Portuguese food retailers – Exploring three classic theories of retail location

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A R T I C L E   I N F O

A B S T R A C T

This article sets forth results from an exploratory empirical study that aimed to test the predictive validity of three classic location theories: central place theory, spatial interaction theory and the principle of minimum differentiation. Correlation, linear regression and analytical procedures in a Geographic Information System were used to reveal relationships between variables. The results show that all theories find significant support. It was possible to relate store location with distance to the centre, population density and competitor's location. It was also found that store location is related to consumer's proximity to the store (when stores are smaller) and the store's attractiveness to the consumer (when stores are larger).

1. Introduction

In Europe countries are still facing economic challenges with direct impact on consumer's confidence levels and family's spending. These economic challenges, combined with increasing consumer mobility, increasing electronic commerce, changing lifestyles along with a consumer much more diligent with his time and money, are forcing thousands of small stores, retail chains and shopping centres to rethink their strategy. As a fundamental component of national economy and an important element in organizing Portuguese sociocultural practices, retail, Portugal's GDP single most contributor (INE, 2013b), is becoming a priority to local and central administration. The retail sector has, since the 1990s, been the main player in the property market in Portugal. In fact, the retail gross leasable area (GLA) per 1.000 inhabitants in Portugal is higher than EU27 average and higher than UK or France retail GLA (Cushman & Wakefield, 2014). The increase in the supply of retail space in Portugal has kept pace with this industry's success story, having recorded high growth rates up to 2009, when the market started to reveal a slower supply growth rate. The Portuguese market has been clearly dominated by institutional investors with international funds focusing on retail sectors and prime office space. The retail sector alone is responsible for 44% of the total property investment market between 1990 and 2013 (Cushman and Wakefield, 2014).

Of all the elements of the retail mix, location is often referred as the most important one (Brown, 1994; Cox and Brittain, 2004; Davies and Harris, 1990; Ghosh, 1994; Levy and Weitz, 2009). Not only is the store's location generally equivalent to convenience and to the mini-

mization of consumers' shopping efforts (Reimers and Clulow, 2004), but it also involves the retailer in a long term commitment with the chosen location, given the amount of investment involved. Recently, a changing retail environment is augmenting the location importance as retail economic groups develop multi-outlets chains of small or medium stores. For the past decades the range of choices available to a retailer has continued to expand. Modern retail space (shopping centres, retail parks and factory outlet centres) in Portugal as at the end of 2013, amounted to more than 3.65 million square meters (Cushman and Wakefield, 2014).

From the retail spatial patterns line of investigation, the four most important theories of retail location emerge: Central Place Theory (Christaller, 1933), Spatial Interaction Theory (Reilly, 1929, 1931), Bid Rent Theory (Haig, 1927) and the Principle of Minimum Differentiation (Hotelling, 1929). Despite the theories' positivist and simplified premises, results of empirical investigations in this field show that the spatial patterns observed in reality are broadly supportive of the hypothesised patterns (Brown, 1993, 1994; Litz and Rajaguru, 2008). Since the bulk of empirical investigation is more than 30 years old [the case of the classic studies of Berry (1963) and Scott (1959)] and since retailing spatial structures has changed dramatically since then, the question is: can we still find support for the hypothesised patterns in an empirical investigation today? It is the main purpose of this investigation to conduct an exploratory research to test the predictive validity of three classic retail location theories. Due to the lack of reliable and comparable data on land values, Bid Rent Theory will not be tested.

Is the priority still on locating stores near the centre (Central Place

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Theory)? Is the store location power of attraction dependent on the distance to the consumers or the assortment carried by the store (Spatial Interaction Theory)? Do retailers still tend to cluster tightly together (Principle of Minimum Differentiation)? This study seeks to advance understanding concerning the relevance of classic theories of retail location for Portuguese food retailers. All main theories were formulated more than 30 years ago and in a much different reality from the Portuguese. Given the specific characteristics of this small country and the recent changes in the Portuguese retail environment it's crucial to understand if the classic theories of retail location are still relevant to the Portuguese retail players. Although international literature and empirical investigations about retail location is extensive and diversified, in Portugal there's a deficit of academic work on the subject. This investigation looks to fill, partially, these apparent research need. The findings of this research investigation will be important and especially relevant for large retailers, current and future, which manage multiple stores and each year find themselves involved in store opening, closing and restructuring decisions. Also small retailers, without the power of attraction of large retailers, can benefit from these findings since their success relies heavily on the quality of their location. It can also be important for future professionals and entrepreneurs in the retail sector, in particular regarding their training. In another perspective it can also be relevant to the local and central government concerning spatial planning and land management.

After this brief introduction, in the next section we present a review of relevant literature and methodological approaches to the application of location theories. Next, we present the study area and data, followed by the methodology were we advance a set of hypotheses linking specific locational variables to the test of the predictive validity of three classical location theories. Finally we present, and discuss, the results and the main conclusions.

2. Theoretical and methodological framework

It was in the brief six year period between 1927 and 1933 that the four vital theories of our understanding of retailer's location were conceived. More than eighty years afterwards, Central Place Theory (Christaller, 1933), Spatial Interaction Theory (Reilly, 1929, 1931), Bid Rent Theory (Haig, 1927) and the Principle of Minimum Differentiation (Hotelling, 1929), still attract considerable attention from the academic world, but also some controversy (Brown, 1993). As formulated by Christaller (1933), *Central Place Theory* seeks to explain the size, distribution and number of urban centres, and the hierarchical relationship among them, in an economy where consumers are uniformly distributed, with identical buying power and fully informed, and where sellers behave in rational, perfectly competitive and profit maximizing manner in a free entry and equivalent costs market. Transport costs vary linearly with distance and the consumer, in order to minimize costs, acts rationally visiting the nearest centre offering the desired good or service (Brown, 1993; Vala and Monteiro, 2002). Central Place Theory predicts that, given the increase in transport cost with increasing distance from the source of supply, i.e. from the centre, the demand for a particular good or service decreases. From a certain point the good or service demand is zero and the distance consumers are willing to travel for the purchase of a specific good or service is called market area or range of a good (Brown, 1993; Scott, 1970). The larger the centre, the larger the market area and more establishments and types of businesses there are, providing a greater offer of goods and services than a small centre (Scott, 1970). Using this approach Christaller demonstrates how the hierarchy of urban centres is formed. The centres at the top of the hierarchy have larger dimensions, namely in terms of population. This way, flows between centres occur only in vertical ascending direction, i.e., an urban centre of order n uses a higher order centre to search for a function it does not possess, belonging to the higher order centre trade area (Brown, 1993; Mafra and Silva, 2004; Rodrigues et al., 2002; Scott, 1970). Contrary to

Central Place Theory that assumes that consumers patronize the nearest centre that offers the required good or service, *Spatial Interaction Theory* is based on the assumption that consumers trade off the attractiveness of alternative shopping areas against the deterrent effect of distance (Brown, 1993). In other words, consumers may choose a less attractive shopping area closer to them or a distant centre with a larger offer of goods and services. Reilly's (1931) retail gravitation law, which states that in normal conditions two cities draw trade from an intermediate city approximately in direct proportion to their populations and in inverse proportion to the square of the distances of these two cities to the intermediate city, pioneered the gravitational models research (Brown, 1993; Lee and Pace, 2005; McGoldrick, 2002; Mendes, 2005). These models, inspired by Newton's gravitational law, try to explain human behaviour related to retail activities through the gravitational phenomenon around big sized or nearest stores/cities. Several empirical tests were made to the gravitational postulates with mixed results (Brown, 1993; Lee and Pace, 2005). Although less well known than Central Place Theory or Spatial Interaction Theory, Hotelling's (1929) *Principle of Minimum Differentiation* laid the foundations for the study of micro-scale retail location (Brown, 1994). Hotelling's model considers a linear market (e.g. street, road) in which demand is inelastic and identical, transport costs are constant, and consumers are evenly distributed and patronize stores solely on the basis of delivered prices (the price of the good plus transportation cost). If two retailers, selling the same type of product, decide to enter this market both will locate their store in the middle of the market and sell at the same price (Brown, 1989; Hotelling, 1929). If a third retailer enters this market he'll locate near the other two retailers, but not between them, since he desires as large a market as possible. If more and more retailers want to enter the market there will be a tendency for them to cluster (Hotelling, 1929; Huang and Levinson, 2008). Hotelling (1929) also maintained that the clustering phenomenon is visible on a plane as well as on a linear market when consumers are unevenly distributed. The introduction of uncertainty and risk reduction behaviour (i.e. the risk of consumers not finding what they are looking for and the risk of retailers being overtaken by competitors) into Hotelling's model by Webber, shows that agglomeration is the inevitable outcome (Brown, 1989). Furthermore, the higher the variability of consumer demand, the higher the propensity to agglomerate. The introduction of these new variables also helped to formalize Nelson's (1958) Theory of Cumulative Attraction. From his extensive empirical surveys of consumer behaviour (Brown, 1993), Nelson proposes that a given number of stores dealing in the same merchandise will do more business if they are located adjacent or in proximity to each other than if they are widely scattered (Nelson, 1958). Consumer's desire to compare the offerings of several stores before purchase, especially for items where price quality and fashion are important considerations (such as furniture, clothing and motor cars) led Nelson to his location law.

Since the 1920s, there has been a growing interest in the application of location theories to solve location decision problems, namely the decision to locate a new store. Spatial Interaction Theory has underpinned significant advances in this field. Various models for determining optimal store location, using several parameters like store performance, competition or economic factors, have been proposed [see Turhan et al. (2013) for a review]. Most of these models use gravity modelling techniques (Benoit and Clarke, 1997; Beule et al., 2014; González-Benito 2005; Lee and Pace, 2005; Li and Liu, 2012) or econometric techniques (Hymel, 2014; Litz and Rajaguru, 2008; Pennerstorfer and Weiss, 2013; Themido et al., 1998). Although the ability of Central Place Theory and the Principle of Minimum Differentiation to generate research activity is strong, it comprises only a fraction of that generated by Spatial Interaction Theory. Applications of Central Place Theory include, among others, shopping centres catchment areas and their position in retail hierarchy (Dennis et al., 2002), urban and regional growth (Davies et al., 1999; Hsu,