1 RETAIL SITE SELECTION USING GIS

An Introduction to Methods, Models, and Data Sources

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Abstract
This chapter illustrates the use of geographic information systems (GIS) in retail site selection. Basic theories of retail location are reviewed, and data requirements and sources are discussed. The chapter then develops trade area analysis and spatial interaction models and proposes methods for the incorporation of these models with GIS. Finally, the use of a GIS-generated gravity model to determine an optimal retail location is demonstrated.

Introduction

Retail sales depend on the disposable income of potential customers and their patterns of expenditure. Customers either live in the market area and make shopping trips to retail sites or visit the market area during trips generated for some other purpose.

The process of analyzing retail demand and sales is, arguably, more sophisticated and more accurate than analysis for any other land use. Retailers generally keep accurate records regarding sales activity, numerous associations maintain industrywide data, and numerous well-tested theories of consumer shopping patterns and preferences provide a firm base for...
the analysis of consumer demand. In addition, detailed socioeconomic data on the trade area of interest are usually available. Both the U.S. Bureau of the Census and proprietary databases provide a vast amount of data that are aggregated upward from the census block level.\textsuperscript{1}

This chapter illustrates the use of geographic information systems (GIS) in retail site selection. GIS can improve the location decisions of firms because of its ability to spatially reference demographic and real estate data.

A GIS has three types of databases — point, line, and polygon. Point database records have a single latitude and longitude reference such as property locations. Attribute data attached to these records might include square footage, usage, rents, or assessed value. Line database records consist of two points and their joining vector such as streets. Attached attribute data would include street name and address range. Finally, polygon database records represent areas such as counties or census tracts; attribute data might include demographic and economic information such as population density, median age, or per capita income.\textsuperscript{2}

The real power of GIS is its ability to easily access and manipulate data in a spatial manner; such data can then be employed in various urban geography models. While many of these theoretical models have existed for years, their data requirements are demanding, and, until GIS, they have been laborious to execute. A GIS can import 1990 census data in digital format; this (polygon) census data can then be aggregated to determine, for example, the number of households or average income within a radial area of a specific point. Alternatively, a GIS can aggregate point data (such as individual property rents) into a sum or average for a certain area.

The remainder of this chapter is organized as follows. Basic theories of retail location are reviewed in the next section. Data requirements and sources for the implementation of a retail site selection models and examples of the use of GIS to convey information on the market area are discussed in the following two sections. Then the selection of optimal sites using spatial interaction models is examined, and methods for the incorporation of these models with GIS are proposed and developed. The use of a GIS-generated gravity model to determine an optimal retail location is demonstrated in a case study. The chapter concludes with a summary.

The models and methods presented in this chapter are applicable to virtually any retail location. However, as a case study, the chapter focuses on the location of major grocery stores (shopping centers) using the city of Ocala, Florida. Ocala had a 1990 population of approximately 42,000 within the city boundary. The Ocala/Marion county MSA contained a 1990 population of 197,000.