

Hoyt Sector Model: AP Human Geography Crash Course

Are you a city person? Whether you like it or not, you are probably like more than half of the population of the United States and live either in a city or close enough to quickly travel to one. Cities are growing much faster than rural areas, and it is important for you to learn about the dynamics of urban geography. There are several classic models used to understand and explain the internal structures of cities and urban areas, and we are going to learn about the **Hoyt Sector Model** in this AP Human Geography study guide.

Nature of the City

Cities are at the center of every advanced society and act as the hub of economic, social and political activities in that area. They have a variety shapes and functions, and their geography impacts the daily lives of those who live in the city and surrounding areas. All cities provide their residents a variety of services and functions: shopping, manufacturing, transportation, education, medical, and protective services.

Cities evolved over time, and if a city had favorable factors (agriculture, access to water, trade, defense), its population increased. This led to urbanization (rapid growth, and migration to large cities).

This increase in urban population resulted in rapid expansion of the city and greater urbanization of the society. After the conclusion of World War II, North America experienced rapid urbanization. There was a need for housing outside of the core urban areas due to growing population and demand. The result was the **suburbanization** of our society. Suburbanization is the movement of people from core urban areas to the outskirts.

Model of Urban Land Use

In the early 1900's, researchers wanted to find out how cities worked. They developed a variety of urban land use models to help describe and explain different types of cities and the neighborhoods that made up the city. All of the models used to explain urban land use have at their center the **central business district (CBD)**.

The CBD is found at the heart of every older city and is the area of skyscrapers, business headquarters, and banks. Spreading out from this intensive economic land use area is a fringe of wholesale and retail businesses, warehouses, transportation terminals and light industry. The residential area extends outward beyond this ring of activity. Several of these models try to depict the use of this urban area spatially.

It makes sense that students at the University of Chicago developed many of these land use models because Chicago was a city that saw rapid growth in the 18th century. One of these Chicagoan scholars was economist Homer Hoyt, who in 1939 developed the Hoyt Sector Model.

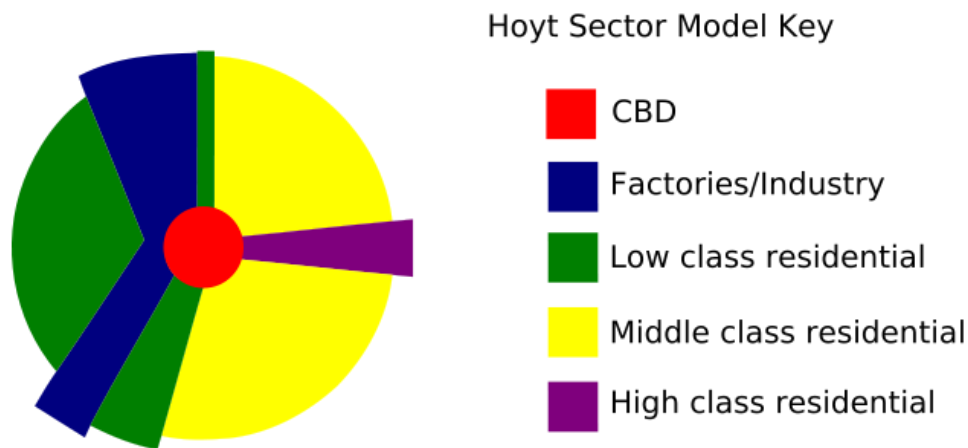
What is the Hoyt Sector Model?

Homer Hoyt wanted to provide an alternative to the concentric zone model as a way of explaining urban land use. Ernest Burgess developed the [concentric zone model](#) in the 1920s based on his studies of

Chicago. Burgess's model suggested that cities have zones arranged in a series of concentric bands that expand outward from the CBD.

Hoyt argued that instead of concentric sets of neighborhoods, cities are primarily laid out in pie or wedge-shaped zones and corridors developed from the core of the city to the outskirts. In the Hoyt Sector Model, the CBD is still in the center, but expanding outward away from it along transportation lines are zones used for industry and residential developments. For example, the electric streetcar allowed low-income areas to extend from the CBD to the outer edge of the city.

Land use within each sector would remain the same because like attracts like. The high-class sector would stay high-class because it would be the most sought after area to live, so only the rich could afford to live there. The industrial sector would remain industrial as the area would have a common advantage of a railway line or river.



[Image Source: Wikimedia Commons](#)

What are the Sectors of the Hoyt Model?

The Central Business District

As with all classic models of urban land use, the Hoyt Sector Model has at its core the central business district (CBD). Every older city has one such district at its center; typically, it is the area with the high-rise buildings, banks, and large business headquarters. It is the commercial and business center of a city. In bigger cities, the CBD is often referred to as the “financial district.”

The Industrial Sector

According to this model, in regions of the city with significant industrial transportation routes (rail, barge, freight), industrial corridors will develop. The noise and pollution of these zones drive all but the poorest residents away from these areas. In these zones, almost everyone rents. In Chicago, several of these industrial corridors stretched outward from the CBD along railroad lines and the Illinois-Michigan industrial canal.

Residential Sectors

Hoyt's model suggests that people will live in the different sectors based on income levels. Since desirable land (near lakes, hills, places away from the smells of the factories) was more expensive, the elite class neighborhoods were built in zones separated from lower, working-class zones.

Low-Class Residential

Next to the industrial corridors are the lower- or working-class residential zones. People who live here tend to be factory workers and live in low-income housing. Housing is cheap due to its proximity to industry where pollution, traffic, railroads, and environmental hazards make living conditions poor. Those who live in this sector do so to reduce the cost to commute to work. They are sometimes stereotyped as living on the "other side of the tracks," and may experience discrimination.

Middle Class

This residential area is a bit more desirable because it is located further from industry and pollution. People who work in the CBD have access to good transportation lines, making their commute easier. The middle-class sector is the largest residential area.

High Class

Hoyt's model also identified an elite zone, for the handful of upper-class people who live in the city. Michigan Avenue was that elite district in Chicago. High-class residential sectors tend to be quiet, clean, and have less traffic than the other ones. There is also a corridor that extends from the CBD to the edge of the city, where the prime real estate is found.

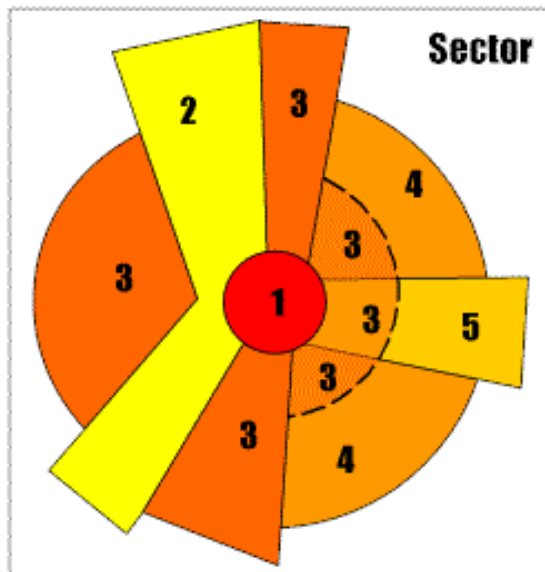
In many cities, you will find the high-class district on the west side, where prevailing winds enter the city and are upwind from industrial zones, which are dirty and smelly. It is unlikely that high-class residential housing would be found near factories or lower-class housing areas. In this way, Hoyt's model suggests a distinct physical separation between the wealthy and the poor.

Limitations of the Hoyt Sector Model

Hoyt's model is based on outdated rail transportation and does not consider the existence of personal cars that let people commute from low-cost land outside the city boundaries. The model also does not take into account the new concepts of edge cities. Edge cities are urban complexes consisting of a large node of office buildings with more workers than residents.

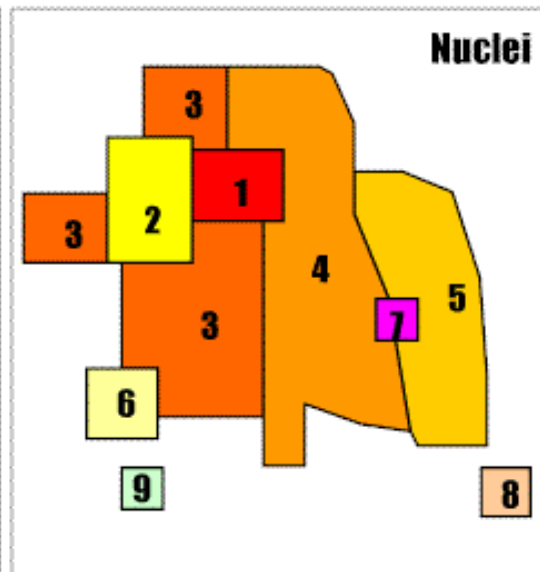
The CBD has lost some of its importance since it was created, as many retail and office buildings have moved into the suburbs. If you look at older cities, they tend to follow the Hoyt Segment Model, whereas newer cities follow Burgess's concentric zone model.

Homer Hoyt: Sector Model



- 1 CBD
- 2 Wholesale and light manufacturing
- 3 Low-class residential
- 4 Middle-class residential
- 5 High-class residential

Harris and Ullman: Separate Nuclei Model



- 6 Heavy manufacturing
- 7 Sub business district
- 8 Residential suburb
- 9 Industrial suburb

Source:
adapted
from H.
Carter
(1995)
Urban
Geography,
Fourth
Edition,
London:
Arnold, p.
126.

Sector and Nuclei Urban Land Use Representations

A study done in 1939 by Homer Hoyt concluded that the land use pattern was not a random distribution, nor sharply defined rectangular areas or concentric circles but rather **sectors**. Communication axes are mainly responsible for the creation of sectors, thus **transport has directional effect on land uses**. We can see on the sector representation that Burgess transitional process is still part of land use changes, but there exist axes along which urban activities are oriented.

Following Hoyt's development of a sectorial city, C.D. Harris and E.L. Ullman (1945) introduced a more effective generalization of urban land uses. It was brought forward that many towns and nearly all large cities do not grow from around one CBD, but are formed by the progressive integration of a number of **separate nuclei** in the urban pattern. These nodes become specialised and differentiated in the growth process and are not located in relation to any distance attribute, but are bound by a number of attributes:

- * **Differential accessibility.** Some activities require specialized facilities such as port and rail terminals. For instance, the retailing sector demands maximum accessibility, which is often different from centrality offered in the CBD.
- * **Land use compatibility.** Similar activities group together since proximity implies improved interactions. Service activities such as banks, insurance companies, shops and institutions are strongly interacting with each other. This can be defined as centripetal forces between activities.
- * **Land use incompatibility.** Some activities are repelling each other such as high quality residential and heavy industrial. This may be defined as centrifugal forces.
- * **Location suitability.** Some activities cannot afford the rent of the optimal site for their location. They are thus locating at cheaper places, which are not optimal, but suitable for these activities.

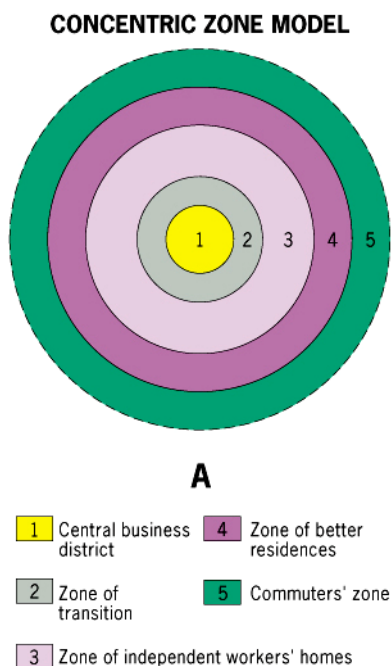
Harris and Ullman polynuclear model was the first to represent the fragmentation of urban areas, specialised functions as well as suburbanisation.

Models of Urban Structure

Cities are not simply random collections of buildings and people. They exhibit functional structure: they are spatially organized to perform their functions as places of commerce, production, education, and much more. One of the most important forces determining where certain buildings or activities are located within a city deals with the price of land. This tends to be the highest in the downtown area and declines as one moves outward from the center. The United States is the only country in the world in which the majority of the people live in the suburbs. Even though house prices may be higher in the suburbs, the land value is lower (a downtown apartment complex will produce much more revenue per year than a few suburban homes occupying the same amount of space). In every other country the majority resides in either rural or urban areas.

Before preceding, it is important to define some commonly used terms in referring to city structure. The **central business district (CBD)** (or “downtown”) is the core of the city. High land values, tall buildings, busy traffic, converging highways, and mass transit systems (e.g., South Florida’s “Tri-Rail”) mark the American or European CBD. An **urban zone** is a sector of a city within which land use is relatively uniform (e.g., an industrial or residential zone). The term **central city** is often used to denote the part of an urban area that lies within the outer ring of residential suburbs. A suburb is an outlying, functionally uniform part of an urban area, often (but not always) adjacent to the central city. All of these urban regions or zones lie near or adjacent to each other and together make up the **metropolis**. The term **hinterland** is a German word meaning the “land behind” the city (the surrounding service area).

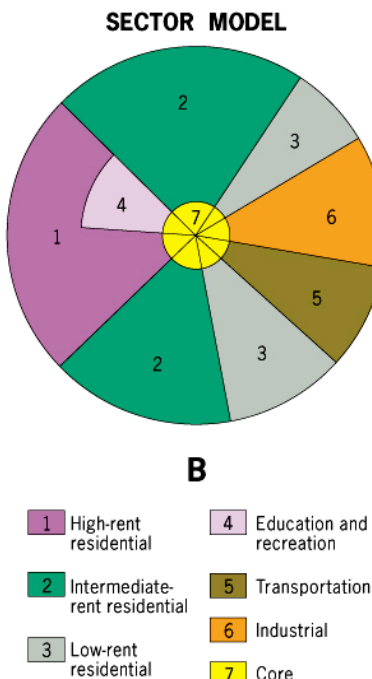
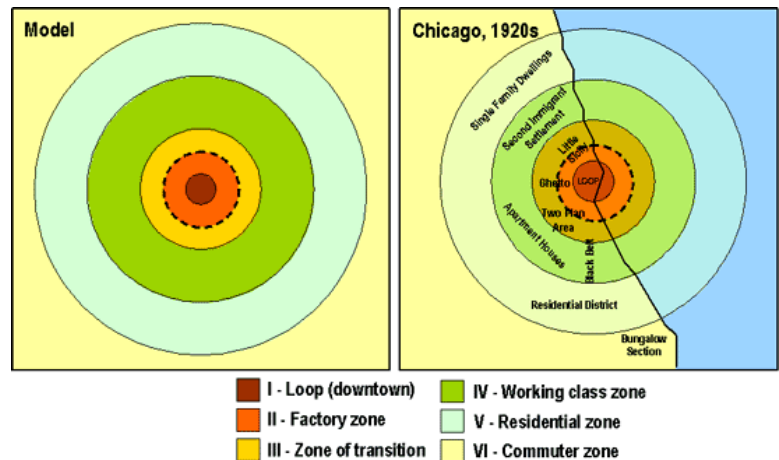
Modeling the North American City



As cities evolved, they displayed increasing complexity over time. The **concentric zone model** (A) resulted from a study of Chicago in the 1920s by Ernest Burgess. This model was drawn up at a time when the full impact of the Industrial Revolution came to bear on the American City. Burgess recognized five concentric functional zones. At the center was the CBD (1). The zone of transition (2) was characterized by

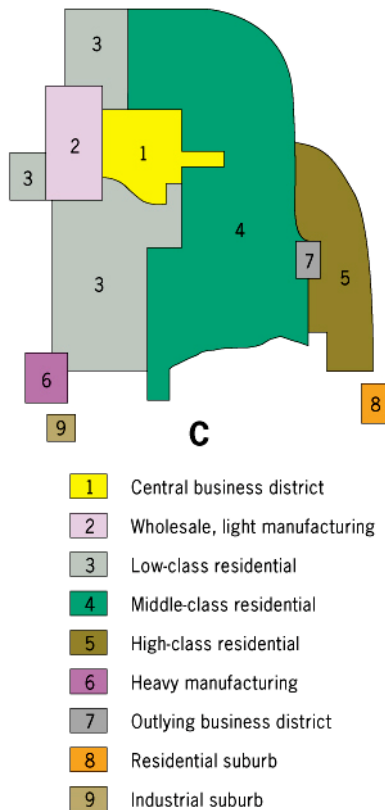
residential deterioration and encroachment by business and light manufacturing. The zone of independent workers' homes (3) was primarily occupied by the **blue-collar** (wage-earners, manual laborers) labor force. The zone of better residences (4) consisted mainly of the middle-class. Finally, the commuters' zone (5) was the suburban ring, consisting mostly of **white-collar** workers who could afford to live further from the CBD. This model was dynamic. As the city grew, the inner zones encroached on the outer ones.

Remember, the model was developed for American cities and had limited applicability elsewhere. It has been demonstrated that pre-industrial cities, notably in Europe, did not at all followed the concentric circles model. For instance, in most pre-industrial European cities, the center was much more important than the periphery, notably in terms of social status. The Burgess concentric model is consequently partially inverted in these instances.

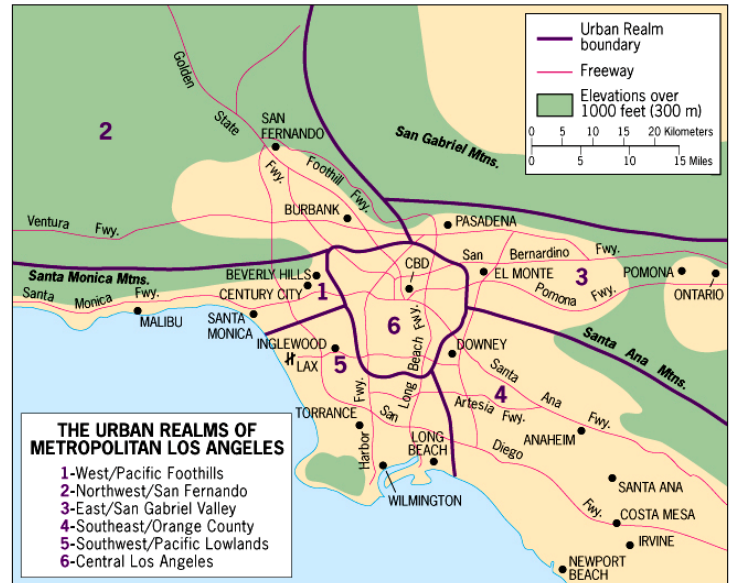


In the late 1930s, Homer Hoyt's **sector model** (B) was published, partly as an answer to the drawbacks of Burgess' concentric zone model. As technology dealing with transportation and communication was improving, growth alone created more of a pie-shaped urban structure. Hoyt discovered that land rent (for residential, commercial, or industrial) could remain consistent all the way from the CBD to the city's outer edge.

MULTIPLE NUCLEI MODEL



In the 1940s, Chauncy Harris and Edward Ullman, arguing that neither of the earlier models adequately reflected city structure, proposed the **multiple nuclei model (C)**. This model was based on the notion the CBD was losing its dominant position and primacy as the nucleus of the urban area. Several of the urban regions would have their own subsidiary but competing "nuclei." As manufacturing cities became modern cities and modern cities became increasingly complex, these models became less and less accurate.



The term "**edge city**" was coined by Washington Post journalist and author Joel Garreau in 1991. We can equate the growing edge cities at major suburban freeway interchanges around America as the latest transformation of how we live and work. These new suburban cities are home to glistening office towers, huge retail complexes, and are always located close to major highways. According to Garreau, several rules must apply for a place to be considered an edge city:

1. The area must have substantial office space (about the space of a good-sized downtown) & substantial retail space (the size of a large regional shopping mall);
2. The population must rise every morning and drop every afternoon (i.e., there are more jobs than homes);
3. The place is known as a single end destination (the place "has it all;" entertainment, shopping, recreation);
4. The area must not have been anything like a "city" in 1960 (cow pastures would have been nice).

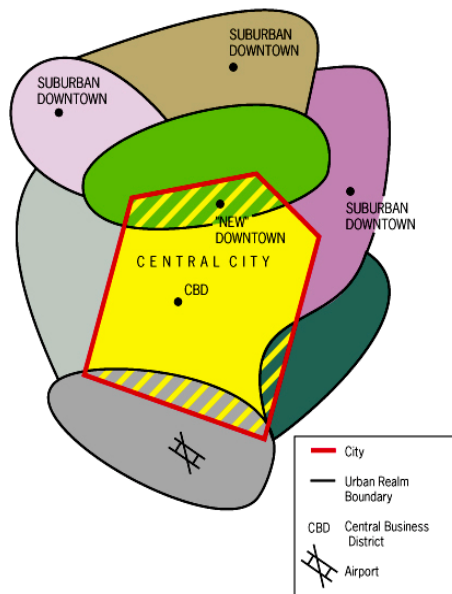
Edge cities represent the third wave of our lives pushing into new frontiers in this half century. First, we moved our homes out past the traditional idea of what constituted a city. This was the **suburbanization** of America, especially after World War II. Then we wearied of returning downtown for the necessities of life, so we moved our marketplaces out to where we lived. This was the "**malling**" of America, especially in the 1960s and 1970s. Today, we have moved our means of creating wealth, the essence of urbanism - our jobs - out to where most of us have lived and shopped for two generations. That has led to the rise of the edge city.

The Rank-Size Rule

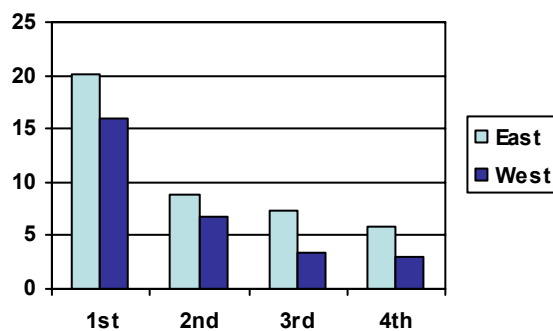
We discern not only the hierarchy of urban places (hamlet, village, town, city, etc.) but also the so-called **rank-size rule**, established by George Zipf in 1949. This rule holds that in a model urban hierarchy, the population of a town or city will be inversely proportional to its rank in the

Today, there are urban realms, components of giant conurbations (connected urban areas) that function separately in certain ways but are linked together in a greater metropolitan sphere. In the early postwar period (1950s), rapid population diffusion to the outer suburbs created distant nuclei, but also reduced the volume and level, of interaction between the central city and these emerging suburban cities. By the 1970s, outer cities were becoming increasingly independent of the CBD to which these former suburbs had once been closely tied. Regional shopping centers (e.g., malls) in the suburban zone were becoming the new CBDs of the outer nuclei.

URBAN REALMS MODEL



urban hierarchy. For example, if the largest city has 12 million people, the second city will have around 6 million ($\frac{1}{2}$ the population of the largest city); the third will have 4 million ($\frac{1}{3}$ the population of the largest city); the fourth city 3 million; and so on. The rank-size rule does not apply in all countries, especially those with dominant primate cities (e.g., France, Mexico), but it does apply in several countries with complex economies. The United, for example, displays a **binary distribution** of the rank-size rule. When a country has two large cities of similar size in separate regional areas; the rank-size rule may apply regionally – as in the case of the U.S. The eastern U.S. is anchored by the largest city, New York, followed by Chicago, Washington D.C., and Philadelphia. The largest city in the west, Los Angeles, is followed by San Francisco, Seattle, and Phoenix. The chart below illustrates that the rank-size rule does generally apply in a regional sense.



Urban Functions

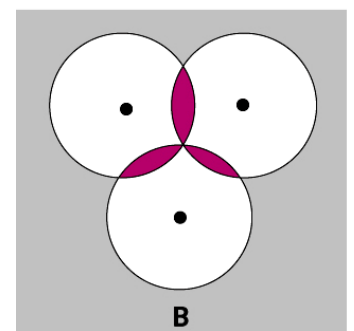
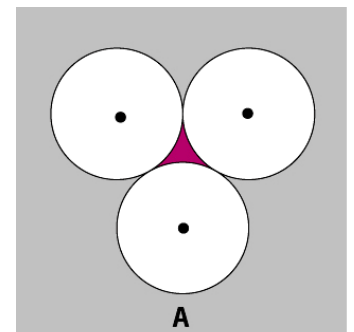
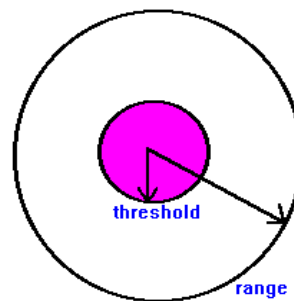
It is important to note that every town and city has an economic base. For example, workers in a manufacturing plant are in the city's **basic sector**; their work produces goods for export and generates an inflow of money. On the other hand, workers in the **nonbasic sector** (the service sector) are responsible for the functioning of the city itself (e.g., teachers, street cleaners, office clerks, etc.). The ratio of basic to nonbasic workers gives an impression of the city's **economic base**. The ratio is about the same for most large cities (about 1:2). When a business is established with 50 production (basic) workers, it adds 100 nonbasic workers to the workforce. Economic expansion of this kind therefore has a **multiplier effect** on the workforce and the urban population (most workers have dependents (e.g., children) who consume goods and services). Data on the number of people employed in basic and nonbasic jobs (the **employment structure**) can help discern the primary functions of a city.

Although it is becoming increasingly more uncommon, some cities are dominated by one particular activity. This **functional specialization** was more evident in the past – Detroit's automobiles, Pittsburgh's steel, and Houston's aerospace industry were but a few examples. Today these cities are much more diversified. Some functional specialization can still be seen today – Orlando's theme parks and vacation spots, Las Vegas' casinos, etc.

Central Place Theory

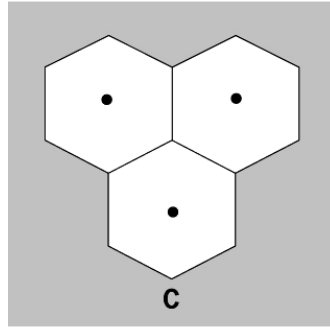
How do service areas relate to each other? Do they overlap? Do towns of approximately the same size lie about the same distance away from each other? Every urban center has a certain economic reach that can be used as a measure of its centrality.

In 1933, Walter Christaller, a German, laid the groundwork for central place theory. He attempted to develop a model that would show how and where central places (hamlets, villages, towns, cities,...) would be functionally and spatially distributed. In his model, the ideal region would have flat terrain with no physical barriers. Soil fertility, population distribution, purchasing power, and transportation networks would all be uniform. Finally, he assumed that a constant maximum distance or range of sale of any good or service produced in a central place would prevail in all directions from that urban center. Christaller's idea was to compare his model to real world situations and try to explain any variations and exceptions. He defined **central goods and services** as those provided only at a central place (e.g., bowling alley, professional sports team,...). The **range of sale** was the distance people would be willing to travel to acquire the goods or services. The limit would lie halfway between one central place and the next where the same product was sold at the same price (all things being equal, you wouldn't travel 10 miles to a movie theater if one was 5 miles away). The **threshold** is the minimum market area needed to bring a firm or city selling goods and services into existence, and to keep it in business.



In Christaller's urban model, each central place has a surrounding **complementary region**, an exclusive hinterland within which the town has a monopoly on the sale of certain goods or services because it alone can provide these within the range of sale. If all his assumptions were in effect, such complementary regions would be circular, but this would create some significant problems. The issue is that either the circles adjoin and leave unserved areas (A), or they overlap; in the latter situation (B) the central place no longer has a monopoly.

These two problems are resolved by a model consisting of perfectly fitted **hexagonal regions (C)**. If, for example, the hexagonal complementary region was focused on a hamlet (where the fewest goods and services are available), that hamlet and its region form a complementary region of a village.



And that village and its complementary region would be part of a town's complementary region, and so on. Thus, a **nesting pattern** is revealed (region-within-region); each larger region is centered on a higher-order urban place. The image below displays Christaller's interlocking model of a hierarchy of settlements and their service areas (H=hamlet; V=village; T=town; C=city).

Like von Thünen, whose model was based on a series of assumptions, Christaller knew that conditions would be different in the real world. His model did yield some practical conclusions, however. First, he showed that the ranks of urban places do in fact form an orderly hierarchy of central places in spatial balance. Second, his model implied that places of the same size with the same number of functions would be spaced the same distance apart. Third, larger cities would be spaced farther from each other than smaller towns and villages. His model confirmed that the general pattern we see on the map is not an accident but a product of specific forces that tend to

create regular rank-size patterns. Christaller's ideas may be applied to the real world, but keep in mind – it is still a model, not reality.

Christaller's ideas may be applied to regions in Europe, North America, and elsewhere. Studies in the U.S. Midwest suggested that while the square layout of the township-and-range system imposed a different kind of regularity on the landscape (square, not hexagonal), the spatial forces at work there tended to confirm Christaller's theory. Relatively flat lands in China display some similarities to the central place model.

Keep in mind, when central place theory was first formulated, the world was a simpler (and much less populated) place than it is today. Take, for example, the so-called Sunbelt phenomenon since the 1960s – the movement of millions of Americans from northern and northeastern States to the South and Southwest. Some of this was through involuntary, internal migration made possible by social security and retirement money. It has also resulted from governmental economic and social policies that favor "Sunbelt" cities through federal spending on military, aerospace, and research facilities. In addition, millions of Middle and South American migrants moved northward – into the same urban centers already growing for domestic reasons. The overall effect of this was to create a changed **urban hierarchy** in the Sunbelt region. Many cities – Miami, Atlanta, Dallas, and Phoenix – have become major central places in the United States.

