SETTLEMENT HIERARCHY|

Structure

15.1   INTRODUCTION

In the previous two units' i.e. Unit 13 and Unit 14 we have a detailed discussion on structure and morphology of rural and urban settlements. Till now you might have understood that human settlements do not exist in isolation. They are inter-connected and stay in a system. All settlements are not same; they vary according to size of the population. Some settlements have huge population and some have very few. Size of a settlement depends on physic-historic and socio-economic condition of the settlement and its relation with others settlements. Apart from population size, every settlement has some function or more than one functions; it generates services and goods. Based on their size and functions settlements can be grouped into a hierarchical order. Thus population size is the first factor which creates settlement hierarchy and size-class classification is accepted almost all over the world. Main profession of the people is considered as the main function of the city and if there are diversified population, the settlement has more than one function and generates more services as well as goods. Thus, function is another actor that creates hierarchy of settlements. A settlement becomes a central place, when it offers various services to its neighbouring settlements and it is the main theme of settlement hierarchy introduced by Christaller in 1933.

In this unit, we will learn about factors contributing to hierarchy of settlement in section 15.2. In the Section 15.3 we will discuss about Central Place Theory given by Christaller and later on modified by Losch. This is followed by

Rank Size Rule in the Section 15.4. Finally in the Sections 15.5 and 15.6, an attempt has been made to explain the hierarchy of global city in present day context and apply settlement hierarchy in Indian context.

Expected Learning Outcomes

After studying this unit, you should be able to:

- Define Central place, hierarchy of central places, and centrality;
- Differentiate Christaller and Losch model of central places;
- Describe the method of ranking the settlement;
- Explain the hierarchy of global city in present day context; and
- Apply settlement hierarchy in Indian context.

15.2   FACTORS CONTRIBUTING TO HIERARCHY OF SETTLEMENTS

Three main factors contributing in the hierarchy of settlements are:

a) Size of the population,
b) Functions performed, and
c) Sphere of influence.

The last component, the 'sphere of influence' directly depends on the number of services a settlement offers, its accessibility and competition with other settlements. The maximum distance a customer travels to purchase a good and service determines its range and it is called the sphere of influence. Small settlements offer fewer services and their sphere of influence is also small. A hamlet has its sphere of influence only a few kilometres. However, a city offers many services and some are specialised ones. A city may have a sphere of influence beyond hundreds of kilometres. So, the sphere of influence is not only a settlement's geographical area, but its functional area. In the scale of hierarchy, isolated hamlets are standing at the lower end and cities are at the upper end. Many scholars propounded theories on settlement hierarchy, but German geographer Walter Christaller's Central Place theory is one of the crucial one.

15.3   CENTRAL PLACE THEORY

Walter Christaller's *Die Zentralen Orte in Suddeutschland* or Central Places of South Germany was the first written exposition of central place theory. It shows settlements hierarchy based on economic activities or in other words, it shows spatial arrangements of settlements based on size, number, and distribution of clusters of urban centers and institutions.

In his book, Christaller has said that the crystallization of mass around a nucleus is an organic as well as inorganic in nature and the most elementary form of ordering of things that belong together- or exists in a centralistic order. Centralistic principal is also applicable in settlements. If we look into a medieval town, we can see that the settlement followed a strict centralistic pattern. They had a prominent nucleus like forts etc. However, visible symbol of centralistic order of a city is absent in today's cities. Christaller said that

even modern cities also follow centralistic pattern, but now it is their functions or *chief profession* of a town. The *Chief Profession* of a town is very much important and it makes a settlement central place to its rural surroundings or hinterland. The rural hinterland or the areas outside the central place is composed of farms, hamlets and villages looking like pawns in a chessboard. They are called *Unabgesondert*. It is a German word, means unprotected parts of a medieval town that usually lies beyond the city wall.

All regions have some central places, they may be market spots or small towns or big cities. The centrality is a relative concept and it differs from region to region.

Two basic concepts influence Christaller Central Place theory, the first one is the concept of homogeneity and the second one is the development pole or economic node that has a service area or hinterland delineated by threshold. Based on these two broad concepts, Christaller propounded following assumptions-

1. There should be a homogenous plain, or a limitless plain, without any physical barriers (like mountains, rivers etc.) that might change transport routes.

2. A rural population that is evenly distributed across the homogenous plain.

3. Homogenous transportation services that enable a man to move in any direction with equal ease. Humans will purchase goods and services from the closest place.

4. Based on the first three assumptions, an economic landscape develops. Now, the evolution of this economic landscape depends on the development of tertiary activities.

When demand for a certain good is high it will be offered in the closed proximity of the population. When demand drops, supply or availability too drops.

In order to explain the spacing of urban settlements over the landscape, Christaller developed three two-dimensional models of the economic landscapes, based on marketing, transport and administrative principles

15.3.1 What is A Central Place

A central Place is a settlement that provides goods and services to its own population as well as population of other neighbouring settlements. Here the concept of threshold is very important. **Threshold means minimum number of people needed for a central place business or economic activity to remain active and flourishing.** So, he divided goods and services into lower and higher order goods. The concept of 'Lower and Higher Order Goods' incorporate food to other household necessities, even services. Lower order goods like foods, groceries make our daily needs, and people like to purchase them from the nearest centre. Higher order goods like automobiles, furniture etc. specialised items, and people buy less frequently and therefore, may travel longer distance. So, these specialised goods and services need a

larger **threshold of population** than the lower order goods like groceries. Therefore, higher order goods and services are located in big cities.

Based on this concept, there are three types of goods and professions-

1. **Central Professions which include Central goods and services**- the goods and services produced or offered at the central place. e.g. - Administrative services, Airport etc.

2. **Dispersed goods and services**- they are produced or offered at the dispersed places.

3. **Indifferent goods and services** that are found everywhere.

British geographers divided them into rural and urban goods, but Christaller did not use these terms. In case of goods and services there are two aspects which should be taken- a) production aspect and b) offerings or distribution aspect. A central good can be centrally produced but dispersedly offered. Following Alfred Weber's terminology they can be consumer oriented and raw material oriented. Christaller also gave suitable examples of consumer oriented and raw material oriented goods. Breweries are consumer oriented, but dairies and sugar refineries are raw-material oriented industries.

Central services are banking, trading etc.

Economic distance of Range of a good- every good and service has an economic distance, which depends on physical distance. Transport cost, insurance, storage, passenger's travel time, loss of weight during transport, discomfort in travel- all these factors determine economic range of a good or services. The economic distance is equal to the geographical distance converted into freight and other economically important transportation advantages or disadvantages. In simple words, economic range means the average maximum distance people are willing to travel for buying certain goods or services.
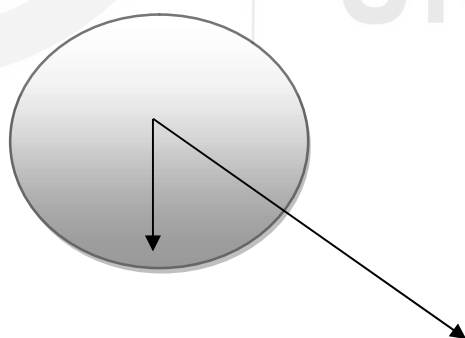
Fig. 15.1: Concept of Threshold & Economic Range.

SAQ I

a) What are the two basic concepts that influenced Christaller's Central Place theory?

b) Describe in brief the concept of threshold.

15.3.2 Measurement of Centrality and Hierarchy

Centrality and Hierarchy are two major concepts related to measurement of central place. Walter Christaller and August Losch have made a significant contribution in the development of central place theory. Central Place theory was originally developed by Christaller in the year 1933 in his book titled "Central Places in Southern Germany". Later on this theory was modified by German Economist August Losch in 1940. Both the theories have described the spatial distribution of cities related to human settlements.

15.3.3 Walter Christaller's Theory

Christaller also visualized two types of central places, higher order and lower order central places. Lower order central places are the Complementary Region of the higher order central places; they are termed as Ergansungsgebiet (supplementary or complementary region). It is very difficult to identify complementary regions or lower order central places, they are often overlapped on each other and change periodically. They are also called Importance-Deficit region, against Importance-Surplus Regions or higher order Central places. Size of the settlement is the main important factor that determines ordering of central places.

Within the Central place System, there are five sizes of settlements -

1. Hamlet,
2. Village,
3. Town,
4. City and
5. Regional Capital.

Hamlet is the smallest rural community, too small to consider as a village. Regional Capitals are highest order settlements like Los Angeles or Paris; they may not be administrative capitals.
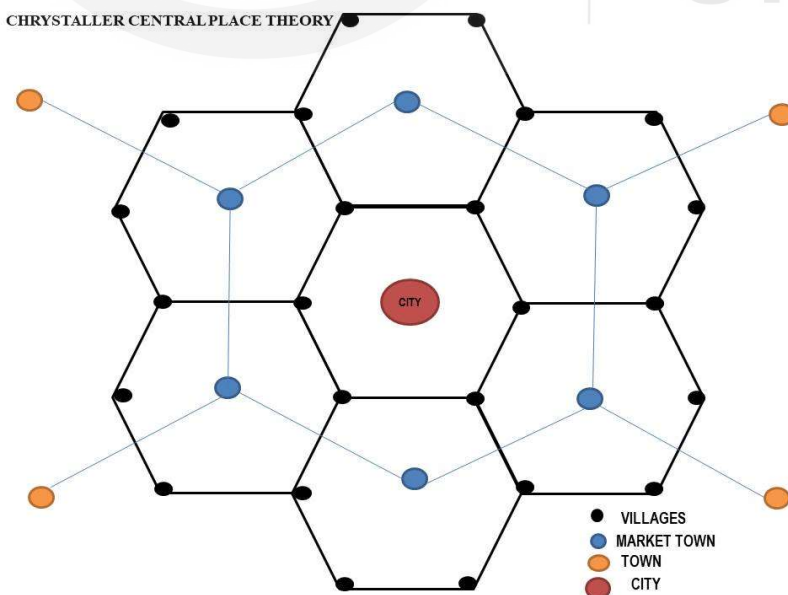
Fig. 15.2: Arrangements of Central Places.

Christaller noted three different principles for arrangements of central places-

1. Market principle (K=3 system)
2. Transport Principle (K=4 system)
3. Administrative Principle (K=7 system).

Christaller developed hexagonal model to explain these systems and each hexagon has one central place at the middle and six at the periphery, total 7 in a hexagon.

In the K=3 system, central places are all market centres, they serve their own population and one third population of the each neighbouring lower order central places. That is why it is called K=3 system.

In K=4 system central places are transport nodes, they serve their own population and 1/4th of each consecutive lower order central places located in the region.

In K=7 system, central places are administrative headquarters, they serve their own population as well as entire population of all the six settlements existing in the hexagon.
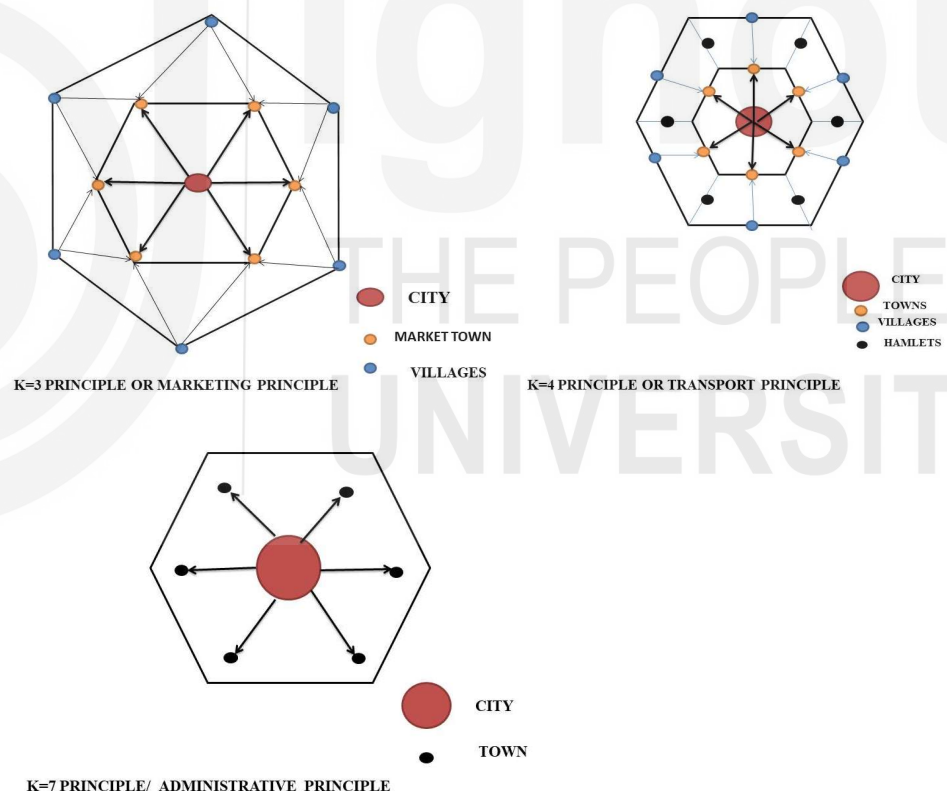
Fig. 15.3: Principles for Arrangements of Central Places.

Relevance of Central Place Theory – Christaller theory gives us an important concept, the concept of centrality.

Concept of Centrality- Centrality is the measure of importance of a place in terms of its functional capacity to serve the demands of population of its own as well as neighbouring settlements. There are high, low and moderate centrality on the basis of their functional base and importance of function. This

concept also establishes a precise relationship between the size of a settlement and services it offers and helps in explaining

1. Consumer services distribution
2. Market area analysis
3. Hierarchy of services and settlements

Central place theory is useful in planning, it explains locations of towns and cities and businesses. It was the first theory which explains spatial pattern of urbanization and explains why there is a hierarchy in urban centres. It also explains why certain business is located in a particular city.

Christaller used here hexagons and it has another advantage. He did not use circles, because they are equidistant from centre to the edge. Two circles either overlap or leave gaps. Squares net together, but their sides are not equidistant. So, he used hexagons, it has the property of both circles and squares. So, in Christaller theory market area is hexagonal.

Short Comings

However, it was criticized for being 'too static' and suitable for agricultural areas rather than modern areas. Christaller model is impossible in the real world, because-

1. Large areas or homogenous plains are rare, physical barriers like mountains; rivers, coast etc. modify transport routes. Transport cost cannot be same in all direction. In a mountainous area, building road is difficult, rivers offer cheap transport; aircrafts offer costly and efficient transportation in remote areas as well.

2. Perfect competition is unreal, some farms always earn more than the others

3. Government intervention can change location of a certain industry.

4. People and resources are not evenly distributed. Christaller overlooked natural endowments and individual's shopping trend. People not always prefer the nearest shop.

5. Christaller envisaged that each centre has a particular function, but in reality, one settlement may have more than one function and function of a settlement may change over time.

13.3.4 August Losch's Theory

In 1954, German economist August Losch modified Christaller theory. His thesis Economics of Location was first published in 1939. It has a focus on location of economic region. He also used the same hexagonal lattices and assumed that raw materials are equally distributed on a flat plain. However, differences came, when he found some settlements provide specialized functions and it changes the K value. According to Losch, no K value is sacrosanct. Every city has poor and rich sectors and they economically behave differently.

He developed a system in which six city rich and six city poor areas are assumed. City-rich sectors produce higher order services, but city-poor sectors have relatively poor services.

Table 15.1: Differences between Christaller and Losch's Central Place Theory

Christaller Central Place Theory	Losch's Central Place Theory
The number of settlements served by each central place is denoted as K. K values are fixed.	K values are not fixed or sacrosanct.
His hierarchy has definite steps or tiers. In each tier, all settlements have same size and same function.	Settlements of same size may not have same functions.
Higher order places contain all the functions of the lower order settlements.	Larger places may not have all the functions of a smaller settlement.

Apart from Christaller and Losch, many other economists also tried to measure centrality of a settlement. Smailes (1944) has used bus service frequency by calculating centrality of a settlement and he called it functional index. Dickinson used wholesale trade and Green (1948) used bus service frequency to measure centrality of a place. John Marshall's book *The structure of Urban Systems* (1987) reviews Christaller's CPT concept and applied in analysing real urban system. Even in India scholars used Central Place model of Christaller for identifying centrality of a settlement.

SAQ 2

a) Name the five sizes of settlements within a central place system.

b) Name the three different principles for arrangements of central places in Christaller's Central Place Theory.

15.4   RANK SIZE RULE

In order to construct urban size hierarchy urban centres must be ranked according to population size. G.K. Zipf (1948) postulated a simple model which states that population size of a given city tends to be equal to the population of the largest city divided by the rank of the given city. So, the given formula is-

$Pn = P1/n$

P1 = Population size of the largest city

Pn = Population size of the given city

n = Rank of the city's population- largest city = 1, second largest = 2

Therefore, according to the rank size rule,

Rank 1 city - Largest city

Rank 2 city- 1/2th of the Rank 1 city

Rank 3 city- 1/3rd of the Rank 1 city

Rank 4 city - 1/4th of the Rank 1 city

However, these are hypothetical populations. In some countries the difference between the first and second rank cities are less than expected and in some countries especially in the developing countries, it is more than expected.

Zipf said that "*if all the settlements of a country are ranked according to population size, the sizes of the settlements will be inversely proportional to their rank*."

If the largest city is commonly at least twice as large as the next largest city and more than twice as significant is called Primate City. It is called the law of Primate City, first given by Mark Jefferson (1948).

**Application of Rank Size Rule on Indian Cities:**

India has 31.6% urban population in 2011. The country has 46 million plus cities or population above one million. Three cities have above 10 million populations, Mumbai, Delhi and Kolkata. The rank size rule exercise shows that Mumbai is the largest city, followed by Delhi, Kolkata Bengaluru, Hyderabad, Ahmadabad and Chennai. However, the actual population is much higher than the expected population.
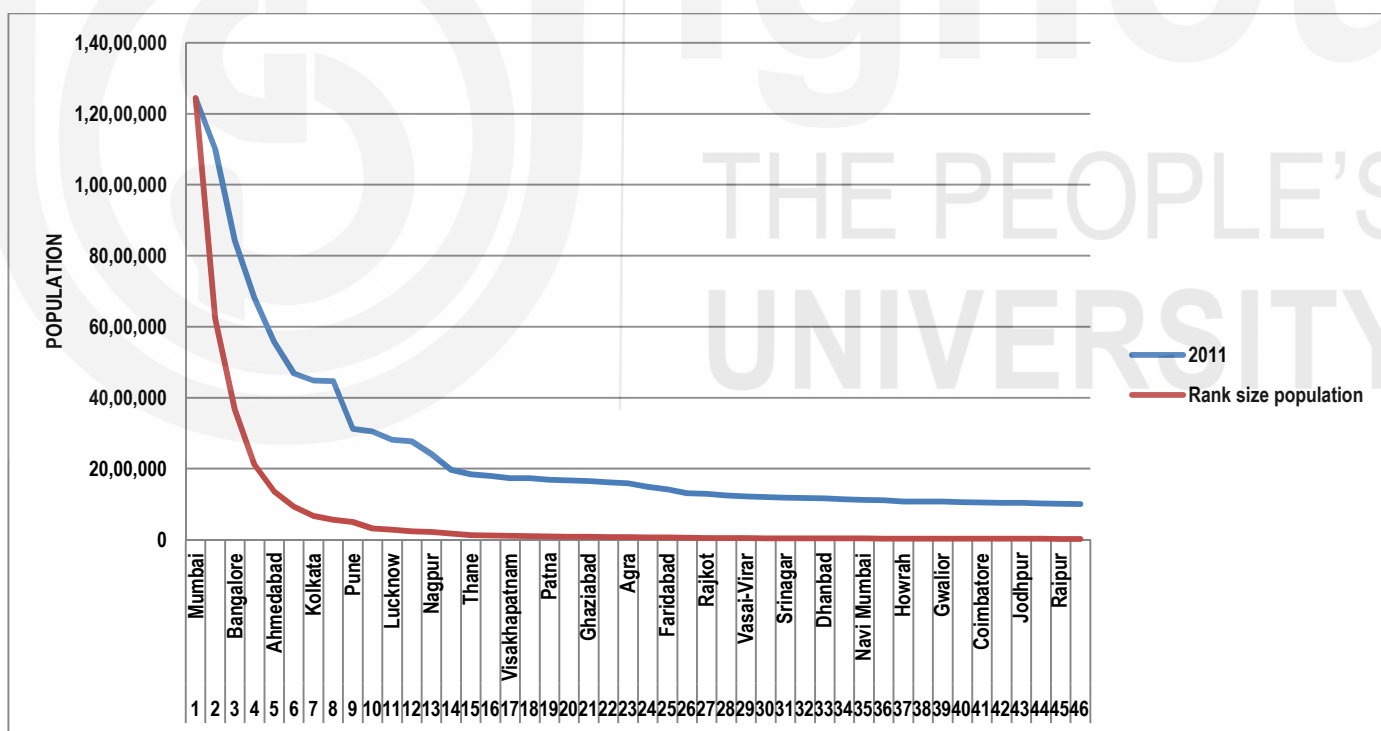
Fig. 15.4: Rank Size Population and Actual population of Million Plus Cities, India, 2011.

In this unit, we have also analysed the state of West Bengal's city population. There are 29 cities above one lakh of population. Kolkata is the largest city, followed by Asansol, Siliguri, Durgapur; but Asansol's population is less than half of Kolkata's population, and Siliguri too has less than one third of Kolkata's population. So, in West Bengal Kolkata is the primate city.

Therefore, city primacy and result of rank size rule differs from national level to regional level.
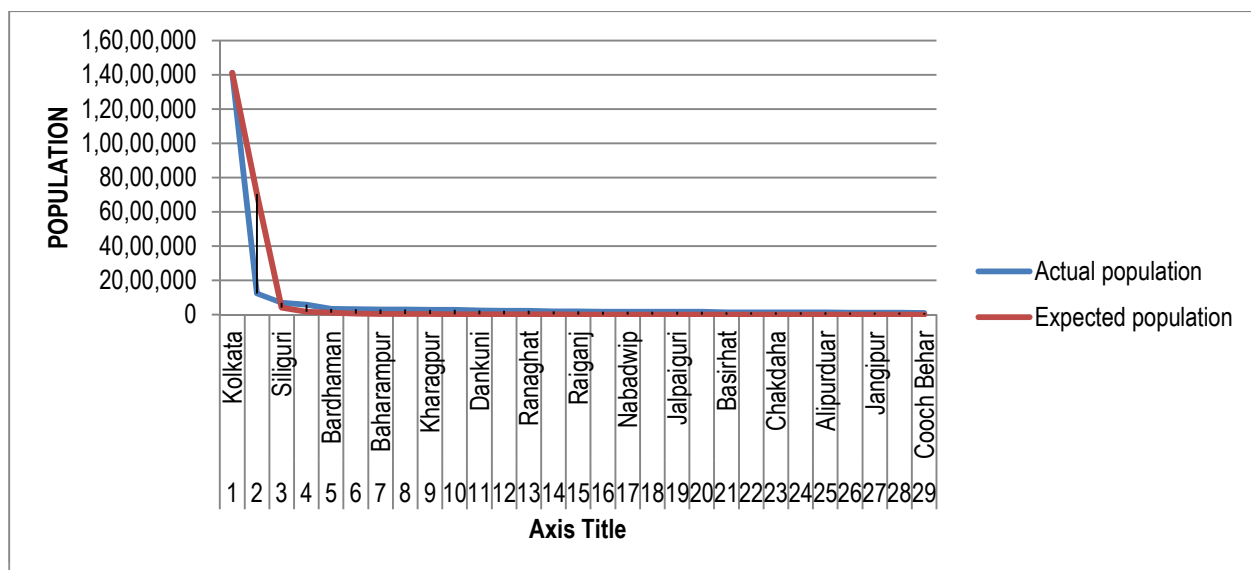
Fig. 15.5: Rank Size Population and Actual population of Million Plus Cities, West Bengal, 2011.

SAQ 3

Fill in the blanks with appropriate word

a) In order to construct urban size hierarchy urban centres must be ranked according to _____.

b) According to Zipf the sizes of the settlements will be _____ to their rank.

c) In West Bengal _____ is the primate city.

15.5   URBAN HIERARCHY IN GLOBAL CITY

Richard. L. Florida, a Professor of urban Studies at the University of Toronto, published the second Global Economic Power Index (2015), a meta list of global cities. It evaluates the rank of the global cities based on the magnetism or comprehensive power of attracting population. It measures six functions-

1. Economy,

2. Research and Development,

3. Cultural Interaction,

4. Liveability,

5. Environment, and

6. Accessibility

Data collection is monitored and every year new ranks are calculated. It has been found that the top ten cities retained their rank over the years, while North American Cities are rising and Beijing and Shanghai fail to retain their ranks.

London is the first rank city, followed by New York and Tokyo; Paris 4 and Singapore 5.

Globalization and World Cities Research Network (GaWC study) in 2010 classified Global Cities into alpha++ (London and New York) and alpha+ (Beijing, Paris, Tokyo, Shanghai, Sydney, Singapore, and Hong Kong).

A.T. Kearney's Global City Index (GCI): In 2008, leading American journal Foreign Policy, in conjunction with the consulting firm A.T. Kearney and the Chicago Council on Global Affairs, jointly published a report on the ranking of global cities, based on consultation with Saskia Sassen, and others. Authors Mike Hales and Andres Mendoza Pena took five dimensions-

1. **Business activities**, which include headquarters of major global corporates, locations of business service firms, value of cities capital market, number of international conferences and the flow of goods through ports and airports. It was given 30 percent weightage.

2. **Human capital** or a city's capacity of attracting talent based foreign migrants or skilled immigrant labours, quality universities, international schools and number of residents with university degree. It was given 30 percent weightage.

3. **Information exchange** or how well circulated information is within and outside the city through telecommunication and IT. Indicators taken here are number of TV networks, broadband subscribers etc. It was given 15 percent weightage.

4. **Cultural experiences** are measured through number of international sporting events organized in the city, number of museums, art galleries, performing arts venues, diverse culinary establishments, number of international travellers and number of sister-city relationships. (Weightage had given 15 points).

5. **Political engagement** of a city is measured through how a city holds influence in global policy dialogue. Here indicators are number of embassies and consulates, major think thanks, international organizations, local institutions with international reach, and the number of political conferences hosted by a city. It was given 10 point weightage.

6. These above mentioned indicators are used for measuring a city's strength and vulnerability.

This report used projections as well as and found that-

1. London, Paris, New York and Tokyo will retain their positions in the coming decades,

2. Paris and Tokyo continue to swap positions 3 and 4,

3. Los Angeles, Chicago, and Hong Kong will follow the leaders at close

4. Seoul, Brussels and Washington will join the top ten cities.

5. Moscow and Vienna made the biggest improvements and Cairo and Bangkok dropped the furthest.

6. Melbourne will join to the GCI in 2012.

7. At least three Asian cities (Hong Kong, Singapore and Tokyo) always remain in the top ten lists. Germany will be an exception, no German city is at top ten lists, but in the lower ranks more than one German city are found.

8. These global cities are power centres and geopolitically important than their parent states, they are called geopolitical urban vectors.

However, rank of the cities differs from index to index, depending on objectives of the study and indicator chosen. A.T. Kearney took Business Activity, but Price water house Coopers (PWC) measured Economic Clout and it took indicators like number of global headquarters, financial and business services employment, FDI attraction, productivity and rate of real GDP growth. PwC'S Cities of opportunities 6 (2014) shows Chicago scores higher rank than San Francisco and New York in terms of standard of living.

Metropolis- It has etymological root in the Greek words metropoles (mother city). It has a connection with colonial cities. Earlier, settlers and explorers established cities elsewhere in the world and sent raw materials from those cities to the mother city or original city. They are called metropolis. However, metropolitan areas consist of a densely populated urban core surrounded by a low density area sharing infrastructure, industry and housing. A metro area comprises multiple jurisdiction, and municipalities. They also include satellite cities. In India, a metropolitan city should have 2 million or more population. Therefore, India has ten metropolitan cities. Example-Delhi NCR, Mumbai Metropolitan Region, Kolkata Metropolitan Area, Chennai Metropolitan Area, Bangalore Metropolitan Region, Hyderabad Metropolitan Region, Pune Metropolitan Region, Kanpur metropolitan area, Visakhapatnam Metropolitan Region and Nagpur Metropolitan Region.

A cluster of well-network cities is called **Megalopolis**. It was first used in 20th century and the first example of megalopolis is the *Bos-Wash Megalopolis* (Boston to Washington). The *Unified Jakarta-Bandung* metro area in Indonesia and the Pearl River Delta in China, are other examples.

The term **Mega city** was first documented in the University of Texas, in 1904. Initially United Nations used the term to describe cities with 8 million or more population, but now the threshold is 10 million. In the USA, a megacity's density should be 2000 per square kilometres. New York was the first megacity of modern time and it exceeds 10 million populations in 1936. In India, the definition of megacity is not very much different. In India, Mumbai, Delhi and Kolkata are megacities.

SAQ 4

a) Name the six functions that were taken in to consideration while evaluating the rank of global cities.

b) What is mega city?

15.6   URBAN HIERARCHY IN INDIA

According to the Census of India, a settlement is called urban when it has a certain population limit and functions; a) A minimum of 5000 population, b) At least 75 per cent of the male main working population engaged in non-agricultural pursuits; and c) A density of population of at least 400 persons per sq. km.

If a settlement fulfils all these criteria, it is called a Census Town. India has 3894 Census Towns in 2011.

However, even if, a settlement cannot fulfil all these criteria, but has a municipality, corporation, and cantonment board or notified town area committee, as its administrative body, it is called a statutory town. India has 4041 Statutory Towns in 2011.

India has 7935 urban centres in 2011; earlier it was 5161, in 2001. Class I cities are 465, among them 53 cities have more than 10, 00,000 population. Among the million plus cities, there are three large UAs, which have more than 10 million population, Greater Mumbai (18.4 million), Delhi UA (16.3 million) and Kolkata (14.1 million). In India, more than 705 of the total urban population live in Class I cities or UAs.

Table 15.2: Percentage of population share by Size Class of UA/City/ Town

S. No	Size Class of UA/City/ Town	Percentage of population share (2011 Census)
1	Class I towns with more than 1, 00,000 population	74.98
2	Class II towns with 50,000 to 99,999 populations	14.81
3	Class III towns with 20,000 to 49,999 populations,	6.78
4	Class IV towns with 10,000 to 19,999 populations	2.38
5	Class V towns with 5000 to 9,999 population	0.98
6	Class VI towns with less than 5,000 populations	0.075

(Source: Census of India 2011, Provisional Population Totals Urban Agglomerations and Cities)

Apart from Cities, Census Towns and Statutory Towns, there are two more concepts, Urban Agglomeration and Out Growths.

*An **Urban Agglomeration** is a continuous urban spread constituting a town and its adjoining outgrowths (OGs), or two or more physically contiguous towns together with or without outgrowths of such towns. An Urban Agglomeration must consist of at least a statutory town and its total population (i.e. all the constituents put together) should not be less than 20,000 as per the 2001 Census. In varying local conditions, there were similar other combinations which have been treated as urban agglomerations satisfying the basic condition of contiguity. Examples: Greater Mumbai UA, Delhi UA, etc.*

Density varies within an Urban Agglomeration. Low density areas within a UA are labelled as indentations, jumps, undevelopable territory etc. Indentations are low density blocks protruded in the main body of the UA. Undevelopable

territories are like corridors that connects two densely populated areas. Jumps connect peripheral areas of the UA.

When a low density area is located in the UA and surrounded by high density areas, it forms an enclave. Exclaves are low density areas located at the outer margin of the UA. These classifications are mainly given by the US Census Bureau.

Out Growths (OG): *An Out Growth (OG) is a viable unit such as a village or a hamlet or an enumeration block made up of such village or hamlet and clearly identifiable in terms of its boundaries and location. Some of the examples are railway colony, university campus, port area, military camps, etc., which have come up near a statutory town outside its statutory limits but within the revenue limits of a village or villages contiguous to the town. While determining the outgrowth of a town, it has been ensured that it possesses the urban features in terms of infrastructure and amenities such as pucca roads, electricity, taps, drainage system for disposal of waste water etc. educational institutions, post offices, medical facilities, banks etc. and physically contiguous with the core town of the UA. Examples: Central Railway Colony (OG), Triveni Nagar (N.E.C.S.W.) (OG), etc. Each such town together with its outgrowth(s) is treated as an integrated urban area and is designated as an 'urban agglomeration'.*

Table 15.3: No. of Urban Agglomeration, Census and Statutory Towns in 2001 and 2011 Census

	2011 Census	2001 Census
Statutory Towns	4041	3799
Census Towns	3894	1362
Urban Agglomerations	475	384
Outgrowths	981	962

(Source: Census of India 2011, Provisional Population Totals Urban Agglomerations and Cities)

SAQ 5

Define the following:

a) Urban Agglomeration

b) Out Growths

15.7   SUMMARY

Human settlements are not isolated entity; they are interconnected with each other. Population size and occupations of people generate various services and goods; this is called function of the settlements. The maximum distance a customer travels to purchase a good and service determines its range and it is called the sphere of influence. Small settlements offer fewer services and their sphere of influence is also small. A hamlet has its sphere of influence only a few kilometres. However, a city offers many services and some are specialised ones. A city may have a sphere of influence beyond hundreds of kilometres. Thus the sphere of influence determines a settlement's functional area. This network creates a functional hierarchy, where hamlets stand at the

lower end with lowest sphere of influence, to the city with highest sphere of influence. Three main factors contributing in the hierarchy of settlements are-a) size of the population, b) functions performed, and c) sphere of influence.

Walter Christaller (1933) firstly wrote about the exposition of central place theory. Every town is a central place, and chief profession of the city dwellers determine its function. These goods and services are of three types- central professions or higher order services like airport, administrative services, dispersed goods and services found at dispersed areas, and indifferent gods and services found everywhere. Based on these functions he identified three types of central places – K7 system with central place with administrative eservices, K4 system with dispersed services like transport nodes, and K3 system with market place system. However, Christaller did not consider central places with multiple functions. Thus Losch modified this theory, where k value is not fixed and smaller settlements may offer unique services that bigger settlements do not have. However, neither Losch nor Christaller paid any heed to human resources, capital cultural factors and information of a settlement. Thus, both the theories have been outdated in recent years. Global city hypothesis has explained factors like outsourcing, immigration and policy engagements.

15.8   TERMINAL QUESTIONS

1. What is Central Place Theory of Christaller? What are the differences between Losch and Christaller's concept?

2. Explain Rank size rule with suitable example?

3. Discuss in detail urban hierarchy in global city?

4. What is urban agglomeration and outgrowth?

15.9   ANSWERS

Self-Assessment Questions (SAQ)

1. a) Two basic concepts were homogeneity and development pole or economic node

   b) Threshold means minimum number of people needed for a central place business or economic activity to remain active and flourishing.

2. a) There are five sizes of settlements:

   i) Hamlet, ii) Village, iii) Town, iv) City, and v) Regional Capital

   b) Christaller's three different principles for arrangements of central places theory are: i) Market principle (K=3 system); ii) Transport Principle (K=4 system); and iii) Administrative Principle (K=7 system).

3. a) population size; b) inversely proportional; c) Kolkata

4. a) Economy, research and development, cultural interaction, liveability, environment, and accessibility.

   b) Initially United Nations used the term to describe cities with 8 million or more population, but now the threshold is 10 million.

5. a) It is a continuous urban spread constituting a town and its adjoining outgrowths, or two or more physically contiguous towns together with or without outgrowths of such towns. It must consist of at least a statutory town and its total population should not be less than 20,000.

b) An Out Growth (OG) is a viable unit such as a village or a hamlet or an enumeration block made up of such village or hamlet and clearly identifiable in terms of its boundaries and location.

<u>Terminal Questions</u>

1. Refer to section 15.3 and section 15.4.

2. Refer to section 15.5.

3. Refer to section 15.6.

4. Refer to section 15.7

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