Using Geographical Information System Techniques for Finding Appropriate Location for opening up a new retail site

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Introduction

In traditional approach of finding out retail store is simple, as one have to decide that where sales potential is more. This approach has been changed in recent years with involvement of organized and un-organized retail becoming more and more popular. Organized retail is a retail which obeys the modern day approach of using Manage Information System reports based on inventory system or any other enterprise resource planning software and in unorganized approach a retail store do not use any software or reporting software but work on just gut feeling. In last two decades India has also adopting the franchise system by which more and more retail stores are opened after opening a single store. This franchise system has been adopted by almost all segments of retail store from electronics which is croma by tata , jewelers by kalyan, food chains by Sagar Ratna and entertainment by essel group which is fun republic. In this paper the problem factor is how to find a suitable place for a new retail store.

Abstract

In this research as the name depicts the important factors is finding a suitable place for a new store in this the geographical understanding is very important. This gives a new information system which is geographical information system which is used to find out a best possible location for a retail store. In last decade the rise in price of property and rentals has forced many new retail store to search exhaustively for a location. In this search different parameters has to be reached for example considering sales potential, transportation cost to reach there, parking space etc. Combining these factors step by step procedure is formed to screen the selection process in finding out a new location for retail stores which is called as analytical hierarchy process (AHP). I will be illustrating these parameters further in my research paper.

Understanding Geographical information system

1.0 What is geographical information system: GIS is a special-purpose digital database in which a common spatial coordinate system is the primary means of reference. Comprehensive GIS require a means of:

1. Data input, from maps, aerial photos, satellites, surveys, and other sources
2. Data storage, retrieval, and query
3. Data transformation, analysis, and modeling, including spatial statistics
4. Data reporting, such as maps, reports, and plans

Three observations should be made about this definition:

First, GIS are related to other database applications, but with an important difference. All information in a GIS is linked to a spatial reference. Other databases may contain locational information (such as street addresses, or zip codes), but a GIS database uses geo-references as the primary means of storing and accessing information.

Second, GIS integrates technology. Whereas other technologies might be used only to analyze aerial photographs and satellite images, to create statistical models, or to draft maps, these capabilities are all offered together within a comprehensive GIS.

Third, GIS, with its array of functions, should be viewed as a process rather than as merely software or hardware. GIS are for making decisions. The way in which data is entered, stored, and analyzed within a GIS must mirror the way information will be used for a specific research or decision-making task. To see GIS as merely a software or hardware system is to miss the crucial role it can play in a comprehensive decision-making process. (1995 Kenneth E. Foote and Margaret Lynch, Department of Geography, University of Texas at Austin)

By this definition we can understand that GIS presents the data into pictorial analyses which furthers helps us in understanding that how we can distinguish statistical figures on the map of any city.

1.1. GIS in retail: Successful businesses use GIS software. Organizations can go beyond standard data analysis by using GIS tools to integrate, view, and analyze data using geography. These applications can be used across an entire organization, in the field, and on the internet.

1.1.1 Retail Business Processes, including market analysis, site selection, merchandising, distribution, delivery, and facilities management, involve various sets of geographic relationships. GIS enables retailers to visualize and understand these geographic relationships and improve productivity, effectiveness, and efficiency in these processes.

1.1.2 GIS used as tool for Demographic survey - Predictive investigators such as market and customer analytics are also enhanced by GIS. Many different forms of real-world and modeled data can be used with it to understand the demographic, competitive, and psychographic interaction of consumers, suppliers, and the geographic space in which the data is distributed. GIS allows retailers to consider many possibilities, understand potential, review the impact of different investments, store and produce configurations, and analyze changing trends in the retail landscape. The pictorial representation pictures are shown below showing area having better sales potential.

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This picture depicts the different trade areas having minimum and maximum population.

Problem definition

2.0 Retail site problems: The opening of a new establishment is a critical factor for firms in the retail sector because the decision carries with it a series of very serious financial and corporate image risks. This paper presents the development of a methodology for the process of selecting a retail site location that combines geographic information systems (GIS) and the analytical hierarchy process (AHP) (Norat Roig-Tierno 2013). Before we understand the concept of GIS it is important to understand geo-demand and geo-competition which is Geodemand can be defined as the location of the customers who purchase a product or service in a specific market. Geocompetition is the location of the competitors of a business and the delineation of their trade areas in a particular market. A trade area can be defined as the geographic area in which a retailer attracts customers and generates sales during a specific period (Applebaum & Cohen, 1961; Baviera-Puig, Buitrago-Vera, & Mas-Verdú, 2012).Various theories have been utilized to evaluate the locational selection of retail stores, and among them spatial interaction theory has gone through significant advances in sales-forecasting and performance-monitoring techniques

(Ghosh & Mclafferty 1987). The central-place theory (Christaller 1933) provided the simplest model of store-choice, the "nearest-neighbor" model, in which customers patronize the nearest store, that is, consumers minimize distance and hence the travel cost. Reilly (1931) proposed the famous Law of Retail Gravitation by combining the effects on patronage of both distance and center attractiveness. Giving two stores with different sizes, the break point of the two trade areas is not in the middle of the two stores, instead it moves towards the smaller store. Therefore the larger store has a bigger trade area. The power of these stores to draw customers from different distance zones is observed by understanding customer shopping behavior. The drawing power of the stores is then used to estimate the trading area and the expected sales of alternative sites for the proposed store.

After understanding geographical information system and verifying facts about geo-demand and geo-competition the suitable location for retail store we can distinguish various facts about how to get best location.
The analytic hierarchy process (AHP) was developed by Saaty (1980) and consists of defining a hierarchical model that represents complex problems through criteria and alternatives that are set out initially. This procedure is designed to break a complex problem into a set of simpler decisions, thus making the problem easier to understand and therefore easier to solve (Arquero, Álvarez, & Martínez, 2009). Using multi-criteria decision models, it becomes possible to select and/or prioritize the opening of different retail sites. At the same time, AHP determines the criteria that affect the success of the chosen business (Gbanie, Tengbe, Momoh, Mebo, & Kabba, 2013; Suárez-Vega, Santos-Peñate, Dorta-González, & Rodríguez-Díaz, 2011).
The retail site location decision process to determine the best site for a new retail outlet, we first conduct an analysis of geodemand, which is used to locate the clients of a product or service. Second, geocompetition is analyzed, which means spatially locating the firm's competition. Third, the possible commercial sites are determined by combining the results of the two previous steps, together with the use of kernel density analysis. The software used in these three steps is ArcGis 10. Finally, depending on the resources available to the firm, multi-criteria decision models are used to help select the best location from among the possibilities identified in the previous analysis steps.

Identifying geodemand and geocompetition
When geolocating or finding out the right demand, our procedure drills down to the city block level, which provides a greater level of detail than that available from other site selection procedures, which work with information at the census tract level. This high level of detail makes it necessary to calculate the number of housing units per city block from the data and, based on this number, to estimate the average number of residents per city block. First, to calculate the number of housing units per city block. First, to calculate the number of housing units per city block, alphanumeric data from the database available to us and then to link to the graphical data of the city blocks using GIS. Second, to estimate the average number of residents per city block, data from the census department are linked to the number of housing units per city block. This process yields an estimate of the number of people living in each city block. This second step is more complex than the previous one because the information from the census pertains to the

census tract level, and a census tract consists of several city blocks. To complete this second step, we first use the census department to identify the inhabitants of the data in question. The inhabitants are then allocated among the housing units in each census tract, taking into account multi-family and single-family units. By this we find a cluster of possible customer and it is consider as sales area. In this we not only contemplate on one trade area but on several other trade areas and after this we will choose best out of it.

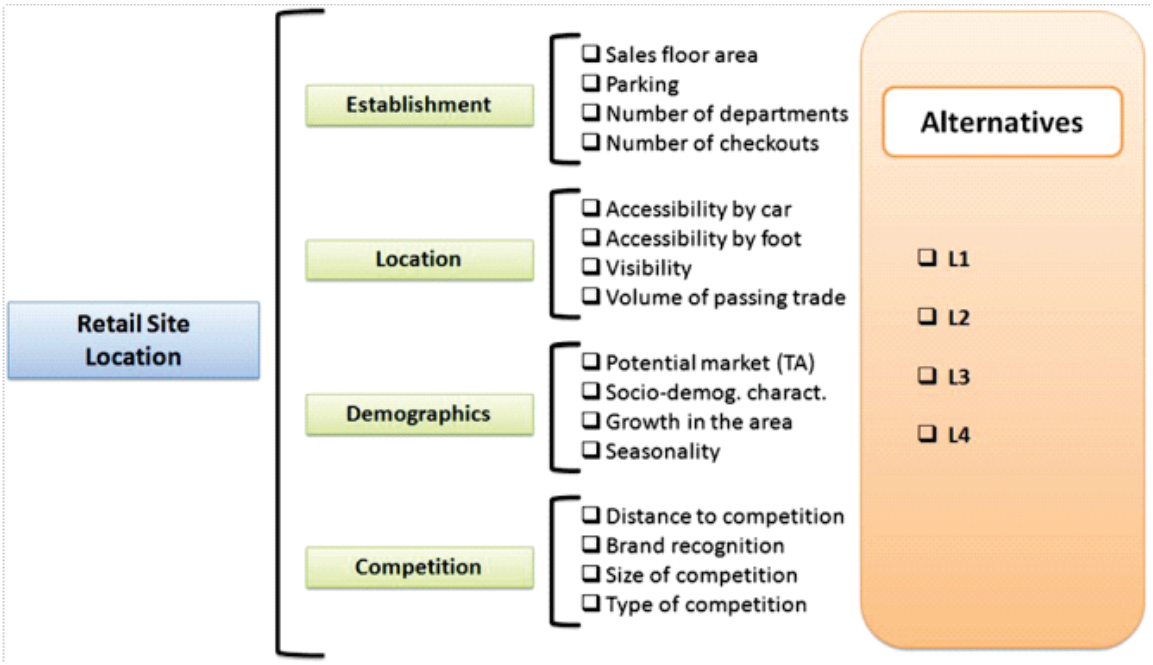

Diagram a: The AHP for the four possible locations (N. Roig-Tierno et al. / Applied Geography 40 (2013) 191-198)

Conclusion:

The overall goal of this research paper was to develop a method that combines GIS and multi-criteria decision models to allow retail outlets to determine locations for new outlets. The retail site location process proposed in the study consisted of first identifying the geodemand to locate potential customers. It is important to stress that demand was located at the city block level, which provides a greater level of detail than methods proposed in other studies that use measures of demand at the census tract level. The second stage of the process was to analyze the geocompetition by identifying and spatially locating the competition of the firm seeking to open a new retail store. The next step was to calculate the trade area of each of the competitors as a function of the area of the sales floor to assess whether the commercial choice in each area was low, medium or high. The third stage of the process linked the two prior analyses together to yield one layer showing the areas where residents do not have any commercial choice and the areas with a poor range of commercial options.

Geographical Information Systems involve software that provides storage, retrieval, analysis, visualization, and mapping capabilities for spatial data such as road networks, land use information, census track data, etc. Some GISs include embedded location models and most provide the opportunity to integrate location models within a map-based graphical user interface. Because GIS can be used to assemble data from various sources involving different map scales and transformations, it can be a significant aid to the location analyst in retail outlet finding.

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