



IS REILLY'S LAW OF RETAIL GRAVITATION PERTINENT IN SUB-URBAN AREAS OF WEST BENGAL? - A STUDY

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ABSTRACT

The Law of retail gravitation is a heuristic idea conceptualized by William J. Reilly in 1931, which depicts that "customers are willing to travel longer distances to larger retail centers given the higher attraction they present to customers". According to Reilly's formulation, "the attractiveness of the retail center becomes the analogy for size (mass) in the physical law of gravity". The law of retail gravitation (LRG) and the economic law of market areas (LMA) both seek to define the market-area boundary between two competing centers. Each law is characterized in terms of the primary magnitudes of the market-area periphery. It is revealed that under specific circumstances the two laws keep up a correspondence precisely, so the LMA is able to offer some economic hold for the LRG. The two laws are also viewed within the broader outline of a hierarchically prearranged urban system. Accurate association between the laws is again possible under definite circumstances, but the eloquent competence of the LMA is greatly augmented when estimate is permissible. This paper aims at relevance of Reilly's (1931) Law of Retail Gravitation in sub-urban areas of West Bengal, especially Northern region of the state where a good number of shopping malls are being constructed in last few years.

KEYWORDS: Law of retail gravitation, retail trade area, retail catchment, marketing strategy.

Introduction

Defining the location and the catchment area of any shopping mall is a very significant constituent in developing the business of a shopping center. Catchment area analysis in retail industry calculates the trade area population and studies the accessibilities to the impending shopping mall. In 1931, William J. Reilly was inspired by the law of gravity to create a relevance of the gravity model to quantify retail business between two cities. His work and theory, *The Law of Retail Gravitation*, shows us to identify a trade area territory around cities by means of the distance between the cities and the population of each city. Reilly conceptualized that the bigger a city the larger a trade area it would have and thus it would draw from superior vicinity around the city. Two cities of equal size have a trade area boundary equidistant between the two cities. When cities are of asymmetrical size, the boundary lies closer to the smaller city, giving the larger city a larger trade area. Reilly renamed the boundary between two trade areas the breaking point (BP). On that line, closely half the residents shops at either of the two cities. The formula is used between two cities to find the BP between the two. The distance between the two cities is divided by one plus the result of dividing the population of city B by the population of city A. The law supposes the geography of the area is flat (i.e. without any rivers, roads or mountains) to adjust a consumer's choice of where to go to buy goods. It also assumes consumers are otherwise apathetic between the actual cities. In equivalence with Newton's Law of Gravitation, the point of indifference is the point at which the "attractiveness" of the two retail shopping zones (postulated to be relative to their size and inversely proportional to the square of the distance to them) is equal:

$$\frac{d_A}{d_B} = \sqrt{\frac{P_A}{P_B}}$$

Where d_A the distance of the point of indifference from A is, d_B is its distance from B, and P_A/P_B is the relative size of the two cities. If the customer is on the line connecting A and B, then if D is the distance between the cities, the point of indifference as measured from A on the line is

$$BP = \frac{\text{distance between city a and b}}{1 + \sqrt{\frac{\text{pop. b}}{\text{pop. a}}}}$$

BP is distance from city a to breaking point

As expected, for centers of the same size, $d=D/2$, and if A is larger than B, the point of indifference is closer to B. As the size of A becomes very large with respect to B, d tends to D, meaning the customer will always have a preference the larger centre if not they are very close to the smaller one. Customer's verdict on choosing a shopping center depends on tenant mix, attraction of the shopping

center, marketing communications, location, accessibility, etc. By using Reilly's Law of Retail Gravitation and Breaking-Point Model, we will calculate the trade area for specific shopping centers.

Literature Review

One of the major significant decisions a retailer can make is where to locate a retail outlet; a retail store can prosper or fail exclusively based on its location (Mendes and Themido, 2004). International Council of Shopping Centers (ICSC) acknowledged that, "a shopping center is group of retail and other commercial establishments that is planned, developed, owned and managed as a single property, typically with on-site parking provided. The center's size and orientation are generally determined by the market characteristics of the trade area served by the center". Retail trade area development is closely linked to economic and social progress in a community. The accumulation usefulness can draw together a lot of footfall with different functional shopping needs to the center and then produce other emotional shopping needs for people at each shopping time – in this way one store supports another store (Tegner, 2009). M Batty (1978) attempted a reformulation and oversimplification of Reilly's (1931) law of retail gravitation. Reilly himself challenged workers in the field to produce new evidence which would refute or strengthen his law, and developments in spatial-interaction theory during the last decade are used here in taking up this challenge. An assessment of Reilly's law sets the scene: By adopting a gravity model more general than the Newtonian model used by Reilly, it is shown how the limitations of the law with respect to hierarchy, spatial competition, location size, and the symmetry of trade flows, are overcome. To be more specific the notion of Reilly's law as a special case of the market-area analysis originating from Fetter (1924) and Hotelling (1929) is confirmed in terms of a theory of the breakpoint implying spatial price-cost apathy. Another approach, through entropy-maximization and its dual problem, leads to similar conclusions with regard to prices, and it also serves to introduce multi-centered spatial competition. These ideas are then universal in numerous ways: through ideas about the control of prior spatial information, through concepts of consumer as well as producer market areas or fields, and through the implications of the analysis for the family of spatial-interaction models. An assumption on the connection of price differentials to Tobler's (1979) interaction winds is prepared, with a relevance of these models to the definition of an urban hierarchy in the Reading sub region.

Appliance of Reilly's Law in the case of shopping centers located in between Siliguri and Jalpaiguri is in Northern Part of West Bengal:

Reilly's Law of retail gravitation states that bigger cities will have bigger zones of persuade than the smaller ones. According to Reilly's Law, people travel more to reach a larger city. Reilly established that the larger a city, the larger a trade area it would have and thus it would draw from larger surroundings around the city. Two cities of equal size have a trade area boundary equidistant between the two cities. When cities are of unequal size, the boundary lies closer to the smaller city, giving the larger city a larger trade area. In North Bengal, there are two major shopping centers located on the highway between the two main cities, Siliguri and Jalpaiguri: Uttorayan City Centre and Cosmos mall, respectively located on the 12th km and on the 6th km of the highway away from Siliguri metropolitan. In their communication approach both shopping centers are targeting customers from both cities, Siliguri and Jalpaiguri.



Figure: The stretch between the two cities Siliguri and Jalpaiguri

The Breaking Point would be $= 12 \text{ km} / (1 + \sqrt{266,823/765,813}) = 12 \text{ km} / (1 + 0.59) = 12 \text{ km} / 1.59 = 7.54 \text{ km}$ from the city of Siliguri.

In retail jargon this operational area is termed as “catchment area” for the shopping centers. This means that residents in this distance tend to travel toward the shopping centers of Siliguri rather than toward the shopping centers of Jalpaiguri. Reilly's Law gives us an clarification why both shopping centers do not have customers from the city of Jalpaiguri. Located 6 km and 12 km away from Siliguri, both shopping centers trade area is the city of Siliguri. From this potential, if Uttorayon City Centre and Cosmos mall will offer the same promotional and other retail service mix to customers, Cosmos mall will be more preferred because of the fact that customers will have to travel less. Uttorayon City Centre should have a high level of magnetism and offer different retail product in order to be aggressive. To calculate the trade area population, the shopping centers in each city should count the population located in the distance calculated with the formula of the Breaking Point. This figure characterizes the market prospective for the shopping centers. When there are many roads to admittance the shopping centers, this distance is usually measured as a radius.

Conclusion

Reilly's Law guides managers of shopping centers to define the catchment area of each shopping center, the number of impending customers surrounded by the

trade area and the competitors. The calculation of Breaking Point between Siliguri and Jalpaiguri shows that residents up to the distance of 7.54 km away from Siliguri will be attracted to frequently visit a shopping center that makes them travel towards the Siliguri. So, Siliguri plays a significant role for the shopping centers analyzed in this study, because of the large number of population in it. Taking into consideration the actual location of City Centre Uttorayon (12 km) and Cosmos Mall (6 km), we can say that these shopping centers are competing for more or less, the same catchment area and potential customers. Differentiated marketing strategies and different shopping attraction mix need to be implemented in order to put a stop to cannibalization of each shopping center and avoid any kind of repulsion for customers.

REFERENCES

1. Batty M. (1978). “Reilly's challenge new laws of retail gravitation which defines systems of central places”, *Environment & Planning A* 10(2), 185-219.
2. Bennison, D. and T. Hernandez. 2000. “The art and science of retail location decisions”. *International Journal of Retail & Distribution Management*, Vol. 28 No. 8, pp. 357-367. Retrieved February 2, 2007, EBSCOhost database
3. Converse, P.D. (1949). “New Laws of Retail Gravitation” *Journal of Marketing*, Volume 14, Janua
4. Fetter Frank A., (1924) “The Economic Law of Market Areas,” this Journal, XXXVIII (May 1924), p. 525.
5. Goldstucker J. L., Bellenger D. N., Stanley T. J., Otte R. L. (1978). “New developments in retail trading area analysis and site selection”, Publishing Services Division, College of Business Administration, Georgia State University (Atlanta).
6. Hotelling H. (1929). “Stability in competition”, *Economic Journal*, 39, 41-57
7. International Council of Shopping Centers, (1999). “ICSC Shopping Center Definitions Basic Configurations and Types”
8. Mendes and Themido, (2004), “Multi-outlet retail site location assessment”, *International Transactions in Operational Research*, Wiley Online Library, DOI: 10.1111/j.1475-3995.2004.00436.x, Volume 11, Issue 1, January 2004, Pages 1–18
9. Okoruwa A., Terza J. V., Nourse H. O. (1988). “Estimating patronization shares for urban retail centers: an extension of the Poisson gravity model”. *Journal of Urban Economics*, 24, 3, 241-259.
10. Rogers, D. 2004, January 26. “A status report on location analysis”, *DSN Retailing Today*, 14, Retrieved February 2, 2007, EBSCO host database.
11. Tegner J. (2009). The good reasons for establishing IICG shopping centers
12. Tobler W.R (1979), “Estimation of attractivities from interactions”, *Environment & Planning A* 11, 121-127.