❖Settlement Geography

▪ Rank Size Rule by G.K. Zipf

Zipf's law is an empirical law formulated using mathematical statistics. The Rank-Size Rule was revealed in both developed and underdeveloped countries when the cumulative frequency of cities with a population of greater than twenty thousand people was ranked against the size of a city on a log-normal scale. The cities in any region be ranked from largest to smallest according to their population size. The larger city ranked 1 and the second largest no 2 and continuing in this way down to the lower ranking towns.

The rank-size rule, proposed by G.K. Zipf in 1949, attempts to express the relationship between towns in a precise mathematical terms and states. That "if all the urban settlements in an area are ranked in descending order of population, the population of the nth town will be 1/nth that of the largest town". In other words, the population of urban settlements in a region can be arranged in the series of 1, 1/2, 1/3, 1/4, ..1/n.

The rank-size rule says that 'when ranks of cities, arranged in descending order, are plotted against their populations (rank 1 being given to the largest, and so on) in a doubly logarithmic graph, a rank-size distribution results'; or to put it in much simpler words: 'In an ordered set of cities representing a given country, the product of the rank and size of a city is constant'. The rank-size rule is also commonly referred to as Zipf's Law because the model describing a constant relation between the size of an event and its rank was at first developed by G. Zipf. In the case of cities distribution by population, when the natural logarithms of the rank and of the city size (in terms of the number of people) are calculated and represented graphically, a remarkable log-linear pattern is attained, which is called the rank-size distribution. **If the slope of the line is equal or close to -1 (a straight line), the relationship is known as Zipf's Law.**

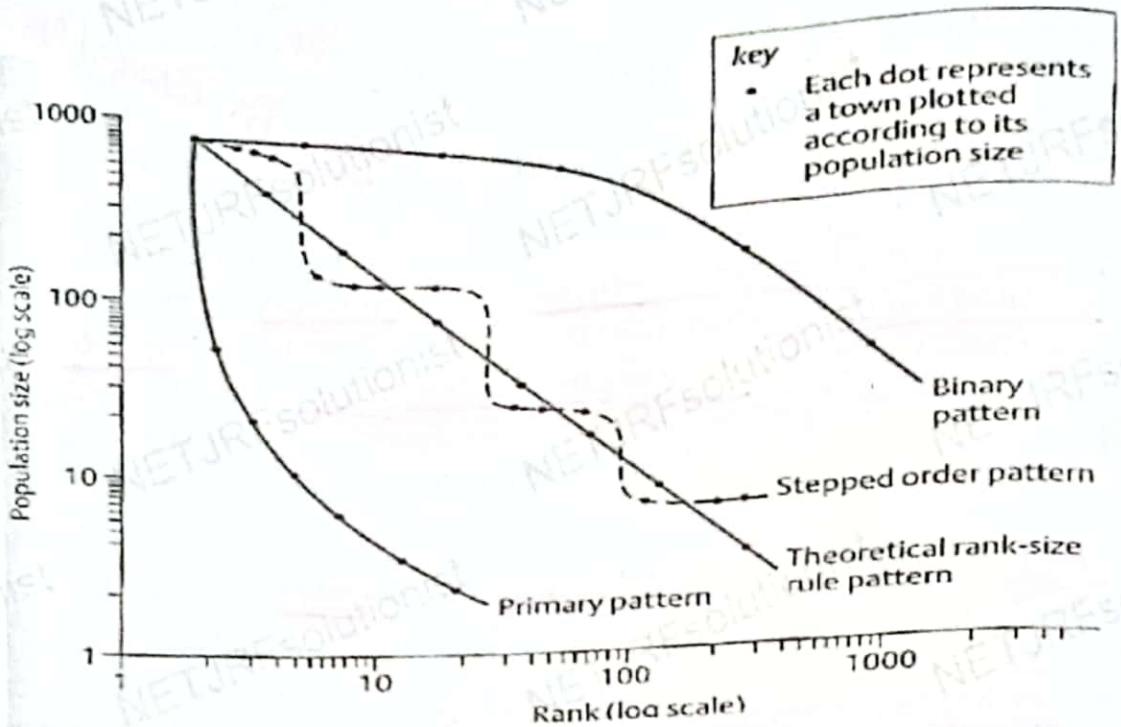
This regularity can also be expressed by the formula:

$$\mathbf{Pn = P1/n}$$

where Pn is the population of the town of rank n in the descending order and P1 is the population of the largest city.

Thus, if the largest city has a population of 2 million, the tenth ranking town should, according. to the rule, have a population of 2,00,000 inhabitants.

1. The theoretical rank size rule pattern is a straight line.
2. In urban primacy, a single city dominates and is much greater than the next large center (primary pattern).
3. In Binary pattern two or more cities are larger than the predicted size.
4. In Stepped order pattern there are series of levels and steps (conurbations, cities, towns etc.).



Zipf postulates that the size and number of settlements in any nation are governed by two sets of forces, i.e.,

1. The forces of diversification
2. The forces of unification.

The balance between the two forces results in the regularity of settlement size and number.

Forces of Diversification: The location of small settlements is generally determined by nearness to the source of raw materials. In such a situation, where primary economic activities predominate, land becomes the basic raw material or resource. Land is tilled by farmers to produce food and other basic necessities of life. A peasant society rooted to the land merges with a large number of village settlements within walking distance of each other. Similarly, apart from agriculture, other primary activities such as mining, fishing and forestry also generate dispersed settlements of small size at regular intervals of distance.

As society advances, secondary production makes it possible to locate settlements of greater distances from the source of raw materials. Thus, the settlements specializing in secondary production can be located farther apart, and also be larger in terms of population. Nevertheless, a wide range of secondary economic activities must be located near the source of raw materials so that the costs of transportation can be minimized. Secondary economic activities generate settlements of large size and greater distances apart as compared to primary activities.

Forces of Unification: In contrast to the forces of diversification, the forces of unification result in the emergence of few large settlements. Here, the focus is on tertiary economic activities. Nearness to the market, rather than the source of raw materials, is the determining factor in the location of settlements. The size of market is measured by

the population of the settlement itself. Thus, a large settlement in itself constitutes a large market. Tertiary activities, such as education, health and administration, are all consumer-oriented and tend to be concentrated in large cities. In recent times, a wide range of secondary activities have acquired a market orientation (for example, electronic and engineering goods and information technology industries).

Rank-Size Relationship in India

The rank-size relationship is absent in India at the national level as the population size of Mumbai, Kolkata and Delhi is very close to each other. Moreover, a great majority of states in India also do not conform to the rank size rule. In fact, primacy exists in at least 15 out of the 28 states of India and in another eight states (Kerala, M.P., Punjab, Orissa, Goa, Arunachal Pradesh and Nagaland) the leading city is only just larger than the second city. In Kerala, the three cities of Cochin, Calicut, and Thiruvananthapuram (Trivandrum) have nearly the same population size; his is also the case with cities of Indore, Jabalpur and Bhopal in Madhya Pradesh, and Ludhiana, Amritsar and Jalandhar in Punjab. Rank-size relationships appear to hold good in the state of Rajasthan. In brief, rank-size rule in India is an exception rather than a rule.