

S6 GEOGRAPHY (MR.MUGERWA EMMANUEL)

TRANSPORT

Transport refers to the physical movement of people and commodities from one place to another.

Major aims of transport are;

- To bring together people and their various needs, that is to say services and facilities.
- To reduce wastage especially in areas of over production.
- To increase the volume of goods and services especially from areas of over production (surplus) to areas of scarcity.
- To encourage the spread of new ideas, that is to say innovations and inventions encouraging both agricultural growth, industrial growth and expansion.
- To encourage surplus production through exports.
- To facilitate the exploitation of natural resources for example forests, minerals, potential rich agricultural lands and fishing (water resources).
- To minimize scarcity of commodities such as food stuffs to avoid food shortages.

There are four forms of transport namely, road transport, water, air and rail way transport.

Other forms of transport included **human portorage, traction** as well as animal transport.

In many parts of West Africa, heavy loads were carried on heads like the coconut collection in Coastal Ghana.

ROAD TRANSPORT

Roads are the most universal form of communication and vary from one kind to another.

Roads are advantageous in that;

- They are flexible and can reach almost every part of the region.
- They are quicker and cheaper over short distances.
- They can be used to carry a wide range of goods ranging from parcels to large loads.
- Specialized vehicles can be designed to carry perishables such as milk and fish.
- They can be built over steep gradients that rail ways would avoid.
- They are reliable and convenient.

However, they also have short comings such as;

- They are expensive to use over long distances.
- They are subjected to highway robbery.
- They are costly to build and maintain.
- Limited cargo can be carried.

NB: Roads remain a major factor in economic development. Such great road projects include the;

- Trans – African High way (from Kenya to Lagos in Nigeria)
- Trans – Sahara High way (Algeria to Lagos and Senegal in Dakar)
- Great North road (from Cairo to Cape Town)
- Pan American High way

THE TRANS – AFRICAN HIGH WAY

The Trans – African High way is 6500km long running through the Kenya, Uganda, Zaire, Central African Republic, and Cameroon to Nigeria linking the East from Mombasa and the West Coast of Africa to Lagos. It runs through the towns of Mombasa, Nairobi, Nakuru, Eldoret, Tororo, Jinja, Kampala, Fort Portal, Kisangani, Bangassok (Democratic Republic of Congo), Bangui, Bouar (Central African Republic), Enugu, Benin and on to Lagos. It was constructed using the aid from Western Europe, U.S.A and the World Bank.

The initial aim for its construction was to provide an inland route to the East and West Coasts of Africa between Mombasa and Lagos. It was hoped that after its completion it would facilitate trade between the African countries of East, Central and West. However its effectiveness has been limited due to;

- Unfavourable climate especially rainfall which is too heavy making the high way impassable at certain periods of the year.
- Political instabilities especially in Zaire and Central African Republic.
- Limited capital to maintain the road.
- Limited skills to complete the road
- Variations in political ideologies between African leaders, has affected the effectiveness of the high way.

BENEFITS

- ✓ Trade has been stimulated between West Africa and East Africa. Prior to this trade between East, Central and West Africa was very negligible but it has now tremendously increased goods between Kenya, Uganda and Eastern Zaire including fish, machinery, vehicles, tea, petroleum products, oil palm are now transported.
- ✓ Land locked countries such as Uganda, Chad, Central African Republic now have an easy access to the sea. The high way links Uganda and Eastern Zaire to the Coast at Mombasa.
- ✓ The high way has led to the exploitation of natural resources such as forests and minerals in Zaire and fish in Western Uganda. This has boosted domestic and foreign revenue.
- ✓ The high way has encouraged the growth of trading centres and towns such as Nairobi in Kenya, Kampala in Uganda, Lagos in Nigeria which act as nodal points and it has led to the development of associated infrastructure such as schools, hospitals and railway lines.
- ✓ It has led to the creation of large markets for both agricultural and industrial as well as services. These are easily marketed where the road passes.
- ✓ It has encouraged regional co-operation among states through which the road passes. This has further boosted international trade by widening markets for their products.

- ✓ It has encouraged tourism which has benefited the region as a whole offering alternative sources of foreign exchange. This has been used in the development of other sectors in the economy such as infrastructural development, industries, mining as well as the agricultural sector.
- ✓ The high way has encouraged the spread of new ideas in agriculture, industries and other sectors through the interaction of people.
- ✓ The Trans – African high way has stimulated growth along its length. Other roads connecting to it have developed connecting agriculturally productive areas to it, making marketing of agricultural produce easier.

PROBLEMS STILL FACED

- ✓ High costs of maintenance by the individual countries.
- ✓ Some sections of the roads are not under tarmac making the use of the road difficult especially during the wet season.
- ✓ Political differences which reduce the effective use of the road for example boarder closures and refusal of entry.

THE TRANS – SAHARAN HIGH WAY

This was built from North to South. The route runs from Algeria to Tamanrasset (Algeria) where it divides into two directions, one to Kano and South to Lagos in Nigeria and the other to Gao in Mali joining with roads through to Bamako up to Dakar in Senegal and Niamey into Niger to the Port of Cotonou in Benin.

THE GREAT NORTH ROAD

This runs from Cairo in Egypt in the North to Cape Town in South Africa in the South. It passes through countries like Ethiopia (Addis Ababa), Eritrea (Asmara), Tanzania (Dodoma, Makambako), Sudan (Khartoum), Nimule, Uganda, Egypt to South Africa at Cape Town. The road carries more international traffic than any other route in Africa. It has been of great importance in the promotion of international trade, stimulation of industries and agricultural sectors, easier exploitation of natural resources, diffusion of new innovations and inventions. The road is however in fragments in terms of roads standards. The effectiveness of this road lies in making it a good surface road all through and the co-operation of the African countries through which it runs at present.

THE PAN – AMERICAN HIGH WAY

This high way was made to link together all the countries of North America and South America by road. It was originally conceived as a single road linking Alaska in the North and Argentina in the South. However, as the concept expanded, alternative routes were added and today, there is no single road which can be identified as the Pan – American High Way. It has been very useful in the promotion of trade, tourism, industry and regional co-operation.

RAILWAY TRANSPORT

This mode of transport is important in the movement of bulky materials such as ores and manufactured products. In Africa, only South Africa has a true railway network directly comparable with those in Europe and North America. Other countries with developed railway systems include Egypt, Nigeria and Zambia. The poor development of railway transport in Africa is attributed to the following;

1. There is limited capital in most African countries to bear heavy overhead expenses and maintenance costs irrespective of the amount of traffic carried. Many countries are too poor to build their own railway lines, later on to enable their electrification.
2. Large areas in Africa are uninhabited making it very uneconomical to construct railway lines through them for example, in Zaire, Chad, Mali.
3. The establishment of railways lines has also been affected by different forms of relief. The low altitude areas of the Coast which are below sea level have poor railway network such as in Southern Nigeria while highland countries limit railway construction such as in Ethiopia, Rwanda, Burundi and North Western Highlands in Zambia.
4. Poor drainage especially along the coast also limits railway construction since the soils are too soggy or soft to hold the railway sleepers in place. This is so especially around the Niger Delta in Nigeria while in some parts of the South in Zambia, are also limited in railway connections.

5. Railway construction has also been limited by the presence of natural barriers such as dense forest cover especially in South East Nigeria and Zaire. This is because the soils here are too soft to allow construction.
6. The nature of soils on some places also pose as a hindrance. The loose sandy soils in arid and semi – arid areas like the Sahara – Sahel region, Namib – Kalahari Desert hinder the construction of railway lines.
7. Harsh, climatic conditions like too much rainfall, frequent tropical thunder storms, cause damage or deterioration in the railways raising the maintenance costs which aren't affordable. This was the case in South West Nigeria and in Western Zambia.
8. Railway construction has also been limited by the limited economic activities in some places. They are only evident in industrial and mining centres. Away from these, they are fewer or even none existent for example, Zambia, its evidence is the Copper Belt connecting in the Shaba Province in Zaire and to Lusaka up to Dar es Salaam then through agricultural rich highlands of Southern Tanzania. Away from this zone, it becomes limited.
9. There is limited trade among African countries as they produce more or less the same commodities, the railway lines therefore link the countries to the Coast rather than with each other limiting their development.
10. Most African countries have limited technology for the construction and maintenance of railway lines as well as for modernisation. This leaves them continuously under developed.

11. Political instabilities in African countries. Its planning of railway networks both within and across the borders for example the use of the railway lines running between Mali and Senegal got severed when the two countries fell apart politically. As such alternative routes to be used through Ivory Coast (Cote D'ivoire).
12. Poor Government policies of giving priorities to other forms of transport particularly roads and air also affects the establishment of railways. This is because they are faster and more efficient compared to railways that are slow.
13. Railways are also faced with competition of other forms of transport especially roads, air and water which appear to be faster, more flexible and within reach by many. Railways on the other hand are slow making them not to be preferred by users.
14. There is also limited skilled manpower needed in the construction and maintenance of railway lines. Mainly expatriate labour is depended on which is very costly and unaffordable by many African countries.
15. Railway construction was also limited by the colonial legacy of separation such that railways laid were of different gauges making it difficult to connect. For example, for Sierra Leone and Guinea, it was deliberately built on different gauges to prevent them from joining Futa Djallon plateau under the British.
16. Railway transport is also affected by vandalism, that is to say theft of railway sleepers. This not only affects their use but also raises the costs of maintenance.

RAILWAY NETWORK IN NIGERIA

The South and Central Jos Plateau have more railways while the West and South East have poor railway network. The railway network joins the Northern towns of Kano, Nguru, Maiduguri, Bauchi, Zaria, Sokoto, Kaura, Namoda, Jos Kafanchan, Kaduna, Minna to the Central and Southern states of Baro, Makurdi, Jebba, Ibadan to Lagos to Enugu to Port Harcourt.

RAILWAY NETWORK IN ZAMBIA

The railway network is concentrated in the North East along the border with Democratic Republic of Congo and in the South along the border with Zimbabwe. It connects the Copper Belt towns of Chililabombwe, Chingola, Mufulira, Chambishi, Kitwe, Ndola, Luanshya to Kabwe and Lusaka South to Livingstone at the border with Zimbabwe to Dar es Salaam in Tanzania (Tazara), Maputo in Mozambique and Luanda in Angola.

RAILWAY NETWORK IN SOUTH AFRICA

South Africa has the most developed railway network on the African continent with over 13,000 miles of railway lines. It's interwoven connecting the North East with the Central industrial and mining towns to the South West and various coastal towns such as Cape Town, Port Elizabeth, East London, Durban. Some railway lines are electrified such as the one from Durban to Johannesburg, which is one of the longest electrified lines in the world.

RAILWAY TRANSPORT IN GABON

This was developed to ease the exploitation and transportation of iron ore in the North East part of the country as well as her forest resources. As such, it connects to the Port of Libreville through Booue, one arm going to the North East through Makokou to Belinga which has iron ore and another to the South East through Moanda which has manganese and uranium to Franceville.

RAILWAY NETWORK IN EGYPT

The railway network in Egypt runs through the Nile Valley to the Nile Delta region from Port Alexandria to Cairo, Helwan, Nag Hammadi branching westwards to El Kharga near Kharga Oasis while it goes eastwards to Qenarup to El Quseir near the Red Sea on one hand and from Qena countries southwards to Aswan.

FACTORS THAT FAVOURED THE ESTABLISHMENT OF RAILWAYS IN AFRICA

1. The presence of natural resources especially minerals such as coal, iron ore, uranium, gold, diamonds in the Rand region of South Africa, copper in the Zambian copper belt and oil in the Niger Delta in Nigeria and Nile delta in Egypt as well as forest resources such as the Equatorial rain forest in Zaire, Gabon needed cheap rail transport to facilitate their exploitation.
2. The presence of rich agricultural lands needed easy means of transporting the agricultural produce such as the coastal areas of Ghana favouring cocoa growing, Southern Nigeria and Zaire with oil palm, Southern Tanzania (Kilombero) and the

Natal Province in South Africa for sugarcane growing favoured railway construction.

3. The presence of gentle/ flat land favoured railway construction explaining why much of it was constructed in Southern Tanzania and along the Nile Valley in Egypt.
4. The presence of trade and commerce in some industrial centres also favoured the establishment of railways since it was needed to cheaply move people and their goods to various markets and industrial centres. This is particularly so in the Rand region of South Africa, South West Ghana moving cocoa from Kumasi to various coastal ports such as Tema, Accra, Takoradi, industrial centres such as Lagos and Port Harcourt in Nigeria.
5. Railway construction was also favoured in some areas by a wide population distribution that needed cheap means of communication. Such places include the Nile Valley and Delta region in Egypt; mining centres in the Zambian Copper Belt, Coastal ports or towns and the Rand conurbation in South Africa.
6. The availability of capital to construct and hire the necessary technical labour force also favoured railway construction. For example, the Tazara railway was financed by the Chinese Government.
7. The favourable Government policy of diversifying transport means while providing cheap means of transporting bulky products and opening up remote areas also favoured railway construction. For example the construction of the Tazara to open up the Southern highlands of Tanzania, the Trans – Zaire railway connecting Banana

to Matadi to Kinshasa, Ilebo; South Africa connecting the mining and industrial towns with the coastal ports such as Durban, Cape Town, Port Elizabeth for easy export of her products. The Trans- Gabon railway connecting the interior timberlands and allowing the exploitation of iron ore in Belinga and uranium and manganese at Moanda in the South East.

8. The availability of labour, semi and unskilled from the nationals and technical from the financing bodies favoured railway construction for example the Chinese who constructed the Tazara railway.
9. Political stability also favoured the construction of railways in South Africa, Gabon and Egypt.
10. The presence of advanced technology used in the construction of the railways such as the electrified railways in South Africa and Egypt favoured railway construction.
11. Colonial influence or historical factors also determined where the railways were to be constructed. For example, in Gabon, the French influenced its development towards the interior to tap forestry products and iron ore in North East Belinga while Zambia, Egypt, South Africa and Nigeria were influenced by the British.
12. The presence of water bodies especially rivers and coasts offered outlets for railways. Rivers connected to these railways increasing traffic flow by supplying them with goods. For example, River Ogoove in Gabon, River Congo/ Zaire in Congo, River Vaal in South Africa, Nile in Egypt and Niger in Nigeria.

IMPORTANCE OF RAILWAY TRANSPORT

1. Railway transport helps in providing cheap means of transporting bulky raw materials and finished goods in large quantities giving it a large margin for profit making. Such goods include heavy machinery, oil imports, agricultural products, mineral ores and forest products. Besides it, eases movement of people from one place to another promoting mobility of labour.
2. Railways have helped in opening up remote areas for economic development for example the highlands in Southern Tanzanian and the Coastal Ports where sugar and rice production in the Kilombero Valley, the interior of the Rand, the Northern States of Nigeria and the Eastern part of Gabon.
3. Railway stimulates the exploitation of minerals through transporting bulky ores particularly coal, diamonds, gold (South Africa), iron ore and coal at Mpande in Tanzania, copper from the Zambian copper belt, soda ash and copper from Zaire, manganese and uranium at Moadia in Gabon and iron ore in Western Siberia.
4. Railways enable large quantities of agricultural produce to be easily transported and marketed cheaply promoting the growth of the agricultural sector such as maize, tobacco, the maize triangle in South Africa, sugarcane growing in Natal, sugarcane and rice in Kilombero, cocoa in Ghana, oil palm and cocoa in Nigeria.
5. Railways have stimulated the development of manufacturing industries through the transportation of raw materials and manufactured goods for example in the Rand region of South Africa, Cairo in Egypt, Port Harcourt and Lagos in Nigeria.
6. Railway junctions have developed into urban centres leading to the growth of towns and associated infrastructure for example, Germiston in South Africa, Kano, Nguru,

and Kauna, Namoda in Nigeria, Iringa and Makumbako in Tanzania, Booue and Moanda in Gabon, Cairo in Egypt, Ndola and Chingola in Zambia, Matadi, and Boma in Zaire.

7. It has promoted both internal and external trade allowing easy movement of both imports and exports. In Southern Tanzania and Zambia, the Tazara has led to flourishing trade along its route.
8. Railways have also been sources of foreign exchange for the various countries through handling both export and import goods. For example, Tanzania handles exports and imports for Zambia and Uganda; Zaire; South Africa from Swaziland, Lesotho and Botswana.
9. Railways have also contributed to the growth of various coastal ports in a bid to handle imports and exports. This has led to modern port handling facilities being put in place, facilitating further development. For example, Dar es Salaam and Tanga in Tanzania, Durban, Port Elizabeth, East London, Cape Town in South Africa, Banana in Zaire, Lagos, Port Harcourt in Nigeria, Alexandria in Egypt, Luanda in Angola, Maputo, Beira in Mozambique.
10. They have offered sources of employment opportunities to drivers, technicians, casual laborers in the transport sectors and at ports. This has helped them improve their standards of living.
11. They are sources of domestic revenue through levying taxes on passengers and goods transported by the railway. This has been used to develop other sectors of the economy.

12. Railways have boosted the growth of the tourist industries by linking remote tourist destinations to the urban and coastal areas.
13. Where railways are shared across borders or are jointly owned, it has promoted regional and international co-operation strengthening political and economic ties, thereby further boosting trade. For example the Tazara has strengthened ties between Zambia and Tanzania.
14. Railways supplement other forms of transport like roads, air and water making it easy to acquire any means of transport as well as reduce the congestion and costs that may be witnessed especially on roads.
15. They have stimulated infrastructural development especially the construction of roads and the development of water ways meant to serve the railways with various goods from mining, industrial and agricultural sectors. This has led to further economic development.
16. Railway construction was a form of economic diversification from which countries earned foreign exchange as well as domestic revenue from railway users for both passengers and goods.
17. The railways provided market for the heavy engineering and machinery industries through building and repairing of locomotives hence promoting industrialization. For example, at Pretoria in South Africa.
18. Railway construction has also aided and eased effective administration especially by the colonial masters since they could reach most remote areas. For example, the

French administration in Gabon, the British in South Africa and Nigeria. It therefore encourages the diffusion of ideas.

19. Railways promoted the development of social services especially at the focal points and around railway stations. Such as health centres, schools, electricity, roads to cater for the needs of the workers and their families. This led to further development of such areas.

SHORT COMINGS OF RAILWAY TRANSPORT

1. It is quite slow causing serious delays making it unsuitable for the transportation of perishable goods especially in the developing countries. For example, it sometimes takes a month from Kapiri Mposhi back to Dar es Salaam.
2. It is very expensive to construct and maintain since it is affected by frequent break downs especially during rainy seasons as well as due to vandalism. This makes it difficult to manage by most African countries.
3. It is less flexible since it has particular routes and doesn't involve door to door movement. It is therefore not a popular means of transport in the developing world.
4. It is associated with accidents in cases of derailing resulting into loss of lines and destruction of goods leading to great losses.
5. Double costs have to be incurred of loading and off loading at the railway terminals. This makes it an expensive means of transport.

6. Railway transport is limited by the terrain and therefore only passes through flat lands. This limits its construction in highland areas, making them remain inaccessible.
7. There is periodic congestion of ships at coastal ports making the railways unable to cope with increasing flow of cargo or traffic. This is due to inadequate port handling facilities for loading and offloading of goods causing further delays.
8. Since it promotes urbanization, it leads to urban related problems such as crimes, thefts, slum development, poor sanitation and hygiene.
9. It has led to environmental pollution due to the fumes emitted in the atmosphere leading to reduced productivity of land and breathing in of unclean air leading to respiratory diseases.
10. The construction of railways led to environmental degradation since most of them are located in remote areas and transverse forested areas leading to loss of valuable timber and destruction of the landscape.

THE TANZAM (TAZARA) RAILWAY

The Tanzam railway is found in Tanzania and Zambia running from Kapiri Mposha and Kasama in Zambia to Mbeya, Makumbako, Ifakra in Tanzania to Dar es Salaam port. The railway line covers a distance of about 1023km. it was constructed by the Chinese and has 147 stations, 310 bridges and 21 tunnels and was commissioned in 1975. The major aims of constructing the railway were;

- ◆ To provide Zambia with an alternative route to the sea for her copper export trade and imports of manufactured goods. This was because the struggle for independence by Zimbabwe and Mozambique had affected Zambia's only sea route to Beira and the Benguela railway to Lobito in Angola was too long for economic use.
- ◆ To open up remote parts of Southern highlands in Tanzania which were agriculturally productive but largely limited in transport systems.

NB: *The project was funded by both Tanzania and Zambia.*

There was a problem of rolling stones along the railway mainly because the Chinese powered locomotives were not up to the challenges presented by Tanzania, Southern highlands thus it frequently breaks down.

TRANS SIBERIAN RAILWAY IN ASIA

This is the most important railways in Asia. The line runs from Leningradskaya and Moscow in the West to Vladivostok in the East coast covering a distance of 8960 km length in former USSR, now Russia. From West to East, the railway runs through towns such as Kazan, Sverdlovsk, Omsk, Novosibirsk, Irkutsk, Chita and Khabarovsk.

The railway was constructed to provide a link between East and West of Russia (former USSR). Its effectiveness is however limited by severe winter season experienced in the region. The railway encouraged rural development in remote Siberia and facilitated the development and improvement in agriculture within the region. It has connecting links South of the main line to Odessa in the Ukraine, Baku in Caucasus and Ulan Bator in Mongolia and beyond to Peking in China. This has facilitated rapid integration economically of the region. Various towns have sprung up along the route especially the point where the railway crosses the rivers. These have become centers of dense population concentration.

RAILWAYS IN NORTH AMERICA

The continent of North America has the most extensive railway network in the world with over 300,000km in U.S.A, 93,000KM in Canada and the rest in Central America. It connects the Eastern Seaboard from Halifax in the North through Winnipeg to Churchill, to the Western Seaboard in Prince Rupert, San Francisco, Los Angeles South to New Orleans.

This pattern of railway network was aimed at;

1. Opening up of vast empty lands in the interior in the Prairies and rocky mountain states and provinces such as British Columbia.
2. Transportation of bulky manufactured goods to the ports of Halifax, New York, New Orleans, Vancouver, Los Angeles for exports such as machinery and cars.

3. Transportation of bulky raw materials to the interior for example oil, coal, iron ore, timber and construction materials.
4. Facilitating mineral exploitation for example iron and steel at Pittsburg, magnetite near New York, leematite and limonite at Birmingham and copper, iron, zinc in the Great lakes region.
5. The Trans – continental lines followed the East to West direction linking the main centres of settlements in the East to the Western coasts of less population concentrations.
6. The railway pattern also aimed at providing transport for agricultural products to distant markets on the Seaboards such as wheat for the Prairies, cotton in the South.
7. It aimed at distributing manufactured goods to the region from the main industrial regions of Boston. New York, Philadelphia, Detroit, Lake Michigan and Birmingham.
8. It aimed at linking the main cities especially Eastern U.S.A, Southern Canada, South of the Great lakes to the Atlantic Seaboard where main cities occur such as New York, Boston, Washington DC and Philadelphia.

WATER TRANSPORT

This is an important form of transport in many parts of the world. The advantages of water transport are that it's a cheapest form for transporting large bulky loads and it uses existing routes such as rivers, seas and lakes. There are **two** major types of water transport, that is to say;

1. **Inland waterways** such as;

- Rivers for example in the River Amazon in Brazil and River Zaire in Congo, Si – Kiang, Yangtze in South East Asia, River Rhine, River Maas, River Lek, River Waal in Netherlands, River Main and Mosel in Germany.
- Canals which are constructed channels for either inland vessels or ocean-going ships. These form an important mode of transport in Netherlands (North Sea canal, Rhine-Scheldt canal and Rhine-Herne Canal); in Germany (Dortmund-Ems Canal, Lippisette Canal, Wesel-Dattein Canal, Rhine-Marne Canal and Main- Danube Canal); in North America (Welland Canal, Sault St. Marie Canal or Soo Canal); Panama Canal and in Africa the Suez Canal in Egypt.
- Canalised rivers where dams and barrages have been constructed to improve their navigation for example the St. Lawrence Seaway in North America, Rhine in Europe, Rhone in Switzerland, Nile in Africa.
- Lakes for example, Lake Victoria serving three East African countries Uganda, Kenya and Tanzania and the Great lakes serving U.S.A and Canada.

2. **Ocean transport or Marine transport** which makes use of the large ocean shipping routes around the world making use of the Pacific, Atlantic and Indian

Ocean, these offer shipping routes in all directions connecting with various continents.

THE RIVER RHINE WATERWAY

The Rhine waterway is Europe's most important waterway being the principal North-South waterway for Basel in Switzerland through the Central Heroyinian highlands to the Netherlands forming the Eastern boarder of France. The river is linked to the Rhone River and the Mediterranean by the Rhone- Rhine canal. It is joined by many tributaries some of which include Mosselle which are canalised. The river has been dredged, straightened and improved.

IMPORTANCE OF THE RHINE WATERWAY

1. It provides one of the Worlds' most efficient waterway system serving Western and Southern Germany, Switzerland and Eastern France to Netherlands. It carries both imports such as crude oil, cotton, wool, iron ore, coal, wheat, meat and dairy products and exports such as chemicals, fertilizers, textiles, machinery, watches, automobiles and confectionaries.
2. It facilitated the development of various industries particularly in the Ruhr Industrial complex due to the presence of cheap water transport used for both importation of raw materials and exportation of manufactured commodities as well as acting as a source of large quantities of water for cooling purposes. Such industries include iron and steel, engineering, motor vehicle, chemicals and textiles.

3. It has encouraged regional trade through reduced transport costs as compared to road and railway transport because of the reduction in distance. This has promoted imports and exports of heavy and bulky commodities such as coal, iron ore and petroleum.
4. It has facilitated the exploitation of minerals such as coal in the Ruhr region, oil, sand as well as iron ore from Lorraine via the Moselle thus leading to the development of the mining industries as well as industrialization.
5. It has led to the provision of employment opportunities in the industries, mining, as captains of ships from which income is earned leading to better standards of living.
6. The waterway has stimulated the growth of ports and towns such as Basel, Dusseldorf, Rotterdam, Mainz, Bern with associated infrastructure such as roads leading to further development. Rotterdam for example is one of the busiest ports in the World.
7. The waterway has led to development of tourism by offering a scenic beauty as well as being used as a mode of transport for the tourists. It has therefore offered other sources of foreign exchange.
8. The waterway is a source of foreign exchange for countries that use it for importing and exporting various goods such as Germany, France, Netherlands and Switzerland. This has been used to develop other sectors of the economy.
9. It has encouraged settlement along the Rhine Valley. This is because of the growth and development of several industries, agriculture especially vine

- growing in the Rhine Rift Valley which attracted people for jobs. Besides, it offers cheap means of transport allowing easy mobility of people.
10. The waterway is also a source of domestic revenue to the various countries, that is to say Germany, France, Switzerland and Netherlands. This is got from levying taxes on the industries, miners, agriculture, from the transport sector which is used to develop other sectors of the economy.
 11. It has promoted the development of other modes of transport especially railways, roads and canals. These connect other areas to the waterway bringing in various goods hence promoting trade. These include the Rhine-Herne canal, Dortmund-Ems Canal and the Lippesite Canal.
 12. It has led to the growth of international relationships among countries since it also serves as a natural boundary of Switzerland and Germany. It has thus helped to create political togetherness as well as increasing international trade.
 13. The waterway has opened up landlocked states connecting them to the sea such as Germany and Switzerland, as such, they have been able to increase their trade, both imports and exports as well as receiving raw materials.
 14. It has acted as a source of water for industrial and domestic use. Industries that require large water supply such as soft drinks industries, textiles, and smelting ores as well as for cooling machines.
 15. The waterway has promoted power generation such as Hydro Electric Power from the dams as well as the use of coal and exploitation of oil for mining

industries. This is because it offered cheap means of transporting the bulky heavy minerals. This further led to the development of industries in the region.

NEGATIVE CONTRIBUTIONS

1. Congestion of both traffic and cargo causing delays because the waterway is one of the busiest in the world.
2. It has led to pollution of the environment in form of air and water from vessels in form of oil spills. This has interfered with the movement of vessels.
3. The river carries large quantities of load which are deposited in the lower parts of the river. This leads to silting making constant dredging necessary. Thus there are high costs of maintaining the waterway.
4. Due to urbanisation, there are related problems such as congestion, development of slums and high crime rates.
5. They are faced with regional or territorial conflicts over control of the water body.
6. The waterway limits the size of vessels used on the route due to seasonal fluctuations of water. Large vessels cannot sail on it.
7. The Rhine is liable to flooding especially in spring when the winter snows begin to melt as well as in early summer when glaciers melt waters come down the Alps hence affecting navigation.
8. The waterway has also encouraged piracy or smuggling of goods in and out of the countries causing losses to the Government.

9. Accidents occur leading to loss of lives and merchandise.
10. Downstream from Monheim fog affects visibility interfering with movement of goods, sometimes causing delays.

ST. LAWRENCE SEAWAY

It is an inland waterway which was jointly funded by U.S.A and Canada. It stretches for about 3760km from the Port Duluth on Lake Superior to Montreal at the Atlantic Coast. It is the most important waterway in North America. Its natural barriers such as rapids, waterfalls, gradient differences and shallow stretches were overcome by building canals such as the Sault St. Marie (Soo Canal) and Welland Canal.

IMPORTANCE OF THE SEAWAY

1. Cheap waterway for transporting raw materials like wheat, iron ore and products like chemicals, textiles and vehicles.
2. Mineral exploitation for example iron ore in the Mesabi ranges in U.S.A and coal from Pittsburgh.
3. Industrialization for example pulp and paper, textiles, engineering, boat building, shoes industries, electrical and chemical industries at Montreal and Quebec.
4. Ports and town development for example Buffalo, Cleveland, Duluth, Chicago, Montreal, Quebec.
5. Natural boundaries between United States of America (U.S.A) and Canada.
6. Builds international relationships between U.S.A and Canada.

7. Water for domestic and industrial purpose.
8. Source of revenue.
9. Source of foreign exchange
10. Hydro Electric Power for industrial and domestic use from the Niagara Falls, Iroquois, long Sault dam.
11. Controls flooding and its related problems.
12. Promotes tourism through waterfalls, dams, locks thus generation of foreign exchange.
13. Economic diversification
14. Opened U.S.A and Canada to the World market
15. Encouraged agricultural development for example wheat growing in the Prairies in Canada, cotton in the South and corn in the U.S.A.
16. It has promoted fishing.

PROBLEMS / NEGATIVE CONTRIBUTIONS

1. Pollution leading to decline in fishing activities.
2. Expensive to maintain for example dredging to solve silting and use of ice breakers for 3 to 4 months.
3. Urban problems like high crime rates, poor sanitation and overcrowding.
4. Piracy and smuggling
5. Congestion and delays due to many locks to adjust the level of water to improve navigation.

6. Accidents
7. The seaway enables ships to sail further inland and this has resulted into the decline of the volume of cargo going through New York Port along the New York State Barge Canal. This has led to loss of revenue for goods in transit.
8. The width and depth of the seaway limits the size of vessels to be used on the route. Thus, large ocean-going ships cannot sail on it.

CHALLENGES THAT LIMIT THE EFFECTIVE UTILISATION OF INLAND WATER TRANSPORT IN CANADA/ RHINELANDS

1. The St. Lawrence Seaway is icebound for 3 to 4 months in a year. This limits its use during these months due to long periods of winter freezing.
2. Continuous silting of the Seaway affects its usefulness for navigation as it becomes shallow for big vessels calling for constant dredging which is costly. The period during dredging also limits its use.
3. St. Lawrence has many locks at the Montreal section, Welland Canal and between Ontario and Erie, Erie to Michigan and Michigan to Superior used to adjust the water levels and improve navigation due to fluctuating volumes of water. These cause serious delays in movement.
4. The width and depth of the seaway limits the size of vessels to be used on the route. The Freighters, Whalebacks and Cargo barges are much larger than those of the Rhine waterway.

5. Presence of waterfalls and rapids interrupts the use of rivers for navigation.

In the Rhine lands, the Rhine is navigable up to Basel in Switzerland and the rest of the country is mountainous especially in the Alpine region limiting navigation.
6. The occurrence of smog and foggy conditions at the mouth of River St. Lawrence leads to poor usability causing accidents.
7. The seaway is still narrow and shallow with bends along its course especially for large ocean-going vessels.
8. There is pollution of the seaway by well-established industries and oil spills causing air, water and land pollution which interferes with the traffic along the Rhine or St. Lawrence Seaway.
9. There is congestion in terms of traffic and cargo carried and accommodated at a single season. This is due to many vessels along the river causing delays.
10. The waterways are faced with competition from other modes of transport especially roads, air and railways. This is because they are less congested and faster especially air transport for fragile and perishable items such as horticultural products and precision products (watches, microscopes).
11. They are faced with seldom flooding.
12. Remoteness
13. Low population
14. Limited natural resources or activities.

MEASURES TAKEN TO IMPROVE INLAND WATER TRANSPORT

1. There is need of connecting inland ports to roads and railway systems in a bid to increase traffic increasing the amount of cargo and passengers to be handled by the waterways.
2. Construct canals to bypass waterfalls and rapids and connect roads and railways to improve on navigation.
3. There is need to remove water weeds and floating vegetation so as to make the waterways navigable.
4. There is need to construct slice gates to regulate the flow of water to a steady supply all year round such as what was done to improve navigation on the Great Lakes.
5. Construct modern ports with better port handling facilities so that it is easy to load and offload goods such as the use of containers.
6. Purchase modern vessels which are faster and safer so that water transport can easily compete with other means of transport especially roads and railway transport.
7. There is need to deepen and widen river valleys so that large vessels can easily sail on the narrow and shallow water bodies.
8. Use containers to ease loading and offloading of goods at the different ports.

THE YANGTZE RIVER WATERWAY IN CHINA

This is the third longest river in the world after the Nile in Africa and the Amazon in Latin America originating from the Tibetan mts/ plateau area flowing to the East China Sea.

FACTORS FOR THE GROWTH AND DEVELOPMENT OF THE WATERWAY

1. The strategic location of the river connecting china to the greater pacific made it very accessible for the usage.
2. Presence of the Yangtze River and navigable tributaries that made water transport possible along the river.
3. Presence of a rich hinterland of central and southern china with a variety of goods and passengers to be transported.
4. Presence of dams that controlled the natural flow of water and depth for large ships.
5. Positive government policy that aimed at diversifying the transport sector to reduce dependency on roads and railways.
6. The ice-free conditions of the river throughout the year enabled navigation from the interior to the pacific coast.
7. The proximity of the waterway to the Pacific Ocean where large ocean-going ships are able to dock at the mouth of the river.
8. Presence of advanced technology used to make navigation wagons /ships for transfer of goods and passengers.
9. The booming trade and industrial development necessitated better transport for bulky goods and raw materials.

10. The rugged nature of landscape in the mid central region hindered easy construction of roads, railways and airports.
11. Its development was also out of the need to improve accessibility in some remote villages in the interior of the country.
12. The growing rate of urban centers needed alternative transport means that could be met by developing the waterway.

IMPORTANCE OF THE WATERWAY

1. Many towns have developed along the waterway like Kunming, Shanghai, and Nanjing with related infrastructure.
2. It has improved on inland shipping especially from Shanghai to Wuhan.
3. Fishing is carried out in the waterway providing sources of food in form of protein.
4. It has encouraged industrialization by providing water and transportation of raw materials and finished products.
5. It has promoted tourism due to a variety of river related fauna, landscape hence earning foreign exchange.
6. Government earns a lot of foreign exchange through tourism and trade used in developing other sectors of the economy.
7. It's a source of employment opportunities to boat engineers, captain of ships, earning income improving their standards of living.

8. It has attracted a large population in central china has been used to boost tourism, agriculture etc.
9. It has promoted international trade and relations due to its link with outside world like North America, Africa via the Pacific Ocean.

PROBLEMS FACED ALONG THE WATERWAY.

1. Sedimentation and silting narrows the waterway for large ships.
2. The source of the river (Tibetan plateau) makes the section un- navigable due to the ruggedness.
3. Ongoing hydro power projects interrupt the natural flow of the water and navigation.
4. The ship lock capacity ta some inland ports limit large ships which cannot dock on them.
5. Presence of wild aquatic fauna disrupts navigation leading to loss of goods and passengers.
6. There are limited fans for navigation due to the rising technology in shipping standards.
- 7.

PROBLEMS LIMITING USE OF CHINESE RIVERS.

1. Fluctuation of water levels especially in the north affecting size of sailing ships.

2. Flooding during summer making some rivers dangerous to navigate.
3. Congestion along rivers causing delays.
4. The presence of narrow valleys with gorges limit the size and carrying capacity of ships.
5. Some rivers are not navigable along some sections due to freezing, rapids and falls.
6. Siltation of river valleys hinders the sailing of large ocean going ships.
7. Industrial waste discharge pollutes rivers damaging ships and limiting their usage.

SOLUTIONS

1. Using alternative means of transportation like air, roads and railways.
2. Constructing water canals where falls and rapids exist to enable passage.
3. Treating industrial waste to reduce pollution and damage of ships.
4. Dredging of silted rivers and canals to ease sailing of a variety of boats.

WATER TRANSPORT IN AFRICA

Generally in Africa, water transport has not been well developed. Many rivers in their natural state do not make good modern routes for the following reasons;

1. Few rivers are navigable throughout their length. They are interrupted by waterfalls, rapids and floating vegetation along their courses. The Nile River for example has

five major waterfalls and rapids. Other rivers such as Zambezi, the Orange, the Limpopo fall over the edge of the plateau.

2. Many rivers fluctuate in volume seasonally, that is to say, the water levels are high during the rainy seasons and low in the dry seasons making it difficult for navigation. For example although the Nile River is 4,200km in length, it is subjected to marked seasonal fluctuation in the water level.
3. Many rivers are too short, too shallow or too swift to be useful for navigation. This is typical of rivers flowing from mountain regions such as Ethiopia, Kilimanjaro and Rwenzori.
4. Many rivers which would be capable of carrying much trade flow through remote areas which are also sparsely populated and inaccessible for example River Zaire.
5. Rivers tend to meander in their flood plains making the distance covered by the river much longer than the similar journey by land.
6. Some rivers flow across empty and inhospitable lands so that they are of little economic significance.
7. Some rivers are shallow because of heavy deposition of silt limiting the use of large vessels that can move on them such as the Nile which is subjected to silting especially near its mouth.
8. There is limited capital to develop inland water transport such as buying vessels, constructing ferries and modern ports to handle cargo and passengers.
9. Political differences which limits the use of the rivers. The Gambia for example is one of the most navigable rivers in Africa. Unfortunately its usefulness has been

greatly reduced by the existence of political division between Gambia and Senegal, which has resulted in the river being divorced from its natural hinterland.

10. The volume of traffic being handled is so small that it does not warrant injection of large sums of money to develop ports and other facilities.
11. Some rivers have aquatic animals such as crocodiles and hippos and these limit navigation since they are a threat to man.
12. The building of manmade dams interrupts the use of rivers for navigation since it interferes with the flow of water. Such dams include Aswan High dam in Egypt along the Nile, Akasombo dam on River Volta in Ghana, Kariba dam on River Zambezi at the border between Zambia and Zimbabwe, the Inga and N'zilo dams on River Congo.
13. Some rivers are faced with a problem of floating vegetation like the Sudd in Sudan on River Nile. This interferes with navigation.
14. Some rivers have inland deltas making some places impassable such as the River Nile.
15. Flooding of rivers during the wet seasons interrupts their use for navigation such as River Nile, Niger and Congo.
16. Some rivers are seasonal appearing in the wet seasons and drying up in the dry seasons making it difficult for navigation, especially those found in arid and semi-arid areas.
17. There is shortage of skilled manpower to handle navigation vessels.

18. There are low levels of technology used which are unsafe for navigation such as the use of boats and canoes. These pose as dangers to both passengers and their goods, limiting navigation.
19. There is competition with other forms of transport that are quicker and less risky like air transport, road transport and railway transport.

Revision Questions

- 1. Assess the contribution of either the Rhine waterway or the Yangtze waterway in the promotion of international trade.**
- 2. Discuss the problems facing the development of railway transport in Africa.**
- 3. Discuss the importance and limitations of air transport in either a developed or developing country.**
- 4. Account for the development of road transport in either South Africa or Zambia.**
- 5. To what extent have physical factors hindered the development of railway transport in either Africa or America?**
- 6. Discuss the challenges that limit the effective utilisation of inland water transport in either Canada or Rhine lands.**
- 7. Assess the role of transport in the economic development of any one country in either the developed or developing countries.**
- 8. Explain why African rivers are not an important mode of transport.**

END