Breaking Point Theory

The theoretical position of the margin of an urban field can be calculated by using a technique known as breaking point theory. This is a simple variation on the standard gravity model. The breaking point between two towns divides the people who will travel to one town from those who will travel to another town for similar services. If enough breaking points can be established around a town, its theoretical urban field can be delimited in that way.

Reilley introduced his model of retail gravitation based on Gravity Model. This Retail Gravitation Model is popularly known as Breaking Point Theory or Breaking Point Model. The formula of breaking point as given by Reilley is –

$D_{BP} = D_{ab} / 1 + (\sqrt{P_a} / P_b)$

Where,

D_{BP} = Breaking point distance from city 'a' to city 'b'

D_{ab} = Distance between city 'a' and 'b'

P_a = Population of city 'a'

P_b = Population of city 'b'

Retail Gravity Model suggests that there are underlying consistencies in shopping behaviour that yield to mathematical analysis and prediction based on the notion or concept of gravity. It is based on Newtonian gravitational principles, explains how large urbanised areas attract customers from smaller rural communities.

Suppose, there are two cities P_a, P_b having population of 20,000 and 5,000 at the distance of 12km, how then can the boundary line be fixed showing the level of interaction?

As per formula-

$D_{BP} = D_{ab} / 1 + (\sqrt{P_a} / P_b)$

$= 12 / 1 + (\sqrt{20,000/5,000})$

$= 12/3$

$= 4km$

Therefore, the distance of breaking point from city 'b' toward the city 'a' is 4km.

Reference:

Singh, R. L., R. P. B. 2008. Elements of Practical Geography, Kalyani Publishers