

Grocery stores and urban transport – theoretical and empirical approaches to explain store location

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Explaining retail location is crucial for understanding urban transport. We present our approach to identifying attributes that explain number of stores by region and size based on theories and empirical studies and tested in regression models.

Urban agglomerations are growing worldwide – the population in cities increases. At the same time, demand for goods becomes more and more differentiated, particularly regarding logistics; corresponding trends comprise just-in-time or same day delivery, among others. The consequence of increasingly differentiated goods demand is that more densely populated urban agglomerations are associated with more freight trips since fewer goods per lot need to be transported. This very current problem shows that it is important to understand the interaction between urban structure and transport.

In our study, we understand this problem as the interaction between the decisions of different agents that create the urban structure. As retail-related freight transport accounts for about 50 % of converted vehicle kilometers in urban freight we focus on retailers on the one side and consumers on the other. From several studies we know, that a major part of freight transport is caused by deliveries to grocery stores. Consumers decide about where to shop and food retailers (or their subcontractors) need to plan their tours and where they locate which also depends on the decisions of consumers. The location decision of food retailers therefore represents the results of the interaction of both: consumers and retail companies. Thus, our study intends to identify independent attributes that influence retail location decisions, in particular that of food retailers. We first analyze theories on location choice and other choice problems discussed in fields such as urban geography, economics, microeconomics, etc. for determining the main drivers of retail location choice and formulating hypotheses about how these drivers interact. In a second step, we analyse other more empirical studies on retail location choice in order to find out how theoretically relevant variables can be quantified, i.e. operationalized.

By analysing location choice theories, we found a number of hypotheses which can be related to several groups of variables, i.e. accessibility, demand, supply, environment, competition, regulation, and other. Accessibility variables address the regional accessibility that is the connection to the transport system, while demand pertains to the local market potential in the area describing socioeconomic characteristics of the neighborhood. Supply comprises attributes of the retail companies themselves, since different types of companies likely have different location preferences. Hypermarkets as an example have other requirements than discount stores or organic supermarkets. Environment describes qualities of the neighborhood that influence its attractiveness - the assumption here is that people shop in the area because they like to be there. Finally, competition describes variables that describe the interaction between one retailer and the others. Such interaction can be true competition in the sense of the presence of other retail stores that pose a risk to the located store, or 'coopetition' in the sense of rather complementary food outlets, since complementary stores together have a higher attraction potential for consumers. Finally, regulation in such a country as Germany strongly constrains where commercial activities can locate, particularly if they are of larger scale.

The variables found are tested in two location models for Berlin, Germany which are of the Poisson regression type. These models predict the number of grocery stores by region, one for small retailers and one for large ones. Due to data availability and multicollinearity it is not feasible nor reasonable to include all theoretically relevant variables. Hence, we applied explained variation calculating regression models with only one explanatory variable selecting those with the highest explanation power. Using the most relevant variables in Poisson regression models, we found that the number of grocery store locations both small and large are best explained by population size and number of public transport stops. Besides these two variables, traffic volume and general amount of center-oriented retail, not including grocery stores, further increase the explanation of the spatial distribution of small grocery stores.