Retail Location Decision Using an Integrated DEMATEL-ANP Method

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ABSTRACT
This study focuses on developing a model for making retail location decisions which addresses the limitations of existing methods. The integrated DEMATEL-ANP method used here successfully accounts for interdependencies between the selected criteria. After reviewing the existing methods for decision making, the Decision Making Trial and Evaluation (DEMATEL) and the Analytical Network Process (ANP) methods were chosen. DEMATEL evaluates the degrees of influence the criteria have on each other. ANP is used to assign weights to criteria and the sub-criteria, and eventually derive the weights for the alternative locations. The integrated model helps prioritize among the available alternatives based on scientific methods, much more reliable than intuition and experience based methods still practiced today. Adopting this method can help retail chains make more informed decisions. This is the first time an integrated DEMATEL-ANP method has been applied in the context of retail location decision.

KEYWORDS
ANP, Criteria and Sub-Criteria, DEMATEL, Retail Location Decision

INTRODUCTION
The location of a retail store plays a pivotal role in its success. It is an integral and a crucial part of the retail strategy because it directly influences the merchandising mix and the store layout. Once a store is opened, a retailer can take strategic steps towards adjusting prices, changing the merchandising mix, improving services, but it becomes very difficult to change the location. Therefore, recent trends have observed a lot of research being done before finalizing the location, be it penetrating a new city, new customer segment or a new location within a city.

Retailers have a vast range of analytical techniques for their use to support their location decision. However, in the past a great proportion of retailers have preferred instinct and personal experience, considering the process as an ‘art’ (Simkin et al., 1985), using very subjective and emotional methods. Most locations were fixed based on rules of thumb and intuition (Rogers, 1987).

However, over the last two decades, retailers have faced increasing pressure to adopt more rigorous and holistic approaches (Bowlby et al., 1984). Due to tightening of planning controls on new development. The availability of computing data and capacity, and rapid reduction in cost of IT software and hardware has spurred an immense growth in the volume of data available for analysis.
(both primary and secondary) (Hernandez et al., 1995). The methods for retail location decision making that have been widely used can be broadly classified into comparative, predictive and knowledge based. These methods have been described further in this report.

This particular study uses an integrated Decision Making Trial and Evaluation (DEMATEL) - Analytical Network Process (ANP) model. After establishing the fundamental criteria required for selecting a location, DEMATEL is used to determine their effects on each other. Then, ANP is used to assign weights to each criterion and eventually, to the alternative locations being considered.

LITERATURE REVIEW

Existing Methods and Strategies

A number of surveys and journal articles in the retail market, extensive research has been done to establish different methods for deciding the location. These methods can be classified into three categories (Ciari et al., 2008):

- **Comparative**: Rules of thumb, analogues, checklist, ratio;
- **Predictive**: Discriminant analysis, multiple regression, gravity models, cluster analysis;
- **Knowledge-based**: Neural networks, Expert systems.

Descriptions of these methods are as follows (Birkin et al., 2002):

- **Rules of thumb** uses experience as its main criterion. It entails intuitive and subjective guidelines based on knowledge of the sector and company;
- **Checklist** entails a list of variables thought to influence store performance, with a variable points system;
- **Ratio and market support** focuses on population and spending potential in the area along with a list of potential competitors;
- **Analogue** methods are amongst the most popular methods still used. The principle behind it is to forecast sales by comparing with existing stores of the same retailer located in similar areas;
- **Statistical models** are another popular set of methods. They are best applied to highly segmented markets. Linear multiple regression is the most common. This model assumes that future sales is influenced directly by a set of variables which can be evaluated using an equation of the type:

\[ Y = k + c_1X_1 + c_2X_2 + \ldots + c_nX_n \]

The coefficients are calculated by using sales levels and attributes of existing stores. These methods help in reducing the degree of subjectivity in decision making. However, one drawback is the possibility of excluding some relevant factors.

- **Gravity models** use spatial data as the key factor in determining the attractiveness of a location. Sales are forecasted by considering distances between competing facilities and population densities. The major drawback of this model is that it does not consider population segmentation;
- **Expert systems** and neural networks use computer programs that have initial knowledge fed in and are programmed to ‘learn’ and autonomously suggest solutions for the location problem. However, these methods require complex algorithms and are not widely seen in practice.

Certain spatial strategies (Laulalajainen, 1987) have been observed being practiced by retail chains. They can be classified as contagion and hierarchical strategies. The contagion strategy entails
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