

Disaster Managements

Disaster

'A disaster is a serious disruption of the functioning of a society involving human and material loss. Disaster is broadly classified into natural and man-made disasters.

Disaster	
Natural Disasters	Man- Made Disasters
<ul style="list-style-type: none"> ✓ Earthquakes ✓ Volcanoes ✓ Tsunamis ✓ Cyclones ✓ Floods ✓ Landsides ✓ Avalanches ✓ Thunder & Lightning 	<ul style="list-style-type: none"> ✓ Fire ✓ Destruction of buildings ✓ Accidents in industries ✓ Accidents in transport ✓ Terrorism ✓ Stampede

Natural Disasters

Earthquake

The sudden shaking of the earth at a place for a short spell of time is called an earthquake. The duration of the earthquake may be a few seconds to some minutes. The point where an earthquake originates is called its 'focus'. The vertical point at the surface from the focus is called 'epicentre'.

An earthquake is sudden, rapid shaking of the ground caused by the shifting of rocks beneath the earth's surface. Earthquakes strike suddenly without warning and can occur at anytime. The impacts of the earthquakes include deaths, injuries and damage of property.

CASE STUDY

Nepal – India Earthquake

The **April 2015 Nepal Earthquake** (also known as the **Gorkha Earthquake**) killed nearly 9,000 people and injured nearly 22,000. It occurred on 25 April, with a magnitude of 8.1 Richter scale. Its epicentre was east of Gorkha District at Barpak. It was the worst natural disaster to strike Nepal since 1934 Nepal–Bihar earthquake. The earthquake triggered an avalanche on Mount Everest, killing 21 people making April 25, 2015 the deadliest day on Nepal's history. The earthquake triggered another huge avalanche in the Langtang Valley, where 250 people were reported missing.



Nepal Earthquake

Tsunami and floods

Tsunami refers to huge ocean waves caused by an earthquake, landslide or volcanic eruption. It is generally noticed in the coastal regions and travel between 640 and 960 km/h. Tsunamis pose serious danger to the inhabitants of the coastal areas.

The word 'Tsunami' is derived from Japanese word 'tsu' meaning harbour and 'nami' meaning wave (Harbour wave).

Indian Ocean Tsunami of 2004

- On December 26, 2004, at 7:59 a.m. local time, an undersea earthquake with a magnitude of 9.1 struck off the coast of the Indonesian island of Sumatra.
- The tsunami killed at least 2,25,000 people across a dozen countries, with Indonesia, Sri Lanka, India, Thailand, Somalia and Maldives, sustaining massive damage.

A killer Tsunami hit the south east Asian countries on the 26th of December, 2004. A massive earthquake with a magnitude of 9.1 -9.3 in the Richter scale epicentre in the Indonesian island of Sumatra. It triggered one of the biggest Tsunamis the world had ever witnessed. The massive waves measuring up to 30



metres that killed more than 2,00,000 people of Asia. In India, over 10,000 people were killed by this disaster. Tamil Nadu alone accounted for 1,705 deaths. All the coastal districts were affected, Nagapattinam was the worst hit in the state of Tamil Nadu. Fishermen, tourists, morning walkers, children playing in beach and people living on the coast were unprepared for the waves. So they lost their life and the most of the loss of lives and damage to property was within 500 metres of the shore. After that the Indian government set up a Tsunami Early Warning System at Indian National Centre for Ocean Information Services (INCOIS), Hyderabad in 2007.

Floods

Floods are high stream flows, which overlap natural or artificial banks of a river or a stream and are markedly higher than the usual flow as well as inundation of low land.

Types of floods

Flash floods: Such floods that occur within six hours during heavy rainfall.

River floods: Such floods are caused by Precipitation over large catchment areas or by melting of snow or sometimes both.

Coastal floods: Sometimes floods are associated with cyclone high tides and tsunami.

Causes of floods

- Torrential Rainfall.
- Encroachment of rivers bank.
- Excessive rainfall in catchment.
- Inefficient engineering design in the construction of embankments, dams and canals.

Effects of floods

- Destruction of drainage system
- Water pollution
- Soil erosion
- Stagnation of water
- Loss of agricultural land and cattle
- Loss of life and spread of contagious diseases.

Landslide

A landslide is defined as the movement of a mass of rock debris down a slope. Landslides are caused by the direct influence of gravity. Landslides can be caused by rainfall, snowmelt, stream erosion, and flood, earthquakes, volcanic activity, disturbance by human activities, or any combination of these factors.

Landslides cause property damage, injury and death and adversely affect a variety of resources. For example, water supplies, fisheries, sewage disposal systems, forests, dams and roadways can be affected.

Cyclone

A low pressure area which is encircled by high-pressure wind is called a cyclone.

The major natural disaster that affects the coastal regions of India is cyclone and as India has a coastline of about 7516 km; it is exposed to nearly 10 percent of the world's tropical cyclones. About 71 percent of flood prone areas are in ten states (Gujarat, Maharashtra, Goa, Karnataka, Kerala, Tamil Nadu, Pondicherry, Andhra Pradesh, Orissa and West Bengal). The islands of Andaman, Nicobar and Lakshadweep are also prone to cyclones.

Volcanoes

Volcanoes are openings or vents where lava, small rocks and steam erupt onto the earth's surface.

Avalanche

A large amount of ice, snow and rock falling quickly down the side of a mountain is called an Avalanche.

Man-made disasters

Disasters induced by human beings are man-made disasters. It includes fire accident, transport accident, structure failure, mining accidents, explosions, stampede etc. In this lesson, we study about some of the man-made disasters.

Stampede

The term stampede is a sudden rush of a crowd of people, usually resulting in injuries and death from suffocation and trampling. In stampede, the term mob or crowd is used to refer to a congregated, active, polarized aggregate of people, which is basically heterogeneous and complex. Its most salient features include homogeneity of thought and action among its participants and their impulsive and irrational actions.

"Mumbai railway station stampede kills at least 22"

"Rush-hour crush on footbridge connecting two stations was triggered by falling concrete that caused panic!" At least 22 people have been killed and more than 30 injured during a rush-hour stampede on a bridge between two railway stations in Mumbai. The crush occurred on a narrow footbridge connecting Prabhadevi station, formerly Elphinstone, and Parel station during the Friday, September 29, 2017 morning commuter rush and amid heavy rain. "There was a huge crowd on the foot over bridge. Everybody tried to leave at once and it appeared one of them slipped and fell, triggering the stampede," said an Indian Railways spokesman. Another spokesman said the number of people on the bridge was higher than usual because people were using the station to shelter from the rain.

Causes of stampede

Incidents of stampedes can occur in numerous socio-cultural situations. These stampede incidents can be categorized into the following types: Entertainment events, escalator and moving walkways, food distribution, processions, natural disasters, power failure, religious events, fire incidents during religious/ other events, riots, sports events and weather related events.

Large religious gatherings are a particular stampede danger in the developing world. A 2013 paper out of India, for example, found that 79 percent of stampedes in that country have taken place at religious events, as opposed to political or entertainment-related events.

Stampede Management

Crowd management is defined as the systematic planning and supervision of the orderly movement and assembly of people. Crowd control is the restriction or limitation of group behavior.

Drowning

Drowning is the 3rd leading cause of unintentional injury death worldwide, accounting for 7% of all injury-related deaths. There are an estimated 3, 72, 000 annual drowning deaths worldwide. Children, males and individuals with increased access to water are most at risk of drowning. Drowning is the process of experiencing respiratory impairment from submersion/immersion in liquid; outcomes are classified as death, morbidity and no morbidity.

Fact File

It is one of our most visceral fears; thrashing in the deep, far below the water's surface, lungs burning for oxygen. Drowning claims hundreds of thousands of lives every year, a great many of whom are young children. Of course, exposure to water is a key factor in drowning, but there is a strong economic correlation as well. Those in poorer countries are far more likely to be drowning. In Bangladesh, 17,000 children drown annually that's 46 a day.

Below are 10 facts about drowning; from a lake that never surrenders its victims to a party for lifeguards that ended in deadly irony.

Fresh Water and Salt Water Drown You Differently.

Males are especially at risk of drowning, with twice the overall mortality rate of females. Studies suggest that the higher drowning rates among males are due to increased exposure to water and riskier behavior such as swimming alone, drinking alcohol before swimming alone and boating. Drowning accounts for 75% of deaths in flood disasters.

Prevention

There are many actions to prevent drowning. Installing barriers (e.g. covering wells, using doorway barriers and playpens, fencing swimming pools etc.) to control access to water hazards, or removing water hazards entirely greatly reduces water hazard exposure and risk. Community-based, supervised child care for pre-school children can reduce drowning risk and has other proven health benefits. Teaching school-age children basic swimming, water safety and safe rescue skills is another approach. Setting and enforcing safe boating, shipping

and ferry regulations is an important part of improving safety on the water and preventing drowning. Building resilience to flooding and managing flood risks through better disaster preparedness planning, land use planning, and early warning systems can prevent drowning during flood disasters.

Fire Accident

Massive forest fires may start in hot and droughty weather as a result of lightning, and human carelessness or from other causal factors. Fires can lead to the destruction of buildings, wooden bridges and poles, power, transmission and telecommunication lines, warehouses of containing oil products and other fuel. It causes injury to people and animals.

During droughts or windy weather, fire may destroy low vegetation and trees. The spreading speed of low fire is 1-3 m/sec and high fire may reach up to 100m/sec.

Industrial Disasters

Industrial hazards consist of four principle hazards. The hazards encountered are fire, explosion, toxic release and environmental damage. This is because industries employ many different processes involving a wide range of different raw materials, waste products and final products. Danger originates from technological or industrial accidents, dangerous procedures, infrastructure failures or certain human activities. It may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation.

Fire: This is the most frequent hazard. Fire can also produce toxic fumes like Acrolein, Carbon monoxide and Cyanides. Physical structures can be damaged either by the intensity of the heat or combustion. It may also have an effect on essential services like power and instrumentation.

Explosion: Explosions is the result of a shock wave. This overpressure can kill people but usually the indirect effects of collapsing buildings, flying glass and debris causes far more loss of life and severe injuries. There are different types of explosions which include gas explosions and dust explosions. Gas explosions occur when a flammable gas mixes with air. Dust explosions occur when flammable solids, especially metals, in the form of fine powders are intensively mixed with air and ignited.

Chemical release: Sudden release of toxic vapors has the potential to cause death and severe injuries several kilometers from the release point. They are carried by water and air. Their release into public sewage systems, rivers, canals and other water courses, either directly or through contaminated water used in firefighting can result in serious threat to public. The number of casualties depends on the weather conditions, population density in the path of the cloud and the effectiveness of the emergency arrangements.

Environmental Damage: Release of other substances, not directly toxic to humans can cause major pollution problems. It is becoming increasingly recognized that damage to natural resources such as plant and animal life can have serious long term consequences. E.g. destruction of trees is increasing the effect of global warming and extinction of animals are severely disrupting food webs and causing an increase in pests.

Means of reducing the industrial hazards

Process Safety Management: Reliability assessment of process equipment, incorporating safety tips, scrubbing system, etc, should be done before effecting major process changes.

Safety Audits: Periodical assessment of safety procedures, performance of safety systems and gadgets along with follow up measures should be carried out.

Emergency Planning: A comprehensive risk analysis indicating the impact of consequences and practiced emergency procedures should be done. This can be done by communities as well as national or regional corporation authorities.

Training: Proper training of employees and protective services should be done.

Road accident

It is estimated that 1.34 million people are killed in the road accidents every year. Road accident is the 8th leading cause of death globally. Every year, up to 50 million people suffer serious, life-altering injuries which, in many low- and middle-income countries, directly contribute to the poverty cycle.

Primary road safety risk factors in low and middle-income countries include:

1. Speeding
2. Drink-driving
3. Non-use, or improper use of helmets, and
4. Non-use, or improper use of seatbelts

Strengthening the capability of the road traffic police to enforce traffic laws is fundamental to deterring road users from violating the laws, to reduce harm and to reduce inappropriate and unsafe behaviors on the roads.

Hazards

Hazards are defined as a thing, person, event or factor that poses a threat to people, structures or economic assets and which may cause a disaster. They could be either humanmade or naturally occurring in the environment. The word 'hazard' owes its origin to the word 'hasart' in old French meaning a game of dice (in Arabic - az-zahr; in Spanish - azar). Though the society experiences several types of hazards, it is important for a region to be aware of those threats that are most likely to affect the community most severely.

A natural hazard is a natural process and event that is a potential threat to human life and property. The process and events themselves are not a hazard but become so because of human use of the land.

A disaster is a hazardous event that occurs over a limited time span in a defined area and causes great damage to property/

loss of life, also needs assistance from others.

A catastrophe is a massive disaster that requires significant expenditure of money and a long time (often years) for recovery.

Types of Hazards

Some hazards occur frequently and threaten the people. Hazards are classified in different ways.

- I. Based on their causes of occurrence.
- II. Based on their origin.

I. Based on their causes of occurrence

Hazards can be broadly classified into three types: natural, human-made and socio-natural hazards.

1. Natural hazards:

These are the results of natural processes and man has no role to play in such hazards. The main examples of natural hazards are earthquakes, floods, cyclonic storms, droughts, landslides, tsunamis and volcanic eruptions.

Human-made hazards:

These are caused by undesirable activities of human. It can be the result of an accident, such as an industrial chemical leak or oil spill, or an intentional act. Such hazards can disturb the safety, health, welfare of people and cause damage or destruction to property. The following are the examples of human-made hazards. They are explosions, hazardous wastes, pollution of air, water and land, dam failures, wars or civil conflicts and terrorism.

2. Socio-natural hazards (Quasi-natural hazards):

These are caused by the combined effect of natural forces and misdeeds of human. Some of the examples are:

- The frequency and intensity of floods and droughts may increase due to indiscriminate felling of trees, particularly in the catchment areas of the rivers.
- Landslides are caused by natural forces and their frequency, and impact may be aggravated as a result of construction of roads, houses etc., in mountainous areas, excavating tunnels and by mining and quarrying.
- Storm surge hazards may be worsened by the destruction of mangroves.
- Smog is a serious problem in most big urban areas. The emissions from vehicles and industries, combustion of wood and coal together combined with fog leads to smog.

II. Based on their origin

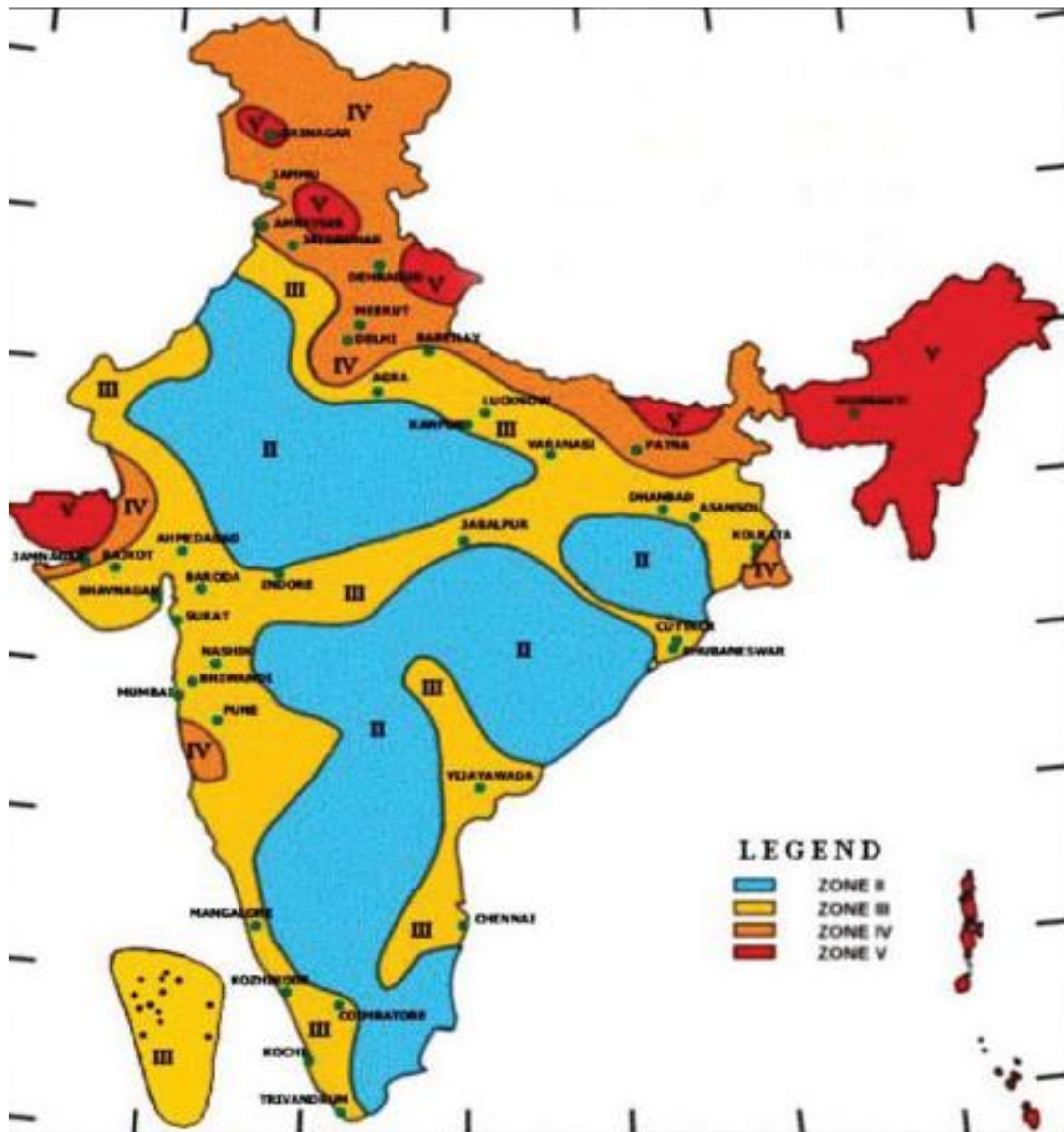
Hazards can be grouped into eight categories

1. Atmospheric hazard - Tropical storms, Thunderstorms, Lightning, Tornadoes, Avalanches, Heat waves, Fog and Forest fire.
2. Geologic/Seismic hazard - Earthquakes, Tsunamis, Landslides and Land subsidence.
3. Hydrologic hazard - Floods, Droughts, Coastal erosion and Storm surges.
4. Volcanic hazard - Eruptions and Lava flows.
5. Environmental hazard - Pollution of soil/ air/water, Desertification, Global warming and Deforestation.
6. Biological hazard - Chickenpox, Smallpox, AIDS [HIV] and Killer bees.
7. Technological hazard - Hazardous material incidents, Fires, Infrastructure failures m[Bridges, Tunnels, Dams] and Nuclear/ Radiological accidents.
8. Human-induced hazard - Terrorism, Mass shootings, War, Transportation accidents and Civil disorder.

Major Hazards in India

1) Earthquakes

Earthquake is a violent tremor in the earth's crust, sending out a series of shock waves in all directions from its place of origin. Earthquake prone regions of the country have been identified on the basis of scientific inputs relating to seismicity, earthquake occurred in the past and tectonic setup of the region. Based on these inputs, Bureau of Indian Standards has grouped the country into four seismic zones: Zone II, Zone III, Zone IV and Zone V (No area of India is classified as Zone I).



(Source: National Institute of Disaster Management, New Delhi)

Seismic Zones of India

Seismic Zones	Level of Risk	Regions
Zone V	Very High	Comprises entire northeastern India, parts of Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Rann of Kutch in Gujarat, part of North Bihar and Andaman & Nicobar Islands.
Zone IV	High	Covers remaining parts of Jammu and Kashmir and Himachal Pradesh, National Capital Territory (NCT) of Delhi, Sikkim, northern parts of Uttar Pradesh, Bihar and West Bengal, parts of Gujarat and small portions of Maharashtra near the west coast and Rajasthan.
Zone III	Moderate	Comprises Kerala, Goa, Lakshadweep Islands, remaining parts of Uttar Pradesh, Gujarat and West Bengal, parts of

		Punjab, Rajasthan, Madhya Pradesh, Bihar, Jharkhand, Chhattisgarh, Maharashtra, Odisha, Andhra Pradesh, Tamil Nadu and Karnataka.
Zone II	Low	Covers remaining parts of country.

2) Floods

Flood is an event in which a part of the earth's surface gets inundated. Heavy rainfall and large waves in seas are the common causes of flood.

The major causes of floods are:

A. Meteorological factors

- i) Heavy rainfall
- ii) Tropical cyclones
- iii) Cloud burst

B. Physical factors

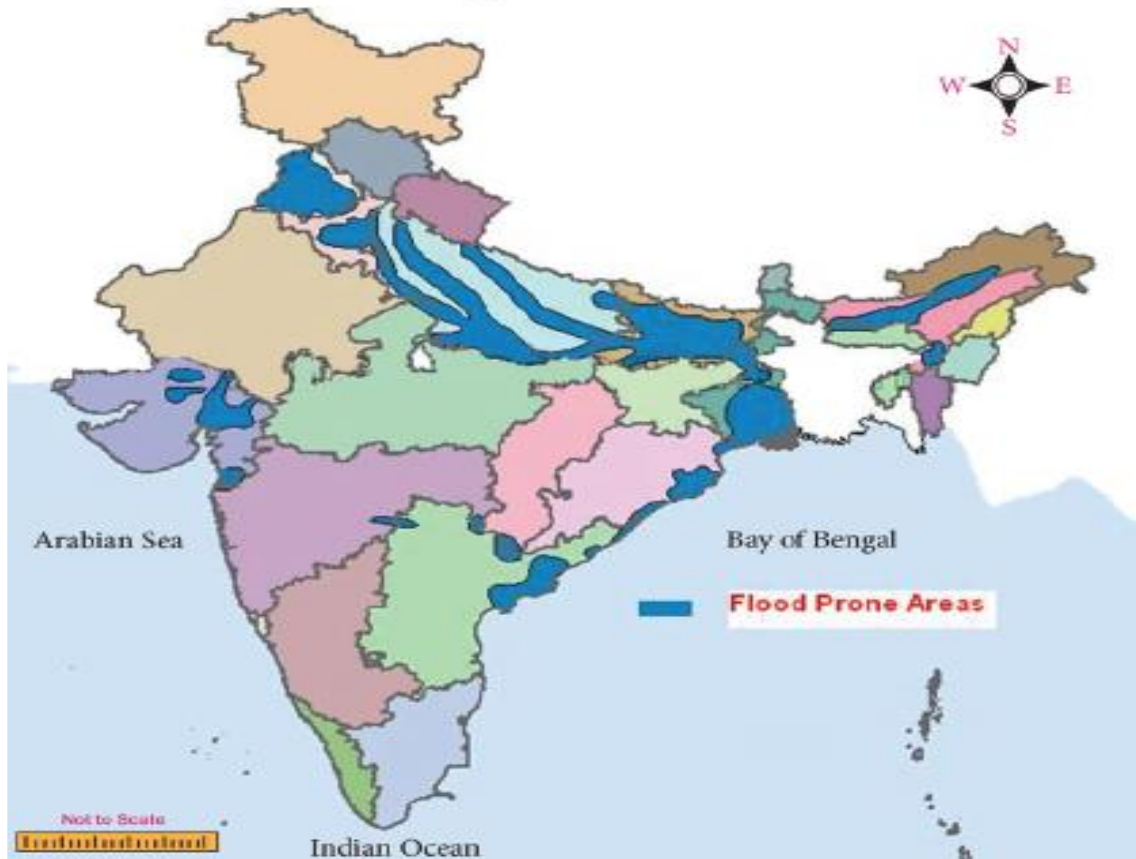
- i) Large catchment area
- ii) Inadequate drainage arrangement

C. Human factors

- i) Deforestation
- ii) Siltation
- iii) Faulty agricultural practices
- iv) Faulty irrigation practices
- v) Collapse of dams
- vi) Accelerated urbanization

The following map shows the major flood prone areas in India. Gangetic plains covering the states of Punjab, Haryana, Uttar Pradesh, North Bihar, West Bengal and Brahmaputra valley are the major flood prone areas in north and northeast India. Coastal Andhra Pradesh, Odisha and southern Gujarat are the other regions which are also prone to flood often.

Major flood prone areas of India



(Source: National Institute of Hydrology, New Delhi)

3) Cyclonic Storms

A cyclonic storm is a strong wind circulating around a low pressure area in the atmosphere. It rotates in anti-clockwise direction in Northern Hemisphere and clockwise in the Southern Hemisphere.

Tropical cyclones are characterised by destructive winds, storm surges and exceptional levels of rainfall, which may cause flooding. Wind speed may reach upto 200 km/h and rainfall may record upto 50 cm/day for several consecutive days.

A sudden rise of seawater due to tropical cyclone is called storm surge. It is more common in the regions of shallow coastal water.

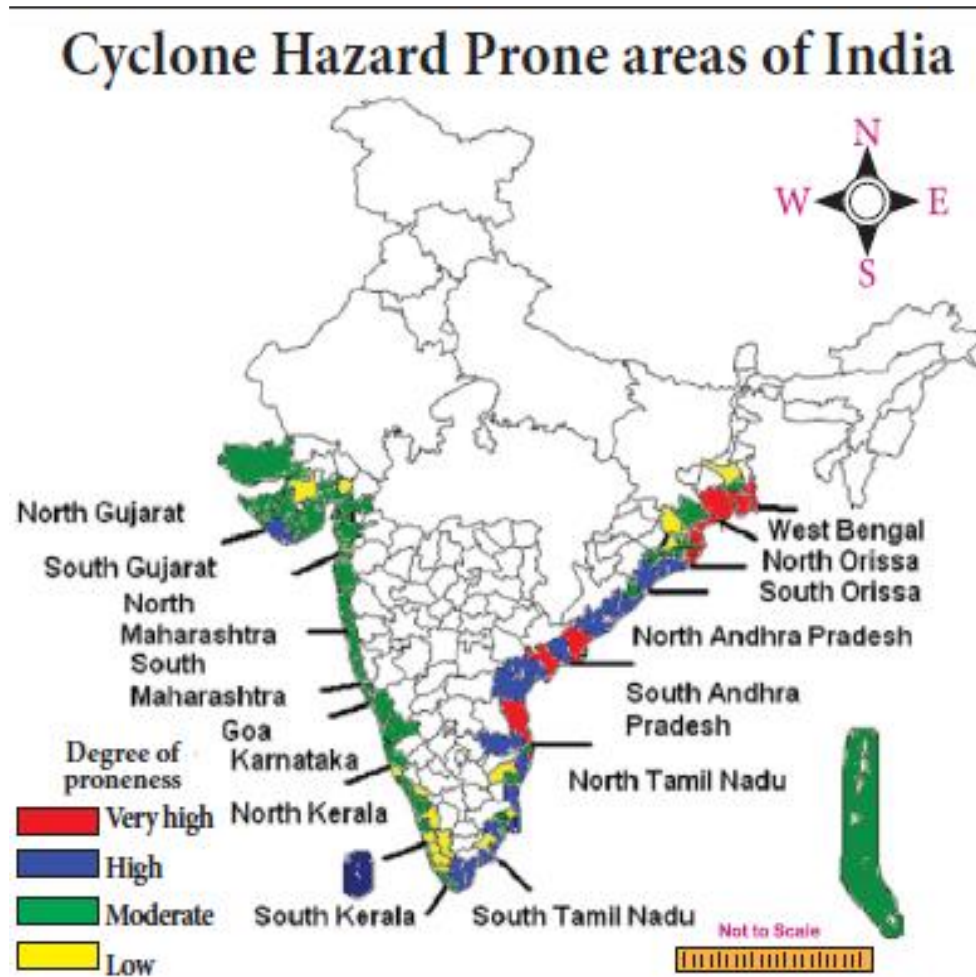
East coastal areas vulnerable to storm surges

- i) North Odisha and West Bengal coasts.
- ii) Andhra Pradesh coast between Ongole and Machilipatnam.
- iii) Tamil Nadu coast (among 13 coastal districts, Nagapattinam and Cuddalore districts are frequently affected).

West coastal areas vulnerable to storm surges

The west coast of India is less vulnerable to storm surges than the east coast.

- i) Maharashtra coast, north of Harnai and adjoining south Gujarat coast and the coastal belt around the Gulf of Cambay.
- ii) The coastal belt around the Gulf of Kutch.



(Source: Mohapatra et al., 2015)

3) Droughts

The above map shows most the acute shortage of water in Tamil Nadu in 10 years. (2017)

Drought is a period of time (months or years) during which a part of the land has shortage of rain, causing severe damage to the soil, crops, animals, and people. It sometimes causes even death. During drought high temperature is experienced. Such conditions may affect our health. The primary cause of drought is deficiency of rainfall and in particular, the timing, distribution and intensity. In India around 68 percent of the country is prone to drought. Of the entire area 35 percent receives rain falls between 750 mm and 1,125 mm which is considered drought prone while 33 percent areas receive rainfalls less than 750 mm is considered to be chronically drought prone.

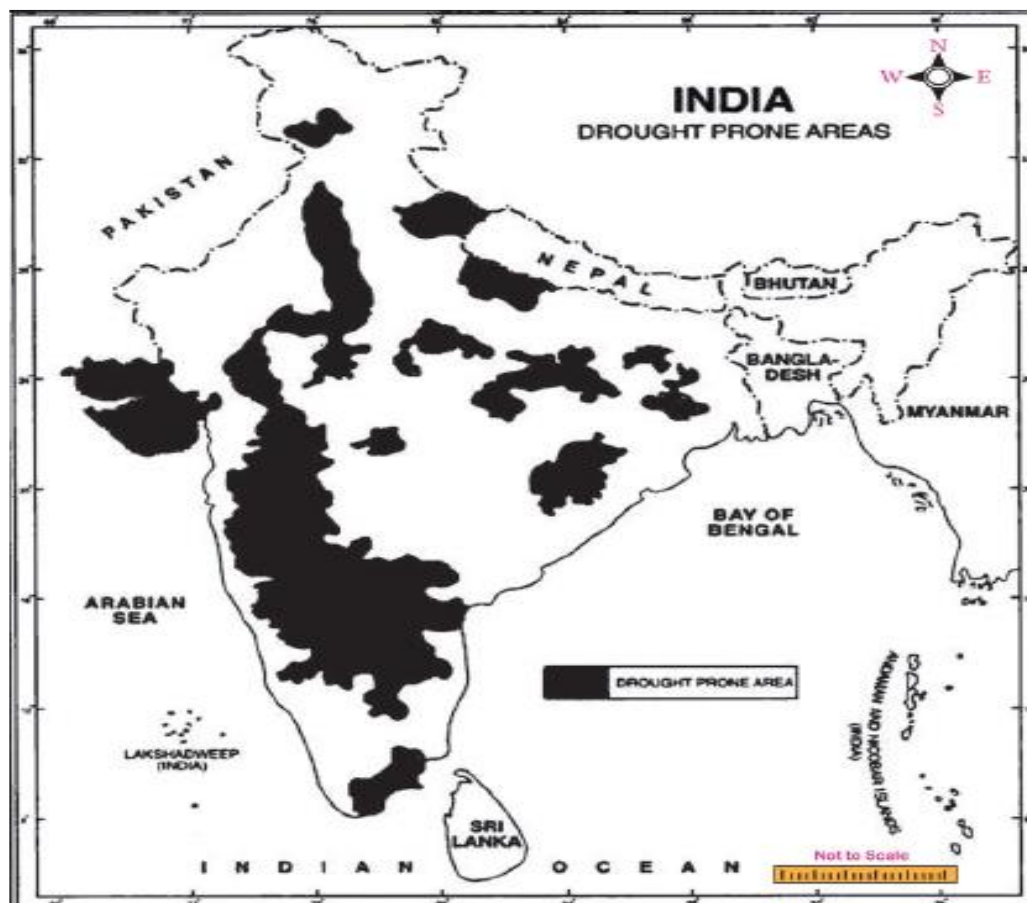
Any lack of water to satisfy the normal needs of agriculture, livestock, industry or human population may be termed as a drought. Further, the drought could be classified into three major types as,

- i) **Meteorological drought:** it is a situation where there is a reduction in rainfall for a specific period below a specific level.

- ii) **Hydrological drought:** it is associated with reduction of water in streams, rivers and reservoirs. It is of two types, a) Surface water drought, and b) Groundwater drought.

- ii) **Agricultural drought:** it refers to the condition in which the agricultural crops get affected due to lack of rainfall.

Droughts in India occur in the event of a failure of monsoon. Generally monsoon rainfall is uneven in India. Some areas receive heavy rainfall while other regions get moderate to low rainfall. The areas which experience low to very low rainfall are affected by drought.



(Source: Khullar, 2014)

The major areas highly prone to drought are:

- 1) The arid and semi-arid region from Ahmedabad to Kanpur on one side and from Kanpur to Jalandhar on the other.
- 2) The dry region lying in the leeward side of the Western Ghats.

5) Landslides

Landslide is a rapid downward movement of rock, soil and vegetation down the slope under the influence of gravity. Landslides are generally sudden and infrequent. Presence of

steep slope and heavy rainfall are the major causes of landslides. Weak ground structure, deforestation, earthquakes, volcanic eruptions, mining, construction of roads and railways over the mountains are the other causes of landslides.

About 15% of India's landmass is prone to landslide hazard. Landslides are very common along the steep slopes of the Himalayas, the Western Ghats and along the river valleys. In Tamil Nadu, Kodaikanal (Dindigul district) and Ooty (The Nilgiris district) are frequently affected by landslides.

6) Tsunamis

Tsunami refers to huge ocean waves caused by an earthquake, landslide or volcanic eruption. It is generally noticed in the coastal regions and travel between 640 and 960 km/h. Tsunamis pose serious danger to the inhabitants of the coastal areas.

The word 'Tsunami' is derived from Japanese word 'tsu' meaning harbour and 'nami' meaning wave (Harbour wave).

Indian Ocean Tsunami of 2004

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- The tsunami killed at least 2,25,000 people across a dozen countries, with Indonesia, Sri Lanka, India, Thailand, Somalia and Maldives, sustaining massive damage.

Lightning

Lightning is an atmospheric electrostatic discharge (spark) accompanied by thunder, which typically occurs during thunderstorms, and sometimes during volcanic eruptions or dust storms. Lightning generates 10-20 ampere current and it is therefore fatal. It is especially dangerous for people in an open area.

Lightning strikes often have fatal consequences. On an average, 2000 people die from lightning in the world every year. Lightning mostly strikes tall things, such as trees that break down and catch fire or it may strike power transmission lines and antennas fastened on roofs and buildings which causing fire. The air temperature, when lightning occurs, is as hot as 9982.2 °C.

Thunder is the sound caused by lightning. A charged, superheated lightning bolt creates a "resonating tube" as it travels. The air in the tube rapidly expands and contracts causing vibrations that we hear as the rumble of thunder.

Lightning strikes can explode a tree. Imagine 15 million volts of electricity hitting a tree branch. The heat travels through the tree, vaporizing its sap and creating steam that causes the trunk to explode.

7) Hazardous Wastes

The wastes that may or tend to cause adverse health effects on the ecosystem and human beings are called hazardous wastes. The following are the major hazardous wastes.

- i) Radioactive substance:** tools and unused fuel rods of nuclear power plants.
- ii) Chemicals:** synthetic organics, inorganic metals, salts, acids and bases, and flammables and explosives.
- iii) Biomedical wastes:** hypodermic needles, bandages and outdated drugs.
- iv) Flammable wastes:** organic solvents, oils, plasticisers and organic sludges.
- v) Explosives:** the wastes resulting from ordnance manufacturing and some industrial gases.
- vi) Household hazardous wastes:** pesticides, waste oil, automobile battery and household battery.

Pollution of Air

Air is a mixture of several gases. The main gases are nitrogen (78.09%) for forming products such as, fertilisers for plants and for making the air inert, oxygen (20.95%) for breathing and carbon dioxide (0.03%) for photosynthesis. Some other gases like argon, neon, helium, krypton, hydrogen, ozone, zenon and methane are also present. Besides, water vapour and dust particles make their presence felt in one way or the other.

Air pollution is the contamination of the indoor or outdoor air by a range of gases and solids that modify its natural characteristics and percentage. Air pollutants can be categorized into primary and secondary pollutants.

A primary pollutant is an air pollutant emitted directly from a source. A secondary pollutant is not directly emitted as such, but forms when other pollutants (primary pollutants) react in the atmosphere.

Primary Pollutants

- i) Oxides of Sulphur**
- ii) Oxides of Nitrogen**
- iii) Oxides of Carbon**
- iv) Particulate Matter**
- v) Other Primary Pollutants**

Secondary Pollutants

- i) Ground Level Ozone**
- ii) Smog**

9) Pollution of Water

Water pollution may be defined as alteration in the physical, chemical and biological characteristics of water, which may cause harmful effects in human and aquatic life.

In India, water pollution has been taking place on a large scale and since a long period. Both surface and groundwater bodies are polluted to a great extent. The major causes of water pollution in India are:

- i) Urbanisation
- ii) Industrial effluents
- iii) Sewages
- iv) Agricultural runoff and improper agricultural practices
- v) Seawater intrusion
- vi) Solid wastes

Need for Prevention

Prevention is defined as the activities taken to prevent a natural calamity or potential hazard from having harmful effects on either people or economic assets.

- Prevention planning consists of i) hazard identification, and ii) vulnerability assessment.
- Delayed actions may increase the economic losses.
- For developing countries like India, prevention is perhaps the most critical components in managing disasters.

Disaster Response

Disaster response entails restoring physical facilities, rehabilitation of affected population, restoration of lost livelihoods and reconstruction efforts to restore the infrastructure lost or damaged. The Response Phase focuses primarily on emergency relief: saving lives, providing first aid, restoring damaged systems (communications and transportation), meeting the basic life requirements of those impacted by disaster (food, water and shelter) and providing mental health and spiritual support and care.

Who are the first responders?

No matter how large or small, local communities are expected to provide immediate disaster response. On a daily basis, **police officers, firefighters, and emergency medical technicians** are a community's first responders, whether during fire, flood or acts of terrorism. Mental health professionals and the community's hospitals may also be activated in those early minutes and hours after disaster.

Disaster management includes Prevention, Mitigation, Preparedness, Response and Recovery. Disaster management involves all levels of government. Non-governmental and community based organizations play a vital role in the process. Modern disaster management goes beyond post-disaster assistance. It now includes pre-disaster planning and preparedness activities, organizational planning, training, information management, public relations and many other fields. Crisis management is important, but is only a part of the responsibility of a disaster manager.



Disaster Management Cycle

Community-Based Disaster Risk Reduction

Community is a group of people living in the same place having homogenous characteristics. It includes shared experiences, locality, culture, language and social interests. Community-based disaster risk reduction is a process within a community and for the community. Reducing risk in communities should address the root causes of risks and address it through local knowledge and expertise. Performance and the arts provide a variety of creative opportunities to communicate. Important messages through live experiences. Examples include: Street theatre, dramatic readings, skits and plays, puppet shows, poetry reading.

Dance, flash mob activities in large urban settings (a group of people who assemble suddenly in a public place, perform an unusual act and then disperse), tapping into oral traditions such as story-telling, music and sing-along, mural-making and other hands-on art and design activities. All of these can involve volunteers and community members, as performers and audiences. Skilled performers find creative ways to engage their audience.

Natural Disasters public Awareness for Disaster Risk Reduction

On an average, 232 million people are affected by different types of disasters every year. In recent years disaster risks have been on the rise due to factors such as population growth, unplanned urbanization, environmental degradation, conflicts and competition for scarce resources, climate change, disease epidemics, poverty and pressure from development within high-risk zones. Hence, disaster risk reduction is the need of hour.

Recognizing the importance of Disaster Risk Reduction in 2005, 168 governments and all leading development and humanitarian actors signed the Hyogo Framework for Action (HFA), committing themselves to a ten-year multi-stakeholder and multi-sector plan to invest in disaster risk reduction as a means to building disaster-resilient societies.

Public awareness campaigns can be started modestly and tailored to meet the needs of specific populations and target groups. These approaches can be integrated into almost all existing initiatives, whenever and wherever they take place. They can build on and support existing volunteer mobilisation and peerto- peer communications. To support this, it requires strong and unified disaster reduction messages and clear and targeted information, education and communication materials.

Public awareness for disaster risk reduction

There are four key approaches to public awareness for disaster risk reduction: Campaigns, participatory learning, informal education, and formal school based interventions.

STATE NATURAL CALAMITIES

Natural disasters in TamilNadu.

According to United Nations office for Disaster Risk Reduction, Disaster Risk Reduction (UNDRR) is the concept and practice of reducing disaster risks through systematic efforts to analyse and reduce the causal factors of disasters. This includes reducing exposure to hazards, lessening the vulnerability of people and property, wise management of land and environment, and improving preparedness and early warning for adverse events.

1. Landslide

A collapse of a mass of earth or rock from a mountain or cliff is called landslide. Water is the most common trigger of a **landslide**. Nilgiris in Tamil Nadu is identified as one of the most vulnerable districts in the country and landslides pose a major threat in this area. The other regions which are prone to land slides are Coimbatore and palani hill of Dindigul district where Kodaikanal hill station is located.

2. Flood

- Flood is a common one in the coastal districts of Tamil Nadu during northeast monsoon. The recent flood occurred in the state was in 2015. The 2015 South Indian
- floods resulted from heavy rainfall generated by the annual northeast monsoon in November–December 2015. They affected the Coromandel Coast region of the South Indian states of Tamil Nadu and Andhra Pradesh.
- More than 500 people were killed and over 1.8 million people were displaced. With the estimates of damages and losses ranging from nearly 200 billion, the floods were the costliest natural disasters of the year 2015.
- Tamil Nadu was the worst affected state by this flood. Generally the districts of Kancheepuram, Tiruvallur, Cuddalore, Villupuram, Thanjavur, Tiruvarur, Nagapattinam, Pudukkottai, Ramanathapuram, Tirunelveli and Kanyakumari are the most flood prone districts of the state.

3. Cyclone

- The coastal regions of Tamil Nadu are often hit by the tropical cyclones formed in Bay of Bengal during northeast monsoon. Occurrence of flood, losses to lives and properties are the recurring one in the state.

- Based on the cyclone hit areas, the state of Tamil Nadu can be divided into five zones namely very high, high, medium, low and very low cyclone prone zones. Southern part of Chennai, eastern part of kancheepuram, eastern part of Villupuram, northeastern part of Cuddalore and Union Territory of Puducherry fall under the very high cyclone prone zone.
- Nagapattinam, Tiruvallur, Tiruvarur (except northwestern part), southern part of Thanjavur, eastern part of Pudukkottai, eastern part of Cuddalore, middle portion of Villupuram, eastern part of Tiruvannamalai, western part of kancheepuram, northeastern part of Vellore and northern part of Chennai districts are included in the high cyclone prone zone.

Districts in Tamil Nadu which are frequently affected by cyclones:

All the 13 coastal Districts of Tamil Nadu are affected by cyclonic storms which occur during May- June and in October-November months. These Districts are: Tiruvallur, Chennai, Kancheepuram, Villupuram, Cuddalore, Nagapattinam, Tiruvarur, Thanjavur, Pudukkottai, Ramanathapuram, Tuticorin, Tirunelveli and Kanniyakumari. On an average, about five or six tropical cyclones form in the Bay of Bengal and Arabian sea and hit the coast every year. Out of these, two or three are severe. When a cyclone approaches to the coast, a risk of serious loss or damage occurs from severe winds, heavy rainfall, storm surges and river floods. **The effect of a storm surge is most pronounced in wide and shallow bays exposed to cyclones such as in the northern part of Bay of Bengal. Most cyclones occur in the Bay of Bengal .followed by those in the Arabian Sea** and the ratio is approximately 4:1. During the cyclonic of cyclonic storms, wind speed is between 65 km/h and 117 km/h.

4. Drought

Tamil Nadu is water deficit state. It is almost a regular one and not a seasonal one. It depends mostly on northeast monsoon for its rain. Its failure ends in disastrous. The total assessed water resources in the state amount to 1,587 TMC (Thousand million cubic feet) while the state government's demand estimate is 1,894 TMC. Demand exceeds supply by 19.3%, this happens when rainfall is "normal".

The government classifies groundwater blocks into different categories. Only 145 of 385 such blocks are classified safe. The others are in various stages of depletion: over-exploited, critical and semi-critical. About 2% of the blocks are already saline. About 64% of the total area of the state is drought prone. Coimbatore, Dharmapuri, Kanyakumari, Madurai, Ramanathapuram, Salem, Tirunelveli, and Tiruchirappalli are the districts which are more drought prone.

According to the desertification atlas prepared by the ISRO, about 12 percent of the total geographical area is under desertification and land degradation. Theni, Virudhunagar, the Niligris and Kanyakumari are the worst affected districts. To manage the water deficit, rain water harvesting and water conservation methods have to be implemented strictly.

Tamil Nadu is a tropical state. The high temperature during summer leads to occasional forest fire in deciduous and thorn forests. The recent fire accident in the state took place in 2018. The tragedy happened on March 11 when 37 people from Chennai and Erode

regions were returning after a trekking trip to the Kurangani hills in Theni district. The groups were struck in the middle of a forest fire, which ultimately killed 23 people. In the aftermath of the Kurangani forest fire, Tamil Nadu government has banned trekking in the state for two months every year (February 15 to April 15).

5. Tsunami

Though Tsunami is not a common one in India, its incident in 2004 alerted India and the state of Tamil Nadu on this aspect. Almost all the countries situated around the Bay of Bengal were affected by the tsunami waves in the morning hours of 26 December 2004 (between 09:00 and 10:30 hrs IST). The killer waves were triggered by an earthquake measuring 8.9 on the Richter scale that had an epicentre near the west coast of Sumatra in Indonesia. Waves rose up to 6-10 metres and the impact was felt up to the East African coast affecting Somalia, Tanzania and Kenya.

6. Tremors and Tidal Waves in South India

Tremors and Tidal waves hit South India and Large Scale devastation was reported. Over a thousand people have been killed in tidal waves in Tamil Nadu, Andhra Pradesh, and Andaman and Nicobar Islands. Tamil Nadu was the "worst affected" state of India in this incident. More than 1,500 people have been killed in the state. Casualties reported were very high in Nagapattinam (700), Kanyakumari (250) and Cuddalore (200) districts. Around 125 deaths have been recorded in the state capital of Chennai. Earlier, the tsunami was reported in India in 1881 and 1941.

7. Earthquakes

India is a vast country which experiences many earthquakes at different periods. Generally high risk zones of the country are located in the north and central parts. The state of Tamil Nadu is located in the moderately low risk zone.

Earthquakes in Tamil Nadu

26 September 2001: A moderate quake occurred in the Bay of Bengal, off the coast of the Union Territory of Puducherry, resulting in three deaths and minor damage to property in Puducherry and coastal Tamil Nadu. It had a magnitude of 5.6 on Richter scale.

7 June 2008: A mild earthquake occurred in the Palar Valley region in Tamil Nadu. It had a magnitude of 3.8 on Richter scale and was felt in many parts of Vellore district.

12 August 2011: A mild earthquake occurred in the Cauvery basin in Ariyalur district. It had a magnitude of 3.5 on Richter scale and was felt in several districts in southern Tamil Nadu. It resulted in one death and caused minor damages in the districts of Cuddalore, Villupuram, Perambalur and Tiruchirappalli.

In 2012, Chennai experienced a mild tremor with its epicentre in the Indian Ocean.

Man made Disasters in Tamil Nadu

Definition

A disastrous events caused directly or indirectly by human actions are called as manmade disaster. Man-made disaster can include hazardous material spills, fires, groundwater contamination, transportation accidents, structure failures, mining accidents, explosions and acts of terrorism.

Industrial Disaster

Disasters caused by industrial companies either by accident, negligence, or incompetence fall under industrial disasters. Electrical faults seem to be the major reason for industrial disasters in the country. Overheating, aging of the material and use of sub-standard quality of electrical gadgetshave been the main factors contributing the increasing fire accidents in industries. Electricity is not just a life line; It can also take away life when handled improperly', Apart from these, explosions, leaking of poisonous gases, injuries and deaths caused by machines are the other causes of industrial disasters.

Sivakasi, is considered the "fireworks capital" of India. Series of industrial accidents causing deaths are reporting frequently in the regions of Virudhunagar and Sivakasi where a number of fireworks and match units are in operation. An explosion occurred on 5 September, 2012 in a private firework company. In this incident 40 workers were killed and more than 70 workers were injured. Various measures are being taken by the Government to reduce the fire accidents and casualties caused by industries. In another industrial accident which took place at Coimbatore on 2nd February 2016 in a tyre melting unit, six migrant workers were critically injured.

Stampede

A situation in which a large number of animals or people running in the same direction in an uncontrolled way causing injuries and deaths is called stampingOn 21st April, 2019 seven people were killed and 10 injured in a stampede during a local festival at a temple near Thuraiyur in Tamil Nadu. The incident took place when hundreds of devotees gathered at the Karuppasamy temple in Muthiampalayam village for the 'padikasu' (temple coin) distribution ceremony.

Mitigation

Hazard mitigation refers to any sustained action taken to reduce or eliminate the longterm risk to human life and property from hazardous conditions.

- Regular maintenance of machines and wires may reduce the frequency of accidents,
- Creating awareness and training the workers to be cautious during work hours may help them to reduce risk during disasters.
- Wearing specially designed dresses and other safety materials would help the workers to protect themselves from any serious injuries.

- Conducting periodical medical camps would help them to assess their health status. The Provision of having life insurance policies will secure their future.
- Besides these, the administration should be employees friendly and ready to extend their help in case of any untoward incidents.

Road Accidents

The road accidents in India is on very high level. Tamil Nadu leads in the number of road accidents in the country. Increase in road traffic, high speed of vehicles and violation of traffic rules are the causes of major of accidents.

In 2013, 14504 accidents had taken place in the state which resulted in 15563 deaths. In the ten years from 2002-2012, Tamil Nadu tops the list in number of road accidents among the states of India. It is reported that about 15 percent of accidents of the country takes place in Tamil Nadu. The figure of 2017 also puts Tamil Nadu on top with recording of 16157 deaths out of 147913 deaths recorded in the country. Death toll came down rapidly in 2018 to 12213 deaths, a decline of 24.5 percent.



Industry

Phases of Industrial development in India

a. Industrial development during 1950s to 1965

During this phase, a majority of consumer goods were produced in India. The industrial sector was underdeveloped with weak infrastructure. Technical skills were in short supply. The first three Five-Year Plans were very important because their aim was to build a strong industrial base in independent India. These plans mostly focused on the development of capital goods sector. As a result, this phase witnessed a strong acceleration in the growth rate of production.

b. Industrial development during 1965–1980

As the first three Five-Year Plans mostly focused on the development of the capital goods sector, the consumer goods sector was neglected. The consumer goods sector is the backbone of rural economy. As the result, there was a fall in the growth rate of industrial production. So this period is marked as the period of structural retrogression.

c. Industrial Development during 1980s till 1991

The period of the 1980s can be considered as the period of the industrial recovery. This period witnessed quite a healthy industrial growth.

d. Industrial Development Post 1991 Reforms

The year 1991 ushered a new era of the economic liberalisation. India took major decision to improve the performance of the industrial sector. The Tenth and Eleventh Five-Year Plans witnessed a high growth rate of industrial production. The abolition of industrial licensing, dismantling of price controls, dilution of reservation of small-scale industries and virtual abolition of monopoly law enabled Indian industry to flourish. The new policy welcomes foreign investments.

Modernisation

India has now a large variety of industries producing goods of varied nature, which shows a high degree of modernisation. Some modern industries have really grown and they are competing effectively with the outside world. This has reduced our dependence greatly on foreign experts and technologists. On the contrary, India is exporting trained personnel to relatively less developed countries.

The term information technology includes computer and communication technology along with software. Along with three-sector model of primary, secondary and tertiary industries, a fourth sector, information-related industries, has emerged. The knowledge economy depicts the automation of labour-intensive manufacturing and service activities as well as growth in new service industries such as health care, distance education, software production and multimedia entertainment.

Self-Reliance

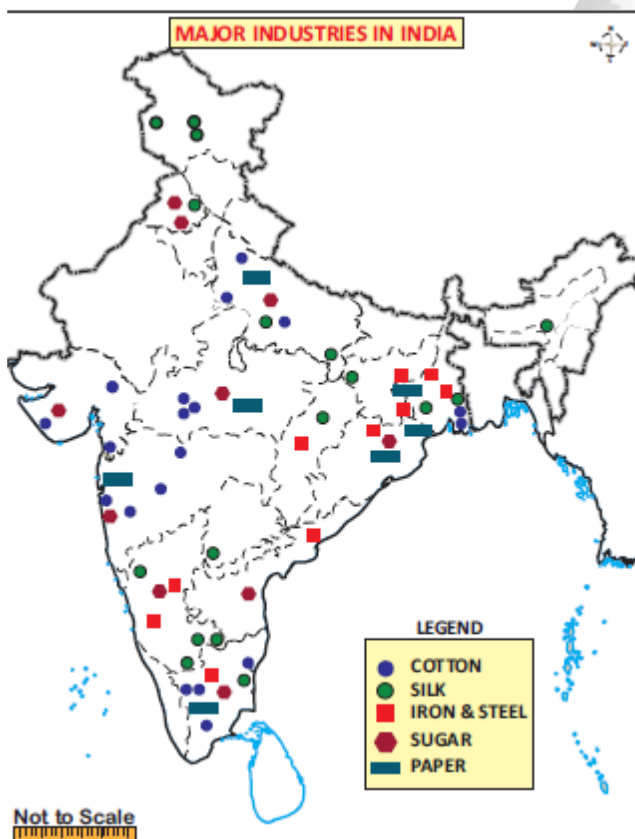
Another positive aspect of industrial growth is the attainment of the goal of self-reliance. We have achieved self-reliance in machinery, plant and other equipment. Today, the bulk of the equipment required for industrial and infrastructural development is produced within the country.

The Indian road network has become one of the largest in the world. Government efforts led to the expansion of the network of National Highways, State highways and major district roads, which in turn has directly contributed to industrial growth.

As India needs power to drive its growth engine, it has triggered a noteworthy improvement of availability of energy. After almost seven decades of independence, India has emerged as the third largest producer of electricity in Asia.

Major Industries in India

It refers to the activities which convert the raw materials into finished products. This sector is called as the value addition sector. On the basis of the source of raw materials, Industries are classified into the Agro based industries, Forest based industries and Mineral based industries.



Agro based industries

These industries draw their raw materials from agricultural sector. The following part discusses the agro based industries in India.

a. Cotton Textile Industry

Textile is a broad term which includes cotton, jute, wool, silk and synthetic fibre textiles. This sector in India with 3400 textiles mills with installed capacity of more than 50 million spindles and 842000 rotors is the second largest in the world. Traditional sectors like hand loom, handicrafts and small power-loom units are the biggest source of employment for millions of people in rural and semi urban areas. The cotton textile industries contribute about 7% of industrial

output, 2% of India's GDP and 15% of the country's export earnings. It is one of the largest sources of employment generation in the country.

With over 45 million employees, the total employment in this industry is well over 25million worker. At present there are 1,719 textiles mills in the country. Out of which 188 mills are in public sector, 147 in cooperative sector and 1,284 in private sector. Currently, India is the third largest producer of cotton and has the largest loom arc and ring spindles in

the world. At present, cotton textile industry is the largest organized modern industry of India. About 16% of the industrial capital, 14% of industrial production and over 20% of the industrial labour of the country are engaged in this industry.

The higher concentration of textile mills in and around Mumbai, makes it as “Manchester of India”. Presence of black cotton soil in Maharashtra, humid climate, presence of Mumbai port, availability of hydro power, good market and well developed transport facility favour the cotton textile industries in Mumbai.

The major cotton textile industries are concentrated in the states of Maharashtra, Gujarat, West Bengal, Uttar Pradesh and Tamil Nadu. Coimbatore is the most important centre in Tamil Nadu with 200 mills out of its 435 and called as “Manchester of South India”. Erode, Tirupur, Karur, Chennai, Thirunelveli, Madurai, Thoothukudi, Salem and Virudhunagar are the other major cotton textiles centres in the state.

b. Jute Textiles

Jute is a low priced fibre used mainly for making package materials like gunny bags. Today jute is blended with cotton and wool to produce textiles. India is the largest producer of jute goods contributing 35% of the world’s total output. This is the second important textile industry in India after cotton textiles. Jute is the golden fibre which meets all the standards of goods packing with its natural, renewable, bio degradable and eco-friendly products. The first jute mill in India was established at Rishra near, Kolkata in 1854 by the English man George Auckland.

India tops in the production of raw jute and jute goods and second in the export of jute goods next to Bangladesh. Jute production includes gunny bags, canvas, pack sheets, jute web, carpets, cordage, hessians and twines. Now jute is also being used in plastic furniture and insulation bleached fibres to blend with wool. It is also mixed with cotton to make carpet and blankets.

The major jute producing areas are in West Bengal and concentrated along the Hooghly river within the radius of six kilometre of Kolkata. Titagarh, Jagatdat, Budge-Budge, Haora and Bhadreswar are the chief centres of jute industry. Andhra Pradesh, Bihar, Uttar Pradesh, Assam, Chhattisgarh and Odisha are the other jute goods producing areas.

c. Silk Industry

India has been well known for the production of silk. Since the ancient times, India is the second largest producer of raw silk next only to China. Sericulture is a labour intensive industry and provides employment to 7.56 million people make to weaker and marginalised sections of society

Karnataka is the largest producer of silk with an average of 8200 metric tons every year which is about one third of the total silk production of India. Other major producers of silk are West Bengal, Jammu Kashmir, Bihar, Jharkhand, Chhattisgarh, Uttar Pradesh, Punjab, Assam and Tamil Nadu states. India exports exclusively silk fabrics, silk scarves, dress material and sarees. It exports to the principal countries like Europe, U.S.A, U.K, Russia, Saudi Arabia, Kuwait and Singapore.

d. Sugar Industry

Sugar can be produced from sugar cane, sugar-beets or any other crop which have sugar content. In India, sugar cane is the main source of sugar. At present this is the second largest agro based industry of India after cotton textiles. India is the world's second largest producer of sugar cane after Brazil. This industry provides employment to 2.86 lakh workers. Sugar industry is decentralized and located near the sugarcane growing areas as they are weight loosing and bulky to transport.

Uttar Pradesh is the largest producer of sugar, producing about 50% of the country's total. Other major producers are Maharashtra, Uttar Pradesh, Karnataka, Andhra Pradesh, Tamil Nadu, Bihar, Punjab, Gujarat, Haryana and Madhya Pradesh states. These states account for more than 90% of the sugar mills and sugar production.

Forest based industries

Forest provide us with different types of material which are used as raw material for certain industries like paper, lac, sports goods, plywood etc.

a. Paper industry

Paper Industry has emerged as a diversified and specialized industry in India that produces numerous types of papers that comes in various use such as sheet paper, paper boxes, tissues, paper bags, stationery, envelopes and printed-paper products such as books, periodicals, and newspapers.

In India the Soft wood is the principal raw material used for making paper especially newsprint and high class printing papers. Paper is the pre-requisite for education and literacy and its use is an index of advancement in these two fields as well as the overall well-being of the society.

The first successful effort was made in 1867 with the setting up of the RoyalBengal paper mills at Ballyganj near Kolkata. Subsequent successful efforts were made at Lucknow in 1879, Titagarh in 1882, Pune in 1887, Raniganj in 1892, Kankinra in 1892 and Naihati in 1918. The raw materials for paper industry includes wood pulp, bamboo, salai and sabai grasses, waste paper and bagasse. West Bengal is the largest producer of paper in the country followed by Madhya Pradesh, Odisha and Tamil nadu states.

Mineral based industries

Mineral based industries use both metallic & non-metallic minerals as raw materials. The major mineral based industry of country is the iron steel industry

a. Iron and steel industries

Iron and steel industry is called a basic metallurgical industry as its finished product is used as raw material by host of other industries. Several industries like engineering, heavy machines and machine tools, automobile, locomotives and railway equipment industries use iron and steel as their primary raw material. Due to this, the steel producing capacity of a country is generally taken as an indicator of its level of industrial development.

The modernization of the industry was started in 1907 with the establishment of Tata Iron and Steel Company at Sakchi, now called Jamshedpur. Iron and steel industry of India is mainly concentrated in the states of Jharkhand, West Bengal and Odisha. Proximity to the coal fields of Jharia, Raniganj, Bokaro and Karanpura and the iron ore mines of Mayurbhanj,

Keonjar and Brona are responsible for this. This area also has sufficient deposits of limestone, dolomite, manganese, silicon and dolomite which are required for the industry.

S.N O	Name of Industry	Place	Establishment year	Product
1.	Tata Iron and Steel Company (TISCO)	Jamshedpur, Jharkhand	1911	Pig Iron
2.	Indian Iron and steel Company (IISCO)	Burnpur, Hirapur, Kulti, West Bengal	1972	Pig Iron & Crude steel
3.	Visweshwaraya Iron Steel Ltd (VISL)	Bhadravati, Karnataka	1923	Alloy and Sponge steel
4.	Hisdustan Steel Ltd (HSL) Collaborated with Russia	Bhilai, Chattisgarh	1957	Railway Equipment's and Ship Building
5.	Hindustan Steel Ltd (HSL) Collaborated with Germany	Rourkela, Odisha	1965	Hot and Cold rolled sheets, Galvanized sheets and electrical plates
6.	Hindustal Steel Ltd (HSL) Collaborated with United Kingdom	Durgapur, west Bengal	1959	Alloy steel, Construction materials and railway equipment's
7.	Hisdustan Steel Ltd (HSL) Collaborated with Russia	Bokaro, Jharkhand	1972	Sludge and Slog
8.	Salem Steel Ltd	Salem, Tamil Nadu	1982	Stainless Steel
9.	Vijayanagar Steel Plant	Tornagal, Karnataka	1994	Flat steel and Long Steel
10.	Visakhapatnam Steel Plant (VSO)	Visakhapatnam, Andhra Pradesh	1981	Hot Metal

Automobile Industry

India is set to emerge not only as a large domestic market for automobile manufacturers, but also as a crucial link in the global automotive chain. It is one of the most dynamic industrial groups in India. The first automobile industry of India was started in 1947. The industry is the Premier Automobiles Ltd located at Kurla (Mumbai). It was followed by the Hindustan Motors Ltd at Uttarpara (Kolkata) in 1948.

At present, India is the 7th largest producer of automobile manufacturers which include two wheelers, commercial vehicles, passenger car, jeep, scooty, scooters, motor cycles, mopeds and three wheelers. Major centres are at Mumbai, Chennai, Jamshedpur, Jabalpur, Kolkata, Pune, New Delhi, Kanpur, Bengaluru, Sadara, Lucknow and Mysuru. Tata Motors, Maruti Suzuki, Mahindra & Mahindra and Hindustan Motors are the largest passenger car manufacturers of Indian companies in the country.

Presence of foreign car companies such as Mercedes Benz, Fiat, General Motors, Toyota and the recent entry of passenger car manufacturers BMW, Audi, Volkswagen and Volvo makes the Indian automobile sector a special one. Tata Motors, Ashok Leyland, Eicher Motors, Mahindra & Mahindra and Ford Motors are the major Indian companies which manufacture commercial vehicles. MAN, ITEC, Mercedes-Benz, Scania and Hyundai are the foreign companies engaged in the manufacture of commercial vehicles. Two-wheeler manufacturing is dominated by Indian companies like Hero, Bajaj Auto and TVS.

The automobile industries are found in four clusters viz; Delhi, Gurgaon and Manesar in North India, Pune, Nasik, Halol and Aurangabad in West India, Chennai, Bengaluru and Hosur in South India and Jamshedpur and Kolkata in East India.

Electrical and Electronic Industries

Heavy electrical industries manufacture equipment used for power generation, transmission and utilization. Turbines for steam and hydro power plants, boilers for thermal power plants, generators, transformers, switch gears etc. are the chief products of this industry.

The most important company in the field of heavy electrical is Bharat Heavy Electricals Ltd (BHEL). It has its plants at Hardwar, Bhopal, Hyderabad, Jammu, Bengaluru, Jhansi and Tiruchirappalli. This Industry covers a wide range of products including television sets, transistor sets, telephone exchanges, cellular telegram, computers and varied equipment's for post and railway, defence and meteorological department.

Bengaluru is the largest producer of electronic goods in India, hence it is called as the "Electronic Capital of India". The other major producers of electronic goods centers are Hyderabad, Delhi, Mumbai, Chennai, Kolkata, Kanpur, Pune, Lucknow, Jaipur and Coimbatore.

Software Industry

India is home to some of the finest software companies in the world. The software companies in India are reputed across the globe for their efficient IT and business related solutions. The Indian Software Industry has brought about a tremendous success for the emerging economy.

In India, software industry began in 1970 with the entry of Tata Consultancy Services (TCS). Along with this, L & T, InfoTech, i-Flex, Accenture, Cognizant, GalaxE Solutions India Pvt Ltd and ITC InfoTech are the major software industries in the country. At present, there are more than 500 software companies all over India. It exports software service to nearly 95 countries in the world.

The main centres of IT parks are located in Chennai, Coimbatore, Thiruvananthapuram, Bengaluru, Mysuru, Hyderabad, Visakhapatnam, Mumbai, Pune, Indore, Gandhi Nagar, Jaipur, Noida, Mohali and Srinagar.

Major challenges of Indian Industries

Industries in India face many problems. Some major problems are listed below.

- Shortage and fluctuation in Power Supply.
- Non-availability of large blocks of land.
- Poor access to credit.
- High rate of interest for borrowed loan.
- Non-availability of cheap labourers.
- Lack of technical and vocational training for employees.
- Inappropriate living conditions nearby industrial estates.

Important Industrial Policies Prior to 1991

India is the Asia's third largest economy. The 70 years of Independence have brought a remarkable change in the socio - economic landscape of India.

Industrial Policy of India 1948, 1956, 1977, 1980, 1990 & 1991

Economic development of a country particularly depends on the process of industrialisation. At the time of Independence, India inherited a weak and shallow industrial base. Therefore during the post-Independence period, the Government of India took special emphasis on the development of a solid industrial base. The Industrial Policy Resolutions of 1948 and 1956 clearly stated the need for developing both small scale industries and large scale industries.

Industrial Policy Resolutions 1948

The Government of India recognized the significant contribution of industrialization. Therefore the Government of India declared its first Industrial Policy on 6th April 1948. The main importance of this policy was that it ushered in India the system of mixed economy.

Industrial Policies

Industrial Policy 1948 -

Center's Monopoly: Government of India's Monopoly shall include Railways, Arms and ammunition, Atomic Energy, Postal Department.

State's Monopoly: State Monopoly shall include natural resources like coal, steel, manufacture of aircraft, cement, rubber automobile, wireless apparatus (Radio Receiving Sets) and mineral oil.

Unregulated Private Enterprises: It was kept open to private enterprises of individuals and co-operative societies to also involve.

1. Industries were classified into four groups such as public sector (strategic industries), public-cum -private Sector (key industries), and controlled private sector, private and co-operative sectors.
2. This policy endeavoured to protect cottage and small scale industries.
3. The central and state governments had a virtual monopoly in rail roads and exclusive rights to develop minerals, iron ore etc.
4. The Government encouraged the significance of foreign capital for industrialization but the government decided that the control should remain with Indian hands.

Industrial Policy Resolution 1956

1. The Industrial Policy of 1956 sought to give a dominant role to public sector. At the same time, it assured a fair treatment to the private sector.
2. The Government would support and encourage cottage and small scale enterprises by restricting volume of production in the large scale sector by differential taxation or by direct subsidies.
3. This industrial policy emphasized the necessity of reducing the regional disparities in levels of development.
4. The Government recognized the need for foreign capital for progressive Indenisation of foreign concerns.

Industrial Resolution Policy - 1956

Shaped by the Mahalanobis Model of growth which suggested that emphasis on heavy industries would lead the economic towards a long term higher growth path. The Industrial Policy Resolution - 1956 classified industries into three categories;

17 Industries:

Exclusively under the domain of the Government. These included inter alia, railway, air transport, arms and ammunition, iron and steel and atomic energy.

12 Industries:

Which were envisaged to be progressively State owned by Private Sector was expected to supplement the efforts of the State. The third category contained all the remaining industries and it was expected that private sector would initiate development of these industries but they would remain open for the state as well.



NEW INDUSTRIAL POLICY 1991

Meaning of Liberalization, Privatization and Globalization (LPG)

The triple pillars of New Economic Policy are Liberalization, Privatization and Globalization (LPG)

Impacts of Liberalisation	
Positive Effects	Negative Effects
Increase In Foreign investment	Increase in Unemployment
Increase In production	Decrease in Tax Receipt
Technological advancement	
Increase in GDP growth rate	

Liberalization:

Liberalization refers to removal of relaxation of governmental restrictions in all stages in industry. Delicensing, decontrol, deregulation, subsidies (incentives) and greater role for financial institutions are the various facets of liberalization.

Privatization:

Privatization means transfer of ownership and management of enterprises from public sector to private sector. Denationalization, disinvestment and opening exclusive public sector enterprises to private sector are the gateways to privatization.

Globalization:

Impacts of Globalisation	
Positive Effects	Negative Effects
Expansion of market	But thought Completion
Development of infrastructure	Rise in Monopoly
Higher living Standards	Discourage Domestic Forms
International Co-operations	Increase in inequality

Globalization refers to the integration of the domestic (Indian) economy with the rest of the world. Import liberalization through reduction of tariff and non-tariff barriers, opening the doors to Foreign Direct Investment (FDI) and Foreign Portfolio Investment (FPI) are some of the measures towards globalization.

Arguments in favour of LPG

- Liberalization was necessitated because various licensing policies were said to be deterring the growth of the economy.
- Privatization was necessitated because of the belief that the private sector was not given enough opportunities to earn more money.
- Globalization was necessitated because today a developed country can grow without the help of the under developed countries. Natural and human resources of the developing countries are exploited by the developed countries and the

developing economies are used as market for the finished goods of the developed countries. The surplus capital of the developed countries are invested in backward economies. Obsolete and out dated technologies of the developed countries can be easily sold to poor under developed countries. Ultimately, the rich countries can grow further at the cost of developing economies.

Arguments against LPG

- a. Liberalization measures, when effectively enforced, favour an unrestricted entry of foreign companies in the domestic economy. Such an entry prevents the growth of the local manufacturers.
- b. Privatization measures favour the continuance of the monopoly power. Only the powerful people can sustain in business markets. Social justice cannot be easily established and maintained. As a result, the disparities tend to widen among people and among regions.
- c. As globalization measures tend to integrate all economies of the world and bringing them all under one umbrella; they pave the way for redistribution of economic power at the world level. Only the already well-developed countries are favoured in this process and the welfare of the less-developed countries will be neglected. The economic crises of the developed countries are easily spread to the developing economies through trade.

The following are the major changes after 1991:

1. Foreign exchange reserves started rising.
2. There was a rapid industrialization.
3. The pattern of consumption started improving (or deteriorating).
4. Infrastructure facilities such as express highways, metro rails, flyovers and airports started expanding (but the local people were thrown away).

The benefits of this growth in some sectors have not reached the marginalized sections of the community. Moreover, the process of development has generated serious social, economic, political, demographic and ecological issues and challenges. Development brings benefits, but which section gets this benefit depends on socioeconomic structure of the society.

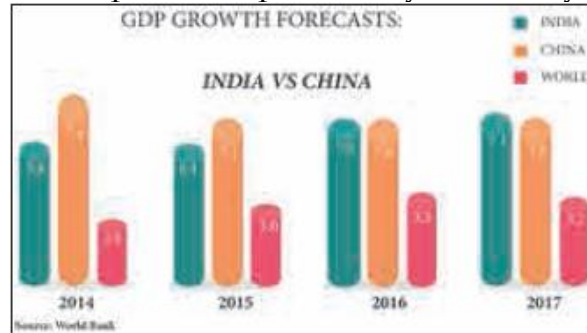
Despite all these initiatives in the Indian economy, a large section of the people of India continue to face basic economic problems such as poverty, unemployment, discrimination, social exclusion, deprivation, poor healthcare, rising inflation, agricultural stagnation, food insecurity and labour migration. However, for these problems, Government policies alone cannot be blamed. As new institutional economists suggest, the values, beliefs, norms etc. of the individuals also matter.

Disinvestment

Disinvestment means selling of government securities of Public Sector Undertakings (PSUs) to other PSUs or private sectors or banks. This process has not been fully implemented.

Relative Position of on Indian Economy

(This discussion is suitable for a particular period only, there may be changes afterwards)



- According to International Monetary Fund, World Economic Outlook (October-2016), GDP (nominal) of India in 2016 at current prices was 42,251 billion. India contributed 2.99% of total world's GDP in exchange rate basis. India shared 17.5 percent of the total world population and 2.4 percent of the world surface area. India was now 7th largest economy of the world in 2016.
- India was at 3rd position after China and Japan among Asian countries. India shared 8.50% of total Asia's GDP (nominal) in 2016.

Industrial Sector Reforms

The Prime Minister of India announced the new industrial policy on July 24, 1991. The new policy radically liberalized the industrial policy itself and de-regulated the industrial sector substantially. The primary objectives of the industrial policy were to promote major industries from the clutches of bureaucrats, to abolish restrictions on foreign direct investment, to liberate the indigenous enterprise from the restrictions of MRTP Act, to maintain a sustained growth in productivity and employment and also to achieve international competitiveness.

Important Initiatives by the Government towards Industrial Policy

The policy has brought changes in the following aspects of industrial regulation:

1. Industrial Delicensing
2. De reservation of the industrial sector
3. Public sector policy (de reservation and reform of PSEs)
4. Abolition of MRTP Act
5. Foreign investment policy and foreign technology policy.

Industrial De regulation	
Before 1991	After 1991
Industrial licensing for all commodities	Licensing restricted to alcohol, drugs etc.,
Private Sector not allowed in many industries	Only defence, energy, railway for public sector large scale privatization, disinvestment
Controls on price fixation and distribution	Market allowed to determine prices

1. **Industrial Delicensing policy:** the most important objective of the new industrial policy of 1991 was the end of the industrial licensing or the license raj or red tapism.

Under the industrial licensing policies, private sector firms had to secure licenses to start an industry.

2. **De reservation of the industrial sector:** Previously, the public sector was given reservation especially in the capital goods and key industries. Under industrial deregulation, most of the industrial sectors were opened to the private sector as well. Under the new industrial policy, only three sectors viz., atomic energy, mining and railways will continue as reserved for public sector. All other sectors have been opened for private sector participation.
3. **Reforms related to the Public sector enterprises:** Reforms in the public sector were aimed at enhancing efficiency and competitiveness of the sector. The government identified strategic and priority areas for the public sector to concentrate. Loss making PSUs were sold to the private sector.
4. **Abolition of MRTP Act:** The New Industrial Policy of 1991 has abolished the Monopoly and Restrictive Trade Practices Act 1969. In 2010, the Competition Commission has emerged as the watchdog in monitoring competitive practices in the economy. The policy caused big changes including emergence of a strong and competitive private sector and a sizable number of foreign companies in India.
5. **Foreign investment policy:** Another major feature of the economic reform was red carpet welcome to foreign investment and foreign technology. This measure has enhanced the industrial competition and improved business environment in the country. Foreign investment including FDI and FPI were allowed. In 1991, the government announced a specified list of high-technology and high-investment priority industries wherein automatic permission was granted for foreign direct investment (FDI) up to 51 % foreign equity. The limit was raised to 74 percent and subsequently to 100 percent for many of these industries. Moreover, many new industries have been added to the list over the years. Foreign Investment Promotion Board (FIPB) has been set up to negotiate with international firms and approve foreign direct investment in select areas.

Impact of LPG on Agricultural Sector Reforms

Since the inception of economic reforms, Indian economy has achieved a remarkable rate of growth in industry and service sector. However, this growth process bypassed the agricultural sector, which showed sharp deceleration in the growth rate (3.62 % during 1984/85 - 1995/96 to 1.97 percent in 1995/96 - 2004/05). The sector has recorded wide variations in yield and productivity and there was a shift towards cash crop cultivation. Moreover, agricultural indebtedness pushed several farming households into poverty and some of them resorted to extreme measures like suicides.

Crop Insurance

Agriculture in India is highly prone to risks like droughts and floods. It is necessary to protect the farmers from natural calamities and ensure their credit eligibility for the next season. For this purpose, the Government of India introduced many agricultural schemes throughout the country. The Pradhan Mantri Fasal Bima Yojana (Prime Minister's Crop

Insurance Scheme) was launched on **18 February 2016**. It envisages a uniform premium of only 2 % to be paid by farmers for Kharif crops and 1.5 % for Rabi crops. The premium for (annual) commercial and horticultural crops will be 5 %

Cold Storage

India is the largest producer of fruits and second largest producer of vegetables in the world. In spite of that per capita availability of fruits and vegetables is quite low because of post-harvest losses which account for about 25% to 30% of production. Besides, quality of a sizable quantity of produce also deteriorates by the time it reaches the consumer. Most of the problems relating to the marketing of fruits and vegetables can be traced to their perishability. Perishability is responsible for high marketing costs, market gluts, price fluctuations and other similar problems. In order to overcome this constraint, the Government of India and the Ministry of Agriculture promulgated an order known as “Cold Storage Order, 1964” under Section 3 of the Essential Commodities Act, 1955. However, the cold storage facility is still very poor and highly inadequate.

Post Harvest measures

The annual value of harvest and post-harvest losses of major agricultural produce at national level was of the order of Rs.92,651 crores, calculated using production data of 2012-13 at 2014 and wholesale prices, estimated by the Indian Council of Agricultural Research (ICAR).

Food Items Waste (%)	
Crops	Cumulative wastages (%)
Cereals	5-6
Pulses	6 - 8
Oil seeds	3-10
Fruits &Vegetables	5-16
Milk	1
Fisheries (in land)	5
Fisheries (Marine)	10
Meat	3
Poultry	7

Source: Ministry of Food Processing Industries, GoI, 2016

Kisan Credit Card Scheme

A Kisan Credit Card (KCC) is a credit delivery mechanism that is aimed at enabling farmers to have quick and timely access to affordable credit. It was launched in 1998 by the Reserve Bank of India and NABARD. The scheme aims to reduce farmer dependence on the informal banking sector for credit - which can be very expensive and suck them into a debt spiral. The card is offered by cooperative banks, regional rural banks and public sector banks. Based on a review of the working of the KCC, the government has advised banks to convert the KCC into a smart card cum debit card.

In order to reduce wastage of agricultural produce and minimize post-harvest losses, the Ministry of Food Processing Industries (MoFPI) has implemented various components of Central Sector Schemes, namely:

Mega Food Parks; Integrated Cold Chain; Value Addition Preservation Infrastructure; Modernization of Slaughter house Scheme for Quality Assurance; Codex Standards; Research and Development and Other promotional activities.

Further, the GoI extended support to arrest post harvest losses of horticulture and non-horticulture produce and to provide integrated cold chain and preservation infrastructure facilities from the farm gate to the consumer or from the production site to the market since 2008-09. However, the improvement is not visible for it is not substantial.

Agricultural Produce Market Committee

Agricultural Produce Market Committee (APMC) is a statutory body constituted by state government in order to trade in agricultural or horticultural or livestock products.

Functions of APMC

1. To promote public private partnership in the ambit of agricultural markets.
2. To provide market led extension services to farmer.
3. To bring transparency in pricing system and transactions taking place in market in a transparent manner.
4. To ensure payments to the farmers for the sale of agricultural produce on the same day.
5. To promote agricultural activities.
6. To display data on arrivals and rates of agricultural produce from time to time into the market.

Agrarian Crisis after Reforms

- a. High input Costs: The biggest input for farmers is seeds. Before liberalisation, farmers across the country had access to seeds from state government institutions. The institutions produced own seeds and were responsible for their quality and price. With liberalization, India's seed market was opened up to global agribusinesses. Also, following the deregulation many state government institutions were closed down in 2003. These hit farmers doubly hard: seed prices shot up, and fake seeds made an appearance in a big way.
- b. Cutback in agricultural subsidies: Farmers were encouraged to shift from growing a mixture of traditional crops to export oriented 'cash crops' like chill, cotton and tobacco. Liberalisation policies reduced the subsidies on pesticide, fertilizer and elasticity. As a result prices have increased by 300%. However, the prices of agricultural goods have not increased to that extent.
- c. Reduction of import duties: With a view to open India's markets, the liberalization reforms also withdrew tariffs and duties on imports. By 2001, India completely removed restrictions on imports of almost 1,500 items including food. As a result, cheap imports flooded the market, pushing prices of crops like cotton and pepper down.
- d. Paucity of credit facilities: After 1991 the lending pattern of commercial banks, including nationalised bank drastically changed. As a result, loan was not easily adequate. This has forced the farmers to rely on moneylenders who charge exorbitant rate of interest.

Trade Reforms:

- Trade Policy Reforms: The main features of the new trade policy as it has evolved over the years since 1991 are as follows:
 - Free imports and exports: Prior to 1991, in India imports were regulated. From 1992, imports were regulated by a limited negative list. For instance, the trade policy of 1 April 1992 freed imports of almost all intermediate and capital goods. Only 71 items remained restricted. This would affect the domestic industries.
 - Rationalization of tariff structure and removal of quantitative restrictions: The Chelliah Committees Report had suggested drastic reduction in import duties. It had suggested a peak rate of 50 percent. As a first step towards a gradual reduction in the tariffs, the 1991-92 budget had reduced the peak rate of import duty from more than 300 percent to 150 percent. The process of lowering the customs tariffs was carried further in successive budgets. This also affected the domestic industries.

Large Scale Industries

The term “Large scale industries” refers to those industries which require huge infrastructure, man-power and a have influx of capital assets. The term ‘large scale industries’ is a generic one including various types of industries in its purview. All the heavy industries of India like the iron and steel industry textile industry automobile manufacturing industry fall under the large scale industrial arena. However in recent years due to the IT boom and the huge amount of revenue generated by it the IT industry can also be included with in the jurisdiction of the large scale industrial sector. Indian economy is heavily dependent on these large industries for its economic growth, generation of foreign currency and for providing job opportunities to millions of Indians. The following are the major large scale industries in India.

1. Iron and steel industry

- First steel industry at Kulti, Near Jharia, West Bengal - Bengal iron works company in 1870.
- First large scale steal plant TISCO at Jamshedpur in 1907 followed by IISCO at Burnpur in 1919. Both belonged to private sector.
- The first public sector unit was “Vishveshvaraya Iron and Steel works” at Bhadrawati.
- All these are managed by SAIL (at present all important steel plants except TISCO, are under public sector)
- Steel Authority of India Ltd (SAIL) was established in 1974 and was made responsible for the development of the steel industry.
- Presently India is the eighth largest steel producing country in the world.

Public sector steel plants

Location	Assistance
Rourkela (Odissa)	Germany
Bhilai (MP)	Russia
Durgapur (WB)	UK

Bokaro (Jharkhand)	Russia
Burnpur (WB)	Acquired from private sector in 1976
Vishakhapatnam(AP)	Russia
Salem (Tamil Nadu)	Government of India (No external assistance)
Vijai Nagar Karnataka)	Government of India
Bhadrawati (Karnataka)	Nationalisation of Vishveshvarayya Iron and Steel Ltd(owned by Centre and State government)

2. Jute industry

- Jute industry is an important industry for a country like India, because not only it earns foreign exchange but also provides substantial employment opportunities in agriculture and industrial sectors.
- Its first modernised industrial unit was established at Reshra in West Bengal in 1855.
- The jute industry in the country is traditionally export oriented. India ranks number one in the raw jute and jute goods production and number two in export of jute goods in the world.

3. Cotton and textile industry

- Oldest industry of India, and employs largest number of workers.
- It is the largest organised and broad-based industry which accounts for 4% of GDP, 20% of manufacturing value-added and one third of total export earnings.
- The first Indian modernised cotton cloth mill was established in 1818 at Fort Gloaster near Calcutta. But this mill was not successful. The second mill named "Mumbai's Spinning and Weaving Co." was established in 1854 at Bombay by KGN Daber.

4. Sugar industry

- Sugar industry is the second largest industry among agriculture-based industries in India.
- India is now the largest producer and consumer of sugar in the world. Maharashtra contributes over one third of the Indian total sugar output, followed closely by Uttar Pradesh.

5. Fertiliser industry

- India is the third largest producer of nitrogenous fertilisers in the world.

6. Paper industry

- The first mechanised paper mill was set up in 1812 at Serampur in West Bengal.
- The paper industry in India is ranked among the 15 top global paper industries.

7. Silk industry

- India is the second-largest (first being China) country in the world in producing natural silk. At present, India produces about 16% silk of the world.
- India enjoys the distinction of being the only country producing all the five known commercial varieties of silk viz Mulberry, Tropical Tussar, Oak Tussar, Eri and Muga.

8. Petroleum and natural gas

- First successful Oil well was dug in India in 1889 at Digboi, Assam.
- At present a number of regions with oil reserves have been identified and oil is being extracted in these regions
- For exploration purpose, Oil and Natural Gas Commission (ONGC) was established in 1956 at Dehradun, Uttarakhand

Small Scale Industries

Small scale industries play an important role for the development of Indian economy in many ways. About 60 to 70 percent of the total innovations in India comes from the SSIs. Many of the big businesses today were all started small and then nurtured into big businesses. The role of SSIs in economic development of the country is briefly explained in forthcoming paragraphs.

Role of SSIs in Economic Development

1. Provide Employment

- SSIs use labour intensive techniques. Hence, they provide employment opportunities to a large number of people. Thus, they reduce the unemployment problem to a great extent.
- SSIs provide employment to artisans, technically qualified persons and professionals, people engaged in traditional arts, people in villages and unorganized sectors.
- The employment-capital ratio is high for the SSIs.

2. Bring Balanced Regional Development

- SSIs promote decentralized development of industries as most of the SSIs are set up in backward and rural areas.
- They remove regional disparities by industrializing rural and backward areas and bring balanced regional development.
- They help to reduce the problems of congestion, slums, sanitation and pollution in cities. They are mostly found in outside city limits.
- They help in improving the standard of living of people residing in suburban and rural areas in India.
- The entrepreneurial talent is tapped in different regions and the income is also distributed instead of being concentrated in the hands of a few individuals or business families.

3. Help in Mobilization of Local Resources

- SSIs help to mobilize and utilize local resources like small savings, entrepreneurial talent etc., of the entrepreneurs, which might otherwise remain idle and unutilized.
- They pave way for promoting traditional family skills and handicrafts. There is a great demand for handicraft goods in developed countries.
- They help to improve the growth of local entrepreneurs and self-employed professionals in small towns and villages in India.

4. Pave for Optimisation of Capital

- SSIs require less capital per unit of output. They provide quick return on investment due to shorter gestation period. The payback period is quite short in SSIs.
- SSIs function as a stabilizing force by providing high output-capital ratio as well as high employment-capital ratio.
- They encourage the people living in rural areas and small towns to mobilize savings and channelize them into industrial activities.

5. Promote Exports

- SSIs do not require sophisticated machinery. Hence, import the machines from abroad is not necessary. On the other hand, there is a great demand for goods produced by SSIs. Thus they reduce the pressure on the country's balance of payments. However, with recent past large scale industries are able to borrow large funds with low interest rate and spend large sums on advertisements. Hence SSSs are gradually vanishing.
- SSIs earn valuable foreign exchange through exports from India.

6. Complement Large Scale Industries

- SSIs play a complementary role to large scale sector and support the large scale industries.
- SSIs provide parts, components, accessories to large scale industries and meet the requirements of large scale industries through setting up units near the large scale units.
- SSIs serve as ancillaries to large scale units.

7. Meet Consumer Demands

- SIs produce wide range of products required by consumers in India.
- Hence, they serves as an anti-inflationary force by providing goods of daily use.

8. Develop Entrepreneurship

- SSIs help to develop a class of entrepreneurs in the society. Tey help the job seekers to become job givers.
- They promote self-employment and spirit of self-reliance in the society.
- SSIs help to increase the per capita income of India in various ways.
- They facilitate development of backward areas and weaker sections of the society
- SSIs are adept in distributing national income in more efficient and equitable manner among the various participants of the society.

INDUSTRIAL MAP OF TAMILNADU

SERVICE SECTOR IN TAMIL NADU

Banking

In Tamil Nadu, Nationalised banks account for 52% with 5,337 branches, Private Commercial Banks 30% (3,060) branches, State Bank of India and its associates 13% (1,364), Regional Rural Banks 5% (537) branches and the remaining 22 foreign bank branches.

Total deposits of the banks in Tamil Nadu registered an year-on year increase of 14.32% by March 2017 and touched Rs. 6,65,068.59 crores. Total credit of the banks in Tamil Nadu registered a year-on year increase of 13.50% by March 2017 and touched Rs. 6,95,500.31 crores. The share of Priority Sector Advances stands at 45.54% as against the national average of 40%. The percentage of Agricultural advances to total advances as at the end of March 2017 works out to 19.81% as against the national average of 18%. Banks in Tamil Nadu have maintained one of the highest Credit Deposit Ratio of 119.15% in the country whereas this ratio is 77.5% at the national level.

Education

a. School Education

Tamil Nadu is grouped among high Gross Enrolment Ratio (GER) States. It ranks third next only to Kerala (81%) and Himachal Pradesh (74%). The all India average is 43% and the world average is 59%.

Gross Enrolment Ratio is 118.8% for primary level(class 1-5); 112.3% for upper primary level (class 6-8), 62.7% for secondary level (class 9-10), 49.26% at Higher Secondary level (class 11-12). This has been possible mainly due to the supply of free food, cloth, foot-wear, scholarship, laptop etc.

Tamil Nadu's primary education statistics 2016-17

Number of schools	Primary	35,414
	Middle	9,708
	High and Higher Secondary	12,911

(Source: Tamil Nadu State portal, State interim Budget 2016-17)

b. Higher Education

In Gross Enrolment Ratio under higher education (Tertiary level) Tamil Nadu continues to be at the top level well ahead of other states. The GER is 46.9% in Tamil Nadu which is far higher against national average and all other States This higher GER is thanks to the distribution of free food, scloth, footwear, laptop and scholarship.

Table 11.16 Gross Enrolment Rate %

State	2016-17
Tamil Nadu	46.9
Maharashtra	30.2

Uttar Pradesh	24.9
Odisha	21.0
Bihar	14.4
All India	25.2

(Source: All India Survey on Higher Education (AISHE) released by the Ministry of Human Resource Development- January 2018)

Tamil Nadu has 59 Universities, 40 Medical colleges, 517 Engineering colleges, 2,260 Arts and Science colleges, 447 Polytechnics and 20 dental colleges. Tamil Nadu produces nearly four lakh engineering and polytechnic students every year, the highest in the country.

Educational Loans

As far as educational loans disbursed by Public Sector Banks under priority sector are concerned, 20.8% of the total amount was disbursed in Tamil Nadu between 2013-14 and 2015-16. Andhra Pradesh was second with 11.2% of the total loan amount followed by Maharashtra (10.2%).

Of the total amount of educational loans disbursed by Private Banks during the same period, Kerala accounted for 37.8% followed by Tamil Nadu with 24.8%. Both Karnataka & Kerala together accounted for more than 60% of the total educational loan amount by Private Banks.

Health

Tamil Nadu has a three - tier health infrastructure comprising hospitals, primary health centres, health units, community health centres and sub-centres. As of March 2015, the State had 34 district hospitals, 229 sub-divisional hospitals, 1,254 primary health centres, 7,555 Sub-centres and 313 community health centres.

Communication

Maharashtra has the highest number of internet subscribers in the country at 29.47 million, followed by States like Tamil Nadu, Andhra Pradesh and Karnataka. According to government data, India had a total of 342.65 million internet subscribers at the end of March, 2016. Tamil Nadu had 28.01 million subscribers, while its neighbor's Andhra Pradesh and Karnataka had 24.87 million and 22.63 million, respectively.

Transport

Tamil Nadu has a well-established transportation system that connects all parts of the State. This is partly responsible for the investment in the State. Tamil Nadu is served by an extensive road network in terms of its spread and quality, providing links between urban centres, agricultural market-places and rural habitations in the countryside. However, there is scope for improvement.

a. Road

There are 28 national highways in the State, covering a total distance of 5,036 km. The State has a total road length of 167,000 km, of which 60,628 km are maintained by Highways

Department. It ranks second in India with a share of over 20% in total road projects under operation in the public-private partnership (PPP) model.

b. Rail

Tamil Nadu has a well-developed rail network as part of Southern Railway, Headquartered at Chennai. The present Southern Railway network extends over a large area of India's Southern Peninsula, covering the States of Tamil Nadu, Kerala, Puducherry, minor portions of Karnataka and Andhra Pradesh. Tamil Nadu has a total railway track length of 6,693 km and there are 690 railway stations in the State. The system connects it with most major cities in India. Main rail junctions in the State include Chennai, Coimbatore, Erode, Madurai, Salem, Tiruchirapalli and Tirunelveli. Chennai has a well-established Suburban Railway network, a Mass Rapid Transport System and is currently developing a Metro system, with its first underground stretch operational since May 2017.

c. Air

Tamil Nadu has four major international airports. Chennai International Airport is currently the third largest airport in India after Mumbai and Delhi. Other international airports in Tamil Nadu include Coimbatore International Airport, Madurai International Airport and Tiruchirapalli International Airport. It also has domestic airports at Tuticorin, Salem, and Madurai, which connect several parts of the country. Increased industrial activity has given rise to an increase in passenger traffic as well as freight movement which has been growing at over 18 per cent per year.

d. Ports

Tamil Nadu has three major ports; one each at Chennai, Ennore, and Tuticorin, as well as one intermediate port in Nagapattinam, and 23 minor ports. The ports are currently capable of handling over 73 million metric tonnes of cargo annually (24 per cent share of India). All the minor ports are managed by the Tamil Nadu Maritime Board, Chennai Port. This is an artificial harbour and the second principal port in the country for handling containers. It is currently being upgraded to have a dedicated terminal for cars capable of handling 4,00,000 vehicles. Ennore Port was recently converted from an intermediate port to a major port and handles all the coal and ore traffic in Tamil Nadu.

Tourism

Tourism is considered as an industry because of its enormous potential in creating employment for a large number of people. In recent years, the state has emerged as one of the leading tourist destinations for both domestic and foreign tourists. Tourism in Tamil Nadu is promoted by Tamil Nadu Tourism Development Corporation (TTDC). The state currently ranks the highest among Indian states with about 25 crore arrivals (in 2013). The annual growth rate of this industry stood at 16%. Approximately 28 lakh foreign and 11 crore domestic tourists visit our state annually. The presence of ancient monuments, pilgrim centres, hill stations, a variety of natural landscapes, long coastline, along with rich culture and heritage make Tamil Nadu the best destination for tourists.

Information Technology

According to National Association of Software and Services Companies (NASSCOM), the southern states continue to account for more than half of the country's total export of

software. Tamil Nadu and Andhra Pradesh together account for 59.6% of India's total software exports. Tamil Nadu is the second largest software exporter in the country next to Karnataka.

A special economic zone (SEZ) is an area in which the business and trade laws are different from the rest of the country. SEZs are located within a country's national borders, and their aims include increased trade balance, employment, increased investment, job creation and effective administration.

Special Economic Zones

Special economic zones (SEZs) provide an internationally competitive and hasslefree environment for exports. Units in SEZ manufacture goods and provide a range of services. SEZs are located in Nanguneri, Ennore, Hosur and Perambalur. IT & ITES SEZ named TIDEL-II and TIDEL-III and Bio-Pharmaceuticals SEZ are located in Chennai and Coimbatore SEZ called the TIDEL Park-IV is located in the city.

The list of IT parks in Tamil Nadu

Tidel Park, Ascendas, Mahindra world city 4 IT & ITES SEZ TIDEL-II, IT & ITES SEZ TIDEL-III, Coimbatore SEZ - Tidel Park

Imports of Tamil Nadu

Machineries like transport equipment, machine tools, non-electrical machinery, electrical machinery, pharmaceutical products, petroleum, fertilizers and newsprint are its major imports. The state contributes 10.94% to the country's trade through major ports.

The above discussion shows that Tamil Nadu is an important state of India in terms of size, population, resources and economic development. People in the state are well secured. The new schemes introduced by the state government periodically have enabled notable progress in various fields.

The Policy Factors that Helped the Industrialisation Process in Tamil Nadu

Policy factors can be divided into three aspects:

Education

Industries require skilled human resources. Apart from a lot of attention to primary education to promote literacy and basic arithmetic skills, the state is known for its vast supply of technical human resources. It is home to one of the largest number of engineering colleges, polytechnics and Industrial Training Centres in the country.

Infrastructure

The widespread diffusion of electrification has contributed to the spread of industrialization to smaller towns and villages in the state. Along with electrification, Tamil Nadu is known for its excellent transport infrastructure, especially minor roads that connect rural parts of the state to nearby towns and cities. A combination of public and private

transport has also facilitated rural to urban connectivity and therefore connect small producers to markets better.

Industrial Promotion

Apart from investments in education and transport and energy infrastructure, active policy efforts were made to promote specific sectors and also industrialisation in specific regions. Policies to promote specific sectors like automobile, auto components, bio technology and Information and communication Technology sectors have been formulated in the post reform period. In addition, the state has put in place several industrial promotion agencies for both large enterprises and the small and medium segments, as well as to provide supporting infrastructure.

The following are some agencies that have played a key role in industrialization in the state SIPCOT (State Industries Promotion Corporation of Tamil Nadu), 1971

SIPCOT was formed in the year 1971 to promote industrial growth in the state by setting up industrial estates.

TANSIDCO (Tamil Nadu Small Industries Development Corporation), 1970

TANSIDCO is a state-agency of the state of Tamil Nadu established in the year 1970 to promote small-scale industries in the state. It gives subsidies and provide technical assistance for new firms in the small scale sector.

TIDCO (Tamil Nadu Industrial Development Corporation), 1965

TIDCO is another government agency to promote industries in the state and to establish industrial estates.

TIIC (Tamil Nadu Industrial Investment Corporation Ltd.), 1949

TIIC is intended to provide low-cost financial support for both setting up new units and also for expansion of existing units. Though it is meant to meet the requirements of all types of firms, 90% of support goes to micro, small and medium enterprises.

TANSI (Tamil Nadu Small Industries Corporation Ltd.), 1965

TANSI was formed in 1965 to take over the small scale-units that were set up and run by the Department of Industries and Commerce. It is supposed to be the first industrial corporation operating in the domain for small enterprises.

Emerging Services Sector in Tamil Nadu

With technological changes, industries too are not able to absorb labour. Automation has been reducing the need for labour in manufacturing. The services sector has emerged as a much bigger employer over the last three decades. Tamil Nadu has become a hub for some important and dynamic service sectors such as software services, healthcare and education services. Healthcare and educational services are diffused across major cities, Chennai and

Coimbatore in particular. Software services is, however, largely confined to Chennai. Only in the last ten years, a few software firms have moved to Coimbatore.

Issues with Industrialisation

Though Tamil Nadu has emerged as a relatively highly industrialised state in the country, the state faces a few issues in sustaining the process. To begin with, some clusters, especially chemicals, textiles and leather clusters, tend to generate a lot of polluting effluents that affect health. The effluents also pollute water bodies into which effluents are let into and also adjoining agricultural lands. This issue requires urgent attention. Second, employment generation potential has declined because of use of frontier technologies because of the need to compete globally. Quality of employment also has suffered in recent years as most workers are employed only temporarily. This issue too requires urgent attention among policy makers.

Entrepreneur

Entrepreneur is an innovator of new ideas and business processes. He possesses management skills, strong team building abilities and essential leadership qualities to manage a business.

Entrepreneurship

Entrepreneurship is a process of a action of an entrepreneur who undertakes to establish his enterprise. It is the ability to create and build something.

Role of an Entrepreneur

Entrepreneurs play a most important role in the economic growth and development of a country's economy.

1. They promote development of industries and help to remove regional disparities by industrialising rural and backward areas.
2. They help the country to increase the GDP and Per Capita Income.
3. They contribute towards the development of society by reducing concentration of income and wealth.
4. They promote capital formation by mobilising the idle savings of the citizens and country's export trade.
5. Entrepreneurs provide large-scale employment to artisans, technically qualified persons and professionals and work in an environment of changing technology and try to maximise profits by innovations.
6. They enable the people to avail better quality goods at lower prices, which results in the improvement of their standard of living.