

10.0.0 Development of Transport and Communication

10.1.0 TRANSPORT

Definition of Transport

Transport is the movement of people and from one place to another.

Transportation is usually classified by the medium in which the movement occurs. For example, land, air and water transport.

Transport can be categorized into traditional and modern means.

a) Traditional means of transport.

The means of transport at this category were land and water evolved.

Land transport

People move on land either by walking or by using other human powered transport. People also use domestic animals as a means of transportation

Human transport

Human powered transportation included carrying goods on their backs, heads and shoulders. Africans were used as porters during the slave trade. Human portage still goes on in the modern society.

Limitation of human portage

- Human portage was cumbersome, slow and tiresome.
- Humans Carry limited amount of goods at particular time.
- It is not convenient over long distances.

Animal transport

Early human beings used the domesticated animals to carry loads on their backs or pull carts. Such animals are referred to as pack animals.

In 500 AD a padded collar was devised that rested on the animals' shoulders. In 200 AD saddles were introduced in Egypt. Horse shoes were introduced in 700 AD

Donkey\Ass

The first animals to be used as pack animals; they were used in Egypt as early as 3400bc to carry weight upto 80kg. They were commonly used in the trade between Nubia and South Sudan. In Ukambani today, donkeys are used to fetch water.

Oxen

Referred to as draught animals used for ploughing and pulling carts and also transportation of goods and people.

Horses

They were first rode but were later trained to pull wagons, chariots and passenger coaches.. in the Roman empire, they carried soldiers during war. (Soldiers on horseback are referred to as cavalry.

Disadvantages of horses

- a) It is highly susceptible to diseases.
- b) It cannot survive in tsetse fly infected areas.
- c) The weight limit of the load it can carry is 120kg
- d) They are not suitable in arid and semi-arid areas because they need a lot of water. NB; - horses are mainly reared by the rich as a symbol of high social status.

Mules

A crossbreed of a horse and a donkey, they are sterile and carry loads upto 110kg.they are mostly used in mountainous areas in central and southern Europe and in Mexico.

Camel

It is referred to as the ship of the desert. What makes a camel ideal in desert transport?

- a) It has a unique ability to survive for long without food and water.
- b) They have an incredible water storage capacity, they do not sweat lose much moisture.
- c) They have broad padded, two toed feet ideal for walking on desert sand.
- d) The nostrils have flaps which keep away sand during sandstorms.
- e) Its fur is thick enough to protect it from the sweltering desert heat by day and extreme cold conditions at night.
- f) The hump contains a lot of fat which the camel uses when it goes without eating

Camels were commonly used during the trans-Saharan trade. They are in use in Kenya today among the Galla and Somali carrying weight upto 200kg.

Llamas and alpaca

Members of the camel family found in central and south America. They carry load upto 40 kg.

Elephants

They are used in Asia to carry people and heavy loads upto 250kg. In India, they were used to transport people and goods during war in 2500BC.

In Africa they were used in warfare in 2700BC.

Water Buffalo

A member of the cattle family and the only type of buffalo that has been domesticated The cape buffalo of Africa and the Pygmy buffalo of Philippines have not been domesticated. It is used to pull ploughs and do other heavy work in India and south East Asia.

Reindeer

A long-horned deer family breed used in the cold parts of Canada, Sweden and Norway for riding and transportation, It also provides milk, meat, hides and horns.

Dogs

Dog types like Bourriers were used to pull small carts and sledges, especially in the Arctic thus making transportation of goods and people easy. Dogs are also used in guiding blind people in sports and as pets at home.

Advantages of animal transport

- a) Pack animals can be used in largely inaccessible areas. The Llama, for example is used in the mountainous areas with narrow and meandering paths and steep cliffs. The camel is well adapted for deserts.
- b) Animals are cheap to maintain. They attract very little maintenance costs, since only feeding costs are incurred.
- c) Pack animals are safe as accidents are rare probably because they do not speed..
- d) Animals help to maintain the ecological balance since they do not interfere with the environment.
- e) Pack animals are capable of sensing danger. For example, horses and dogs can sniff out an enemy from a distance. This enhances security as dangerous confrontations with an enemy can easily be avoided.

Disadvantages of animal transport

- a) Animal transport is slow and tedious. The animals need to feed and drink along the way.
- b) Pack animals may be attacked by wild animals, disease- causing insects such as tsetse-flies and disease.
 - a. Their movement is limited to the day only and cannot travel at night.
 - b. They can only carry small loads as compared to vehicles.
 - c. Some pack animals such as donkey are stubborn when tired and heavily loaded. The camel is only suited for the desert.
 - d. Pack animals use is limited to short distances as they fatigue when they travel for long.

The wheel

The wheel was invented in Sumeria at about 3000bc. By 2500BC, they had invented the spoked wheel used on horse drawn chariots. The chariot was used in Mesopotamia at around 2000BC and later spread to Egypt, Persia, Rome, China, Africa and Europe.

The cart or wagon pulled by humans or animals was the first wheeled vehicle. The wheeled wagons and carts created the need for roads

Today many types of wheels are in use. For example, the steering wheel for cars, turbines for jet engines and gyroscopes used in the automobile pilot technology.

Ways in which invention of the wheel impacted on road transport

- a) More roads were constructed to use wheel vehicles for transport
- b) Road transport became faster and efficient
- c) Bigger loads could be carried hence was cost effective – profitable
- d) It made the use of motor engine driven vehicles possible
- e) It enabled man to move over long distance to disseminate ideas and interact.

Water transport

Water transport has progressed from early rafts and canoes to the modern large passenger and freight ships.

Rafts

A raft is a simple floating structure, usually made by tying together floating material like animal skin, papyrus stalks or logs

The earliest people to make rafts were the Australians. They made rafts called catamaran by tying logs together. Long poles were then used to drive the raft.

Rafts however sank easily and required a lot of manpower upstream.

Canoes

A canoe was a narrow boat that was propelled by one or more paddles. The oldest canoe was made by stripping the bark from trees (bark canoes). Later a new canoe was made from a hollow on a log (dug-out canoe)

In Kenya, canoes are used for transporting people and goods and for fishing in inland lakes and rivers.

Oar-driven boats

Boats are small vessels for travelling on water and are powered by oars, sails or motor. The Egyptians pioneered in the building of boats that used oars (a short wooden pole with a flat end) instead of paddles in 3000BC. The Phoenicians, Greeks and the Romans developed oar-driven trading vessels and warships.

Sailing ships

Humankind learned that the wind could move a boat more easily than human beings if the ship had a piece of cloth fixed on poles (sail). The Egyptians used the sailing ships by 3000BC on the Mediterranean and Red seas. The Greeks made sailing ships known as galleys which were used for trade and war. They used war galley known as triremes to defeat the Persians and Phoenicians.

Sailing ships were depending on monsoon winds discovered by Hippalus. The Arabs and Persians relied on the monsoon winds to reach the east African coast.

The Portuguese invented a three-masted ship called a caravel as the one used by Christopher Columbus and other explorers to sail to America and the Far East. The Carrack used by Vasco da Gama was five-masted to sail to east Africa. Ferdinand Magellan became the first person to sail around the world using a Sailing ship

Fast sailing ships called clippers were made in 1840s in America. It was a long and narrow ship with sharp bows and almost straight sides.

However, sailing ships could not sail on windy days and seasons. Some communities however still use sailing ships upto today for sports, fishing and leisure.

By the 12th c AD, the magnetic compass was being used in navigation aid

Factors that led to the development of various forms of transport

- a) technological development during the scientific age which enabled man to invent machines which could be used to manufacture various parts of cars , rails, airplanes, ships and motor boats.
- b) Expansion of geographical knowledge encouraged the development of transport so as to enable man to search new places faster and more safely.
- c) Introduction of specialization as a means of production which necessitated exchange of goods and services which could only be made possible through development of transport and communication.
- d) Population increase hence demands for more food and goods hence the need for essential transport system.
- e) In order to satisfy the desires of man there was need to develop a system of transport that would enable man to get the goods and services he needed so much.

Modern means of transport

Road transport

The invention of the wheel stimulated the construction of roads. The Roman soldiers built hard and straight roads all over Europe and North Africa by around 300 BC. The roads were built by digging a trench, 1.5metres deep which then would be packed with heavy stones or rocks.

Rough and fine concrete was added to the foundation, then layers of gravel, chalk and cement. The road surface was slightly convex with deep trenches on the sides. Roman roads declined with the fall of the Roman Empire.

Attempts to built better roads in Europe in the 18th c were made by George Wade (1673-1748) built 400km of roads and John Metcalfe (17171-1810) built 290km of roads.

However modern road construction is attributed to John McAdam (1756-1836). McAdam laid three layers of small broken stones packed tightly together. He then placed a layer of gravel which was bound together by the weight of a vehicle. These roads were called the flexible road or macadamized road. These roads were straight and had a smooth surface. They were widely used all over the world. They have curved surfaces and had a Good drainage system. They are cheap and durable.

The roads were later improved by adding tar to produce a water proof surface called tarmac. By 1820, Britain had built 200,000km of road.

Advantages of macadamized roads

- a) They were durable with three layers of small broken stores
- b) They were cheap to construct using stones as the basic material for construction
- c) They had a smooth motoring surface since the gravel layer was bound together by the weight of vehicles
- d) They were straight hence reduced occurrence of accidents
- e) They were easily drained due to their smooth surface and being raised.

The bicycle

In 1790, a Frenchman, de Divrac made the first bicycle which was pushed with the feet thus called a walkalong.

A German named Baron Karl Drais invented a walkalong called draisine which had a steering bar connected to the front wheel

In 1860, Ernest Michaux, a French locksmith, invented a bicycle with two wheels and pedals attached to the front wheel.

In 1866, Pierre Allment a Frenchman, was given the first patent on a bicycle, boneshaker. It had iron wheels fixed to wooden spokes.

In 1873, a bicycle named a high-wheeler was introduced in England. The first bicycle in England was made by Kirk Patrick Macmillan of Scotland.

James Starley is referred to as the father of the cycle industry. In 1870, he invented the tension spoked wheel in which the rim and the hub were connected by wire spokes.

John Dunlop invented the tyre filled with compressed air in 1888 which replaced the iron tyres and solid rubber tyres.

In 1893, a bicycle with a diamond shaped frame with a roller-chain-drive and a compressed air wheel was invented.

The bicycle is today used all over the world not only for transport, but also for sporting and leisure activities. The advantage of a bicycle is that it is easily used on narrow paths and on a fairly level surface. It is also cheap and convenient.

Motor vehicles

These are self-propelled power-driven land transportation devices used to transport people or goods, especially on land. The device converts fuel into energy to provide the power for the vehicle to move.

The first attempt to power drive devices was the suggestion by a Swiss clergyman J.H. Genevois in 1760 that wind springs be used to move wheels on roads.

However the making of an engine that could drive a vehicle is attributed to a French engineer, Nicholas Joseph Cugnot (1725- 1804). He built a three wheeled steam-driven vehicle in 1769, though he abandoned his experiment prematurely.

In 1883, a German, Gottlieb Daimler (1834-1900) produced a high speed petrol engine which he fitted on a wooden cycle in 1885. Karl Benz (1844-1929) fitted the same engine on a w tricycle in the same year.

In 1886, Daimler made the first petrol driven car with four wheels. Benz built the first four wheeled Benz car in 1893. In the same year, an American, Charles Duryea (1862-1938) built the first gasoline powered automobile. The tyres made by Dunlop were fitted on these cars to make them more comfortable.

The first car in the motor industry, *Panhard-Hevassor*, was made by a French company which had bought the rights to use Daimler's engine.

In 1903 in USA Henry Ford founded the Ford Motor Company in Detroit leading to mass production of cars in the world. For example the model T Ford was developed in 1909.

Students read more on the motor vehicle inventions.

Impact of road transport

- a) Roads have promoted trade within and between countries since goods are transported by road to various markets. This case is true in east Africa.
- b) Road transport has stimulated industrial development as raw materials to factories and manufactured goods to the market are easily transported.
- c) Development of towns and urban centres along roads has been as a result of improved road transport.
- d) Many countries earn a lot of foreign exchange from the sale of motor vehicles. For example Japan, Germany and USA.
- e) Employment opportunities are created as many people work in the motor vehicle industry while others are employed to construct and maintain roads.

Advantages of road transport.

- a) Since it is the commonest mode of transport, it reduces the cost of movement of goods and people as well as promoting social interaction.
- b) It is cheaper compared to other forms of transport. Roads are easier to construct and maintain when compared to railway transport.
- c) It is faster when compared to water and railway transport unless in the case of electric trains.
- d) Roads are flexible and link with other forms of transport such as water, railway and air.

Disadvantages of road transport.

- a) The high number of accidents on roads leads to loss of lives.
- b) Road transport is responsible for pollution which causes environmental degradation.
- c) Due to an increased number of vehicles on roads, traffic congestion is a major concern in most urban cities and towns.
- d) Roads may sometimes inconvenience the users when they become impassable.
- e) The quantity of goods carried is limited as roads cannot carry bulky goods compared to the railway.
- f) The use of roads is limited to specific areas. It cannot go beyond land e.g across the sea or lake.
- g) Construction of all-weather roads is expensive. Developing countries find themselves constrained by limited resources that are needed to construct all-weather roads.

Rail transport

Railway lines are paths of parallel metal rails that allow a wheeled vehicle to move easily by reducing friction. Initially, they were used in 1800s to guide horse drawn wagons. Later the steam engine replaced horses as the means of transport.

The development of modern railway was a gradual process that started in Britain and Germany with the use of wooden rails.

A British engineer, Richard Trevithick (1771-1833) designed a steam engine that was small enough to be put on a truck. This he fitted on a railway locomotive which he had bought in 1804 to pull a cargo and passenger train in south Wales.

Fenton, Murray and Wood of Leeds built the John Blenkinsopp locomotive in 1812.

William Hedley built the puffing Billy in 1813.

George Stephenson (1781-1845) a coal miner in Newcastle, England invented a locomotive engine called the Blucher which pulled eight laden wagons in 1814. He also built the world's first public railway between Stockton and Darlington near Durham in 1825.

In 1829, Stephenson and his son, Robert, built the most improved engine, the rocket, which had a speed of 48 km per hour. In 1830, he built the Northumbrian and the planet.

In 1825, in the United States, Colonel John Stevens built a tiny experimental locomotive. In 1929, a major railway was built by the Delaware and Hudson Canal Company to serve a coal mine.

Germany and Belgium had railroads by 1835, Russia by 1837, Spain by 1848 and Sweden by 1856.

In 1892, a Germany Rudolf Diesel designed a heavy oil-driven-engine which replaced the steam engine. It was cheaper and efficient

The first diesel railcar was used in 1913 in Sweden. Later diesel engines were replaced with electric engines which was an invention of the Siemens Brothers and John Hopkinson in Britain in 1883. The electric train from Paris to Lyon covers a distance of 212 km in one hour.

Railway transport has remained a major mode of passenger travel. In Europe and Japan, major cities are connected by high speed passenger trains such as the French TGV (Train à Grande Vitesse) and the Japanese Shinkansen trains travelling at a speed of 300km/h.

Results of railway transport.

- a) It has promoted the movement of people thus leading to increased social and cultural interaction. People can migrate easily in Europe thanks to the faster electric trains.
- b) It has promoted trade as goods, light, heavy or bulky, are transported efficiently to the markets. It also supplements the use of other forms of transport.
- c) It has stimulated industrial development since industrial products and raw materials can now be transported faster and in large quantities.
- d) Railway transport has stimulated the growth of urban centers. In Kenya for example, urban centres like Nairobi, Kisumu, Mombasa and Voi either developed along the railway line or at the terminus.
- e) It has facilitated the spread of religious faiths and political ideas. This was the case in Kenya during the period of missionary work and colonization. In a way railway transport therefore facilitated European occupation of overseas colonies.
- f) There has been a significant improvement in agriculture since agricultural goods are transported more easily and faster using the railway.
- g) It has been a source of employment for many people in maintenance, engine driving etc.
- h) It has facilitated the exploitation of natural resources like mining, fisheries and forestry. The raw materials from these resources are transported faster using the railway.
- i) Railway transport has stimulated economic growth since it is a source of revenue for many governments.

Disadvantages of railway transport.

- a) It is expensive to construct. The wagons are also expensive to buy and maintain.
- b) Railway transport lacks in flexibility. It can only pass through certain landscapes.
- c) Smoke emitted from the trains lead to environmental pollution.
- d) Railway accidents might be rare but when they happen, they are fatal. This was the case in Kenya in 1998 when 200 people lost their lives.
- e) Railway transport is not self sufficient. T has to be supplemented with road transport.

Water transport

Canal vessels

A canal is an artificial river that is used to transport people and goods. It may be built to link a river and a lake, sea or a sea with a sea. Apart from transportation, their water may be used in irrigation like in the case of River Nile.

Canals have been used for centuries for transportation. The earliest canal was built by the Europeans nearly 4000 years ago to link the river Nile and the Red sea.

The longest canal, the Grand Canal in china is bout 1900km long and it links the Yangtze and Yellow rivers.

Canal building in Europe was pioneered by the Romans who built them for transportation, irrigation and drainage. The Dutch, British and the French also constructed elaborate canals Canal building in the US began in 1817 and ended in 1825 with the construction of the Erie Canal which is 845 km long connecting Hudson River with Lake Erie. It is now known as the New York State Barge. Upto 1840, 4,800 km of canals had been constructed in USA.

Another type of canals is the ship canals, for example the Suez Canal, Panama Canal and Kiel Canal, which are deeper. The Suez Canal in Egypt is 195 km long and links the Mediterranean Sea with the red sea. It was constructed between 1859 and 1869 by a French company under Ferdinand Lesseps. The Kiel Canal links the North Sea and the Baltic Sea. The Panama Canal was built by the USA Government between 1904 and 1914 linking the pacific and Atlantic oceans. It is the most important canal as it shortened the long and dangerous trip around the southern tip of south Arica.

The St. Lawrence Seaway is the longest and most important inland waterway system in North America. It is 3,800 km long and was completed in 1855 in USA and 1895 in Canada.

Steamships

Steamships were made after the invention of the steam driven engine. The first attempt to make a steamship was made by Dr. Denis Papin of France when he fitted a steam engine to a boat and sailed along river Fulda in Hanover.

In 1736, Jonathan Holls of Gloucestershire patented a steam tugboat but it was never tried.

In 1774, Comte J B d'Auxiron of France experimented with a steamboat but also failed like Papin as it broke down.

In 1775, C Perier became the first person to move a small boat powered by steam engine o river Seine in Paris.

The first successful steamboat was built and tried out in1783 by a Frenchman called Marquis de Jouffrey on River Saone near Lyons in France.

In America, John Fitch built a steamboat in 1787. It was used on river Delaware between Philadelphia and Trenton

In 1809, William Symington and Miller Pat succeeded in constructing a wooden steamship that was used on the Forth-Clyde Canal in southern Scotland.

In 1807, in America, Robert Fulton had invented a double –paddle-wheeled steamboat known as Clermont which began operating on the Hudson River.

In 1807, the Phoenix became the first steamship that made regular voyage from Philadelphia to New York.

In 1819, the Savannah became the first ship equipped with a steam engine to cross the Atlantic Ocean.

In 1853, the Peninsular and Oriental Line built the iron-screw steamer, Himalaya, the biggest vessel as at that time.

John Elder invented a compound engine with two cylinders which reduced fuel consumption in steamships.

In 1838, Sirius sailed from London to New York, the Great Western, without using sails crossed the Atlantic in 15 days from Bristol.

In 1839, the Archimedes and the Robert F Stockton were built using Smith's and Ericsson's patent.

The most important ship to cross the Atlantic was the Great Britain built by the Siam Kingdom of Brunei in 1843.

The first USA trans-Atlantic steamers were the Herman and Washington.

The first merchant ship to be all-welded without any rivets in its hull was the MS Fullagar in 1920.

Importance of the discovery and use of the steamship

- a) Man could no longer depend on nature –wind for power. This made travel by sea easier and more comfortable.
- b) It led to expansion of international trade since transportation became cheap.
- c) Bigger volumes and varieties of goods could be carried including those that required special handling like petrol.
- d) It formed the basis for colonization as colonizers could move to other continents easily.
- e) It increased international migrations and spread of races , cultures, diseases , intermarriages, languages and religion
- f) It led to greater expansion of geographical knowledge. It gave access to countries bordered by sea.
- g) It led to expansion of world economies, industries, trade and commerce.
- h) Spread of plants and animals internationally.

Motor- Driven ships

With the invention of the internal combustion engine, oil replaced coal. The *Caspian Steamer Wanal* was built in 1903 was the first sizeable ship with an internal combustion engine.

In the 20th c, the use of atomic energy (nuclear power) was developed. The first ship to use atomic power was the Nautilus in 1956. In 1961, an American merchant ship, MV Savannah, propelled by nuclear power was launched.

There are two types of ships based on the service offered;

- a) *The Liners* operate regular scheduled services on defined trade routes charging advertise drates.
- b) *The Tramp* ships carry any suitable cargo between any two points based on a negotiated contract. They have no regular route or timetable.

Modern passenger Liners

The cruise ship, the most important passenger liner, is a specially designed vessel providing luxurious surroundings and entertainment to passengers. It is about 270 m and carries 2000 passengers.

New passenger Liners were developed after World War II for example the American United States of 1952 and the British Queen Elizabeth 2 of 1969.

The liners were overtaken by the development of the aeroplane and airline transport and only a few remain today.

Freight Vessels

These are Special Ocean going ships designed for carrying large amounts of cargo. Containerships transport large metal containers that have been pre-loaded with cargo. Some container ships carry over 6,800 containers.

Military Vessels

In 1859, the French launched Gloire, the first iron-plated ship. During the American civil war (1861-1865), two iron-plated ships were used.

In world war II, battleships, Aircraft carriers (can carry 85 aircrafts) , cruisers, destroyers, destroyer escorts(frigates), minesweepers, torpedo boats, landing craft and other support vessels were developed.

Hydrofoils and hovercraft

These are specialized water vessels (*a hydrofoil has small wing-like surfaces called foils attached to the bottom of its hull that lifts the hull out of water when the hydrofoil accelerates. A hovercraft is lifted entirely off the water surface by a cushion of air and are propelled by giant air propellers or by water jets*)

Ferries

These are vessels used to transport people, animals and vehicles over water in places where bridges would be inconvenient or impossible to build.

Motorboats and personal craft

These are small boats that are used for recreational purposes with either out boat motors or in boat motors.

Pipeline transport

This is a form of transport used to move liquids, gases or solid liquid mixtures over long distances. The most common liquid that is transported by pipeline in many countries is water. Others are oil and gas. Pipelines are also used to transport solids suspended in liquids such as coal slurry which consists of powdered coal suspended in water.

Air Transport

This is the fastest form of transport over long distances and continents. Different types of Aircraft exist.

Aeroplane

An airplane is an aircraft heavier than air that uses wings to obtain lift in order to fly thus transporting people, mail and cargo from place to place. They are also use in warfare.

The development of an aeroplane started in 1783 when a successful manned flight was made in France by two brothers, Jacques and Joseph Montgolfier using a hot air balloon.

Sir George Cayley, an English scholar and inventor, built model Gliders that could sail in the air in the 19th c. Later, Pilcher added wheels to the gliders in order for them to be towed into the air. By 1850, power driven planes were built. An English engineer, John String built and designed power-driven planes. In December 1903, An American astronomer, Samuel Langley almost won the honour of perfecting the power driven airplanes, by making a full size airplane called the aerodrome. The plane unfortunately crashed in Potomac River before being launched.

On 17th December 1903, two weeks after Langley's failure, the Wright brothers, Orville and Wilbur Wright, produced the first manned power driven aeroplane at Kitty Hawk, North Carolina USA. Their machine was a wooden glider fitted with a petrol engine and two propellers.

In 1906, a Brazilian-born aviation pioneer made the first officially observed European flight in a powered bi-plane.

In 1909, Louis Bleriot of France became the first person to fly a plane across the English Channel in 35.5 minutes.

In 1915, the Germans used the first mono-plane during the First World War.

In 1919, John N. Alcock and Arthur W Brown flew non-stop across the Atlantic from New Foundland to Ireland.

Later improvements in the plane were replacement of wood and cloth with aluminum and stainless steel, invention of a retractable gear that improved streamlining in planes By 1920, plane speed had gone up to 303 km /h. in 1940; it was 755 km/h.

The best known aviator in 1920s was Charles Linburgh who accompanied a non-stop flight from New York to Paris in 1927 in his single monoplane called the spirit of Saint Louis in 33 hours.

In 1920, the first scheduled passenger service was made between Amsterdam and England by KLM Dutch Airlines.

In 1930, the first pressurized plane was launched.

The most popular passenger plane at that time was the DC-3 built by Douglas Aircraft Company. It had a capacity of 30 people and moved at a speed of 320 km.

The jet engine

The jet engine was invented by German engineers in 1939. The first jet powered airplane was the German Heinkel HE -178. The first practical jet fighter was the Lockheed P-8 developed in 1944.

During the post war period, the jet engines were put to commercial use. For example, the Boeing 707 flight which was launched in 1958 in USA. The Boeing 747 Jumbo Jet which entered the market in 1970 can carry 375 passengers, 20 tonnes of freight and move at a speed of 900 km/h.

The Supersonic Loans Port (SST) is designed to fly at speeds of over 1180 km/h. The Russian TU-144 and the French – British Concorde are both SSTs and entered passenger market in 1972.

Helicopters

It is a type of airplane which obtains its lift from a set of rotor blades rather than fixed wings. The first successful helicopter was made in 1907 when a French helicopter left the ground for a few seconds.

Germany made the first practical helicopter in 1936 while the United States Army unveiled its wartime helicopter in 1942.

Uses of helicopters

Lighter- than-air-vehicles

These include balloons relying on hot air and lighter than air gases like helium and hydrogen for lift.

Airships that combine lighter than air gas bags with propellers navigation were initially used for passenger traffic but their usage declined due to several fatal accidents. For example the disaster that befell the German airship, *Hindenburg*, in New Jersey in 1937.

The rocket engine

Rocket engines use fuel. They carry chemicals which enable them to burn their fuel without air supply. The first rocket engine to be used was by a German manufacturer, Fritz von Opel in 1930. An American, R H Goddard also developed a modern rocket in Massachusetts in the USA.

Factors which encouraged the development of air transport.

- a) The effect of the First World War- it increased demand of war planes-jet fighters and fighter planes flying over 600kph were manufactured.
- b) The arms race and the cold war which also made many countries to acquire many planes.- fear , jealousy and competition based on ideological differences.
- c) Desire for comfort among passengers and the need to transport perishables quickly.
- d) Expansion of international trade and desire for more wealth.
- e) Colonization and international migrations.
- f) The expansion of the tourist industry.
- g) Vast improvement in science and technology and growth of industries.

Results of air transport.

- 1) Air transport is a major global employer. The air transport industry directly generates 5.5 million jobs globally and contributes USD 408 billion to global GDP. It directly contributed USD 1,830 billion to world GDP in 2007 and generated 79 million direct jobs globally – 2.8% of total employment.
- 2) Air transport is an important facilitator of international trade, thereby promoting economic growth and development. Forecasts suggest that the global economy will become even more dependent on trade over the next decade. World trade is expected to nearly double, rising at more than twice the rate of global GDP growth, with China, India and emerging markets leading the way.
- 3) Air transport stimulates Tourism which makes a major contribution to the global economy. The air transport industry plays a major role in supporting tourism. Over 40% of international tourists now travel by air, up from 35% in 1990. At the same time, the WTTC estimates that foreign visitors account for just fewer than 25% of overall tourism spending around the world. This includes spending by business travelers, as well as those on leisure trips or visiting friends and relatives.
- 4) Air transport is a significant tax payer. Unlike other transport modes, the air transport industry directly pays for its own infrastructure costs. The user charges collected by airport operators pay both for the day-to-day services they provide to airlines and their customers, and also for the massive investment in runways, terminals and other infrastructure required for a modern, efficient air transport service. In addition, companies in the air transport industry make significant tax payments to national treasuries.
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- 6) Air transport is an important facilitator of international trade, thereby promoting economic growth and development. Forecasts suggest that the global economy will become even more dependent on trade over the next decade. World trade is expected to nearly double, rising at more than twice the rate of global GDP growth, with China, India and emerging markets leading the way.
- 7) Air transport stimulates Tourism which makes a major contribution to the global economy. The air transport industry plays a major role in supporting tourism. Over 40% of international tourists now travel by air, up from 35% in 1990. At the same time, the WTTC estimates that foreign visitors account for just fewer than 25% of overall tourism spending around the world. This includes spending by business travelers, as well as those on leisure trips or visiting friends and relatives.
- 8) Air transport is a significant tax payer. Unlike other transport modes, the air transport industry directly pays for its own infrastructure costs. The user charges collected by airport operators pay both for the day-to-day services they provide to airlines and their customers, and also for the massive investment in runways, terminals and other infrastructure required for a modern, efficient air transport service. In addition, companies in the air transport industry make significant tax payments to national treasuries.

- 9) Air transport expands the range of consumer choices and opportunities to visit other countries and to experience new cultures.
- 10) Air transport delivers humanitarian aid. Air services play an essential role in humanitarian assistance to countries facing natural disasters, famine and war – through cargo deliveries, refugee transfers or the evacuation of people trapped by natural disasters. They are particularly important in situations where access is a problem – for example, ‘air drops’ are among the first response of aid agencies to stem a humanitarian crisis.
- 11) Air transport also plays a vital role in the rapid delivery of Medical supplies and organs for transplantation worldwide.
- 12) Air transport provides access to remote areas. Air transport provides access to remote areas where other transport modes are limited. Many essential services, such as food deliveries, hospitals, education and post, would not be available for people in such locations without air services. And residents would be isolated from family, friends and business contacts.
- 13) Air transport has improved security as soldiers can be flown to troubled areas. Aeroplanes are also used in espionage
- 14) Air transport has led to improvement of space exploration. Satellites are used to study objects in space such as stars and planets.
- 15) Air transport has promoted international cooperation and understanding. People from different countries can exchange ideas..
- 16) It has provides the fastest means of transport for passengers and goods thus increasing cultural and social exchange.
- 17) Aeroplanes are used to break hail in order to cause rain.
 1. Plans and other aircraft have added to variety to sporting and entertainment. E.g the staging of fighter plane shows in public holiday celebration.
 2. Aircraft has revolutionized warfare especially during the Second World War when countries began using planes in warfare.
 3. International terrorism has been facilitated in the recent past by aeroplanes. Incidents of planes being hijacked are becoming common in the world today.
 4. Air transport contributes to environmental pollution due to waste discharged by the burning fuel. Jets cause noise pollution.
 5. Air transport has enhanced agriculture as planes are used to spray and dust insecticides on crops in the case of large scale farming. They are also used in quick delivery of perishable farm produce from horticultural farms.
 6. Planes assist in fire fighting, inspecting fence lines and power cables and border patrol.
 7. Aeroplanes are used in making aerial survey in cartography thus improving map making.
 8. Air transport enhances wildlife management and conservation. Counting of animals by wildlife officers is one used planes.
 9. In meteorology, air transport has enhanced weather survey.
 10. Air transport sometimes leads to deaths of many people when fatal accidents occur. For example, the mid-air blow-up of the trans World Airline plane over the Atlantic ocean in July 1996, the 5th may 2007 crashing of a Nairobi –bound KQ 507 moments after leaving Duala international Airport in Cameroon killing 114 passengers.

Space exploration

This is the attempt by scientists to reach the heavenly bodies namely the stars and moon to learn more about them and their importance to man as a whole.

Space age refers to the period in which the exploration of space became possible. It began with the launch of the first artificial satellite in October 1957 by the soviet union- Sputnik.

The first human to go to space was a Russian Major Yuri Gagarin using Vostok I in April 1961. In the same year an American, John Glenn also went to space.

Neil Armstrong, an American Became the first man to land on the moon in July 1969 in his space craft, Apollo II. He was accompanied by Edwin E Aldrin Jr and Michael Collins. Many other have toured the moon since then.

Later on a space shuttle was built. The first space shuttle, Columbia, launched in 1981, carried two American astronauts, John W. Young and Robert L Crpens. In 1983, the space shuttle, challenger released a satellite into space. One of the crew members, Sally K Ride became the first woman astronaut to go to space.

In 1984, Kathryn D Sullivan became the first American woman to walk in space.

By 1988, there were 300 operating satellites in space while 1200 were not functioning.

Challenges facing space exploration

- a) Deadly hazards like cosmetics and solar radiation and micro meteorites dangerous to space craft.
 - b) Hostile natural environment which is unsuitable for human life making it very expensive.
 - c) Extreme temperatures and light intensities. Extreme darkness and brightness.
- Such difficulties have been overcome through development of new tools and techniques for space navigation.

Importance of space exploration to man

- a) Spacecrafts continue to provide information about conditions in space in particular about the weather.
- b) Reports derived from weather satellite can act as warning systems about impending storm.
- c) It helps us to gain more knowledge about our planet earth. e.g. a scientific satellite known as Vanguard 1 sent back pictures, which showed that the earth was slightly pear-shaped.
- d) Communication satellites like the Telstra and Relay have made it possible to send television programmes and telephone calls over much longer distances.
- e) In 1965, the US achieved another momentous feat in space communication. The mariner4 in a deep space probe sent back pictures of mars that were taken as it passed the planet.
- f) Some space exploration offers possibilities without limit. Planets themselves may have metals and other resources that men on earth need.
- g) Information about outer space may make it possible to make rain and make long-range weather forecast more accurately than before.
- h) Some scientists are optimistic that space research might make it possible for human beings to settle on some planets; so far, we are not very definite about this.

- i) Humankind can benefit from medicine prepared under ideal conditions on the planet namely dust free and germ free medicine.
- j) Space exploration enhances technological development.
- k) It facilitates own understanding of the universe.
- l) It leads to improved manufacture of aircrafts, telescope and related machines.
- m) Contributed to development of advanced air force weapons.

Advances in transportation

Africa's first high speed train system, *the Gautrain*, was officially lanced in Johannesburg on 8th June 2010 to connect the cities of Johannesburg and Pretoria with a 160 km/h rail service.

Effects of modern forms of transport

- a) It has made local and international trade more efficient. Trade in perishable goods such as flowers and vegetables have been expanded thanks to air transport.
- b) Population migration and settlement all over the world has been encouraged using the means of transport.
- c) It has facilitated the quick transfer of technology and ideas as people interact
- d) It has made industries more efficient. Raw materials, industrial workers, and manufactured goods are transported to their destinations cheaply and quickly.
- e) It has promoted tourist industry which is a major foreign exchange earner in many countries. Accessibility to tourist attraction sites has greatly improved.
- f) It has generated employment opportunities to many as road constructors, drivers, pilots and mechanics.
- g) It contributes additional revenue to the government. Countries charge toll fee, license fee and fuel levy.
- h) Air transport enhances space exploration.
- i) Has contributed to the growth of the service sector like banking and insurance.
- j) Transport has promoted humanitarian assistance particularly in disaster situations, e.g distribution of relief food, medical services and evacuations during catastrophes and wars.
- k) It has led to growth of schools and hospitals and social amenities. In Kenya most schools and hospitals are located along transport routes.
- l) It has led to agricultural development. Farmers have been able to increase food production since they can transport farm produce and inputs more efficiently and effectively.
- m) It has stimulated the growth of urban centres. Towns such as London, Nairobi and Harare started off due to their location along transport routes. The towns have also grown due to their transport function.
- n) Transport has enhanced political control in countries. National security has been enhanced due to accessibility of many areas of a nation.
- o) Transport facilitated colonization of Africa and Asian countries. Railway systems helped them to conquer and suppress local resistances to facilitate easy administration.

Negative effects of transport

- a) Transport systems are responsible for many accidents in world leading to loss of lives. The Mtongwe ferry accident in Kenya claimed 257 lives in 1994; a plane crash in Ngong in 2012 killed the minister for internal security professor George Saitoti and six others.
- b) Transport is responsible for environmental pollution. Different forms of transport emit poisonous gases to the atmosphere. Oil –tankers cause oil spills in the sea s leading to marine pollution.
- c) Unless they complement each other, different forms of transport are unreliable. For example, water and railway transport have to be complemented by road transport.
- d) The growth of international terrorism has been attributed to transport network.

1.2.0 Communication

Definition

This is a Two-way process of reaching mutual understanding, in which participants not only exchange information but also create and share ideas and messages.

Communication includes writing, talking and Non-verbal communication (facial expressions, body posture, or gestures).

Traditional forms of communication.

The methods of communication that were used in the traditional society included;

Gestures

These are signals or body movements intended to pass a message. The person to whom the gesture is directed must know the meaning of the gesture.

It is sometimes referred to as sign language.(a combination of gestures that simulate actions or a sound)

Body language

Sometimes gestures are used to enhance and emphasize speech. They are used where silence is required yet communication is vital like in operating theatres, and in traffic control.

Verbal communication-language

This is the commonest form of communication among human beings involving the use of sound (spoken language) in combination with some gestures or alone, to express messages
There are over 6000 distinct languages world today.

Signals

The use plants on the roadsides, the shaving of hair, physical marks on one's body or property are means through which communication is passed to others.

Fire and smoke signals

Fire and smoke signals were used to send quick and urgent messages. Fire and smoke signals were coded such that strangers could not interpret the message correctly. They were commonly used in warning people of an impending danger.

The Jews used fire signals (torch light) to proclaim their feast days on mount Olives. Fire and smoke signals were always sent at night.



Advantages of using fire and smoke signals

- a) Fire and smoke signals Conveyed messages faster than a messenger.
- b) Confidentiality of messages was upheld since the messages were coded and could not be interpreted by strangers.
- c) It was a cheap method of passing a message.

Disadvantages of fire and smoke signals

- a) Messages could not be sent over long distances.
- b) Ranges of messages passed were limited.
- c) It was restricted by weather conditions/smoke is useless in cloudy and misty days. It is difficult to set fire in wet conditions. Smoke could be blown by wind.
- d) It was of little use if no one was on the look out to see and interpret.

Drumbeats

In drumbeating as a means of communication, each beat was coded for relaying different messages. For example there were different beats for ceremonies, announcing funerals, meetings, declaration of war, arrival of strangers and impending attack.

Once the initial beat was heard, the other drummers could pick up the beat in different areas thus spreading the message very quickly.



Advantages of drumbeating

- a) Drumbeats could relay a wide range of messages-different beats could convey different messages. E.g. death, danger, festivities.
- b) In most cases drum beating could be used at any time both day and night whereas smoke signals could only be used during the day.
- c) Drum beats relayed specific messages whereas smoke relayed general messages.
- d) Drum beats could be used all seasons whereas smoke signals could not be used during certain seasons e.g. when it is raining.``
- e) Drumbeats could convey messages over wide areas.
- f) Messages by drumbeat were conveyed faster compared to smoke signals.

The major disadvantage of drumbeats was that at times it was difficult to differentiate the beats and therefore, the message could not be clearly interpreted thus leading to confusion.

Horn blowing

They were used to make public announcements, summon warriors or invite people to an important meeting. This was done by specialists with different tones that passed different messages thus passing a wide range of messages.

Screams and cries

Screaming was effective mostly on hill or mountain tops because of echoing. There were different ways of screaming in different situations.. Ululations signified feasting or good news like child birth.

Running messengers

Sometimes there was use of trust worthy runners for very personal and urgent messages. However the accuracy of the message delivered depended on the memory of the messenger. An Athenian soldier, Phidippides, is remembered in history as a great messenger for covering great distance from Marathon to Athens. Unfortunately, he dropped dead shortly after arrival. The Marathon race is named in his honour.

Messengers are still used to deliver messages today although there has been tremendous improvement after invention of writing.

Disadvantages of using messengers

- a) Messages could not reach recipients on time since the messengers walked on foot to their destinations.
- b) Messengers sometimes forgot the message they were to deliver thus leading to inaccurate messages being passed.
- c) Information could be distorted in the process. Sometimes wrong messages were delivered.
- d) Messengers could be attacked on the way by wild animals.
- e) The distance to be covered by messengers was limited since they walked on foot. However this problem was overcome with improvements in forms of transport.



















Written messages

The oldest record of writing date back to about 5000years, Different communities use different symbols and alphabets to write messages. The messages were recorded on scrolls, stone tablets parchment (dried animal skin) or paper.

The earliest forms of wring were pictographic and ideographic. Examples of these were the cuneiform of Sumerians and Hieroglyphics of the Egyptians.

Cuneiform Writing

Development of Cuneiform, 3000 B.C.–600 B.C.

	Meaning of Pictograph					
	Ear of Barley	Head and Body of Man	Fish	Bird	Bowl of Food	Stream of Water
Pictographs c. 3000 B.C.						
Rotated Position Pictographs c. 2800 B.C.						
Cuneiform Signs c. 600 B.C.						



“Wedge-Shaped” Writing

Scrolls

Scrolls are rolls of paper which were rolled around rods of wood or ivory for writing on. They were commonly used among the Egyptians, Romans, Asians, Jews, Greek, Hebrews, Chinese and Japanese.

Papyrus Reeds along the Nile were used for making writing material. Pens and brushes were also made from the reeds and the hard part of a feather.

The Hebrews used scrolls for their sacred writings.

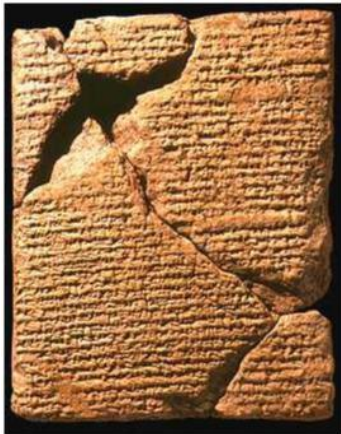
Stone Tablets.

The Sumerians wrote on clay tablets. Writing was done on wet clay which, after drying, hardened like a stone and left a permanent impression.. for example, Hammurabi the law giver wrote his laws on stone pillars for all to read and obey. The Ten Commandments were also written on stone tablets.



On the left is a **stela**, which has all 282 of Hammurabi's laws engraved on it. This stela is located in the Louvre

Museum in Paris, France.



These tablets have been discovered by **archaeologists** and looked at by **historians**.

Advantages of written messages

- a) They provided reliable information that was not easily forgotten.
- b) Information was stored in that form for future reference.
- c) Information could be interpreted into different languages so that it could be accessible to many.
- d) The message in most cases was accurate.

Limitations

- a) They were only limited to literate people.
- b) At times the information could be biased depending on the writers' orientation.
- c) Written messages were open to misinterpretation.

Modern means of communication

Numerous modes of communication have been evolved over time since the time primitive speech was the main means of communication. The modern means of communication include telephone, radio, television, video, cinema, telegraph, telex, electronic mail. Pager etc. The methods are categorized into telecommunications and print media.

Telecommunications

This is a term that describes the technology of receiving and sending messages by telephone, radio, television, telegraph, telex, facsimile or e-mail. The message can be verbal, written or pictorial.

There are a wide range of devices in telecommunication through which messages can be sent in a variety of ways. For example,

Telephone

This is a communication device which is used to relay sound waves by converting them into electrical signals and then reconvert them into sound waves. Telephones carry sound over a distance using electric current.

The history of the invention of telephones starts with the success of a Scottish-born American inventor, teaching speech to deaf children in Boston Massachusetts, Alexander Graham Bell, who built an experimental telegraph which broke down after one day. Bell constructed a transmitter and a receiver for which he received a patent on March 7, 1876. Assisted by Thomas Watson, he discovered that voice can be sent using wires.

Later, Almon Brown Strowger of Kansas City, Missouri, invented the first automatic telephone exchange using electromagnetic switchboard (Strowger Switches) in 1897.

By 1900, long distance service was possible through the use of repeaters (electromagnetic devices placed along the route of the call) which amplified and repeated conversations into the long distance instrument.

Radio transmission later replaced underground and submarine cables for long distance transmission.

In 1877, Graham Bell opened the Bell Telephone Company. In 1900, it was sold to the American Telephone and Telegraph Company (AT&T)

In Kenya, telephone communication was introduced in 1908 and has grown tremendously

Cellphones

A cellular telephony is a type of wireless communication which uses many base stations to divide a service area into multiple cells

The concept of cellular phones began in 1947 when researchers looked at the crude mobile car phones and realized that by using small cells with frequency reuse, they could increase the traffic capacity of mobile phones

Dr Martin Cooper, a former general manager of the systems division at Motorola is considered the inventor of the first modern portable handset. Which he used for the first time in April 1973

The development of mobile telephony technology was slow in the earlier periods due to the hindrance by the strict federal regulations in USA and Europe. In 1921, the USA mobile Radio

began to operate

In June 1946, the first American Commercial mobile radio telephone service was introduced in Saint Louis, Missouri.

By 1950s, the first telephone equipped cars took to the roads in Stockholm.

In 1964, the Bell system introduced the mobile telephone service.

By 1982, commercial cellular phones were being used in the USA and Tokyo in Japan. By 1987, USA had over 1million cellular telephone subscribers.

Currently, there are many mobile manufacturing companies are now in operation. For example, Nokia, Motorola Inc., Sony, Alcatel, Samsung, Sagem, Siemens, AG, and Sony Ericsson

There are also a number of mobile phone service providers. In Kenya, the main ones are Safaricom, Airtel, Orange and Yu

Standard Features of cellphones

- a) They are used for making and receiving calls.
- b) All have a personal phone book.
- c) They all have the ability to send and receive SMS.
- d) They have the ability to store messages and display and record the telephone number of a caller.

The following features are not standard and vary from phone to phone.

- a) Calculator, clock and calendar.
- b) Access to the internet
- c) Digital camera capability
- d) A variety of ringtones

Limitations of cellphones

- a) They may be prone to poor reception especially where they are reliant on internal antennas.
- b) Their use is dependent on the availability of electricity. The phone must be recharged after a number of days. In areas where accessibility to electricity is a problem, mobile phones may not be so much in use.
- c) The continuous use of mobile phones has raised fears of possible side effects of radioactive rays on human beings.
- d) Handsets are easily stolen due to their small size.

Television

The a public broadcasting medium that uses a point to multipoint technology to broadcast to any use within the range of the transmitter

In 1855, the idea of a television was perceived but only came into use in 1922 when a Scot, Loggie Baird, showed how moving images could be transmitted by electromagnetic waves.

In 1931, the cathode ray tube (CRT) was invented in USA. The CRT transforms beams of electrons into visible images on the screen. This led to development of modern television.

The first television broadcasting service was launched in 1936 by BBC.

I 1942, Baird invented the colour transmission.

In Kenya, broadcast television began after a television station was opened in 1970. This was the Voice of Kenya. Kenya was connected to worldwide television via Longonot Satellite Station in 1972.

In 1990, KTN, the second channel was introduced in Kenya

Cable Television

Cable television, a commercial service that links televisions to a source of many different types of video programming using Coaxial cables, was introduced in Kenya in 1994. The television users with personal satellite dishes can access satellite programming directly without a cable installation.

Recently, the digital television (DTV) was invented. This is the transmission of audio and video of digital signals, in contrast to analog signals

Television is an important means of communication since it is an audio-visual device.

Its importance can be summarized as follows;

- a) It conveys news and information from all over the world more vividly than other means of communication such as radio.
- b) It is a source of entertainment as it shows music and drama programmes.
- c) It is a device that may be used in educational broadcasting. Some educational programmes are broadcast on television. For example, programmes that sensitize people on HIV and AIDS pandemic.
- d) It is used in commercial advertisement by manufacturers and companies thus enabling them to sell their products.
- e) It is the best means of transmitting ideas since it commands attention.
- f) It is a source of employment in the television stations.
- g) Television has enabled humankind to bridge the gap of real-time communication between different time zones in the world.

Disadvantages

- a) TV can only be viewed where there is electricity. It is expensive to install solar panels in areas where there is no electricity. The car batteries that may be used require constant charging.
- b) Pornographic programmes have eroded cultural values, especially among the youth. Such programmes originate in the west and the youth want to imitate what they see.
- c) Watching violent programmes has created the culture of violence among the youth. For example, watching of wrestling and violent movies.
- d) Some advertisements encourage deviant behavior. For example, advertisements of alcohol and cigarettes.
- e) Watching television can sometimes become addictive in some homes thus limiting the time to participate in other activities.

Radio

The invention of the radio was a significant development in the electronics industry. In 1864, an English mathematical physicist, clerk Maxwell (1831-1879) suggested that there was the existence of waves.

In 1888, a German, Heinrich Rudolph Hertz, (1857-94) demonstrated the existence of electromagnetic waves (vibrations) that travel through space, which were named after him. These waves could be used in wireless communications.

In 1901, an Italian, Guglielmo Marconi (1874-1937) invented the radio and sent a radio transmission across the Atlantic from Poldhu in Cornwall to Saint John, Newfoundland, Canada.

The radio gained prominence during the World War I as it was used to communicate.

The Marconi Company made the first radio broadcast in Britain in 1920.

The British Broadcasting Company (BBC) was set up in London in 1922.

Kenya's Radio Broadcasts before independence depended on the BBC. The VOK began to air programmes after independence.

In 1990, VOK changed its name to KBC

In 1995, the FM meter Band was launched thus leading to an increase in radio stations

Importance of radio

- a) Radio is easy to access since people can afford to buy the device.
- b) News and information from the radio is quickly received throughout the country
- c) It can also be accessed by the illiterate people who can listen and understand the radio news if broadcast in the language they can understand.
- d) Radio is used to enhance communication in transport systems like motor vehicles, railway, ships and airplanes.
- e) Radios are sometimes used to broadcast educational programmes and important government communications on issues like health, agriculture and family planning.
- f) The radio is a source of entertainment. E.g through Music and drama programmes.
- g) Radio can be used by manufacturers and companies to advertise their products thus stimulating business.
- h) Radio communication has enhanced space exploration. Radio signals are used to communicate with space vehicles.

Telegraph

This is a device or process by which messages are passed over a distance, especially using radio signals or coded electrical signals.

Telegraph messages are sent by a code in which numbers, letters and punctuation marks are represented by a combination of dashes and dots.

The earliest code to be used was the Morse code which evolved into the international Morse code.

A message sent by a telegraph was called a telegram.

Radio invention made it possible for wireless telegraphy.

Samuel Morse (1791-1892) is credited for the invention of the electric telegraph. In 1837, Morse made the first crude telegraph and by 1844, he successfully sent a telegraph over line. By 1845, the first public telegraph was operating between Washington and Baltimore.

In 1851, the first telegraph cable was laid under the English Channel between London and Paris. In 1866, the Trans-Atlantic cable was established.

In 1872, most cities in the world were linked by telegraph.

Disadvantage

- ~ Communication through the telegraph could be rendered unreliable where accidents and poor weather could cut telegraph cables.

Internet

This is a computer-based global communication network system that links thousands of computers using telephone lines. Currently Mobile phones are also used in internet communication.

Internet forms one of the inexpensive and fastest communication means in the world today which has gained popularity.

Internet was introduced in the 1970s. Currently there are over 4000 million users of internet in the world today with its popularity being manifested in the social media networks like facebook, Twitter.

Results of internet

- a) Education has been developed since research can be done on the internet.
- b) E-commerce can be done on the internet hence enhancing the sale of goods and services.
- c) The running of government operations can be done on the internet since the government may use it for internal communication, distribution of information and automated tax processing.
- d) Internet has led to expansion of Business as people use it to interact with other business people.
- e) Individuals use the internet to communicate through e-mail or other social network platforms such as facebook, Twitter, Skype, etc.

Electronic Mail (E-mail)

This kind of communication is also reliant on internet. The communication is done using either computer or mobile phones with the help of a modem.

E-mails first came into widespread use in 1990s and has today become a major contributor to business development. It has taken the lead ahead of telephone, fax, radio and television in communication.

Facsimile transceiver (fax)

This is a method of transmitting text over telephone network. A written, printed or pictorial document is scanned then sent and reproduced photographically at the destination. The message /picture is transmitted within 30 seconds

The Fax machine was developed by a German named Arthur Korn in 1902 and was commercialized in 1926.

Telex

This is a system of direct dial teleprinter which uses a keyboard to transmit typed text over telephone lines to similar terminals

Satellites

A Satellite is a spacecraft or an artificial device orbiting the earth, moon or another planet, transmitting back to earth scientific information. It is launched at a velocity of at least 28,960 km per hour (escape velocity) to enable it overcome gravitational pull of the earth and thus remain in space.

In 1680, a British Scientist, Isaac Newton, introduced the idea of artificial satellites.

The first message to be transmitted by satellite was the Christmas greeting by President Dwight D Eisenhower of the USA in 1958.

In 1969, the first television pictures were relayed around the earth by satellites from Apollo II astronauts.

In October 1957, USSR sent sputnik I, the first satellite into the orbit. In the same year, the first living passenger, a little dog called Laika, was carried into space by a satellite.

In 1961, a Russian Yuri Gagarin went into space on board of a satellite.

In 1969, an American, Neil Armstrong, in his spacecraft Apollo I, landed on the moon.

In 1981, the US released the first space shuttle which is manned, airplane like craft which orbits the earth.

In 1983, Challenger, the space shuttle, released a satellite into space.

In 1986, an accident occurred on the space shuttle, Challenger, killing seven Astronauts

Pagers/beepers

These are portable communication message devices. In using it, the person sending the message uses a phone and calls a pager number.

The impact of telecommunications today

- a) Telecommunication has revolutionized communication through enabling faster and easier communication between individuals. This has increased interaction and therefore international understanding.
- b) Telecommunication has enhanced information management e.g the use of computers for information storage and processing and the internet in communication.
- c) Telecommunication devices are also sources of entertainment. Radios and television broadcast music and movies to entertain people.
- d) Telecommunication systems like television bring reality to the viewers by transmitting live pictures.

- e) Telecommunication devices enhance cultural exchange and understanding through showing programmes from other countries. This helps people to appreciate other people's culture and even enrich their own.
- f) Telecommunication systems have promoted water and air transport. Ships at sea and airplanes use these devices to send signals to guide captains and pilots.
- g) Telecommunication systems have made world trade and businesses more effective and efficient. People can quickly place orders for goods and get news of world markets and commodity prices.
- h) Telecommunications has enabled organizations, government institutions and individuals to access information and programmes at their convenience. This has led to effective management and good governance.
- i) Countries have also improved their security systems by using radio and radio calls and mobile tracking systems to combat crimes.
- j) Modern warfare has been revolutionized. Modern weapons depend on telecommunication services that provide accurate and reliable information. For example, satellites are used to guide missiles.
- k) Remote areas are no longer inaccessible thanks to telecommunications. People can communicate using cellphones even from the most remote areas of a country.
- l) Telecommunication systems have promoted space exploration. Man has been able to send spacecraft to the moon, Mars and Venus using communication satellites.
- m) Telecommunication is a source of employment in many countries. Many people offer services, operate systems and maintain them.
- n) Governments earn revenue from telecommunication systems. This revenue promotes economic development. For example taxes collected from licensing of service operators, manufacturers of telecommunication systems etc.

Negative attributes to telecommunication.

- a) Telecommunication has promoted international social crimes such as fraud, drug trafficking and terrorism.
- b) Some forms of telecommunication promote immorality among children and the youth in the world through watching of pornographic materials.
- c) Some telecommunication devices cannot be accessed by many people due to the expense of acquisition and installation.
- d) Telecommunication devices have an addictive effect for many users. This affects speed of development in developing countries as people sit for long hours watching television instead of engaging in productive activities.
- e) Mobile phone users risk suffering from effects of the constant exposure to radioactive rays which may cause certain types of cancer.

Print media.

This refers to all that is printed or written down and published. For example, journals, books, newspapers, magazines etc.

Newspapers

It is an unbound publication produced at regular intervals and devoted primarily to current events and advertisements

Before printing was invented, the oldest newspaper, *The Siloam Inscription*, (a stone on which news were recorded) was in circulation among the people of Mesopotamia at around 700 BC. The Chinese court journal, *Tsing Pao*, published in Peking in AD 500 was another early form of newspaper.

The Roman Bulletin, *Acta Diurna*, used by Emperor Julius Ceaser from 60BC to post government daily announcements was also an early form of newspaper.

Printing was invented by a german, Johannes Gutenberg, in the 15th century. The first publication, *Strasbourg Relations*, was published in 1609

The London Daily Post also known as the Public Advertiser was published by Henry Woodfall and his son Sampson Woodfall in 18th c.

The London Times was first published as the Daily Universal Register by John Walter in 1785. It changed its name to Times in 1788.

In 1900, C Arthur founded the Daily Express.

The first newspaper in Kenya was the African Standard founded by Alibhai Mullah Jeevanjee, in Mombasa in 1902. It later changed its name to the east African standard in 1905. And moved its operations from Mombasa to Nairobi in 1910. In 1928, Jomo Kenyatta published a local newspaper in Kikuyu, Muigwithania aimed at spreading the views of the Kikuyu central Association and promote kikuyu culture.

The Daily Nation was established by the Aga Khan in 1960

In 1983, the Kenya Times was founded by Hilary Ngweno and later bought by KANU and owned jointly with a Briton Robert Maxwell

Types of Newspapers

Daily Newspapers

These print atleast one edition every weekday. Some print morning and evening edition when necessary. Examples of daily newspapers include *the Daily Nation*, *The standard*, *the TorontoStar* and *The Los Angeles Times*.

Weekly Newspapers

These are published once a week. They contain news of interest to people in a smaller area, maybe a city or a neighbourhood. For example the east African in Kenya and the weekly Telegraph in Britain

Special interest Newspapers

They concentrate on news of special interest to a particular group for example an ethnic community, a corporation or a trade organization. They can be daily, weekly or monthly.

Periodicals

These are publications released at regular intervals and containing news, feature articles, poems, fictional stories etc. they also contain photographs and drawings. Periodicals aimed at general audience are called magazines

Periodicals differ from newspapers in that whereas newspapers deal with sometimes daily news and are unbound, periodicals like magazines and journals focus on more specialized material and deal with news in form of summaries or commentaries. They are printed on finer paper with smaller bound pages and issued at a longer interval than a day when compared to newspapers.

Magazines

These are periodical publications with specialized information on particular issues. They are published fortnightly, weekly or monthly

The oldest magazine is Eileen's Oxford Gazette published in 1665, later became the London Gazette.

The first periodical to use the word magazine in its Title was the Gentleman Magazine published in 1731 in Britain.

The oldest magazine in Kenya is the Kenya Official Gazette (1900-1963), renamed the Kenya Gazette after independence. Other were the Leader of the British East African Company, Wathimo Mukinyu by Consolata Catholic Missionaries in Nyeri, Tangaza by Harry Thuku, the East African Chronicles and the Colonial times by the Asians

Journals

These are periodicals with a narrower target audience such as scholarly publication. They specialize in particular themes or professions. For example the Review of Political Economy, Canadian Journal of African Affairs, the East African Journal of Social Sciences and the East African Medical Journal.

Revision questions

1. **1990 Q23**
Discuss the role played by telecommunication service in modern society.
2. **1992 Q24b**
Explain the impact of the development of transport and communication network in Zimbabwe during the colonial period (1930).
3. **1994 Q3b**
What has been the result of the development of telecommunication Technology in the modern world
4. **1996 Q5**
List two forms of communication used to send messages to distant places in the shortest possible time. (2marks)
5. **1996 Q3**
 - a) Explain three ways in which Macadamised roads are an improvement to road transport. (3marks)
 - b) What were the results of the development of railway transport in Europe up to the end of the Nineteenth century (12marks)
6. **1998 Q6**
Give one way in which poor transport network hinders industrialization in the Third World countries. (1 mark)
7. **1998 Q20**
 - (a) Describe the results of the development of railway transport during the nineteenth century (5 marks)
 - (b) Discuss ways through which the modern society has benefited from the development in telecommunications (10 marks)
8. **2000 Q3, 4**
 3. State two characteristics of the Macadamized roads (2 marks)
 4. Give one advantage of drum beating as a form of communication over the use of smoke signals in Africa during the pre-colonial period (1 mark)
9. **2001 Q4**
Identify one way in which invention of the wheel promoted early transport. (1 mark)
10. **2001 Q 14**
State two ways in which poor transport systems have contributed to food shortages in Africa. (2marks)
11. **2002 Q 11**
State two effects of the development of railway transport in the nineteenth century
12. **2003 Q18a**
 - (a) Give three developments that have taken place in road transport

- systems since 1750. (3 marks)
13. **2004 Q5**
Give two disadvantages of human transport. (1 mark)
14. **2004 Q7**
State one advantage of the telephones as a means of communication (1 mark)
15. **2005 Q2**
Give two advantages of using the steam engine in the transport industry in the 19th Century (2 marks)
16. **2005 Q4, 5**
4. Identify one form of picture writing during the early civilizations (1mark)
5. State two advantages of cinemas (2 marks)
17. **2006 Q 4**
Identify **two** improvements which were made on macadamized roads in the Nineteenth century. (2marks)
18. **2006 Q19**
a) Give **three** factors which should be considered when sending a message. (3marks)
b) Explain the effects of Telecommunications on modern society. (12marks)
19. **2007 Q5, 6**
5. State **one** disadvantage of using a messenger to pass on information. (1mark)
6. State the **main** advantage of using air transport. (1mark)
20. **2008 Q6**
State two disadvantage of using fire and smoke signals as a means of communication (2marks)
21. **2008 Q18**
a) Give three ways in which the invention of the wheel revolutionised transport in Europe before the 19th Century (3marks)
b) What are the disadvantages of using air transport (12marks)
22. **2009 Q7**
Give **two** means of water transport used during the ancient times. (2marks)
23. **2010 Q5**
State **one** advantage of using the pipeline over vehicles in transporting oil (1 mark)
24. **2011 Q4**
State two limitations of using animal transport (2marks)
25. **2012 Q6 P2**
State **two** negative effects of the development of motor vehicle transport. (2 marks)

Answers

1990 Q23

- **Improved communication** - The development of telecommunication has revolutionized communication throughout the world, between countries, between governments and their citizens and among individuals
 - **Mass entertainment**-Telecommunication services such as radio, cinema and television provide mass entertainment that is unprecedented in.This has played an important role in the development of the popular arts
 - **Education** - Telecommunication services have served as a medium for public education. Education by radio and television for example, are widely used in many countries
 - **Travel** - Telecommunication services have helped to improve travel. For example, ships at sea and planes in the air are kept in constant touch through the marvels of the telecommunications industry.
 - **Exploration of outer space**– The development of telecommunication services has enabled people to explore outer space. This has greatly improved our understanding of the way the universe and the earth itself operate.
 - **Warfare** - Telecommunication services have been widely used in improving weaponry and conducting warfare. This has made warfare more destructive than ever before in history.
 - **Cultural imperialism** - The modern telecommunication industry is dominated by a few rich countries. These countries are able to dominate and impose their cultural values on the rest of the world. For example, the USA dominates in the production and export of films and television programmes
 - **Business transaction/advertisement** -The development of telecommunication services have contributed to the speed and efficiency of business transactions throughout the world
 - **Management science** - The development of telecommunication services have led to the improvement of management techniques and systems e.g. computers
 - National unity and patriotism propaganda on radio e.g. songs
- Any 8 pts, 2 mks maximum 15 mks

1992 Q24b

- The development of railway and road transport led to the efficient and fast movement of goods and people
- Improved transport and communication network facilitated colonial administration. For example, administrators were easily transported to various parts of the country.
- Improved transport and communication encouraged large number of white settlers to come to Zimbabwe. They dominated the political and economic affairs of the country
- Air transport helped promote the status of Zimbabwe internationally - since it connected Zimbabwe to Europe, America, Asia and other parts of Africa.
- Development of transport and communication network led to creation of employment opportunities

- The construction of Kariba Dam and Lake promoted the development of local shipping services connecting Zimbabwe and Zambia
- Improved transport and communication system promoted the interaction between African communities
- Improved transport system led to reduction of human portage
- Urban centres developed along transport and communication lines, e.g. Harare.
- Dissemination of information was facilitated by the development of transport and communication network
- Promoted local and international trade
- Transport and communication network generated revenue for the colonial government

1994 Q3b

- Advancement in telecommunications has increased the speed at which messages are communicated from one point to another
- It has enabled direct personal delivery of messages through the use of telephone
- Led to the introduction of many forms of audio-visual forms of entertainment to people in various parts of the world
- It has facilitated live transmission of some audio-visual programmes
- Facilitated fast commercial transactions between countries and individuals through the use of telex, fax and telephone
- Promoted audio-visual commercial advertisement of goods/products thus promoting sales and public awareness of the existence of some products
- Promoted cultural interaction positive or negative between different communities of the world. Thus people have been able to learn more about each other's culture.
- Enriched learning through the use of audiovisual means of communication
- Promoted the safety of air and water transport as it used to send signals to field pilots and captains
- Used in modern warfare to provide information to the parties involved in the war.
- Promoted space research through satellite communication
- Provide employment
- Any 6 pts, 2 mks each ■ 12 mks

1996 Q5

- Telephone
- Telegram
- Telex
- Fax
- E-mail
- Television

1998 Q6

- Poor transport network causes delay in marketing goods.
- Causes delays in supplying industrial raw materials.
- Bring about high transport costs. Any 1 point, 1 mark.

1998

- Railways facilitated transportation of bulky goods especially industrial products and raw materials for the industry.

- It facilitated transportation industrial workers/ labour.
 - It facilitated the spread of ideas/ Reasons / political.
 - It led to widespread migrations and settlement of people.
 - It promoted the development of trade.
 - It opened up remote areas for economic exploitation e.g. mining fishing and farming boosting agricultural.
 - It strengthened European pacification of their overseas colonies/Administration of colonies.
 - It led to the development of towns / urban centres.
 - Promoted social interaction.
 - Created employment opportunities.
 - It supplemented either forms of transportation
 - Sources of revenue. Any 5 points 1 mark each
- (5marks)

- The use of telecommunications has facilitated storage of information more conveniently than the use of computer.
 - It has provided improved entertainment e.g. live transmissions of music and sports.
 - It has promoted fast transmission of ideas/ propaganda / message.
 - It has speeded up business transactions by enabling a few people to handle a lot of workload.
 - It has reduced costs business transactions by enabling individual countries.
 - It has enabled organizations / individuals to access information / programmes at their own convenience.
 - It has enhanced safe traveling by air and water through radar connections.
 - It has facilitated the study of weather. 1 mark each
- (5marks)

2001 Q4

- It facilitated travel over long distances
- It eased transportation of heavy loads
- It facilitated speedy transportation of people/goods
- It enhanced the movement of soldiers during battles. (1mark)

2001 Q14

- Poor transport have led to high transportation costs, leading to high prices of food.
- Poor transport have led to poor distribution of food.
- Poor transport systems have led to delays in the transportation of food leading to waste and losses.
- Poor transport systems discourage/demoralizes farmers and this in turn leads to officers.
- Poor transport system undermines effectiveness of agricultural extension officers.
- Agricultural inputs do not readily/reach/ leading to poor products (2marks)

2002 Q11

- It facilitated transportation of bulky goods
- He led to growth of towns

- It led to growth of towns
- It facilitated in the entrenchment of colonial administration/movement of soldiers.
- It facilitated in the entrenchment of colonial administration/movement of soldiers
- It facilitated the spread of Christ unity
- Created employment opportunities

2003 Q18a

- Tarmac roads which are durable have been constructed
- Bridges have been constructed to facilitate travel on roads
- Roads have been straightened and widened to cater for the increasing volume of traffic
- Dual carriage ways have been constructed to ease traffic congestion
- Motorways have been constructed in developed countries for the exclusive use of wheels.
- Construction of macadamensed roads Any 3 points 1 mark = 3marks

2004 Q5

- It is slow? time consuming
- It is tiring/tiresome
- It cannot be used to carry bulky goods Any 1x1=1mark

2004 Q7

- The message is spoken/personal contact/feedback
- The message is direct/cannot distorted
- It is fast Any 1x1=1mark

2005 Q2

- It did not pollinate the air
- It was cheap
- It increased the speed of locomotives (Any 2 x 1 = 2 marks)

2005 Q4,5

- Cuneiform
- Hieroglyphics (Any 1 x 1 = 2 marks)

2006 Q4

- Tar was put on the top surface to make them smooth
- Roads were widened to create highways
- Roads were straightened
- The roads wee strengthened by adding more layers of gravel/ stones made durable (Any 2 x1 = 2 marks)

2006 Q19

- The urgency of the message/ speed
 - The complexity of the message/ simplicity/ clarity
 - The distance between the sender and receiver of the message
 - The availability of communication facilities/ methods/ mean (3 marks)
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- The message are conveyed over long distances/ shorten distances
 - It has led to spread of ideas to different parts of the world/ the world has become a global village/ sharing of ideas
 - Television, videos, computers and cinemas transmit entertainment

- through pictures
- Telecommunication systems are medium of transmitting education programmes all over the world
- Weather forecasting navigation and space exploration have been made easy by use of satellites.
- Information can be relayed through radio, television or cell phone remote places easily

2007 Q5

- It is slow
- One can give the wrong message or forget the message.
- One can die on the way
- A person carrying verbal message can be tortured to reveal it.

2007 Q6

- It is the quickest in terms of speed.

2008 Q18

(a)

- People could travel faster than before.
- They could cover long distances.
- The chariots made travel comfortable.
- Heavy loads could be carried over long distances.
- Traveling became more secure. (Any 3x1= 3 marks)

(b)

- It is expensive to procure/maintain an aircraft.
- Construction of airstrips requires a lot of resources and expertise.
- The aircrafts can only land and take off in specific/designated areas thus inconveniencing the users.
- Aircrafts cannot carry bulky/heavy goods as compared to other means of transport.
- Air transport can only be used by the well to do members of the society thus making it inaccessible to many.
- Its operations are affected by unfavourable weather conditions.
- Aircrafts emit gases which contribute to the pollution of the atmosphere.
- Travelling by air has facilitated international terrorism/drug trafficking.
- The use of aircrafts in military warfare has resulted to destruction of property.
- Accidents by the air crafts are fatal/chances of survival are minimal.
- Requires a lot of expertise. (Any 6x2=12 marks)

2009 Q7

- Sailing Boats / Our driven boats
- Rafts / logs
- Canoes
- Sailing ships

2011 Q4

- Animals are affected by poor health/ injuries/ attacked wild animals
- Rugged terrain/ extreme weather conditions hampers the movement of animals
- Animal transport has limited carrying capacity

- Animal transport is time consuming/ slow
- Animal transport is cumbersome
- Animal transport is limited to day time and not night time

2012 Q6

- It causes traffic jams especially in urban areas;
- It contributes to environmental pollution;
- It damages roads;
- It causes accidents leading to loss of lives/injuries.

Any 2x1=2 marks