

Von-Thunen Model of Agriculture

VON THUNEN MODEL OF AGRICULTURE

Brief about Von Thunen and his "A Model of Agricultural Land Use":

- Von Thunen [1783- 1850] was a German geographer and economist.
- He gave "A Model of Agricultural Land Use" in 1826 which was translated into English in 1966.
- Von Thunen's model of agriculture use is also called the "concept of locational rent".
- His model is based on the study of an agriculture field in Germany.
- In this model, he assumed that a city [market] is located centrally within an "Isolated State" and the state is self-sufficient in agricultural goods and has no external trade.
- As per Von Thunen, in order to maximize the profit by the farmer, 6 concentric rings
- It also explains the hierarchy of agricultural crops based on profit-making capacity.

- Bulky agricultural goods will be produced near to the city as it would save the transportation cost by carrying less distance to the city.
- Perishable crops such as vegetables and milk products will also be produced near the city.
- Lightweights and durable agricultural goods such as rice, wheat, etc will be grown far away from the city.
- High profitable crops such as vegetables and fruits will grow near the city as land rent is generally high near the city.
- Rent of land decreases with increasing distance from Market to the hinterland.
- An intensive method of cultivation is practiced near to market in order to manage the high cost of land and to enhance profitability.

We will discuss Von Thunen's -"A Model of Agricultural Land Use" in detail here, but first, the following basic terminology needs to understand for a better understanding of the model.

- Crop Productivity
- Crop intensity or intensive farming
- Extensive farming
- Mixed cropping
- Hinterland

- Isolated state

Crop productivity:

Crop Productivity = (Production Value / Input Cost) per unit land area.

For example,

- If when we grow wheat on 1 hectare of land, it costs Rs 10 to grow 100 rupees of wheat, then the productivity of wheat will be $100/10 = 10$ per hectare.
- On 1 hectare of land on the same land, when we grow chilies, it costs Rs 12 to grow chilies by Rs 200, then the productivity of chilies comes to $200/12 = 16.67$
- We can say that the productivity of chili is higher than that of wheat.

Crop intensity or intensive farming:

If two or more crops are grown a year of particular agricultural land, it is called intensive farming. The large level of inputs such as fertilizer, pesticides, labor, and others are used to get a high yield per unit of agricultural land.

Extensive farming:

Extensive farming is farm practice where less than two crops in a year are cropped. Low levels of inputs are used as compared to

intensive farming. There is low productivity in extensive farming as compared to intensive farming.

Mixed cropping:

Mixed cropping is a farm practice where two or more crops are grown simultaneously on the same piece of land.

For example,

- Growing wheat and grams crops on the same field at the same time

Hinterland:

- An area that is far away from the coastline or river.

Concept of Isolated state in the Von Thunen Model:

- An isolated state is a region that is completely flat.
- And, there is equal soil fertility and climate all over the region.
- And, there is no river or mountains.
- And, the state is self-sufficient in food grains production and there are no trades from outside.

What are the Basic Assumptions in the Von Thunen Model?:

The following are the basic assumption in the Von Thunen Model:

- He made the concept of an Isolated state.

- The isolated state is comprised of one market area[city] and the market is surrounded by flat agricultural land[i.e hinterland].
- The market receives goods only from the hinterland and the hinterland sells goods only to the market.
- Farmers are settled in the hinterland who wish to maximize their profit.
- There is only one mode of transport and the horse wagon is used.
- The market is not accessible by waterway and there is no road.
- Transportation cost is directly proportional to the distance and weight of materials.

There are two main principles in the Von Thunen model.

- Crop intensity decrease with increasing the distance from the market. Productivity of crops also decreases with increasing the distance from the market.
- "Agriculture land use pattern" changes with distance increase from the market.

Locational rent's concept:

- Using these two principles and basic assumptions, the Von Thunen model tried to give the optimal land use pattern which will give farmers maximum profit or locational rent.

- Since a farmer is an economic person and hence they will farm those crops which will give more total profit or rent.

Von Thunen also deduce the formula for calculating the locational rent which is given below:

Since farmers are economic people, they try to minimize the "KM" and want to maximize productivity by adding the labor, fertilizer, pesticide, good quality seeds, etc.

For example,

- Vegetables such as tomatoes are perishable items and they are also bulky, that is why tomatoes should be grown near the market area.

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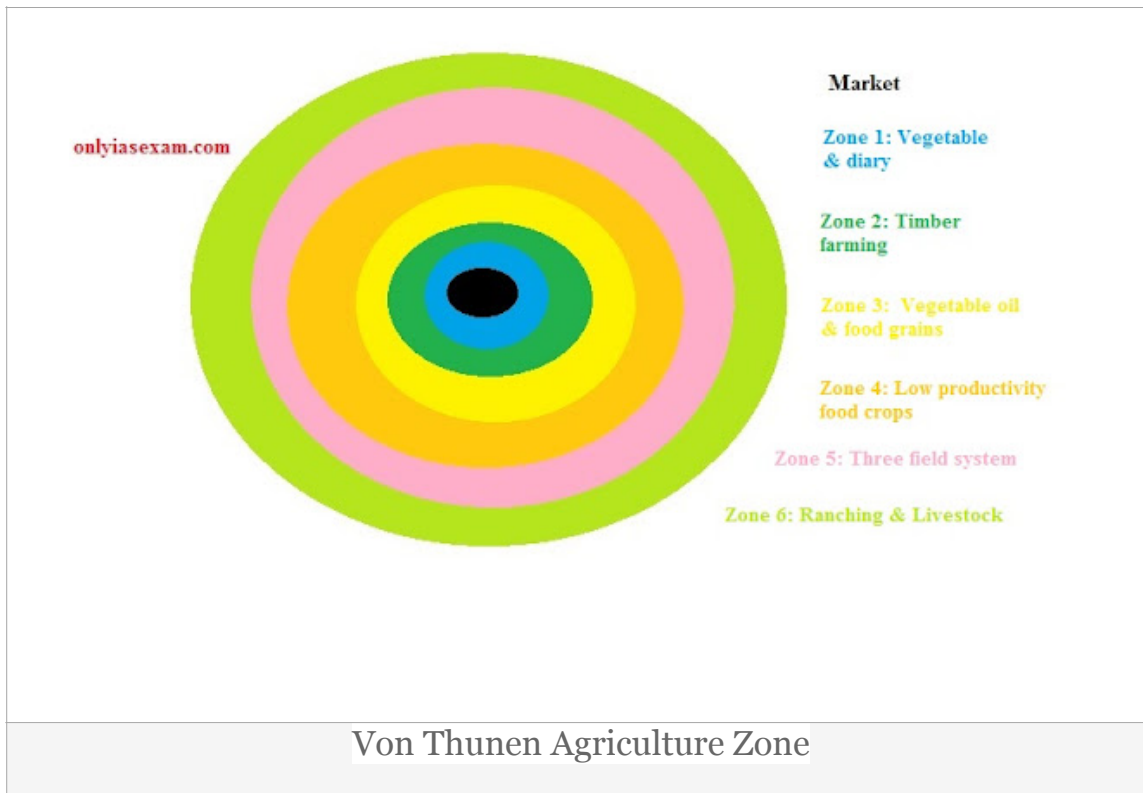
Hierarchy of agriculture crops:

As per Von Thunen, the following are the hierarchy of agriculture crops based on the profitability in decreasing order:

- Fruits and vegetation [very high profitability]
- Dairying
- Mixed crop and livestock farming
- Wheat farming
- Ranching[lowest]

What occupies each ring of the Von Thunen model and why?

Considering the locational rent of lands, productivity, weight of items[bulky or light weight], and perishable nature of the product, the Von Thunen divided 6 agriculture zone around the market.



- Zone1: Land used for growing perishable goods like vegetables, milk, fruits
- Zone 2: Land used for growing forests and timber.
- Zone 3: Land used for growing medium intensity crops such as vegetable oil.
- Zone 4: Land used for growing low-intensity and durable crops such as wheat, rice, barley, meat,
- Zone 5: Land follows a three-field crop system:
 - $\frac{1}{3}$ of the area is used for growing crops.
 - $\frac{1}{3}$ of the area is used for grassland.

- 1/3 of the area is leaved un-cropped.
- Zone 6. The land is used for ranching and Livestock.

Relevance of Von Thunen's model of agricultural location in the present context?

Today, the Von Thunen model is not relevant in most parts of the world because of the following reasons:

- An isolated state is not available in any part of the world today.
- Nowadays, the economic rent of land is not only decided by the distance from the market but also many factors such as nearness to communication networks, climate, relief, safety, etc.
- There are many market centers in a region and the size and influence of the market center change over time.
- Due to technological advancements in the transport, preservation, and packaging field, perishable and bulky items are easily available from the distanced place.
- For example, Amul milk and milk products can be purchased all over India irrespective of the source of production.

However, Von Thunen is still relevant to those places that were lacking in transport and preservation facilities.