers, mechanics, petrol stations etc.

- How have computers changed life around you?
- Do you think technology has changed entertainment? How?
- Find out the story of the first steam engine. How did this lead to establishment of Railways in India?
- Did you see solar energy being used in your neighbourhood, town or city? Make a short list. Why is this source of energy not used even more widely? Discuss.

Technology is not always welcomed. People are afraid that they would lose their jobs to the machines. For example, in the 19th century, in England, many textile artisans protested violently against the new power looms, which would replace them. With combine harvesters being used in agriculture, people have similar reactions. In India, when computers were first

introduced, people thought that they would lose their jobs.

It is true that some jobs will be lost but other new jobs will be created. However, technology impacts different sections of society in different ways. Is there a way out of this situation? Are there overall benefits? To analyse such situations we will study three different situations in India.

Technological changes in Agriculture

Agriculture around the time of independence was traditional. Farmers produced paddy, wheat, vegetables, cotton etc. They mostly depended on rainfall, and in some areas got water from tanks or rivers. Most farmers were able to cultivate only once in a year. Simple implements such as wooden plough, sickle, spades, and crowbars were used to cultivate fields. Farmers used to save seeds on their own for the next season. Bullocks were used to transport goods, ploughing and for other agricultural operations. Agricultural goods were produced mostly for self (consumption – for use within the family) and some for the market.

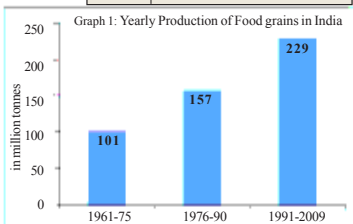
After Independence the government began building dams and providing irrigation facilities by encouraging the use of tubewells. Pump sets, run on electricity or diesel, were used to draw water. There were many far reaching technological changes in agriculture: water was made available to farms for irrigation continuously in some parts of the country. New seeds

from research institutions giving higher yield were made available. Fertilisers and pesticides were sold by cooperative societies or through shops in markets. Farmers were encouraged to buy and use new agricultural machinery such as tractors for various operations.

Impact of Technology

Increase in production: Use of modern technology in agriculture helped farmers to produce more foodgrains and other goods. Farmers are able to get more yields in the same area they cultivated. Look at the following table. There was a two-fold increase in the amount of foodgrains such as paddy, wheat, cereals and pulses produced in India during the last four decades. During 1990s and in the first decade of 21st century, farmers are able to produce more than 200 million tonnes of foodgrains every year.

Period	Production (in mil. tonnes per year)
1961-75	101
1976-90	157
1991-2009	229



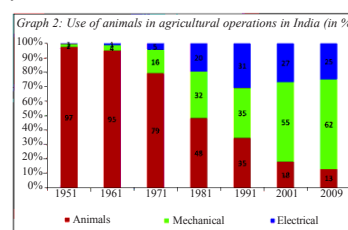
Changes in production process:

The use of agricultural machinery also changed the production process quite considerably. In some areas, farmers began to cultivate their farms twice in a year which increased employment opportunities for labourers.

Use of agricultural machinery made the agricultural workers to prefer to working on daily basis rather than on annual basis. They are free to work for any farmer who pays better wages. But there is no assured employment. Peak agricultural operations such as transplantation and harvest of paddy is the only time when labourers can demand better wages. However, nowadays large farmers often prefer to get this work done using machines. On one hand labourers gained some work but also lost their traditional jobs.

Decline in the use of animal power

Tractors began to be used for transportation and many agricultural operations. Minor tools used in ploughing, sowing, weeding and harvesting also underwent considerable change. Over the years, the use of animals has declined



considerably, as can be seen from the graph 2 given below.

Small farmers are not able to use modern agricultural techniques because these can only be used in large sized farms. Hence, they look for employment in urban areas or in others' farms during the rest of the year.

Loss of employment because of Combined Harvester

Combined Harvester (CH) is one of the important machines used for paddy harvest. It harvests the crop, threshes and cleans the grain from chaff.



Fig 8.3: Combined Harvester

As it combines the activities of harvesting, threshing and winnowing it is called Combined Harvester.

Use of CH helps in timely harvest of paddy. It takes less time, reduces the crop loss and helps farmers to tackle the peak time labour shortage. It also saves from vagaries of weather in coastal regions of Andhra Pradesh and Odisha. Further, the farmers are able to sow the second crop without much delay. Their dependency on labourers is also reduced.

A study on the use of CH in 2003 reported the following: Farmers are able to save about one quintal of grain per acre, which would have been otherwise lost during manual harvesting. CH operators charge about Rs.1100-1400 per day and large farmers are able to earn by hiring out their CH.

CH harvests paddy of about one acre in one hour. If this was done manually, 5 agricultural labourers may be required to work for 4 days. If 10 labourers were employed, they would complete the task in 2 days. Suppose there are 250 agricultural labourers in a village which has 1000 acres of paddy. If Combined Harvester is used, it will complete the work in 55 days working 18 hours every day. But each one of the 250 workers will lose 80 days of employment.

Extensive farm mechanisation is leading to displacement of labourers. Agricultural labourers and farmers working on others' fields lose out to machines used in the farm. If people are not getting sufficient employment opportunities in villages, where will they go? There is very little employment opportunity outside.

- What are the advantages of using CH in agricultural production? Make a list from the above text.
- In many villages agricultural labourers, women labourers in particular were found to be upset seeing the operation of CH. Why?
- List the jobs lost by agricultural labourers when Combined Harvesters are used.

- Do you think it is appropriate to use CHs in India where a large section of people working in agriculture as labourers, are poor, and there is so much of rural unemployment?

Use of machinery also changed the nature of work done by agricultural labourers – they are required to drive tractors for various agricultural operations, irrigating fields using pump sets, use of sprayers, applying fertilisers, work with harvesters and threshers. In many small towns workshops began to be established to repair agriculture machinery which led to creation of new jobs. However, this is not enough to provide employment on a large scale.

- It is argued that new jobs can be created in rural areas through infrastructure works. Link roads, tanks, bunds etc. can be created through labour intensive schemes. If you live in rural area find out if any such activities are being done and discuss if these will suffice the livelihoods of the people there.



Fig 8.4: Ford Assembly line

Technology and Industry

Recall the lesson in Class VII on Jagathai's family engaged in weaving of Ikkat sarees. Textile industry consists of various activities of making cloth. Today, about 10 crore people are working in different segments of textile industry. The textile industry is the second largest employer after agriculture in India.

Impact of Textile Mills

The British introduced powerloom production in India. When the mills started making cloth, the demand for the handloom weavers' cloth dropped. This happened over many years. Later on the mills started facing competition from powerloom clusters that began operating from small workshops.

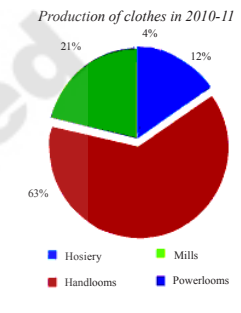
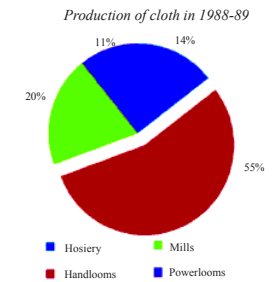
A major difference between a **Powerloom Unit** and a **Mill** producing cloth is the scale of operation. A **Mill** or **Factory** may have hundreds of looms in a large space, it is a factory complex employing tens and hundreds of workers in different sections.

A **Powerloom Unit** will have only a small number of workers and is established at home with a few looms or in a relatively smaller space such as in workshop sheds.

Most mills produce very high quality cloth, whereas powerlooms mostly produce low or average quality cloth. In powerlooms, a wide variety of fabrics are produced such as shirting, suitings, saree, dhoti, sheetings, towels, *chaddhar*, furnishing, shawls, blankets etc. made out of cotton, blended, synthetic, silk and wool yarn.

Impact of Powerlooms

In 1940s, there were only 40,000 powerlooms. Now nearly 5 lakh powerloom units run with 23 lakh looms in India. Most units are small having 1-8 looms. Tamil Nadu, Maharashtra, Gujarat have a large number of powerloom units. Nearly 50,000 powerlooms are being operated in Andhra Pradesh.



Look at the pie diagrams. Since 1980s, powerlooms account for largest share of cloth production in India and their share is increasing over the years.

Powerlooms moved from large mills to small sheds and houses and has led to many changes in textile industry. Nearly 60 lakh persons are getting employment in powerlooms.

Decline of Handlooms

One important and visible change is the decline of handlooms. In 1988 for instance, there were 33 lakh handlooms operating in different states and in 2009-2010, this has come down to 24 lakh units. Look at the following table showing how the number of handlooms in some states has declined during the last two decades. However, handlooms have found a new market in traditional fabric and designs. With increasing government support and subsidies they are able to survive, despite the competition from powerlooms.

Change in no. of handloom units		
State	1988	2009
A.P.	5,29,000	1,24,700
Gujarat	24,000	3,900
Karnataka	1,03,000	40,500
Maharashtra	80,000	4,500
Madhya Pradesh	43,000	3,600
Punjab	22,000	300
Tamil Nadu	5,56,000	1,55,000

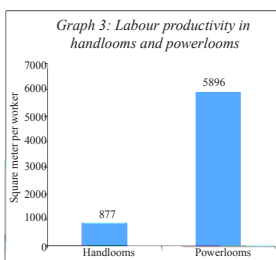
Look at the graph on the right. The amount of cloth produced per worker in powerlooms is about six times higher than



Fig 8.5: Weaving Pochampalli saree

in handlooms because of the use of mechanised technology. This also tells us why powerlooms mushroomed during the last five decades in India.

But there are certain problems to the workers in powerlooms. Compared to mills, powerlooms pay a very low salary. While mills pay workers monthly salary, workers in powerlooms are paid on piece rate basis.



There is no obligation for powerloom units to provide healthcare, pension or other social security provisions. If there is any power-cut, powerloom workers are not given salaries. In mills, workers form trade unions, and employers have to negotiate with trade unions for fixing wage rates. Trade unions do not exist in most powerloom clusters. One study of a powerloom cluster reported in 2008: 'Food insecurity, malnutrition, anaemia and other health-related problems such as tuberculosis, asthma and gynaecological illnesses among women; houselessness, and a high dropout rate among children are some of the common challenges confronting powerloom workers.'

- The production of cloth is classified into 4 categories as mill, handlooms, _____ and _____.
- _____ state had the largest number of handlooms in 1988. _____ state had the largest number in _____.



Fig 8.6: Women repairing community radio, (right) telephone assemble line in China

2009. Which state had the lowest number of handlooms in 2009?

- The _____ pays the worker a salary while the _____ pays the workers on _____ rate.

Technological changes in Service Sector

Technological changes also affect Service activities. Services include activities that support agriculture and industries. For instance, if cotton is cultivated, it needs to be transported to nearby towns for sale. Or if cloth is to be produced in a powerloom, yarn needs to be transported from spinning mills. All the trading activities are also services. Services also include essential activities that may not directly help in the production of goods. For example, we require teachers, doctors, lawyers and those who provide



personal services such as washing clothes, cutting hair, making shoes. We also need people to do administrative and accounting works and to work in banks. Let us look at how communication service has facilitated people to do their business faster and better.

Change in technology makes communication faster and easily available to all

Daram Vinod is an elderly businessman in Karimnagar. He has been running an automobile shop for more than thirtyfive years. He sells all kinds of spare parts. He had a landline phone in which he used to book a trunk call for talking to people outside his town. He had to wait on the queue till he gets connected. Sometimes the person whom he wanted to talk to could not be contacted. If there was any problem in the line or in the machine, he had to wait for weeks to get it repaired.

Times have changed now. Mobile phones have come into use. He contacts any person whom he wants to talk easily and immediately. He uses mobile for ordering the material, enquire about the prices, stock and delivery. Now he can get the details of his

business easily. Besides personal calls from his family members, friends and relatives, many automobile workshop owners contact him on his mobile phone, to know whether he has the specific spares. In case he does not have any spares, he speaks to other shop owners and collects from them and supplies to workshops. This helps him to retain his regular customers. Many mechanics from far away villages and towns also contact him. In olden days when he ordered some materials from Hyderabad, he was not sure in how many days he could get the material. Now he contacts even the driver of the vehicle in which the ordered materials are being transported.

Do you know that India's telecommunication network is the third largest in the world? Nowadays it is so easy to contact anybody through the phone—you can use your landline phone or your mobile phone. But this was not so till the 1990s. Only landlines were available and provided by the government. All over India, the mobile phones have grown from 50 lakh subscribers in 2001 to over 92.9 crores

subscribers by May 2012. The mobile connections are 20 times more than landlines.

The changes in telephone technology brought down the cost of communication. From 1995, when mobile phone facilities were introduced for the first time, until 2002 persons receiving the call and persons making the call were required to pay. Only a few people showed interest in having a mobile phone. This policy was changed in 2003, and now only those who make calls are required to pay. In 1994 if somebody wished to talk on a landline phone for 3 minutes to a person 500 kilometres away, she had to spend Rs. 28. In 2003, this had come down to Rs. 2.40 to 4.80.

- Find out the current rates and discuss why the rates differ between companies and why they are decreasing?

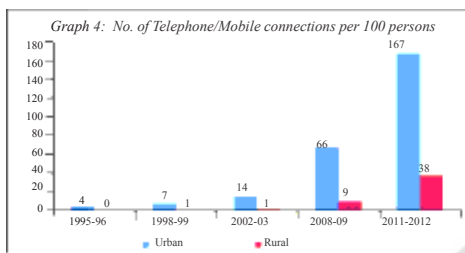
New skills and new jobs

Many private companies including the government-owned ones provide both

landline and mobile connections. Private companies continue to expand their share in the telecommunication services. Many companies are being established in India to manufacture handsets. These companies are now exporting to more than 80 countries around the world. The telephone/mobile technology also came up with the need for new skills. It created new jobs for young people to work in multinational companies, producing mobile handsets, telephone booths, mobile sales, repair and recharge/ top-up shops.



Fig 8.7: A trainer in solar engineering unit. In this chapter we see the photographs of many women engaged in technology. Many of them like the above one does not have an Engineering degree. Conduct a debate in classroom what biases/ stereotypes exist about women getting educated as engineers



Improve your learning

- Narahari created the following list of activities where technology is not used. Do you agree with him? If not prove him wrong.
 - While singing a song
 - While cooking idli
 - While performing drama on the stage
 - While making garland for sale
- Describe how the situation of labour has changed in powerlooms and mills. Do you think this change is beneficial to the labourers or to the owner? Give reasons for your answer.
- What are the advantages of using CHs? Who benefit most? Why do farmers use CH?
- Changes in technology lead to changes in job opportunities. Do you agree with this statement? Why?
- Mallaiah is a farmer in Sripuram village. There are about 100 houses in the village. Today all the work like planting, weeding, harvesting, spraying pesticides and fertilisers is done by machines. In olden days it was all done manually. There are more than 33 tractors and about 15 harvesters available in his village. A few of them are given on hire. The owners of the tractors charge Rs 300 per hour for tilling the fields. More and more farmers are now using these machines in their fields. Based on this information create a wall paper with illustrations and possible discussions between different groups of people in the village.
- Prabavathi feels it is true that telephone technology has changed. She feels that new jobs are available to only educated persons. She also says that many people in India are not literate and hence modern technology is always biased to the educated. Do you agree with her? Give your reasons.
- In this chapter, changes in technology in three sectors are discussed. In the following table identify a different example for each of these sectors that is not discussed here:

Sl. No.	Sector	Older technology	Newer technology	Any impact on livelihood/ amount of production/ increase or decrease in human effort
1	Agriculture			
2	Industry			
3	Service			

- Read the paragraph under the heading 'New Skills and New Jobs' and answer the following: What are the newly created jobs for young people in your area?
- Locate the following in the world map:
 - England
 - USA
 - India
- The people live in forest and adjacent to forest can not afford to use latest technology. What measures do you suggest for improving their lives?