# The Analysis of Spatial Distribution in Chain Stores of Rasht using mixed AHP and SWOT Models

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**Abstract**

The appropriate distribution of chain stores plays a significant role in reducing the cost of shipping, fast delivery of goods and services, convenient access to parking, and other complementary municipal services. A chain store is formed of several retail stores that are under common and centralized ownership. This paper aimed to review the decision-making components for applying spatial distribution in chain stores of Rasht based on strategic SWOT-AHP model. The findings showed that the strengths with a total value of 0.617 and the threats with a total value of 0.055 have the lowest score among the four main criteria. The proper distribution of chain stores for quick, easy, and cheap access to wider and confident stores with a total value of 0.266 was the most influential factor in spatial analysis. Also, the findings showed that the chain stores did not have a good spatial distribution; by moving from central areas to around of city, the number of chain stores was reduced. Therefore, considering the increase of land prices, limited parking, and the spatial distribution of population, the traditional patterns should change and new patterns should be used for locating the distribution of chain stores.

**Keywords**: The location selection, spatial pattern, chain stores, AHP-SWOT, Rasht

## Introduction

The distribution of urban service centers is one of the important issues affecting the supply of goods to the citizenry. Given that chain stores have dominated on suppliers, competitors, and even legislators, they undoubtedly are very important and vital (Brockman et al, 2001). The appropriate distribution of chain stores in the city can have favorable effects on space - place justice and social justice by providing public access to these stores (Aghayari Hare et al, 2008). The access of customer to a location is typically assessed by the possibility to reach a store or shopping center. Access is not a measurable assessment; it is always a relative matter to attract competition and customer expectations. Several factors can affect the availability of a position: street patterns, street conditions, entry and exit, traffic, visibility, and obstacles. However, these factors interact with each other and simply cannot be measured (snow & scott, 1984). According to studies conducted in the Rasht, 16 chain stores are distributed in different parts of city.

This paper aims to review the decision-making components for applying spatial distribution in chain stores of Rasht based on strategic SWOT-AHP model. Given the increasing importance of chain stores in the country's economic development, the planning about the proper distribution of chain stores in the city is necessary.

The details of SWOT-AHP process can be found in the papers of person et al, 2000; shrestha et al, 2004 ; kurttilla et al, 2000; and masozera et al, 2006. The systematic approach in decision-making and measurability are among the benefits of AHP; they are valuable characters in the SWOT analysis. The SWOT analysis is a tool used to analyze the internal and external environments, in order to obtain a systematic and strategic approach for decision-making conditions (Gorener, et al., 2012). However, multiple criteria and dependencies often complicate the decision making process. Therefore, the use of SWOT in decision-making is not enough. In this study, the analytic hierarchy process (AHP) is combined with SWOT analysis. Using this methodology, planning and analysis would be more flexible and comprehensive; and the selection of location will be considerably easier. As a result, this may help in overcoming the difficulties and complexities of selecting the places of chain stores.

## Materials and Methods

*Geographical features of study population*

Rasht is a small part of Gilan plain located in the southern plains of the Caspian Sea (the master plan of the city of Rasht, 2007: 10). It is one of the major cities of Iran; and it is the center of Gilan. This metropolis is also the largest and most populous city in the north of Iran among three provinces of Mazandaran, Gilan, and Golestan. Rasht is located in 49 degrees 36 minutes of east longitude and 37 degrees 16 minutes of north latitude (Ziyari et al, 2011: 3). With an area of 136 square kilometers, it is on the flat and smooth land (Abbaszadeh et al, 2010: 4). It has a population of more than 639,951 of people in 2011 (Statistical Yearbook of Rasht, 1390).

*The statistical population and sample*

The population consists of trade and economic departments and agencies in the city of Rasht in Gilan province such as Department of Commerce, Economics and Finance, the County Planning Department, the chain stores, the university professors in the Department of Economics and municipality in Rasht. The opinion of experts was asked to calculate the relative importance of involved factors and criteria. People who have the power to decide on

the appropriate distribution of chain stores were used to examine the decision-making factors using SWOT-AHP model. The implementation of AHP-SWOT approach requires experts who are specialists. The number of experts in this study was 120 cases; of which 92 cases were selected based on Morgan method.

*The conceptual framework and literature*
The SWOT analysis was used for the first time in 1960s. The SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis is a tool commonly used to identify the strengths and weaknesses of indoor environment and opportunities and threats of outdoor environment (Pesonen, et al., 2000). The Analytical Hierarchy Process (AHP) is a multi-criteria decision-making method which is commonly used (Saaty, 1980). Although, AHP has new insights for determining the significance of SWOT criteria rating, it still has a major limitation: eliminating errors in human decision-making processes.

In general, SWOT is a list of statements or factors along with descriptions of present or future trends in both internal and external environments. Achieving to the most influential factor in strategic decision-making is difficult (Pesonen, et al., 2000). In addition, most of the criteria and sub-criteria complicate the decision-making processes. Therefore, the use of SWOT in decision-making process is not enough. In this study, the analytic hierarchy process (AHP) has been combined with SWOT analysis.

Several studies have been conducted to improve the strategic planning methods including strengths, weaknesses, threats and opportunities. The details of SWOT-AHP process can be found in the papers of person et al, 2000; shrestha et al, 2004 ; kurttilla et al, 2000; and masozera et al, 2006. In their study, Lee et al., 2011 used the combined SWOT-AHP model for sport marketing among faculties. The results indicated that decision-makers in this organization pay attention to strengths much more than other SWOT factors. Also, the return of investment is the most important factor for decision makers; while minimizing the costs is not so important. In a study, Gorener (2012) compared the AHP and ANP in the use of strategic decisions in a manufacturing company. Another study conducted by Houben, et al (1999) as "The SWOT analysis of knowledge-based systems as a tool for strategic planning in small and medium-sized enterprises" (Onut, et al., 2010). A study in Istanbul - Turkey's most populous city - planed and chose a shopping center site that has universal application. Also, Pertain, et al.,(2013) investigated the use of fuzzy analytic network process (FANP) in a SWOT analysis. The results showed that when there are dependencies among the SWOT factors, this dependence can change the weight and priority of the alternative strategy.

*The chain stores*
The site selection is an important issue in all types of businesses including manufacturing and service efforts. The appropriate choice of business location is a vital component in the likely success or failure of company. It can also be used as a strategic tool to improve market share, growth, and profitability of the customer (Onut, 2007).

 **The AHP and SWOT models**
*The SWOT Analysis*
For effectiveness and efficiency of the market, each organization had to be aware of internal and external forces that can affect the success or failure of the organization. The SWOT Analysis is a simple but effective strategic tool that allows organizations to recognize these components (Leanrned, et al, 1965). The SWOT analysis is a tool used to analyze the internal

and external environments, in order to obtain a systematic and strategic approach for decision-making conditions (Lee & Walsh,2011).

Analytical Hierarchy Process (AHP)

The AHP does pair-wise comparisons to obtain the relative importance of the criteria at each level of the hierarchy and evaluate the criteria at the lowest level of the hierarchy, in order to do the best decision among the strategies. AHP is an effective method for decision making which is based on three principles: first, hierarchical construction; second, paired comparisons; third, combining (fusion) priorities (Groaner, et al., 2012).

For comparison, we need a measure of the numbers that determine how much of an element is more important or dominant than the other element. In decision making with analytical hierarchy process, a number is assigned for each of these judgments. The scale is the common scale of Saaty, 2008. A basic but reasonable assumption is that if property A is much more important than property B (attribute) and is in the range of 9, then B is certainly less important than A and its 1/9 value. These pair-wise comparisons are done for all considered factors that are not usually greater than 7 (Seker & Ozgurler, 2012). In This study, the AHP is the result of the SWOT matrix and is divided into three parts (Figure 3):

A: The goal is obtained by decision-making.

B: SWOT group

C. The factors in each group of SWOT

**Findings**

The SWOT-AHP analysis for the spatial - location distribution of chain stores is arranged in four stages:

Step 1: The analysis of SWOT:

In this case, the SWOT analysis was used for assessing the position of chain stores in Rasht based on four aspects: Strengths, weaknesses, opportunities, and threats (Figure 4). This method involves systematic thinking and identification of metrics related to the planning, management, and new technology. It identifies the criteria -strengths, weaknesses, opportunities and threats- of chain stores position.

Step 2: The pair-wise comparisons among SWOT factors and sub-factors for each group:

Table 1: The pair-wise comparison of SWOT factors

| Factors | Strengths | Weaknesses | Opportunities | Threats | The degree of group importance |
|---------|-----------|------------|---------------|---------|--------------------------------|
| Strengths | 1 | 6 | 4 | 8 | 0.617 |
| Weaknesses | 1.6 | 1 | 2 | 4 | 0.19 |
| Opportunities | 1.4 | 1.2 | 1 | 3 | 0.138 |
| Threats | 1.8 | 1.4 | 1.3 | 1 | 0.055 |
| Total | 37.24 | 62.8 | 22.3 | 16 | 1 |

The SWOT can be summarized as shown in Table 2 -based on the importance of groups- as follows:

$$\begin{bmatrix} S \\ W \\ O \\ T \end{bmatrix} = \begin{bmatrix} 0.617 \\ 0.19 \\ 0.138 \\ 0.055 \end{bmatrix}$$

Table 2: The comparison of strengths sub-elements matrix in SWOT matrix

| The relative weight | S5 | S4 | S3 | S2 | S1 | Strength |
|---|---|---|---|---|---|---|
| 0.431 | 5 | 7 | 3 | 2 | 1 | S1 |
| 0.254 | 2 | 4 | 3 | 1 | 1.2 | S2 |
| 0.169 | 4 | 3 | 1 | 1.3 | 1.3 | S3 |
| 0.076 | 2 | 1 | 1.3 | 1.4 | 1.7 | S4 |
| 0.07 | 1 | 1.2 | 1.4 | 1.2 | 1.5 | S5 |
| 1 | 14 | 31.2 | 91.12 | 49/12 | 457.21 | Total |
| The relative weight | W5 | W4 | W3 | W2 | W1 | Weakness |
| 0.377 | 3 | 5 | 2 | 3 | 1 | W1 |
| 0.228 | 4 | 3 | 2 | 1 | 1.3 | W2 |
| 0.225 | 4 | 6 | 1 | 1.2 | 1.2 | W3 |
| 0.108 | 5 | 1 | 1.6 | 1.3 | 1.5 | W4 |
| 0.062 | 1 | 1.5 | 1.4 | 1.4 | 1.3 | W5 |
| 1 | 17 | 76.5 | 130.24 | 61.12 | 71.30 | Total |

| The relative weight | $O_5$ | $O_4$ | $O_3$ | $O_2$ | $O_1$ | Opportunity |
|---|---|---|---|---|---|---|
| 0.372 | 2 | 4 | 3 | 4 | 1 | $O_1$ |
| 0.220 | 2 | 5 | 3 | 1 | 1.4 | $O_2$ |
| 0.211 | 5 | 7 | 1 | 1.3 | 1.3 | $O_3$ |
| 0.118 | 6 | 1 | 1.7 | 1.5 | 1.4 | $O_4$ |
| 0.079 | 1 | 1.6 | 1.5 | 1.2 | 1.2 | $O_5$ |
| 1 | 16 | 80.6 | 257.35 | 181.30 | 56.24 | Total |

| The relative weight | T5 | T4 | T3 | T2 | T1 | Threat |
|---|---|---|---|---|---|---|
| 0.425 | 5 | 3 | 4 | 3 | 1 | T1 |
| 0.236 | 2 | 4 | 5 | 1 | 1.3 | T2 |
| 0.19 | 5 | 6 | 1 | 1.5 | 1.4 | T3 |
| 0.086 | 7 | 1 | 1.6 | 1.4 | 1.3 | T4 |
| 0.063 | 1 | 1.7 | 1.5 | 1.2 | 1.5 | T5 |
| 1 | 15 | 29.2 | 371.30 | 99.22 | 61.30 | Total |

As can be seen, the total multiplier of the four criteria is equal to one. This reflects the relative importance of the criteria.

Step 3: The pair-wise comparisons are carried out among four SWOT groups, namely strengths, weaknesses, opportunities, and threats. After pair-wise comparisons and determining the relative weight of each group, final weight of each factor is determined by multiplying the relative weight of factors in the relative weight of groups.

| The SWOT factors | The weight of factors | The sub-factors of SWOT | The relative weight of the factors | The final weight of the factors |
|---|---|---|---|---|
| S | 0.617 | The proper distribution of chain stores for quick, easy, and cheap access to wider and confident stores | 0.431 | 0.266 |
| | | The planning to construct chain stores in needed areas | 0.254 | 0.157 |
| | | The municipality support of chain stores construction in the city | 0.169 | 0.104 |
| | | The municipality support for the development of private sector's chain stores | 0.076 | 0.047 |
| | | S5- Providing legal opportunities for use changes of chain stores | 0.07 | 0.043 |
| W | 0.19 | lack of proper distance and radius of action in making these stores | 0.377 | 0.0071 |
| | | Negative impact of stores location on the status of the micro-business units | 0.228 | 0.0043 |
| | | lack of effort to solve the problems of chain stores in the city | 0.225 | 0.0042 |
| | | Small land area of stores and inability to compete with the big stores and the impossibility of future development | 0.108 | 0.0020 |
| | | lack of chain stores in the city of Rasht | 0.062 | 0.0011 |
| O | 0.138 | Having strategic plans and convenient positioning for chain stores | 0.372 | 0.051 |
| | | The construction of chain stores in public centers such as squares, crossroads, and | 0.220 | 0.030 |

Step 4: Using the results in the strategy formulation and evaluation process:

According to the findings, thus, it can be said the ranking of each SWOT factor is as: Strengths (0.617), weaknesses (0.19), opportunities (0.138), threats (0.055). The ranking of each SWOT sub-group is as the proper distribution of chain stores for quick, easy, and cheap access to wider and confident stores with a total value of 0.266, lack of proper distance and radius of action in these stores with a total value of 0.0071, having strategic plans and proper positioning of chain stores with a total value of 0.051, and disregarding the geographic values positioning and construction of chain stores with a total value of 0.023.

These findings suggest that decision-makers consider the strengths with priority value of 0.617 much more than weaknesses, opportunities, and threats. Specifically, the proper distribution of chain stores for quick, easy, and cheap access to wider and confident stores with a priority value of 0.266 is the most important factor in the localization of chain stores. Thus, the proper distribution of chain stores reduces transportation costs and also results in access of citizens to safer and wider stores and high quality goods.

**Conclusion**

The SWOT matrix determines different strategies using four criteria- strengths, opportunities, threats, and weaknesses. But, this matrix is not able to determine the weight of criteria influence on different strategies. The combination of these two models will yield more positive results. In this study, we used the SWOT analysis to analyze the spatial distribution of chain stores in Rasht from four aspects -strengths, weaknesses, opportunities, and threats.

. This paper aimed to review the decision-making components for applying spatial distribution in chain stores of Rasht based on strategic SWOT-AHP model. In their study, Lee et al., 2011 used the combined SWOT-AHP model for sport marketing among faculties. The results indicated that decision-makers in this organization pay attention to strengths much more than other SWOT factors. Also, the return of investment is the most important factor for decision makers; while minimizing the costs is not so important.

In this study, 20 SWOT factors and relative weights of SWOT group were evaluated by focusing on interview group. Also, significant strategic factors were determined for the store chains by combined AHP - SWOT model. Between these factors and sub-factors, strengths has the highest score among the criteria; the appropriate distribution of chain stores for reducing transport costs and quick, easy, and cheap access to confident and wider stores achieved to the highest scores among the sub-criteria. According to the survey, there are 16 chain stores in the city of Rasht (Figure 1). These stores are spread in 5 areas in Rasht. The results show that the distribution of chain stores in the city of Rasht is heterogeneous. Most of the chain stores are in downtown areas (area 2). While, there is no chain store in 4 and 5 areas. By moving from central areas to around of city, the number of chain stores is reduced. According to the results of this study, thus, it is suggested that the calculated priorities of SWOT factors in this study can be used for locating the chain stores in the future. By proper positioning of chain stores, we can reduce the transportation costs, buying time, traffic, urban traffic, and environmental pollution.

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