Strategy Selection of real estate by SWOT-AHP

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Abstract. The purpose of this research is to use the SWOT-AHP approach to help real estate enterprises to make an effective strategy choice. From strengths, weaknesses, opportunities and threats, the internal resources and external environment of a real estate enterprise are analyzed systematically to identify the factors that affect the business objectives. Then quantify the influence of the factors and determine the best strategy through the AHP method. The combination of SWOT and AHP provides more accurate data for decision makers than the qualitative analysis models. The measures of factor identification and strategy selection.

1. Introduction
After decades of development, real estate industry has switched from the seller's market to the buyer's market. It is hard to solve problems only with mental analysis methods for decision makers. In a market with overcapacity, accurate positioning is the best choice for the enterprises. The changes of people's ideology, adjustments to industry standards, and the impact from economic globalization have increased the uncertainty and offered more challenges for enterprise's strategy decision.

2. Literature review
As the real estate industry is regional and purposeful, the scholars' research on strategy selection of real estate enterprises is mainly based on their market objectives. The American marketing expert Wendell R. Smith put forward the famous Market Segmentation theory, which subdivides the market based on consumer behavior and habits to reduce market risk [1]. The marketing theory of 4Ps, namely product, place, price and promotion, proposed by Jerry McCarthy, has been widely used in real estate in the United States [2]. Later, in the age of consumer centered, the marketing theory of 4Cs, developed by Lauterborn, gradually replaced the 4Ps theory, which aims to meet the needs of customers [3]. Michael Porter five forces model proposes three types of successful strategies, namely, overall cost leadership, differentiation strategy and focus strategy, which have been used today [4]. Also, the SWOT (Strengths Weakness Opportunity Threats) method is an important theory proposed by Heinz Weihrich from University of San Francisco. Strategy research about real estate in China started late, and most of the papers are based on the above classical theories, which remain a qualitative analysis.

AHP (Analytic Hierarchy Process) is a method to measure the influence of factors from the market or enterprise itself. In method, the factors that impact the business objectives are divided into several categories. In each category sub-units are subdivided to constitute a hierarchy. Under the principle of reaching the objectives, the weight of factors will be calculated by pairwise comparisons. Combined with AHP, SWOT is able to make a quantitative analysis for strategy selection, and obtain more reliability and accuracy than a qualitative analysis [5].
In many papers, the SWOT-AHP model has been revised and supplemented [6]. It is widely used in market analysis for agriculture, forestry, food industry, high-tech products, regional economic development, etc. It’s also a valuable method for real estate companies to select marketing strategy.

3. Strategy selection of real estate based on SWOT-AHP approach
The approach includes two parts. It initially makes qualitative analysis on strategic selection through the SWOT. Next, it quantifies the influence of each factor through the AHP method. Here are the steps:

3.1. Analyze the Competitive Ability of the Real Estate Enterprise.
Before making a decision, the enterprise needs to be clear about its position in the real estate market and industry. The SWOT requires experts to analyze strengths, weaknesses, opportunities, threats of real estate enterprises [7]. Among them, strength and weakness analysis is making a comprehensive comparison with competitors on their capacity and enterprise resources. For example, the builders take less time to complete the buildings than their competitors. Opportunity and threat refers to the influences of external environment on enterprises, such as changes in the concept of living or the competition from same types of real estate projects in the market.

List the influential factors of each aspect based on the situation of the enterprise, and the weights of these factors will determine which should be chosen among the four strategies in next steps. The hierarchy of SWOT is shown in Figure 1.

3.2. Calculate the Weights of Each Factor
From this step, we use AHP method to calculate the weights of each factor. Firstly, mark four groups of factors of SWOT (strengths, weaknesses, opportunities, and threats) as: \( S_1, S_2, S_3, ..., S_n; W_1, W_2, W_3, ..., W_n; O_1, O_2, O_3, ..., O_n; T_1, T_2, T_3, ..., T_n \). Next, experts compare these factors in pairs which all belong to one group by a matrix named \( I \). Finally, use the eigenvalue to calculate the weight of factors. Here, take the group of threats to build a matrix as an example, as in (1):

\[
I = \begin{bmatrix}
T_1 & T_1 & \cdots & T_1 \\
T_2 & T_2 & \cdots & T_2 \\
\vdots & \vdots & \ddots & \vdots \\
T_n & T_n & \cdots & T_n
\end{bmatrix}
\]

\( T_i \) denotes the weight of factor \( i \). In order to ensure the consistency of comparison, the experts need to consult the scale for pairwise comparison (Fig. 2) to make a decision [8]. The scores from 1 to 9 denote the relative importance of the molecule factor comparing with the denominator factor.
Multiply elements of the matrix by row, as in (2):

\[ A_i = \prod_{j=1}^{n} \frac{T_i}{T_j} \quad (i = 1, 2, \ldots, n) \]  

Find the n-th root of \( A_i \), as in (3):

\[ \bar{T}_i = \sqrt[n]{A_i} \quad (i = 1, 2, \ldots, n) \]  

Then get a vector, as in (4):

\[ \bar{T} = [\bar{T}_1, \bar{T}_2, \ldots, \bar{T}_n]^T \]  

Normalize the vector, as in (5):

\[ t_j = \frac{\bar{T}_i}{\sum_{j=1}^{n} \bar{T}_j} \quad (j = 1, 2, \ldots, n) \]  

The eigenvector is the weights, as in (6):

\[ t = [t_1, t_2, \ldots, t_n]^T \]  

### 3.3. Consistency Test

In order to ensure the validity of the evaluation, it is necessary to verify the consistency of each element. After calculating the maximum eigenvalue of the matrix \( I \), the consistency index (CI) can be got by the following formula, as in (7):

\[ CI = \frac{\lambda_{\text{max}} - n}{n - 1} \]  

In the formula (7), \( n \) refers to the number of variables. \( RI \) refers to the random consistency index, which is related to \( n \).

Finally, consistency ratio (CR) is performed in the following manner, as in (8):

\[ CR = \frac{CI}{RI} \]  

Only if \( CR < 0.10 \), the consistency of the comparison matrix will be guaranteed. The same method can be applied to the other groups to quantify all the factors.

### 3.4. Draw a Strategic Quadrilateral and Choose the Strategy

The global weight of factor equals the product of the local weight and the weight of criterion, as in (9).

In the formula, \( W_{\text{global}} \) is the vector of global weight, \( W_{\text{criterion}} \) is the vector of criterion weight, and \( W_{\text{local}} \) is the vector of local weight within a group.

\[ W_{\text{global}} = W_{\text{criterion}} \times W_{\text{local}} \]  

The global weights of factors reflect how much they influence the project's strategy. Choose the maximal weight of each group as the representative factors to construct a strategic quadrilateral (Fig. 3), and the centroid of quadrilateral will determine the strategy selection: SO, ST, WO, or WT [9]. The corresponding improving methods can also be made based on the results.
4. Conclusions
According to the result of the strategic quadrilateral, the region of the centroid is selected as the priority strategy of the real estate enterprise. Furthermore, based on the area of the strategic quadrilateral in every quadrant, the best order of strategy selection is determined (e.g. WT>ST>WO>SO).

Through the SWOT-AHP approach, the advantages and disadvantages of a real estate enterprise are clearly presented in quantitative form, and countermeasures are able to be provided.

Only using traditional qualitative analysis models to make a decision for enterprise strategy lacks reliability for current real estate market.

The combination of SWOT and AHP provides more accurate data for decision makers. The SWOT-AHP approach can also be applied to complex real estate problems.

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