Unit III . CONCEPT AND TECHNIQUES OF DELIMITATION OF AGRICULTURAL REGIONS

- Agricultural region conveys that it is an uninterrupted area having some kind of homogeneity with specifically defined outer limits .

- In agricultural geography , it is a short step from the mapping of such data and the recognition of areas of dominance by a particular enterprise , association of enterprise or farming type , to the recognition of such areas as distinctive regions .

- **An agricultural region is defined as an area having homogeneity in relief, soil type, climatic conditions, farming practices, crops produced and crop association.**

Techniques of Delimitation

There are various techniques which have been used from time to time for the delineation of agricultural regions . These may be grouped into five distinct techniques :

(i) Normative

Vonthunen developed the classic model of agricultural location, This method is inherently nonnative and subjective because it is based on pre- decided restrictive conditions

(ii) empirical ,

Empirical technique arrives at regionalisation and generalisation on the basis of observed facts.

(iii) single element ,

Such single enterprise regions are areas of highly localised agricultural locations which exhibit a considerable degree of concentration of crops or livestock enterprises . (eg.cotton belt , corn belt)

(iv) complete multi-facet (quantitative and qualitative)

Geographers in particular have been interested in the overall agricultural region based on *physical* , *social* , *economic* , *cultural* etc.

In fact , only two classifications one published by Hahn in 1982 and another by Whittlesey in 1930 have gained widespread acceptance .

(V) multi-element and complex multi element statistical Analysis

A new statistical technique for agricultural regionalisation are cluster analysis and combinatorial analysis In cluster analysis , mathematical criteria are used to divide or evaluate the division of N objects into K groups

Most of the techniques of classification are based on some concept of relationship in terms of similarity, association or proxmity and the objects which share the known attributes in close proxmity in terms of measurements can be put in one cluster .

The second step , to follow the second level clustering is to establish crop ,* livestock or agricultural enterprise combinations for the sub-clusters .

Unit III . Agricultural Regions of India

➢India is a vast country and is endowed with diverse geographical conditions which are bound to bring in regional variations in agriculture

➢The scheme suggested by the Indian Council for Agricultural Research (ICAR) is simple and comprehensive and is reproduced here. It is based on the predominance of crops and crop associations. Accordingly India can be divided into following agricultural regions:

1. Rice-Jute-Tea Region:

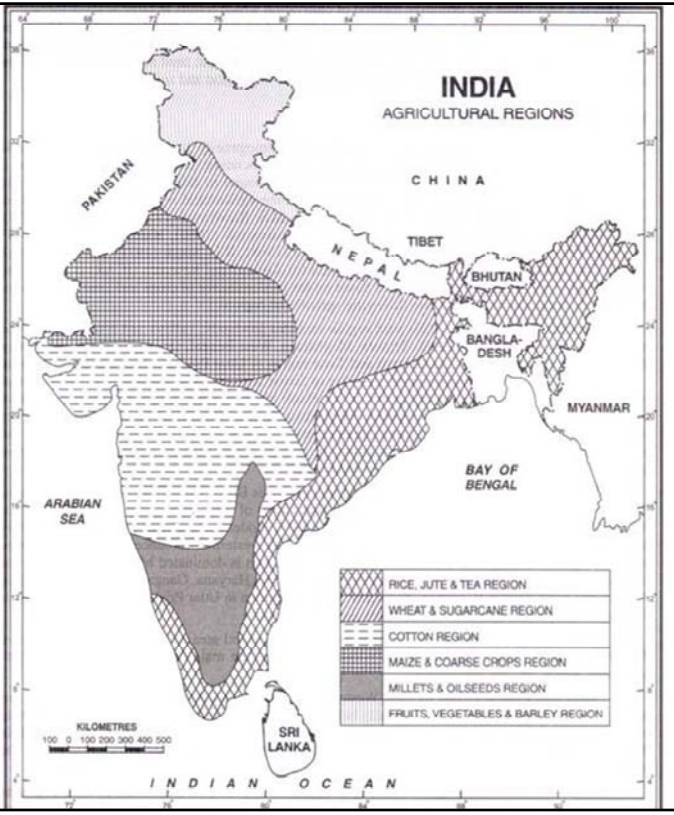
➢This vast region includes lowlands, valleys and river deltas in the states of Assam, Arunachal Pradesh, Tripura, Meghalaya, West Bengal, Orissa, northern and eastern Bihar parts of Jharkhand and Chhattisgarh and Tarai region of Uttar Pradesh.

➢The rainfall vanes from 180 to 250 cm. Rice are the predominant crop due to fertile alluvial soils, abundant rainfall and high summer temperatures.

➢Jute is mainly grown in the Hugli basin of West Bengal Assam, Meghalaya, Tripura, Orissa and Tarai region of U.P.

➢Tea is mainly grown in Assam, Darjeeling and Jalpaiguri areas of West Bengal and Tripura. Sugarcane and tobacco are grown in Bihar.

➢Coconut is grown in coastal areas. Mango, pineapple, betal leaves, bananas, jack fruits, and oranges are the main fruit crops.


INDIA
AGRICULTURAL REGIONS
PAKISTAN
CHINA
TIBET
NEPAL
BHUTAN
BANGLA-
DESH
MYANMAR
BAY OF
BENGAL
ARABIAN
SEA
SRI
LANKA
INDIAN OCEAN
KILOMETRES
100 0 100 200 300 400 500
RICE, JUTE & TEA REGION
WHEAT & SUGARCANE REGION
COTTON REGION
MAIZE & COARSE CROPS REGION
MILLETS & OILSEEDS REGION
FRUITS, VEGETABLES & BARLEY REGION

2. Wheat and Sugarcane Region:

- This region comprises Bihar, Uttar Pradesh, Punjab, Haryana, Western Madhya Pradesh and north eastern Rajasthan.

- Most of the areas have rich fertile alluvial soils with some parts having black and red soils.

- Rainfall is moderate, large part of which is caused by south-west monsoons in summer. Some rainfall is caused by western disturbances in winter. Irrigation is a vital input in drier areas.

- As its name indicates, this region is dominated by wheat and sugarcane cultivation. The main wheat belt of India extends over Punjab, Haryana, Ganga-Yamuna

3. Cotton Region:

- It spreads on the regur or black cotton soil area of the Deccan plateau, where the rainfall varies from 75 to 100 cm.
- Obviously, cotton is the main crop but jowar, bajra, gram, sugarcane, wheat, etc. are also grown.

4. Maize and Coarse Crops Region:

- Western Rajasthan and northern Gujarat are included in this region.
- The rainfall is scanty and is normally below 50 cm.
- Agriculture is possible only with the help of irrigation.
- Maize is mainly grown in the Mewar plateau where wheat and ragi are also produced.
- In the southern part, rice, cotton and sugarcane are grown. Bajra and pulses are grown throughout the region.

5. Millets and Oilseeds Region:

- This region includes areas of poor soils and broken topography in Karnataka plateau, parts of Tamil Nadu, southern Andhra Pradesh and eastern Kerala.
- The rainfall varies from 75 to 125 cm.
- The millets include bajra, ragi and jowar while the oilseeds grown are groundnut and caster.
- Pulses are also grown. Mangoes and bananas are important fruit crops.

6. Fruits and Vegetable Region:

- This region extends from Kashmir Valley in the west to Assam in the east.
- The rainfall varies from 60 cm in the west to 200 cm in the east.
- Apple, peach, cherries, plum, apricot are grown in the west while oranges are important in the east.
- Besides, rice, maize, ragi potatoes, chillies and vegetables are also grown.

Unit III . Agricultural Productivity

- The measurement of production and **inputs required for the production of that output i**s known as agricultural productivity. In other words, it is an **input-output ratio.**
- In traditional measurement of agricultural productivity, geographers and economists used to take into account the inputs like labour and capital and see them as costs which are incurred in the production of agricultural produce.
- At present, in the measurement of agricultural productivity, the question of sustainability of soil, health of ecosystem and social acceptability have become increasingly important.
- Agricultural productivity of a micro or macro region is closely **influenced** by a number of physical (**physiography, climate, soil, water),** socioeconomic, political, institutional and organizational fac-tors.

Agricultural Productivity Measurements

Some of the well known techniques developed and used for the measurement of agricultural productivity and agricultural ef-ficiency per unit area/per unit of time are given below:

1. Output per unit area.

2. Production per unit of farm labour.

3. To assess agricultural production as grain equivalents.

4. Input-output ratio .

5. Ranking coefficient

6. Carrying capacity of land in terms of population

7. Giving weight to the ranking order of the output per unit area with the percentage share under each crop

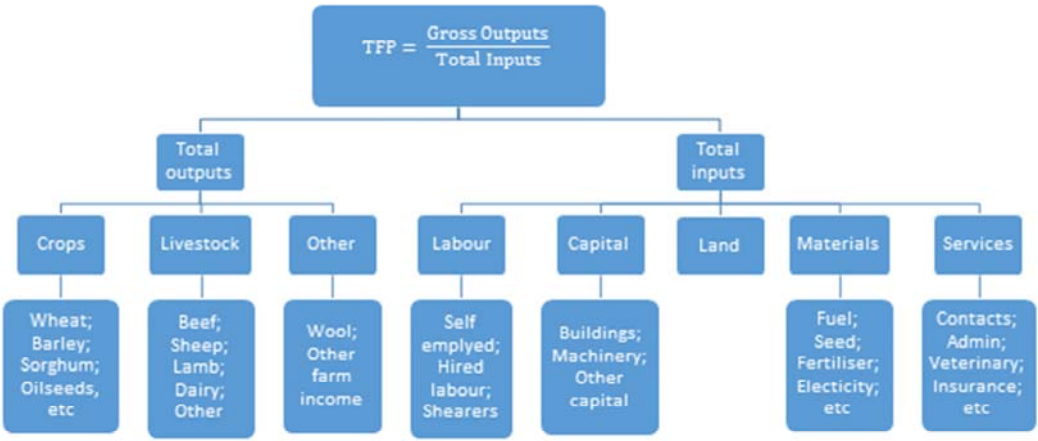
8. Determining an index of productivity.

9. Computing the crop yield and concentration indices ranking coefficient

10. Involving the area, production and price of each cultivated crop in each of the constituent areal units of the region, and then relating the out-turn in terms of money of the unit to the corresponding productivity of the region .

11. To assess agricultural production in terms of money.

12. Assessing the net income in rupees per hectare of cropped area


TFP = Gross Outputs / Total Inputs
Total outputs
Total inputs
Crops
Livestock
Other
Labour
Capital
Land
Materials
Services
Wheat; Barley; Sorghum; Oilseeds, etc
Beef; Sheep; Lamb; Dairy; Other
Wool; Other farm income
Self emplyed; Hired labour; Shearers
Buildings; Machinery; Other capital
Fuel; Seed; Fertiliser; Electicity; etc
Contacts; Admin; Veterinary; Insurance; etc

Unit III . Agricultural Efficiency

- **The agricultural efficiency refers to the properties and qualities of various inputs, the manner in which they are combined and utilized in production.**

- **Agricultural efficiency has three components viz.,**

  Technical efficiency refers to the proper choice of production functions among all those actively in use by farms.

  Allocative efficiency refers to the proper choice of input combinations.

  Production efficiency represents the productivity of different input factors except management. Hence production efficiency is measured in terms of productivity per unit of area or per unit of labour, or per unit of capital or per unit of other input factors except management.

- The concepts of agricultural efficiency is wider than that of agricultural productivity.

Measurement of Agricultural Efficiency

1. Land or Production Efficiency

(i) Intensity of cropping: = (Area cropped /Total cultivated area) X 100

More the cropping intensity better it is. When cropping intensity is 200 that means two crops are grown in a year.

(ii) Yield per hectare: Eg.

Paddy yield per hectare of a firm is 35 q.

Average yield of locality is 25 q. per hectare.

Production efficiency of a farm 'y'

(35 x 100)/25 = 140%

2. Labour Efficiency : Refers to the amount of productive work completed per man on the farm per unit of time.

(i) Return per family labour day:

= Family labour income/Number of family labour days

(ii) Return per worker:

= Output minus cost of input factor other than human labour/Total number of workers

Measurement of Agricultural Efficiency

3. Capital Efficiency

Over head charges, Operating ratio, Capital per unit of gross income, Rate of capital turn over

4. Farm Income / Profit Efficiency Indicators.

(i) Net farm cash income:

Total cash receipts from production minus total cash operating expenses.

(ii) Net farm income:

Net cash income plus change in inventory.

(iii) Farm Earnings:

Net farm income plus value of farm produce used in home.

(iv) Family labour earnings:

Farm earnings minus interest charged on farm capital.

(v) Returns to management:

Family labour earnings minus imputed value of family labour.

Unit III . Von Thunen's Agricultural Landuse Model

The Von Thunen model of agricultural land use was created by economist J.H. Von Thunen (1783-1850). Von Thunen's model was created before industrialization and is based on the following limiting assumptions:

- The city is located centrally within an "Isolated State" which is self sufficient and has no external influences.
- The Isolated State is surrounded by an unoccupied wilderness.
- The land of the State is completely flat and has no rivers or mountains to interrupt the terrain.
- The soil quality and climate are consistent throughout the State.
- Farmers in the Isolated State transport their own goods to market via oxcart, across land, directly to the central city. Therefore, there are no roads.
- Farmers act to maximize profits.

Unit III . Von Thunen's Agricultural Landuse Model

Von Thunen hypothesized that a landuse pattern of rings around the city would develop.
There are four rings of agricultural activity surrounding the city.

➢**Dairying and intensive farming** occur in the ring closest to the city. Since vegetables, fruit, milk and other dairy products must get to market quickly, they would be produced close to the city (remember, we didn't have refrigerated oxcarts!)

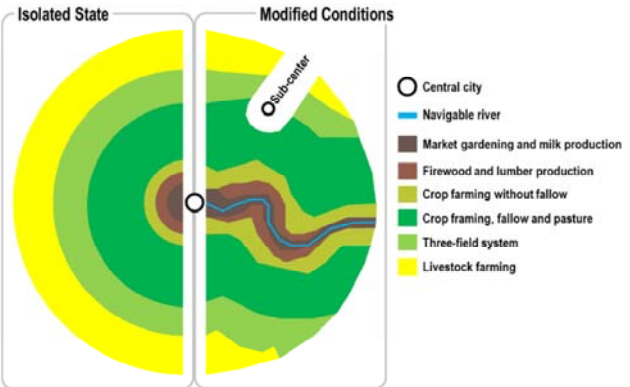
➢**Timber and firewood** would be produced for fuel and building materials in the second zone. Before industrialization (and coal power), wood was a very important fuel for heating and cooking. Wood is very heavy and difficult to transport so it is located as close to the city as possible.

➢**The third zone consists of extensive fields crops** such as grains for bread. Since grains last longer than dairy products and are much lighter than fuel, reducing transport costs, they can be located further from the city.

Ranching is located in the final ring surrounding the central city. Animals can be raised far from the city because they are self-transporting. Animals can walk to the central city for sale or for butchering.

Beyond the fourth ring lies the **unoccupied wilderness**, which is too great a distance from the central city for ***any type of agricultural product***.

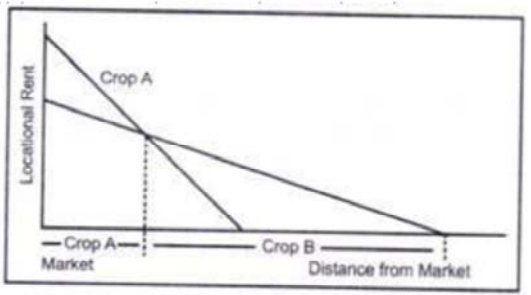
Later, Von Thünen removed the assumption of only one market center. In his model, the new satellite centers would also elongate the model away from the primary center.



Significance of the Model

The location of crops, according to him, is determined by:
(i) The market prices, (ii) Transport costs, and (iii) The yield per hectare.

- The transport cost varies with the bulk and the perishability of the product.
- The crop with the highest locational rent for the unit of land will always be grown, since, it gives the greatest returns and all farmers attempt to maximize their profit.
- Two crops may have the same production costs and yields but difference in transport costs (per ton/kilometre) and market prices influence the decision-making of the farmers.
- If commodity A is more costly to transport per ton/kmand it has a higher market price, A w



Unit III . Von Thunen's Agricultural Landuse Model

- Even though the Von Thunen model was created in a time before factories, highways, and even railroads, it is still an important model in geography.

- The Von Thunen model is an excellent illustration of the balance *between land cost and transportation costs.*

- As one gets closer to a city, the price of land increases.

- The farmers of the Isolated ***State balance the cost of transportation, land, and profit*** and produce the most cost-effective product for market.

Whittlesey's classification of Agricultural systems of the world ..... continues

WHITTLESEY'S WORLD AGRICULTURAL SYSTEMS

I- Introduction

Agriculture is the most fundamental form of human activity. It constitutes both the cultivation of crops and domestication of animals. Thus the land on which agriculture is practiced is the most fundamental of the world's resources as it fulfills man's basic needs of food, clothing and shelter. The evolution process of man indicates that initially human beings were food gatherers and over the time they started cultivating. In the process, animals were tamed, first as a source of meat and milk and later as draught animals. Men were now able to live in permanent settlements and had time to develop various arts and skills. With more scientific and technological developments mechanization of farms took place and resulted in surplus production. As a result different agricultural systems or regions developed in different parts of the world.

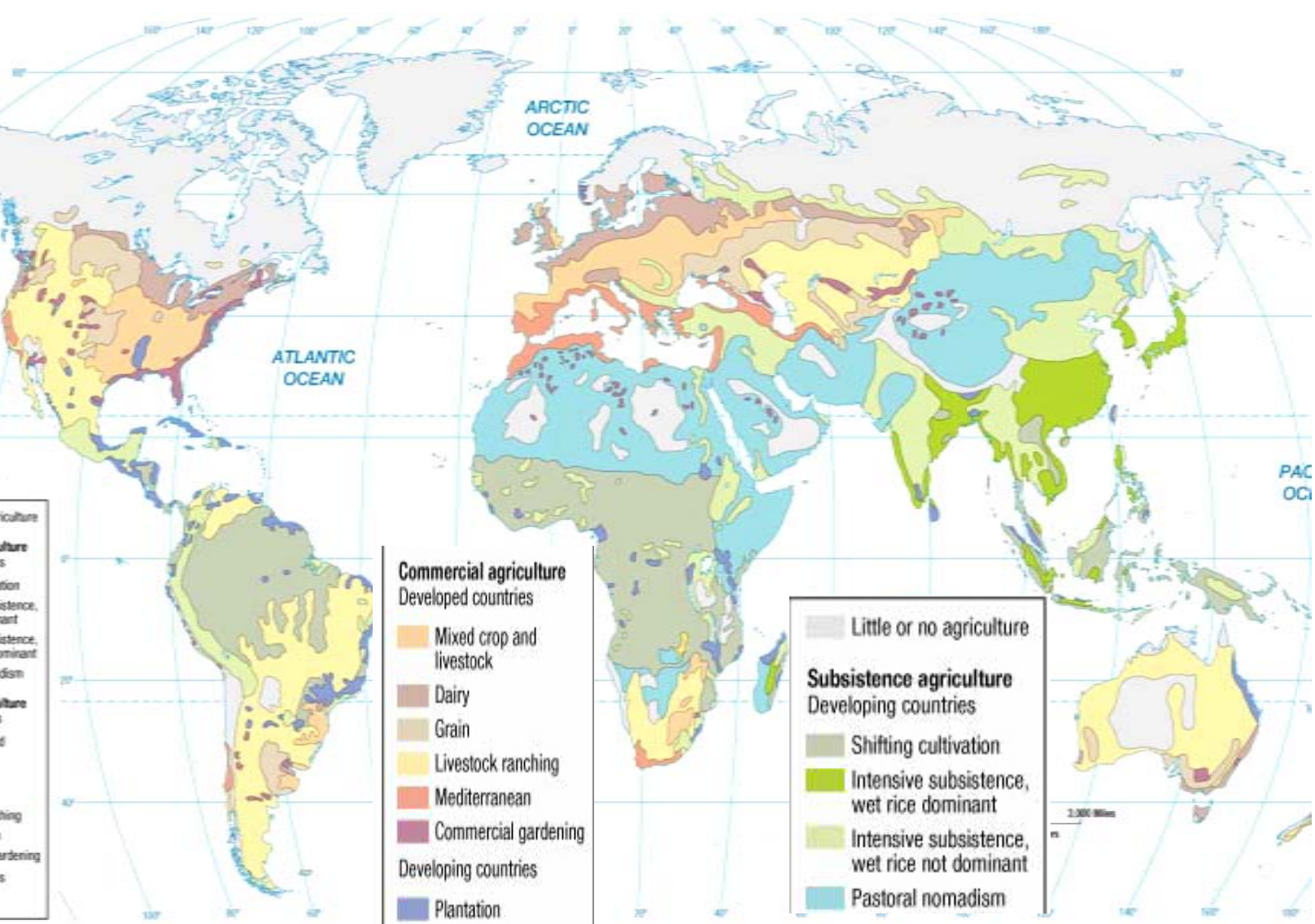
Agricultural system or region is an area or region with similar agricultural functional attributes; it may be a single farm or a group of interrelated farms having similarities of agricultural characteristics. To classify world into different agricultural regions is not an easy task as the pattern of agricultural activities practiced around the world is very complex. If one tries to classify according to climatic types than there is the possibility of duplication of farming activities. If classification is based on the types of crops cultivated or animals domesticated than one tends to ignore the methods used in different agricultural regions. One such attempt was made by Derwent Whittlesey in 1936. He defined agricultural region as an uninterrupted area having some kind of homogeneity with a specifically defined outer limit (1936). He wrote an article on major agricultural regions of the Earth which was published in the Annals of Association of American Geographers (vol.26: 199-240) in 1936 itself.

Whittlesey World Agricultural Systems/Region:

Whittlesey in his monumental paper delineated the agricultural systems of the earth on the basis of the five characteristics of agriculture. These are —

(a) crop and livestock combination

(b) the intensity of land use


ARCTIC OCEAN
ATLANTIC OCEAN
Commercial agriculture
Developed countries
Mixed crop and livestock
Dairy
Grain
Livestock ranching
Mediterranean
Commercial gardening
Developing countries
Plantation
Little or no agriculture
Subsistence agriculture
Developing countries
Shifting cultivation
Intensive subsistence, wet rice dominant
Intensive subsistence, wet rice not dominant
Pastoral nomadism

(c) processing and marketing of farm produce

(d) the level of mechanism, and

(e) types and relations of the building and other structures associated with agriculture.

He identified thirteen types of agricultural occupance of land over the Earth and also marked their distribution on the map. These are —

1. Nomadic herding
2. Livestock ranching
3. Shifting cultivation
4. Rudimentary tillage
5. Intensive subsistence tillage (with paddy dominance)
6. Intensive subsistence tillage (without paddy dominance)
7. Commercial plantation
8. Mediterranean agriculture
9. Commercial grain farming
10. Commercial livestock and crop farming
11. Subsistence crop and livestock farming.
12. Commercial dairy farming
13. Specialized horticulture

Fig-1

WHITTLESEY'S WORLD AGRICULTURAL SYSTEMS

He also states that even a fourteenth type can be added – land totally unused for agriculture.

A brief account of these agricultural regions is given below under separate heads.

(1) <u>Nomadic Herding:</u>

This is a type of extensive farming where animals graze on natural pasture land. This type of activity requires constant seasonal migration of the nomads with their cattle. Nomadic herding is confined to sparsely populated parts of the world where the natural vegetation is mainly grass. This activity can be called the aboriginal form of livestock ranching. It is found in areas which are very dry to produce crops, but not completely wasted desert. Availability of water and presence of natural grassland decides the location of this activity and in most case the first

element that is availability of water; dominates. Ways are very similar across the world, but intensities, care in reproduction and consequently vary widely. Where animals or their products are sold, the methods in this farming are of progressive nature and where the products provide only subsistence, the methods are traditional in nature.

Location:

No reliable data exists for demarcating the Nomadic Herding regions. A general view is that it is spread over large areas in Saharan Africa (Sudan, Libya, Algeria, Mauritania, Mali, Niger, Chad,), the south-western central parts of Asia, some parts of Scandinavian countries (Norway, Sweden, Finland) and northern Canada.

Characteristics:

(a) Nomadic herding ism ecological or rear ecological systems of agriculture

It is derived mainly to produce food for the family to fulfill the daily needs of clothing shelter recreation.

(b) It is a declining type of agriculture.

(c) The main characteristic is the migration of nomads with their livestock in search of forage for the animals.

(d) The Bedouin of Saudi Arabia, the tauregs of the Sahara also practice nomadic herding in the desert and semi desert areas of North Africa and South West Asia.

(e) Therefore, the chief components of nomadic herding are --

- Seasonal pattern of movement.
- Various types of animals are grazed and
- Transhumance.

(2) Livestock Ranching:

The extensive temperate grasslands - once known either for their nomadic herdsmen or by hunters - are now permanent grounds of ranches, where large numbers of cattle, sheep, goats, horses are reared. Everywhere livestock has been established by the ancestors of the European sedentary people in the drier parts of the country. There traditional way of beliefs, habits, behavior has been carried along to the humid areas with them. There are several temporary exceptions where they have modified themselves with accordance to the harsh and insensitive environment of their adopted land. Example can be cited of South Africa's boar, the pioneers

were forced to convert into nomadic herders but with developments in the transportation they became more comfortable with their original culture.

The livestock ranching is a semi-sedentary and extensive type of activity where the cowboy or the rancher is a business operator. He usually works on a large scale and takes good care of the cattle. Usually animal and the product on which it specializes vary from region to region. Cattle, sheep and goats are the most common draught animals.

Location:

Livestock ranching regions are located in North America, Australia, the Republic of South Africa, Brazil, Argentina, Peru and New Zealand.

Characteristics:

The important characteristics of livestock ranching are -

(a) specializes in animal husbandry (rearing) to the exclusion of crop raising in both arid and semi-arid region.

(b) The ranchers have fixed place of residence and operate as individuals rather than in associations.

(c) Ranching differs from nomadic herding as

- The vegetation cover is continuous.
- There is little or no migration.
- Ranches are scientifically managed.
- The animal's are raised for sale.
- Commercial grazing supports the development of town.

(3) Shifting Cultivation:

Shifting cultivation essentially is a land rotation system which is mainly concentrated in the humid low latitudes (rain forests and its fringe areas). The harsh climatic conditions in this region, forces the primitive people to move their farmed plots every few years, usually from one to three years. Although it differs from region to region as it depends on local conditions. As it is practiced by different people it has many different names, e.g. ***milpa*** in Central America, ***conuco*** in Venezuela, ***roca*** in Brazil, ***masole*** in Zaire, ***ladang*** in Malaysia, ***humah*** in Indonesia, ***caingin*** in the Philippines, ***taungya*** in Myanmar, ***tamrai*** in Thailand, ***poda*** in India and ***chena*** in Sri Lanka.

Location:

Shifting cultivation is primarily located in the tropical rainforests and tropical lowland hills in Central America, Africa, and Southeast Asia. In Africa it is also found on the outer margins of the rain forests as tsetse – an enemy of animal husbandry- is found in abundant there.

Characteristics:

(a) Sites for shifting cultivation are usually selected in the virgin forest by the elderly members of the community.

(b) The forests are cleared by fire and the ashes are used as manure. Trees that are not cut are left to rot naturally. This method is prominently called "***Slash and Burn agriculture***".

(c) The fields are usually small in size ranging from 0.5 to 1 hectare. They are widely spread in the forest and are separated from one another either by a dense bush or by a stretch of forest cover.

(d) Primitive tools like hoe, sickle and sticks are used for cultivation.

(e) Starchy foods like tapioca, yams, maize, millet, beans, upland rice and bananas are the common crops raised.

(f) Short period of crop cultivation is alternated with long duration of fallowing. Therefore, in this type field rotation is practiced rather than crop rotation.

(g) This type of cultivation is mainly practiced by aboriginal tribes of the tropical rain forest region.

(4) Rudimentary Sedentary Tillage:

This is a more advanced type of subsistence agriculture that is found in the tropical lowlands. In this type of a system fallow fields are frequently reused and the communities engaged in this type of crop cultivation usually stay in one place permanently. The common methods practiced are crop rotation, intensive tillage, use of crude implements and greater use of manpower.

Location:

This type of agricultural activity occurs in Southeast Asia (Indonesia, Malaysia, and the Philippines), Sri Lanka, West Africa, South and Central America and Central America.

Characteristics:

(a) Crop rotation occurs most rather than field rotation.

(b) Potatoes, Sweet potatoes, Maize, Sorghum, Banana etc are grown.

(c) This type of agriculture is often combined with the cultivation of cash crops like cacao, oilpalm, cocopalm, rubber, peanut and cotton.

(5) Intensive Subsistence Tillage (with paddy dominance):

Intensive subsistence tillage is confined to the Asian monsoon region, *South and East Asia and adjacent islands which is wet in nature. There is another pair of agricultural form, which is very different from all the rest, but the crop is different from each other with the presence or absence of rice in the association. Where the season is very long to mature rice, the excessive intensive farming system supports the dense rural population found in large areas anywhere on Earth. Although three types of crops are associated with three types of fields, the key to this land occupation is irrigable delta, floodplains, coastal plains and roofs imposed on rice. Two crops are collected in a year where the climate is hot or where the water is less or there is interference in cold weather. Rice produces more grain per acre than any other crop.*

Location:

Intensive subsistence tillage dominated by paddy is practiced mostly in the tropical Asia. It is carried on mainly in China, Japan, India, Bangladesh, Myanmar, Thailand, Srilanka, Malaysia, Philippines etc.

Characteristics:

(a) Farming is in intensive nature and double cropping is practiced. In which more than one crop is grown on the same land during a plantation season.

(b) Paddy is the only crop that can be raised in this type of farming. While other food or cash crop such as sugar, tobacco, oil seeds, or fiber crop like jute are raised normally in the dry season.

(c) Asian farmer are now producing even greater yields per acre because of the recent introduction of improved varieties of hybrid rice.

(d) Hand labour is predominant.

(e) Animal husbandry is little developed as the entire focus is on the cultivation of rice.

(f) Animal and plant manures are used liberally.

(6) Intensive Subsistence Tillage (without paddy dominance):

In areas where the neighboring country is called rice country, the crop is deprived of the lack of moisture or lack of weather, and during the year a good deal is out of service. These hurdles revise the agricultural machinery in a subtle but profound manner. For the main rice, many bowls of cereal are replaced; none of these are productive of cereals. The climatic condition makes paddy cultivation impracticable leading to inland farms where the drainage basins in the form of delta, floodplains and coastal regions are absent or short. Irrigation is practiced wherever possible even if on a small scale.

Location: It includes interior India, North-East China, North Korea, Northern Japan and parts of continental South – East Asia.

Characteristics:

(a) The land is intensively used and worked primarily by human power.

(b) Farming in these regions suffers from frequent crop failures and famines.

(c) Wheat, Soya bean, Barley, Kaoliang is grown.

(d) Irrigation is often employed as there is lack of moisture.

(7) Commercial Plantation:

The specialized commercial cultivation of cash crops like tea, rubber, coffee, oil palm, cocoa, cotton, sugarcane, pineapples and bananas on estates or a plantation is a unique type of tropical agriculture. This type of agriculture was initialized by the Europeans in their colonies. The term plantation agriculture was originally applied specifically to the British settlements in America than to any Intra estate in North America, west India, southeast Asia which was cultivated mainly by Negro or other colored labor.

Location:

Commercial plantation is found in different parts of the world though it is concentrated in the tropical regions of Asia and Africa and in the tropical and sub-tropical regions of America.

Characteristics:

i) In plantation farming a land holding is developed for the specialized production of one tropical or subtropical crop mainly for commercial purpose.

ii) Climatic hazards' like strong winds, prevalence of diseases, deterioration of soil often handicap or may even prevent the development and establishment of the plantation.

iii) The plantation estates are generally large and are found mainly in the thinly populated areas. The size of farm varies from 40 hectares in Malaya India, to 60000 hectares in Liberia.

iv) The labour is generally disciplined but unskilled and in huge numbers.

v) The characteristics features of commercial plantation are -

(a) Estate farming.

(b) Foreign ownership and local labor.

(c) Scientifically managed farming in the estates

(d) Heavy capital outlay

(8) Mediterranean Agriculture:

Within the Mediterranean climatic region where there is winter rain and summer drought a distinctive type of agriculture has evolved. This is said to be the most satisfactory type of agriculture as it represents the stable ancient relationship that existed between man and land. Here both subsistence and cash crops are grown although the emphasis on different crops varies with the amount of rainfall received. The methods used also differ from region to region for example in Italy little land labour is used while in California most of the work is done by hand. The business here is intensive. Horticulture is well developed giving high returns. The Mediterranean Lands are often termed as the "***Orchard Lands of the World***".

Location:

Mediterranean Agriculture is confined to the coastal parts of the Mediterranean Sea in Europe, Asia Minor and the North African coastal strip. Outside the Mediterranean coastal areas, this

typology is concentrated in California (USA), Central Chile, the southeast regions of Cape Province (South Africa) and South-West parts of Western Australia.

Characteristics:

(a) The Mediterranean agriculture is governed by factors like length of summer drought, availability of water for irrigation and power supply, local soil conditions, financial aspects and fluctuations in the local, regional and global markets.

(b) These conditions lead to four sub0-types of agriculture in this region –

a. Orchard farming – citrus fruits, olives, figs
b. Viticulture – Grapes for wine making
c. Cereal and Vegetable cultivation – wheat (hard winter type), barley, rice in river plains, green and leafy vegetables, lentils, beans, onions, tomatoes, carrots and sugarbeet
d. Limited animal husbandry – goats, sheep, dairy farmingnad fishing

(9) Commercial Grain Farming:

Commercial grain farming is another market oriented type of agriculture in which farmers specialize in growing wheat. This is recent development (a result of Industrial Revolution) which has occurred in the temperate grasslands of the mid-latitudes. The area used for large scale grain cultivation was previously used either for animal husbandry or for livestock ranching. Some regions were also occupied by the nomadic herders. In such a type of agriculture the balance between crop and stock is standardized. The methods are neither intensive nor traditional rather they are progressive in nature as machinery is used to a large extent.

Location:

Great wheat belts stretch through the Canadian and American Prairies, Argentinean Pampas, Eurasian Steppes, South African Velds and Australian Downs.

Characteristics:

(i) The main characteristics of this systems are--

(a) Big farms in size
(b) Comprehensive use of heavy machines
(c) Wheat Monoculture
(d) Low use of irrigation and fertilizer
(d) Low yield per acre but high yield per man

(e) Long distance of farm from the market.

(ii) Widespread use of machinery enables commercial grain farmer to operate on this large scale; commercial grain farming is more mechanized than any other form of agriculture.

(iii) Wheat is the main crop; Maize, Barley, oat are another important crops.

(iv) The wheat production regions are divided into two belts -

(a) Winter wheat belt and (b) Spring wheat belt.

(10) Commercial Livestock and Crop Farming:

This form of agriculture is often called "***mixed cultivation***" or '***mixed farming***'. It is one of the three lineages of medieval agriculture in Central Europe, all of which are different organizations having both crops and animals but in different ratios. It is one of the most developed forms of agriculture mainly found in the most developed parts of the world. Here, the ratio of crop and stock is dependent on factors like location of the farm, fertility of the soil, animal carrying capacity of land, demand of the market, price of crops and animals and government policies.

Location:

It is found throughout Europe from high land in the West through central Europe to Russia. It is also found in North America at 98° W Meridian, in the Pampas of Argentina, Southeast Australia, Australia, South Africa and New Zealand.

Characteristics:

(a) The main characterized of the mixed farming is that in the farms both livestock and the crops are integrated and their ratios standardized.

(b) Mixed farms one characterized by high expenditure on machinery farm building extensive use of machinery arm buildings fertilizers also by the skill experts of farmers who need to know about all aspects of farming to grow market their range of product successfully.

(c) Mixed farming is mainly associated with the densily populated regions, where urbanized industrialized societies are residing.

(d) More than one crop is grown; cereals dominate the land use and the leading grain varies with varying climatic and soil conditions.

(e) Within this system three well established agricultural sub systems can be recognized. These are –

a. Mixed Farming – crops are grown and livestock are raised
b. Dairy Farming – High intensive type of livestock farming

c. Market gardening and horticulture – cultivation of fruits, vegetables and flowers

(11) Subsistence Crop and Livestock Farming:

The second of the three type of agricultural land acquisition that has its origins in Northern Europe is very similar to the first one. The main difference is that in this type of system the farmer produces for his own consumption and sells either in small proportions or nothing at all. This is due to lack of finance or money, and also because of his unaffordable condition of buying expensive machinery. He can neither sow the best seed nor can buy good breeding stock. Their return is comparably low, and they cannot sell their rare surplus in competition with the high-grade and reliable production of commercial areas. In the absence of a competitive market incentive, the method is raw. In this way, the vicious circle round and round roll continues.

Location:

Parts of Northern Europe, Magreb countries, Central Asia and Mountain region of Mexico

Characteristics:

(a) Produced crops and raised livestock mainly used for own subsistence.
(b) The traditional way of farming.
(c) Seeds are poor of quality and animals are poorly domesticated.
(d) Capital input is normally unknown.
(e) Wheat, Maize, Rye, Barley etc are the main crops.
(f) Sheep and Goats are the most important animal.

(12) Commercial Dairy Farming:

The Commercial dairying is the third form that develops from the medieval system of Northern Europe. In this farming generally rearing of the cattle associated with their different products such as milk, milk products (butter, cheese, condensed milk, dried milk etc) is known for dairy farming. *Commercial dairying develops only where the products can be consumed in the immediate urban market. So far, the largest consumers of these farming products are the population of the northern European cities.*

Location:

It is mainly practiced in Europe, Northern USA, Canada, Australia, New Zealand, Denmark, Netherlands, Belgium, Finland, France, and Switzerland.

Characteristics:

i) Dairying is capital intensive and returns are high.

ii) The cattle size in diaries varies from country to country from farm to farm depending on the size of holding. In the United Kingdom, for example, the ratio of cattle pasture is one cow after one acre. The average size of dairy cattle in northwest Europe is only five cows per farm.

iii) Nearly 80% of the total milk production of the world is produced in Europe, Russia, Anglo America, Australia, New Zealand.

iv) This type of farming requires more labour than crop farms as it is associated with animals.

(13) Specialized Horticulture:

Specialized cultivation of vegetables, fruits, flowers is called horticulture. *The production of fruits and vegetables in kitchen gardens and home orchards is the characteristic of specialized horticulture. This is mainly found in the wetland areas of mid-latitude Mediterranean region. This is again found near large metropolises as the products start perishing if not consumed quickly. Although the production is dependent on demand, the returns are high.*

Location:

Horticulture is well developed in the densely populated industrial districts of northwest Europe, Britain, Denmark, Germany, Netherlands, France, Italy, Argentina and parts of North America.

Characteristics:

(i) In horticultural the farms are small; such farms are located where communication links to the consumption centers are appreciably good.

(ii) The market gardens are scientifically managed to achieve optimum yields and handsome returns.

(iii) Vegetables and bush fruits like apples, cherries and pears are main crops.

Conclusions:

By agriculture, many of the necessities of life especially food, drink, fibers are produced. In this modern period, most of the people are depends on agriculture for this food livelihood. But at this stage, many portions of the world suffer from food deficiency. So, a modern cultivation method should be applied for achieving sufficiency in food.

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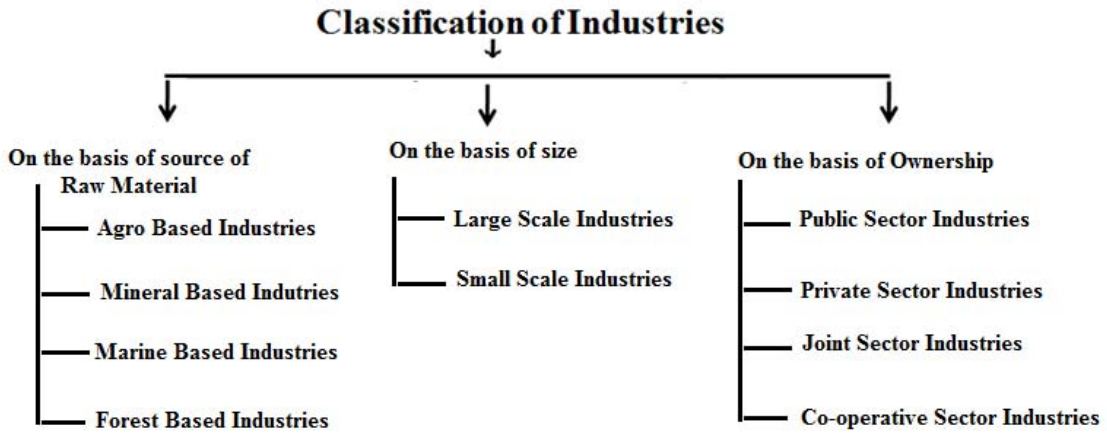
UNIT- IV-INDUSTRIAL GEOGRAPHY

The basic needs of humankind are food, clothing and shelter. For food, humans cultivate several different crops and produce food. The cultivation of crop is generally referred to as agriculture. Humans process these agricultural products through flour mills and preserving industries into palatable food products. The industries involved here are food processing industries. For clothing, humans produce cotton, jute, silk and wool and manufacture clothing in the factories. This is called textile industry. They also manufacture building materials such as bricks, iron and steel products, cement and the like. Therefore, we may define 'industry' as that activity which produces what human beings need in their lives and living.

When humans were primitive, their needs were but a few. Industry was not extensive. With modernisation, the necessities were increasing. With population increases, consumption was on the rise. Humans could not meet their needs only by manual production. Hence, the need to discover machines arose. With the industrial changes in the eighteenth century, industrial activities grew rapidly. As a consequence, humans have developed a multitude of industries to satisfy their needs.

CLASSIFICATION OF INDUSTRIES

Generally Industries can be classified into different types on the basis of raw materials, location, size, production, process, the nature of work and ownership of the industry.



ON THE BASIS OF RAW MATERIALS

(i) Agro Based Industries:

These industries use plant and animal based products as their raw materials. Example: Food Processing, Vegetable Oil, Cotton Textile, Dairy Products, etc.

(ii) Mineral Based Industries:

These are the industries that use mineral ores as their raw materials. Iron made from iron ore is the product of mineral based industry. Cement, Machine Tools, etc. are the other examples of mineral based industries.

(iii) Marine Based Industries:

These industries use products from the sea and oceans as raw materials. Example; Processed Sea Food, Fish Oil manufacturing units etc.

(iv) Forest Based Industries:

These industries use forest products as their raw materials. Example: Pulp & Paper, Furniture and Some Pharmaceuticals industries, etc.

ON THE BASIS OF SIZE AND CAPITAL

(i) Large Scale Industries:

The capital required for the establishment of an industry is more than one crore the industry is called as large scale industry. Iron & steel, Oil refineries, Cement and Textile industries are the best examples for large scale industries.

(ii) Small Scale Industries:

The capital required for the establishment of an industry is less than one crore, the industry is called as small scale industry. Silk weaving and household industries belong to this category

Apart from the above cited industries, cottage or household industries are also a type of small scale industry where the products are manufactured by hand, by the artisans with the help of family members. These industries are also classified and grouped as miscellaneous categories. Example: Basket weaving, Pot Making, handicrafts etc

On the basis of Ownership

(i) Private Sector Industries:

These type of industries are owned and operated by individuals or a group of individuals. Example: Bajaj Auto, Reliance, etc.

(ii) Public Sector Industries:

These type of industries are owned and operated by the Government. Hindustan Aeronautics Limited (HAL), Bharat Heavy Electricals Ltd (BHEL), Steel Authority of India Ltd (SAIL) are the examples of Public sector industries.

(iii) Joint Sector Industries:

These types of industries are owned and operated jointly by the Government and Individuals or a Group of Individuals. Example: Indian Oil Sky Tanking Ltd, Indian Synthetic Rubber Ltd, Mahanagar Gas Ltd, Maruti Udyog etc.,

(iv) Co-operative Sector Industries:

Industries of this kind are owned and operated by the producers or suppliers of raw materials or workers or both. Anand Milk Union Limited (AMUL) is the best example of the Co-operative sector

Functional Linkage

These activities are all integrated by their functions and this is designated as the 'functional linkage'(Figure 4.1)

The raw materials needed for an industry come from another industry. Similarly, the products manufactured by one industry is marketed by another industry. Thus, any industry has at the least two such linkages and they are termed: Input linkage and Output linkage.

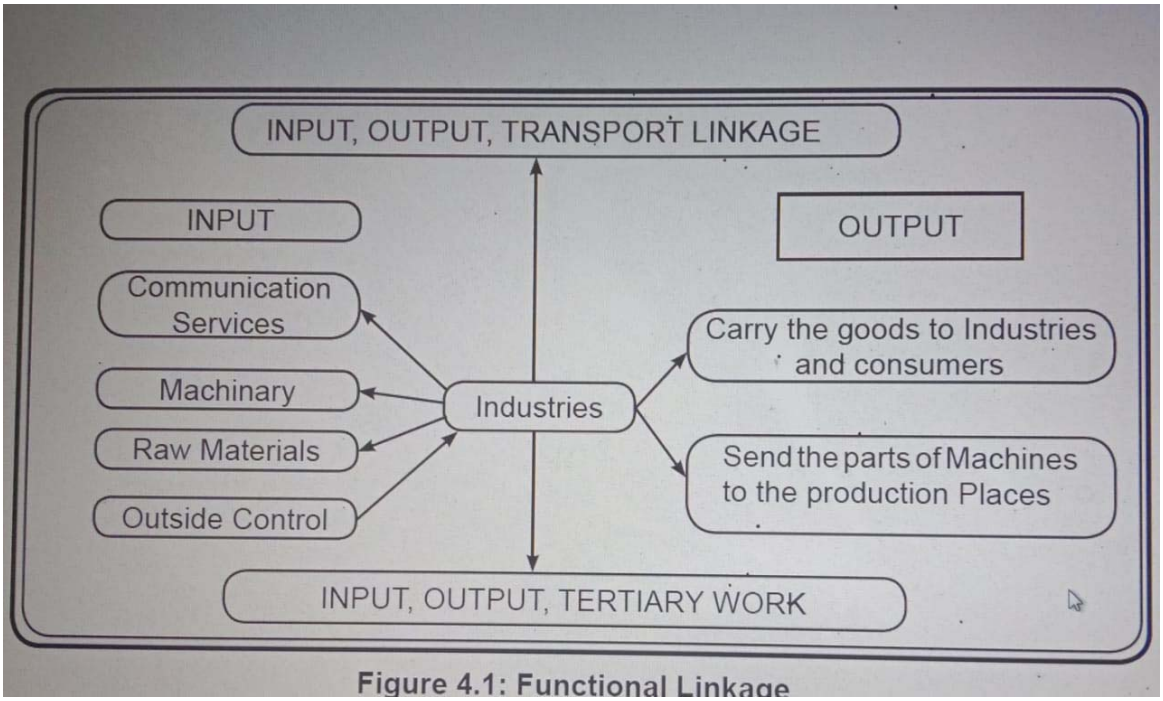


Figure 4.1: Functional Linkage

Input Linkage.

This relates to a function in which the input for one industry is got from another. For example, a small iron lathe works obtains the iron it needs from another smelting industry. This linkage is known as 'input linkage'. Output Linkage. The iron that was shaped in the lathe is then transformed into a product for consumption. Then, it is sold in the market through another institutional arrangement, say, dealers. The linkage so developed is called the 'output linkage'. When obtaining its inputs and when marketing its output, an industrial unit is in need of, integrally, functioning with the transport, bank, telecommunications and other institutions.

Functional Characteristics

An industry is not generally linked with its allied industries in the same way. It is strong and necessary, with some of them. And, with others, it may be weak.

Strong Linkages.

Industries are linked with one another purely in response to the needs to be in such links. The change that occurs in one such link could cause further, more stronger changes in other links. For example, for iron and steel, the important raw materials are those of the iron ores and the coal. Therefore, the iron and steel industry and the mining units of iron ores and coal are inter-linked. If either raw material is not available, it would be difficult for the iron and steel industry to carry on. Further, there is no substitute for either iron ore or coal in smelting iron. Thus, some

industries are very strongly linked with some other industries.

Weak Linkages.

There are instances where one industry is less strongly linked to others. For instance, steel industries depend on banks for their day-to-day transactions. But, if banks are affected for some reasons, it might not result in any big difficulty for the steel industry. The industry could make alternative arrangements for financial transactions.

As the industries are dependent on each other, their locations are structured in a certain way. As primary industries are dependent on natural resources, they are structured in accordance with their locations. For example, agriculture, mining and fishing can only operate in places appropriate to themselves. As the secondary industries are dependent on the primary industries, they are also located nearer to the locations of the primary industries. Industries separating the metals from their ores are generally located near about the locations of ore mines. Similarly, the textile industries are located in the midst of cotton growing areas. In recent times, however, secondary industries are located even away from industrial raw materials, as a consequence of rapid and cheap transport over long distances. For example, the iron ores mined in Indian mines are being used in the manufacture of steel in Japanese industries.

Tertiary and quaternary industries are located either in or near the urban centres. Thus, location of industries is influenced by raw material locations or transport facilities. In some places, industries are in a cluster. There are linkages between the industries that are found in a cluster. Such clustered areas are known as the 'industrial regions'. The Chotanagpur plateau region of Bihar, Orissa and West Bengal is an example of such a region. There is a large number of iron and steel industrial units in this region. In Coimbatore and Madurai of Tamil Nadu, there is a concentration of textile units.

In several countries of the world, there are industrial systems and industrial regions. Examples are the Ruhr industrial region in Germany and the Great Lakes industrial regions of the United States of America. Let us now examine the reason why industries are found in certain regions.

Factors of Industrial Location

In order that the industries operate at maximum profit and optimal production,their locations can be important. The following are the basic factors of industrial location. Of these, either all of them or a combination of a few are important in locating the industries.

Raw Materials.

Natural resources are generally raw materials. They are obtained through primary industries. Iron ore, timber, chemicals and skins, for example, are raw materials for some specific industries. Industrial productions depend upon the supply of raw materials. Industries depend on heavy raw materials or on bulk of the raw materials for production are located in the places of raw materials. Steel industries are found where iron ores are mined. Likewise, they are also located nearer ports to facilitate import of raw materials from elsewhere. Also industries such as those producing perishable items, food processing, forest products and mineral industries and also secondary industries are all located in the places of raw materials. These could be mineral resources, agricultural products, forest resources, animal or sea products.

Market.

Market is where demand and supply meet. Manufactured products are sold in the markets for meeting the consumer needs. Purchasing capacity, people's demand and the ability to earn determine market development. Industries located nearer to markets are those which process fruits, flowers, fish and such other perishable products, glass industry, cheap but bulk products, bricks, tiles and packaging industries. Even weaving industry is located nearer to markets. Those industries which are in need to be in contact with people are also located nearer to the markets.

Location.

Industrial location is determined by the climate and topography as well. Flat and areas rich in water resources are also favourable areas for industrial location.

Capital.

No industry could function without capital. To buy the land where industry is to be set up,

raw materials, office equipment and to pay wages, we need the capital.

Transport.

To transport raw materials to the industrial site and the finished products to the market, we need transport.

Fuel.

For every industry, fuel is the most important need. Industries are dependent on the location of coal, petroleum, hydroelectricity and atomic power. There is however no need for the industries to locate themselves nearer to sources of fuels other than coal, as they are easily transported or transferred.

Labour.

The size of an industry is determined by the number of labour employed by it. Availability of labour and their skill determine the productivity of an industry. Even while introducing new technology, it is difficult to retrench employees. Hence, labour intensive industries are located nearer to their places of residence.

Government.

Economic and political factors affect industrial production. Industrial policy of the government has the industrial production.

Historical background and technological development are also influential in the location of industries. Relocation of an industry is almost impossible proposition. If it happens, then it is because of inefficient labour, lack of transport facilities and high rent; it is even possible for the industry to be closed due to these factors.

The factors above impact upon the industrial location in different ways. All locations are determined by the operation of some of these factors. Those that are not available become more significant.

Theory of Industrial Location

The impact of these factors of industial location on the existing locations become somewhat clear when we look at the industrial regions. It is on the basis of observed facts about an industrial region, 'the Industrial Location Theory' was explained by Weber. Four significant factors have been elaborated in the explanation of his theory.

They are:

1. Resources Locations (R1, R2)
2. Market Location (M)
3. Nature of Finished Products (bulky, weight losing, weight gaining)
4. Transport Costs

Several people have developed industrial location theories. They have been suggested with a view to indicating how economic profits may be maximised if industries were located in a specific place. High profits from industrial production are obtained in two ways. They are: Reduction in Production Costs and High Returns. It is rare to find places which offer both these benefits. Based on the two, the industrial analysts have therefore offered two types of 'theories of industrial location':

1. Locations with low production costs (Least Cost Locations)
2. High return locations (Maximum-Revenue Location)

WEBER'S THEORY OF INDUSTRIAL LOCATION

Alfred Weber, a German economist was the first who gave scientific exposition to the theory of location and thus filled a theoretical gap created by classical economists. He propounded his famous industrial location theory in 1909 which was published in German language, book entitled **'Uber den standart der Industrien'**. The theory was translated into English language which was published as **'The Theory of the Location of Industries'** in

1929. Since then, the work on industrial location has been critically reviewed and highly commended. His theory, which is also known as **'Pure Theory and Least Cost Theory',** has analytical approach to the problem. The basis of his theory is the study of general factors which pull an industry towards different geographical regions. It is thus deductive in approach. In his theory he has taken into consideration factors that decide the actual setting up of an industry in a particular area.

Problems:

Weber was faced with many serious problems. He wanted to find out why did industry moved from one place to another and what factors determined the movement. According to Weber, factors affecting location of industries may be broadly classified into two groups or categories:

1. Regional factors or **Primary** causes of regional distribution of industry.
2. Agglomerative and degglomerative factors or **Secondary** causes responsible for redistribution of industry.

In so far as regional factors were concerned these, among other things, included cost of the ground, buildings, machines, material, power, fuel, labour, transportation charges and amount of interest that the capital would have earned.

1. Regional Factors:

After examining the cost structures of different industries, Weber concluded that the cost of production varies from region to region. Therefore, the industry in general is localized at a place or in a region where the cost of production was the minimum.

According to Weber there are two general regional factors which affect 'cost of production:

(i) Transportation costs, and

(ii) Labour costs.

In fact, these two are the basic factors influencing location of industries.

(i) Transportation Costs:

Transportation costs play an important part in the location of an industry. Transportation costs are influenced by the weight to be transported and the distance to be covered. Generally, industries will tend to localize at a place where material and fuel are not difficult to obtain. Weber has further given that the basic factors for location of an industry are the nature or type of material used and the nature of their transformation into products.

(ii) Labour Costs:

Labour costs also affect the location of industries. If transportation costs are favourable but labour costs unfavourable, the problem of location becomes difficult to have a readymade solution. Industries may have tendency to get located at the place where labour costs are low. But labour and transportation costs should be low for an ideal situation. Whether labour costs will have an upper hand in the location of an industry will be decided by labour cost index.

2. Agglomerative and Degglomerative Factors:

Agglomerative factors make industries centralize at a particulars place. Such factors may include banking and insurance facilities, external economies and the like. The tendency of centralization is influenced by the manufacturing index which indicates the proportion of manufacturing costs in the total of production. If the coefficient of manufacture is high industries will have a tendency to centralize, if it is low, tendency of decentralization may be visible.

Degglomerative factors are those which decentralize the location of industries. Examples of such factors are local taxes cost of land, residence, labour costs and transportation costs. Such factors decentralization because the cost of production stands reduced due to decentralization of shift in location.

ASSUMPTIONS OF THE THEORY:

Weber mainly attempted to analyse different cost minimizing factors and processes and their impact on industrial location. Like in other deductive theories, Weber also offered certain assumptions before analysing the theory. His assumptions were as follows:

(1) The area is typically uniform or isotropic in form of terrain or relief, climate, soils, economic system, technology and distribution of population.

(2) Manufacturing involves a single product at a time and the product is supplied to a single market.

(3) Raw materials are not evenly distributed in space but at a few known and fixed locations which are available at equal transportation cost throughout.

(4) Markets are known as fixed at specific places.

(5) The distribution of labour is fixed, as are wages at any specific location. Wages, however, can vary from one location to another. This means that labour was not mobile, and thus not affected by the location of industries; (of course, Weber knew this was not actually true in the real world).

(6) Transport costs are uniform and tend to increase with increasing linear distance and weight of material transported. Transport routes are not fixed but connect origin and destination by the shortest distance.

(7) Other assumptions include: (a) there is a perfect market competition, (b) each industry would incur identical production cost, and (c) there would be a uniform demand and uniform price for a product at all markets.

Description of the Theory

According to Weber, the optimum location of a firm is determined by transport cost, labour cost and advantages of agglomeration. To him, at first the point of least transport cost is determined and there after the effect of advantages of agglomeration is considered.

Role of Transportation Costs:

1. **A one market (M), one raw material (R1) condition gives rise to THREE situations.**

   (i) **Raw Material Available Everywhere:** The best location in this situation is the market, as that will simply eliminate the transportation costs for the manufacturing unit.

   (ii) **Raw Material Fixed, And Pure:** The manufacturing unit, in this case, should be located either at the market or at the source.

   (iii) **Raw Material Fixed and Gross (i.e. It Loses Weight on Processing):** The best location will be at source.

2. **One Market, two Raw Materials (R1, R2) condition gives rise to FOUR situations.**

(i) **Both R1 and R2 are found everywhere:** here, the best location will be at the market, as in that case, lowest transportation costs would prevail.

(ii) **R1 is fixed, R2 is found everywhere, both are pure:** the best location would be at the market, because then, transportation charges for R1 only will have to be paid.

(iii) **Both R1and R2 are fixed and pure:** the best location will be at the market, because in that case lowest aggregate transportation charges will prevail.

(iv) **Both R1 and R2 are fixed and gross:** this is a complex situation, for which Weber introduced the **"locational triangle"**. Two raw materials-R1, and R2-and market

(M) form the three modes of this triangle. The transportation charges are a product of the cargo weight and the distance carried by transportation. Thus, a pull is being exerted on the location by each of these three modes. It is seen that the weight-losing manufacturing processes like iron smelting tend to be located near the source of raw materials, while the weight-gaining ones like baking tend to be located near the market (Fig. 1).

Role of Labour Costs:

To determine the role of locational pattern of labour force on manufacturing location, Weber's locational triangle is placed in concentric pattern of rising transportation costs outwards from the centre (Fig. 1). It is assumed that the labour force is dispersed outwards and the distance from the centre represents savings on account of labour costs decrease and a point (L) comes where the savings on labour cost overcome the handicap of rising transportation costs. This is a more profitable location than 'F' which is the lowest transportation cost location.

According to Weber, labour is concentrated at some definite places and different places have different labour cost. In order to save labour cost, the industrial plant may be relocated away from the point of the least transport cost. An industrialist considers the possible savings in labour cost being greater than any possible additional costs involved, he would be making a move from the point of least transport cost. Weber resolved this matter through using isodapane method.

isodapane is defined as a contour line drawn through all the points with equal total transport costs, with reference to the supply of each input at the point of industrial location, as well as the finished products. Isodapane joints those points where increased transport costs are balanced by labour movement cost savings.

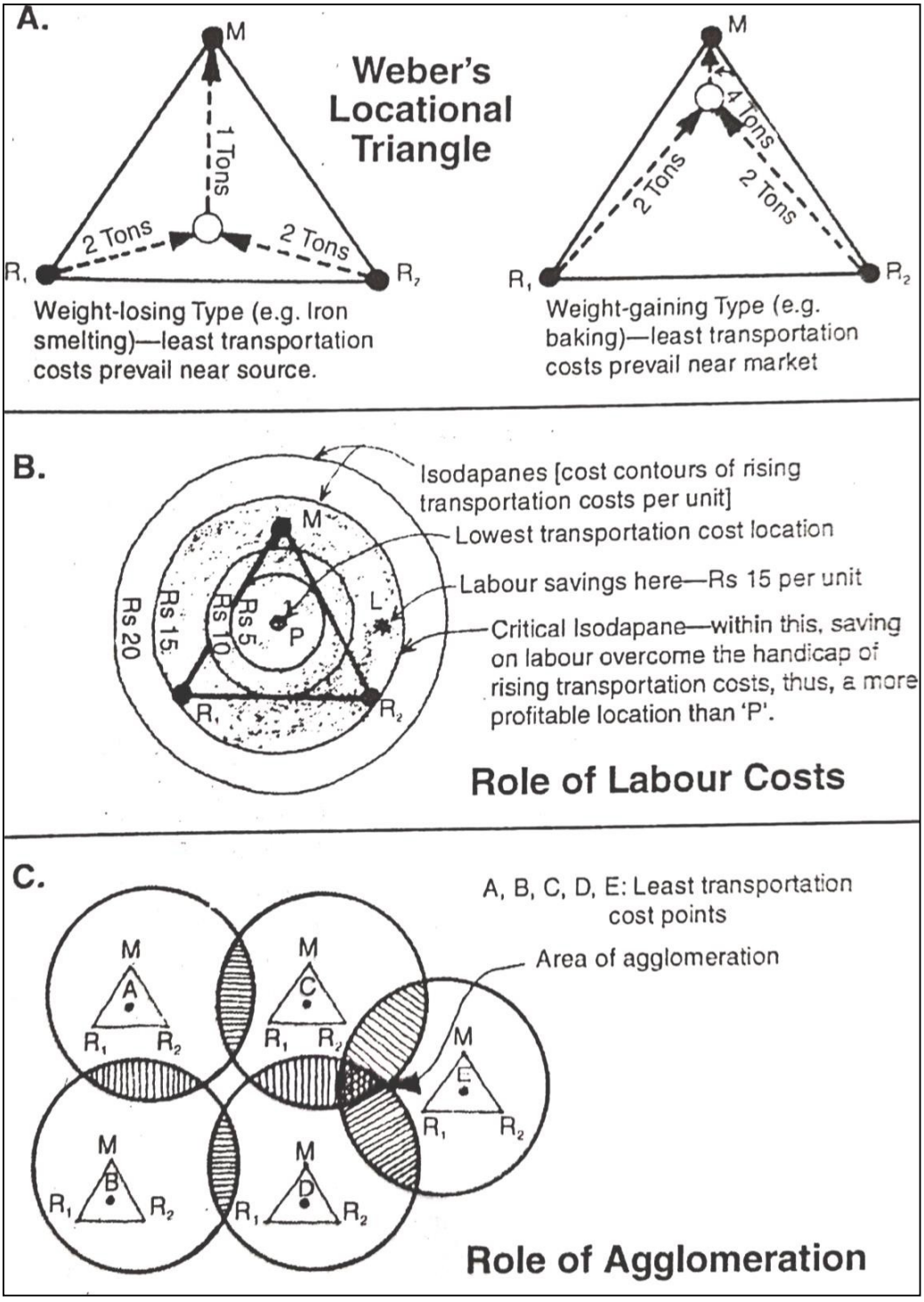


Fig. 1: Weber's Theory of Industrial Location

Role of Agglomeration:

The coming together or agglomeration of industries offers cuts in production costs if two or more industries operate in the same location (Fig. 1). Weber visualized agglomeration economies as an important secondary factor. Agglomeration of industries occurs when several industrial enterprises with different industrial plants would mutually concur to locate and operate at a clustered spatial point closely. Agglomeration economies denotes the savings of the individual plants that result when they operate at the same location. This saving is the result of common use of such activities as financial services, public utilities, auxiliary industries etc. As more and more enterprises cluster, linkage increase and there is an increased flow of goods between plants specialized labour and savings because of purchasing of materials in bulk and facilities of large-scale marketing of finished products. Thus, agglomeration economies can be obtained when a firm produces items in mass or when many firms cluster together in the same location. Agglomeration economies exert significantly on the location of industrial plants. Weber visualized agglomeration economies as a strong deviational force on the location of minimum transport cost in the same way as is exerted by cheap and skilled labour locations.

CRITICISM:

Weber's industrial location theory explains some basic influences on the location of industries, but it has been criticised mainly because of its assumptions and changed circumstances related with technology, transport system etc. Some important criticisms of Weber's theory are given below:

1. Unrealistic Assumptions:

According to critics of this theory, Weber has unrealistically oversimplified the theory of industrial location. Many assumptions in the theory are unrealistic. According to them Weber has taken only two elements for determining the cost of transportation namely weight and distance. He has not given due to place to the type of transport, quality of goods to be transported, topography, character of region etc.

2. Labour Centres Notion Defective:

Weber’s ideas about labour centres have also not been accepted. He has started with the presumption that there are fixed labour centres with unlimited supplies of labour in each of them. Obviously both these assumptions are not correct. There cannot be fixed labour centres, because each industry creates new labour centres. Similarly, there can never be

unlimited supplies of labour in any centre.

3. Ideas about Fixed Points of Consumption:

It is argued that Weber's this idea does not work well with the market conditions in a competitive structure. Consumers are always scattered all over the country and thus consumer centres always shift with a shift in industrial population. There can therefore be no fixed point of consumption.

4. Vague Generalisations:

Weber, while expounding his theory of industrial location, has introduced, it is believed, certain vague generalisations. He has given no due place to non-economic factors of industrial location, which play a big role in this regard. Who can deny that there are certain historical and social forces which go a long way while deciding industrial location of an industry, but he has completely ignored them, which has made his theory very unrealistic.

5. Defective Method of Analysis:

Weber has tried to classify material into ubiquities and fixed material. Again, the division is arbitrary. According to Robinson who does not know that in actual practice materials are drawn from many alternative fixed points.

6. Overburdened with Technical Considerations:

Theory is heavily overburdened with technical considerations. It has not laid due stress on costs and prices and has over stressed technical coefficients. The most important criticism about Weber's analysis is that it is lamentably removed from all considerations of costs and prices and it is formulated mainly in terms of technical coefficients.

Utility of the Theory:

No doubt theory suffers from some serious defects, yet it cannot be denied that it has its own value, importance and significance. It is primarily because the alternatives given are neither comprehensive nor complete. So far it is the only theory which is capable of universal application.

Every change of industrial location involves a change in the combination of means of production. But this theory obviously does not provide any guidelines for locating new industries.

Technical Terms

In the analysis of his industrial location theory, Weber has introduced and defined certain technical terms. He classified materials in terms of weight and availability and their relative significance in processing of products. The terms are as follows:

(1) Ubiquities or Ubiquitous Materials: The raw materials used in manufacturing industries which are available constantly everywhere and are not localised. Such materials do not influence the selection of location of the industry concerned.

(2) Localized Materials: Such raw materials which are found only in some well-known geographical areas. Examples include coal, petroleum, gold, bauxite etc.

(3) Pure Materials: Such raw materials which do not lose, or nominal lose their weight in processing. Raw cotton in spinning or cotton yams in weaving are given as examples.

(4) Gross Materials: That materials which lose weight in processing. Such materials differ in the proportion of loss depending on the characteristics. For example, iron ore, tin are, bauxite ore, sugarcane, sugar beet etc. lose their weight very much in processing.

(5) Location Weight: The total weight that is involved in movement of raw materials and produced materials per unit of products. It is the combined weight of raw materials and manufactured goods.

(6) Material Index: It is a measure of materials used in manufacturing industry which is calculated by the total weight of localized materials used per product divided by the weight of the product. Manufacturing industries in majority have an index greater than 1.0 and are called ***'weight losing'***. Thus, material index is used to indicate whether the least cost location is oriented towards the source of raw material or market centre. If the material index comes to be less than 1.0, it favours market site plant location; if it is more than 1.0 it moves to the raw material site location, and if a plant uses only pure material as raw material, it has an index of 1.0 and may be located anywhere.

(7) Isodapane: A line joining the places (points) having same transport cost per unit manufactured good is termed as isodapane by Weber.

Essay on the Profit Maximisation Theory of August Losch

1. Introduction to the Profit Maximization Theory:

August Losch, a German economist, published his theory of „Profit Maximization" in the year 1954. The least cost location theory of Weber was wholly discarded by Losch. In fact, he suggested that, „profit maximization" is the only objective of the entrepreneur, whether it is state or an individual. The major objective of the industry is, therefore, to find out the place where maximum profits occur.

Unlike Weber, who postulated his entire theory in an economic state of perfect competition, Losch, on the other hand, explained his theory within the environment of monopolistic competition. According to Losch, industry will not necessarily be located within the least cost (transport cost and labour cost) location; rather it would locate in areas where maximum profit will occur. So, ignoring transport cost, labour cost and agglomeration cost, he emphasized more on the total production cost.

To get the maximum profit, as stated by Losch, total consumption is important. Higher the consumption rate, greater will be the profit. In this case, he emphasized most on the price reduction of the commodity. Any decrease of price would automatically stimulate the volume of consumption. This can be illustrated by the following diagram.

In this simple model, it is evident that when price of the commodity drops from R to P, the consumption increases from M to N. The theory of August Losch considered demand as a most important variable. The fundamental objective behind the theory was to find out the most profitable location for industrial establishment.

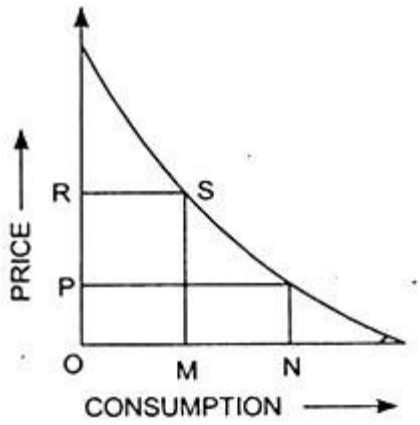


Fig. 4

To determine the location of maximum profit, Losch said, "The complexity stems from the fact that, there is more than one geographical point where the total demand of a surrounding district is at a maximum. We are thus reduced to determine separately for every one of a number of virtual factory location the total attainable demand, and for similar reasons the best volume of production as a function of factory price (Market and Cost analysis). The greatest profit attainable at each of these points can be determined from the cost and demand curves, and from this place of greatest money profits, the optimum location can be found".

Losch argued that most of the existing theories are all simplified and generalizations of the complex problem of industrial location. Like Weber, he also considered certain assumptions for the success of his theory.

2.Assumptions of the Profit Maximization Theory:

Like Weber‟s theory, „profit maximization‟ theory of Losch is not universally applicable.

In the presence of certain optimum conditions the maximum profit location may occur:

1. The area under consideration should be an extensive homogenous plane where raw materials are distributed evenly.

2. The „transport cost‟ is uniform and directly proportional in all the directions.

3. The people inhabiting the region have a general homogeneity either in taste, knowledge and technical skill.

4. There is no economic discriminations among the people. The economic and ca reer building opportunities are open and uniform to all individuals.

5. The population distribution is very even and the area is self-sufficient in agricultural production.

In the case of excess production of agriculture, the status quo of economy will be distorted. To achieve homogeneity of economy within the region, the theory required some more conditions.

These are as follows:

1. The entire area should be equally served by the factories. No area should be exempted from the supply; therefore, no new firm would dare to venture in the area.

2. There must be conformity in the range and quantum of profit. In case of abnormal profit, new firms may try to establish their own plant.

3. The location must satisfy both producer and consumer. The profit of the firm and satisfaction of the consumer must be optimum through the location.

4. There must be provisions for consumers to get the products from other adjacent areas.

5. The number of consumers, producers and areas should be well defined and not very extensive. Only a limited number of producers within a small area will be able to overcome the complexities and satisfy completely the handful of consumers.

According to Losch, to get the desired result from the location and sustained growth of the industry, these conditions are pre-requisites.

3. Explanation to the Profit Maximization Theory:

The major objective of the location theory is to attain equilibrium in the producing area and the product and the ability of the producer. If a single entrepreneur enters in the production process, within a vast area, the distribution cost will be very high.

But when several small producers are engaged in the production process in separate regions, the distribution cost will come down and due to increasing competition, efficiency of the product and cost of production will be lower.

The profit will increase substantially. Due to increasing competition, the area served by individual manufacturing units will be reduced. In the reduced area, several producing units will remain adjacent with each other, without leaving any area un-served. So, in this particular situation, a hexagonal area would serve the purpose. To establish his theoretical model of the theory, August Losch proposed three distinct phase of development.

The phases are as follows:

I. In this first phase Losch observed that if sufficient and symmetrical demand of a prod uct prevails in the market, the market conditions may be explained by a demand cone. The following diagram illustrates that the effective demand of the particular product will be exactly same to the volume of the cone.

In Fig. 5, P is a producer, and demand curve is lying on QF. P or price line, controlled jointly by transport cost and distance. The price increased from P to F. Along the Y axis or PQ, demand of quantity is measured between PF and QF.

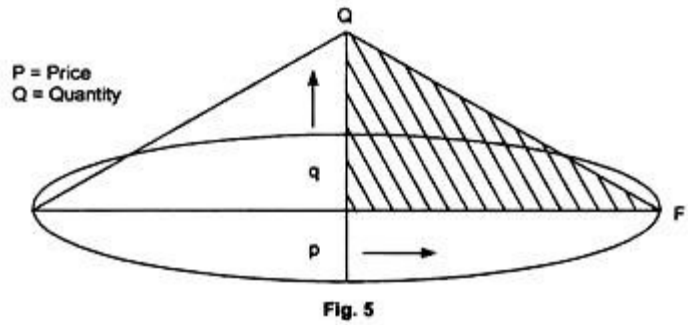


Fig. 5

When PF is taken as a measure of distance and is rotated about P, the circular market area is formed, bounded by the locus of points F, where the price becomes too high. Total sales are given by the volume of the cone produced by the rotation of PQF.

In Fig. 5, it is clear that, away from centre, with increasing distance, demand of the quantity drops drastically.

II. In the second phase, within the vast rounded area, several factories will concentrate. The virgin, extensive market area will automatically give a lucrative operational area.. But despite the growing competition among the firms to capture larger share of consumer and larger market areas, there should be some void in the boundary zones.

Like intra- molecular space, a certain amount of region will remain un-served or poorly served. Though the mal-distribution of firms may result in shrinkage of areas in some instances, some other regions will be devoid of any industry. The circular pattern of industrial hinterland in phase two will ultimately decide the future of the industry in that region.

In Fig. 6, the space situated outside the circular areas is still lying vacant. It is quite natural for the other industries to capture these potential market areas, hitherto unexploited. The influx of new industries in the region will result in shrinkage of the market areas (denoted in Fig. 6 by circle) of different productioncentres.

The intrusion of one market area to other will distort the circular market areas and the market areas of different production units will further reduce. This situation will lead to the initiation of the third phase.

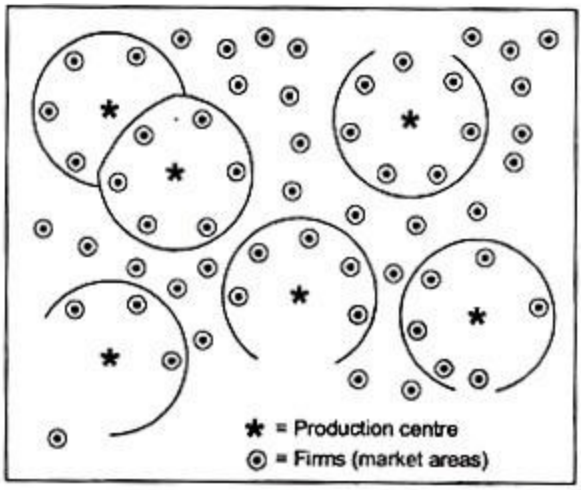


Fig. 6 : Second stage of theory of profit maximization

III. In the third phase of industrial location witness the narrowing of the intermediate space between two market areas. The areas fall vacant between the different markets areas become the target of new enterprises.

As new firms set up within the vacuum, the hinterlands of earlier industries become reduced. The reduction of the market area results in rapid disruption of the early circular pattern. Gradually the market area of the industries attains a hexagonal shape.

According to Losch, when any area possesses several hexagons, lying upon each other and surrounding a particular centre, a metropolitan city will grow. In other words, it may be said that around the nucleus of a city, numerous hexagons or market areas of different commodity will grow.

So, in this fashion, industries would concentrate within a region, each having different products. So, almost all types of materials including raw materials should be available on that point.

Hence, any new industry would get its required raw material within near distance. Obviously, the total transport cost in that place will be minimum. In this way, „equilibrium conditions" as stated by Losch may be attained (Fig. 6).

Losch, however, himself hinted about the deviation of his theory in some special conditions. According to his conception, when price of the commodity of a particular firm increases,demand of the product decreases considerably.

Naturally, due to higher price, the company loses some of its market area. Automatically, that area is encroached by the adjacent firm. In this fashion, market area of a unit changes continuously. This incident was explained by the figure given by Losch in Fig. 7.

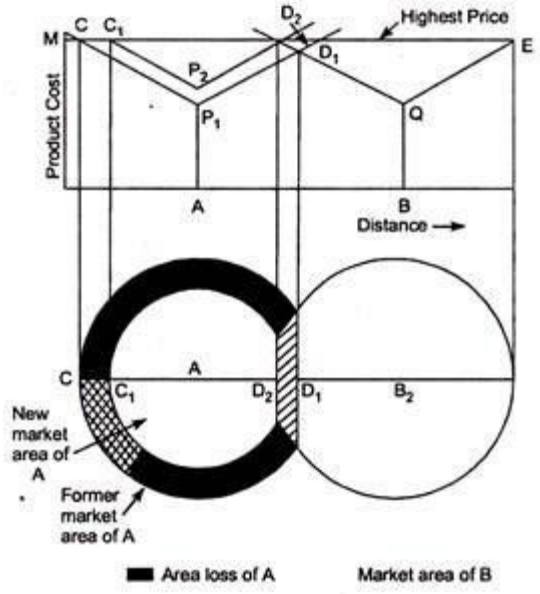


Fig. 7

Fig. 6 shows the development of hexagonal market area in the third stage. The dotted lines represent market boundaries of respective production centres. The crossed area is the production centre.

In Fig. 7, as stated by Losch, A and B are two producing centres, with total production cost of P and Q. Their respective market boundaries are CPD_1 and EQD_1. At the product cost of M, their

production touches the optimum level and equilibrium is attained. But when production cost at A increase from P_1 to P_2, the equilibrium condition is disrupted. The product of A becomes less attractive than before, so market boundaries also reduce from CP_1D to $C_1P_2D_2$.

Following the reduction of market of A, automatically market area of B advances in that void region. The previous area of EQD_1 increases to EQD_2. This D_1D_2 areal increase is well reflected in the circular diagram of Losch. The BD_1 radius increases to BD_2 and former AC radius reduces to AC_1.

4. Merits of the Profit Maximisation Theory:

1. August Losch tried to restore a order in the former chaotic classifications of industrial location.

2. He was the first person to consider the influence of the magnitude of demand on indus trial location.

3. August Losch rightly emphasizes upon the role of competition as an important determinant of location analysis.

4. The calculations adopted by Losch were simple and easily applicable to any place.

5. The theory has also a philosophical contribution on the motive of entrepreneurs‟ role.

6. His equilibrium concept is perhaps the greatest contribution among the location theories developed later on.

7. The least cost concept of Weber was nullified by Losch and instead more precise „profit maximization‟ concept was adopted.

5.Demerits of the Profit Maximisation Theory:

Of course, the theory of Losch was not entirely flawless. Numerous criticism from differ ent quarters were put forward against the theory on various grounds.

The major points against the theory are as follows:

1. This theory is essentially a simplified model or theorizing of an ideal condition. In reality, only in a rare occasion, these events may occur.

2. The assumed conditions of homogeneous plain region, equal distribution of raw mate rials and uniform transport rates never occur in the real world. Therefore, Losch's theory, as said by some critics, is nothing but only intellectual exercise.

3. Losch even assumed the cultural homogeneity and uniform taste of the people within the region. This is nothing but absurdity.

4. He ignored the variation of technological development of different regions. The difference of technical know- how mayoffset the theoretical model.

5. Political decisions play an important role in the industrial location. Losch ignored it.

6. The variation of the cost of raw materials and labour wage rates were not given proper weightage in the theory.

7. Losch categorically separated the role and effect of agriculture and industry. But this difference is somehow arbitrary in nature.

8. The abstract and optimum situation demanded by the theory may be available in agriculture but not in the complex production process of modern manufacturing industries. Thus, Losch theory is more practical in agriculture, rather than in industry.

Resource Based Industries

All the industries which are based primarily on the raw material are called resource based industries. In case of resource based industries, the location of raw material play an important role in the location of industries.

There are various kinds and range of goods and services, so resource based industry may be also of various types. Based on the value addition and tangibility broadly we can have three types of industries : primary industries, secondary industries and tertiary industries. As one moves from primary to teritiary industries, the role of raw material in the location of industries decreases.

1. Primary industries.

2. Secondary industries.
3. Tertiary industries.

Primary Industries

The industries that help extract resources directly from nature are collectively called 'primary industries'. These are fundamental to other allied industries. Hunting, fishing, cultivation of crops and mining are 'the primary industries'. It is the primary industries that provide the food the humans need. They also provide for the raw materials the secondary industries demand.

Secondary Industries

It will have a very complex and diversified structure. The secondary industries takes input from primary industries and add significant value to it in different processing stages. The value addition are so significant that they may have a locational preference in favour of market.

The secondary industries are sub-divided into the following

Heavy Industries

The prominent characteristics of heavy industries are their bulky product or very high capital inputs or units. These may have high capacity to influence environment adversely. Examples of heavy industries are heavy chemical, heavy machinery, locomotive, ship building, heavy electrical etc.

Light Industries

These industries are more inclined to consumer products and are less capital intensive. The products of light industries are usually lighter in weight, require less power, less polluting and can be established in small areas.

Tertiary Industries

The products of the primary and secondary industries reach the people in different parts of the world through transport, trade and allied institutions such as banks, telecommunications, recreation and tourism and such are then called 'the tertiary industries'

Footloose Industries

The industries which are established independent of locational aspects of plant are called as footloose industry. The products of footloose industries are having very high value addition and smaller in size and so transportation cost is only a small fraction of total cost. These industries usually requires a very small production space, are usually less polluting and but requires highly skilled workers.

Footloose industries are those that do not have to locate close to raw materials (unlike the early iron and steel industry that had to locate close to iron ore and coal etc.). Footloose industries locate in pleasant environments near transport routes and near the markets. Examples are watch, camera, diamond cutting, prescision electronics etc.

A footloose industry does not have a strong locational preference because the resources,

production skillz nx onsumers on which it depends can be found in numerous places. Such a company may therefore be more prone to relocation, hence the term footloose.

The basic premises of footloose industries are derived from the work of German economist Alfred Weber, who was probably the first to theorise on the location of industries in the beginning of the 20th centrury. First, we must assume that the most important factor in industrial location is the cost of transportation (however, this is less true over time.

Other types of manufacturing can be market oriented. Let's take the example of a dairy. If we assume that cows can graze just about anywhere and that milk is a perishable commodity, dairy production should be located close to the consumers the industry serves. For resource and market orientation, the locational choices of industries are limited and the spatial margins to profitability and narrow.

UNIT V: Geography of Transport and Trade: Models of transportation and transport cost – Gravity and Allocation models (Edward Ullman and Hurst) - Accessibility and connectivity – inter-regional and Intra-regional – Comparative cost advantages.

- Estimating flows between locations is a methodology of relevance to transportation. These flows, known as **spatial interactions**, enable to evaluate the demand (existing or potential) for transport services.
- They cover forms of mobility such as journeys to work, migrations, tourism, the usage of public facilities, the transmission of information or capital, the market areas of retailing activities, international trade, and freight distribution.
- Mobility can be physical (passengers or freight) or intangible (information), and
- each form of mobility is subject to a form of friction.

Theory of Spatial Interactions

- Spatial interactions consider the dynamics of flows of people, freight, services, energy, or information between locations generated by economic activities.

- They are demand–supply relationships expressed over a geographical space, and usually refer to a variety of movements such as tourism, commuting, migration, international trade, and the transmission of information or capital.

- The theoretical origins of spatial interactions are attributed to the American geographer E.L. Ullman (1957, 1980) He was an urban geographer, transportation researcher and regional development specialist , who first formally defined the concept and proposed *complementarity, transferability, and intervening opportunities* as three interdependent conditions for a spatial interaction to occur.

I. Complementarity: refers to a demand / deficit in a product in a place and a supply / surplus of the same product in another place.

a) A supply and demand pair is necessary for a spatial interaction to occur, which implies that a location generating a supply provides surplus products while a location generating a demand has shortage of them.

b) The direction, distance, and route of an interaction depend on the respective locations of supply and demand.

c) **Due to complementary relationships, spatial interactions may occur over long distances, such as the flow of *petroleum between the Middle East and the United States,* or over much shorter distances, such as the flow of commuters from their places of residence to their workplaces.**

d) **Complementarity is a function of *physical, cultural, and technical differences between regions, which are also closely related to the level of economic development.* For example, China, Australia, Brazil, and India are the top four iron ore producers. China, however, is an iron ore importer while the three other countries are exporters.**

II. Transferability refers to the possibility of interactions occurring between locations by overcoming distance, time, and cost.

1. Even though a complementary supply–demand relationship exists between locations, no interaction will take place if the transfer cost is higher than the benefits derived
2. The cost of overcoming distance is known as the ***friction of distance***, which is subject to factors such as existing transportation technology and the cost of energy.
3. The shorter the distance between supply and demand, the higher the interaction. The rule of ***distance decay*** describes the ***decrease of interaction as distance increases.*** For instance, although the Middle East ranks first in the world for oil production and exports, the United States imports more crude oil from Canada due to the shorter transport distance.
4. Transferability can be accomplished by different transport modes depending on the weight and value of goods as well as the distance involved.

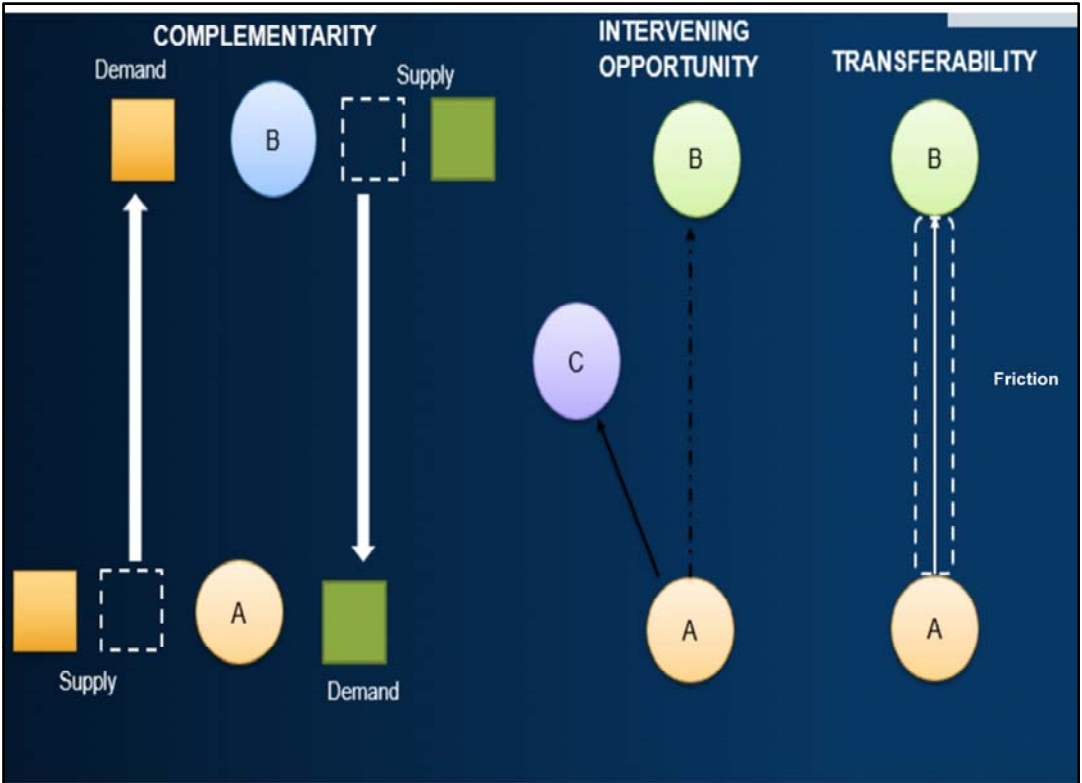
III. Intervening opportunities explains the absence or insufficiency of ***alternate opportunities*** between two complementary locations.

a. Complementarity will only generate a flow if there is no intervening or closer location. The flows that would otherwise occur between two complementary locations may be ***diverted to a third location*** if it represents an intervening opportunity, such as a ***closer complementary alternative*** with a cheaper overall transport cost.

b. For instance, in order to have an interaction between a customer and a store, there should not be a closer store that offers a similar array of goods at the same price

c. Under some circumstances, ***intervening opportunity may help to create interactions between distant supply and demand pairs***. As Ullman (1980) noted, the trade - diverting effect of an intervening opportunity could eventually facilitate interaction between more distant complementary locations.


Intervening opportunities
5 miles,
1 lane dirty
road
A
B
C
10 mile -2 lane paved
highway
(assuming everything
equal else such as
prices for goods and
services) if the county
built a new five-mile-
long, paved, four-lane
highway between A
and B.
, most of the people who live in
town A would probably stop
driving the extra five miles to
city C
A
B
C


COMPLEMENTARITY
Demand
Supply
B
A
Supply
Demand
INTERVENING
OPPORTUNITY
B
C
A
TRANSFERABILITY
B
Friction
A

Important forms of spatial interaction such as traffic flows and migration may be predicted and explained based on an analogy with Newton's model of the gravitational attraction between celestial bodies.

Assuming that there is no intervening opportunity, the degree of complementarity between any two regions is proportional to the product of the populations of the origin and destination regions.

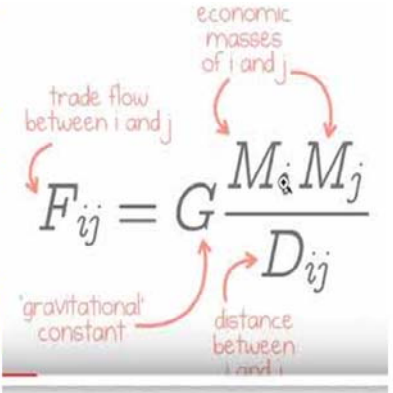
GRAVITY MODEL IN TRANSPORT GEOGRAPHY

The gravity model is the most common formulation of the spatial interaction method.

It is named as such because it uses a similar formulation than Newton's law of gravity.

Gravity concept have been applied in a wide variety of contexts, such as migration, commodity flows, traffic flows, commuting, and evaluating boundaries between market areas.

Accordingly, the attraction between two objects is **proportional to their mass and inversely proportional to their respective distance,** Shown in formula and explained using population potential as follows:



- The basic gravity model has been used as a predictive tool, starting in 1931 with W. J. Reilly's law of retail gravitation, predicting the flow of retail trade.

- Reilly's law clearly indicates that the rate at which the influence of a place dissipates with distance can be expressed as an exponent of the friction of distance.

- A higher exponent of distance suggests that the friction of distance is significant and, therefore, the rate of decline of influence accelerates as distance increases.

- The form of spatial interaction maintains the normal production and life through exchanging and connecting materials, energy, people, funds and information between cities and regions. It varies widely in direction, distance and time.

- The level of spatial interaction reflects the level of economic development to a certain extent. The level of economic development also reflects the degree of division of the regional economy and whether the economic structure is reasonable.

The Gravity Model
Case of Population Potential

			Population and Distance matrix				
Sl.No	Town	population	to Delhi	to Meerut	to Gurgaon	to Bulandsahar	to Khurja
1	Delhi	3647023	14	59	27	65	72
2	Meerut	367754	59	30	82	62	76
3	Gurgaon	57151	27	82	14	76	78
4	Bulandsahar	59505	65	62	76	8	15
5	Khurja	50245	72	76	78	15	8

			Population potential (towns with population above 50,000)				
Sl.No	Town	population	Delhi	Meerut	Gurgaon	Bulandsahar	Khurja
1	Delhi	3647023	260502	61814	135075	56108	50653
2	Meerut	367754	6233	12258	4485	5932	4839
3	Gurgaon	57151	2117	697	4082	752	733
4	Bulandsahar	59505	915	960	783	7438	3967
5	Khurja	50245	698	661	644	3350	6281
			270465	***76390***	***145069***	***73579***	***66472***
		in 000's	***270***	***76***	***145***	***73***	***66***

Delhi has the higher population potential by its population and distance to the towns. Khurja is shown with least potential by its population and distance with neighboring cities.

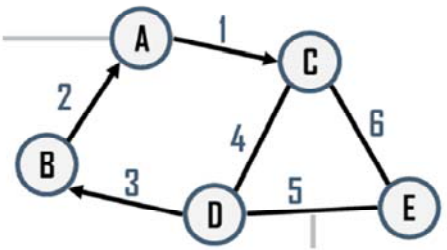
Allocation Models

- Transport geographers are also interested in **flow and location-allocation models** that can be used to define boundaries or the location for a new retail outlet.
- **Network analysis** also referred to as **graph theory**, which is used to study transport network forms and structures, particularly how they change in time.
- Network science has offered transport geography a whole set of mathematical tools.

Accessibility and Connectivity Analysis

Network analysis is an important aspect of transport geography because it involves the description of the disposition of nodes and their relationships and line or linkage of distri-bution.

It gives measures of accessibility and connectivity and also allows comparisons to be made between regional networks within a country and between other countries.



Connectivity Matrix (C)					
	A	B	C	D	E
A	0	0	0	0	0
B	1	0	0	0	0
C	1	0	0	1	1
D	0	1	1	0	1
E	0	0	1	1	0

Connectivity : The degree of connection between all vertices is defined as the connectivity of the networks". The greater the degree of connectivity within a transportation network, the more efficient with that system.

The connectivity of a network may be defined as the degree of completeness of the links between nodes. Kansky (1963) developed several descriptive indices for measuring the connectivity of networks,

i.e., beta, gamma, alpha indices and cyclomatic number.

Beta Index (β):

The beta index is a very simple measure of connectivity, which can be found by dividing the total number of arcs in a network by the total number of nodes, thus:

β = arcs/ nodes

The beta index ranges from 0.0 for networks, which consist just of nodes with no arcs, through 1.0 and greater where networks are well connected.

- **Alpha Index (α):**

most useful measures of the connectivity for complex network, is the alpha index (α).

α= actual circuit/ maximum circuits

The alpha index gives the range values from 0 to 1 that is from 0 to 100 per cent. giving the number of funda-mental circuits as a percentage of the maximum number possible.

The higher the index, the greater is the degree of connectivity in the network.

The gamma index (y)

Is a ratio between the observed number of edges and vertices of a given transportation network.

- The numerical range for the gamma index is between 0 and 1. This measure may be written in the form of percentage and would thus range from 0 to 100.

Cyclomatic Number:

This is based upon the condition that as soon as a connected network has enough arcs or links to form a tree, then any additional arcs will result in the formation of circuits.

Thus, the number of circuits in a connected network equals the total number of arcs minus the number of arcs required to form a tree, i.e., one less than the nodes or vertices. It may be written as:

Cyclomatic number (μ) = $e - v + p$

- e = number of edges or arcs
- v = number of vertices or nodes
- p = number of non-connected subgraphs

Transport and Inter and Intra Regional Development

Transportation has a strong influence on the spatial structure at the local, regional, and global levels.

Contemporary economic processes have been accompanied by a significant increase in mobility and higher levels of accessibility. Such conditions are closely related to the development of transportation networks, both in capacity and spatial extent.

It also underlines the importance of specific dimensions, such as nodes, locations, networks, and interactions. The impacts of transport on the spatial structure became multiscalar.

Transportation systems are composed of a complex set of relationships between the demand, the locations they service, and the networks that support movements.

The introduction of information technologies is changing mobility and its relations with geography since it can support, modify, substitute, or expand transportation activities.

Developmental Impacts

- **Direct impacts.** The outcome of improved capacity and efficiency where transport provides employment, added value, larger markets, as well as time and costs improvements. The overall demand of an economy is increasing.

- **Indirect impacts.** Transport activities are responsible for a wide range of indirect value-added and employment effects, through the linkages of transport with other economic sectors

  (*e.g. office supply firms, equipment, and parts suppliers, maintenance and repair services, insurance companies, consulting and other business services).*

- **Induced impacts.** The outcome of the economic multiplier effects where the ***price of commodities, goods, or services drops*** and **their variety increases.**

Comparative Cost Advantages

Geographic specialization:
Improvements in transportation and communication favor a process of geographical specialization that increases productivity and spatial interactions.

An economic entity tends to produce goods and services with the *most appropriate combination of capital, labor, and raw materials.*

A region will thus tend to specialize in the production of goods and services for which it has the *greatest advantages* (or the least disadvantages) compared to other regions as long as appropriate transport is available for trade.

Through geographic specialization supported by efficient transportation, economic productivity is promoted. This process is known in economic theory as **comparative advantages** that have enabled the economic specialization of regions.

Eighteenth-century economist David Ricardo created the theory of comparative advantage. “country boosts its economic growth the most by focusing on the industry in which it has the most substantial comparative advantage”

Ricardo developed his approach to combat trade restrictions on imported wheat in England. no sense to restrict low-cost and high-quality wheat from countries with the right climate and soil conditions. England would receive more value by exporting products that required skilled labor and machinery.

Sources of Comparative Advantage

- Natural Resources. Perhaps the easiest example of **comparative advantage** arises out of differences in natural resources.
- Specialization: each person can work on one tiny step in the production process of one good, and develop high levels of skill at it.
- Scale: An “economy of scale” exists whenever large scale production is more efficient than small scale production.
- Competition: countries gain because open trade forces firms to compete more intensely.

Absolute advantage: is anything a country does more efficiently than other countries. Nations that are blessed with an abundance of farmland, fresh water, and oil reserves have an absolute advantage in agriculture, gasoline, and petrochemicals

Competitive advantage: is what a country, business, or individual does that provide a better value to consumers than its competitors.