Von Thunen’s Model of Agriculture

By: Jenna Turrentine and PJ Pemberton
J.H. Von Thunen

J.H. Von Thunen was a farmer and amateur economist who lived from 1783-1850 and created the Von Thunen model of Agriculture in 1826 that had simplifying assumptions that he based the model off of:

- The city is located centrally within an "Isolated State."
- The Isolated State is surrounded by wilderness.
- The land is completely flat and has no rivers or mountains.
- Soil quality and climate are consistent.
- Farmers in the Isolated State transport their own goods to market via oxcart, across land, directly to the central city. There are no roads.
- Farmers behave rationally to maximize profits.
Von Thunen’s Theory/Formula

- Von Thunen created a theory called the theory of marginal productivity.
- He then put that theory into a mathematical formula.
- The formula looked like this: \( R = (p-c) - YFm \)
- In the formula; \( R \) = land rent; \( Y \) = yield per unit of land; \( c \) = production expenses per unit of commodity; \( p \) = market price per unit of commodity; \( F \) = freight rate (per agricultural unit, per mile); \( m \) = distance to market.
different locations would be used. It compares the relationships between production cost, the market price, and the transport cost of an agricultural commodity. The farmer has one role in this model and that is to maximise his profit by minimizing the market price.

The Von Thunen Model was first proposed by Thunen in 1826 in his book, The Isolated State. This model showed how market processes could determine how land in
How can Von Thunen’s Model be used today?

This model remains relevant today primarily for the theoretical aspects that draw a direct connection between distance from market and profitability of product. Transportation costs associated with agricultural products remain an important consideration, and land costs remain very much relevant to decision-making. As land values increased in traditionally suburban areas due to demand for quality housing in such areas, the costs associated with agricultural activities became prohibitively high. In short, the Von Thunen model remains relevant today, but given the historical context in which it was formulated, its practical application is very limited.
Doubts on the Model in 19th Century

There were a number of reasons for doubting the model in the 19th century. This is because the spatial structure of land-use at that time was not ring-like; indeed one can point to a close correlation of enterprise with soil type to the north and west of London. Also, the ordering of cropping zones did not accord with the expectations of the model. It must be recognised that the circumstances of agriculture around each city will to a degree depend not only upon its own unique requirements for food and cash crops, but also upon its size and purchasing power. Von Thunen’s model was enriched by his own personal experience of agriculture and marketing, but much of the empirical data he adduced was not reliable for long after 1826. For these reasons, there are now many doubts on Von Thunen’s model.
More facts

- Given the model’s assumptions, the pattern that emerges predicts more intensive rural land closer to the marketplace, and more extensive rural land use farther from the city’s marketplace.
- These rural land use zones are divided in the model into concentric rings.
- Concentric rings are rings like on a bulls eye for example, that the concentric zone models are comprised of.
Conclusion on Von Thunen’s Model

Von Thunen's model of Agriculture is an important model used to date that predicts agricultural patterns using concentric rings. It is very popular in the teaching of agricultural geography in schools and universities. Also, while originally applied to agricultural land use, the von Thunen model is commonly used to explain urban land use patterns. Two primary conclusions from the model are that land values decrease as distance from the central point of attraction increases and that different land use activities are contained in concentric rings equal distance from the central point of attraction based on the weight (or transportation cost) of the activity.