

DECISION SUPPORT SYSTEM DETERMINATION OF BUSINESS LOCATION (CAKE SHOP) USING AHP AND TOPSIS METHOD

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Abstract:

The application of information technology can provide the best alternative solution to consider the criteria of the alternatives. Criteria that become general reference of research is distance, location of road, wide, price, social economy. AHP-TOPSIS method is expected to provide an alternative solution in determining the right location. The AHP method is used to generate the weighted value of the criterion, while the TOPSIS method is used to generate an alternate ranking sequence. This study has 8 criteria, and the result of this research is a prototype system that displays the order of rankings based on positive ideal values and alternative negative alternatives. This study recommends the order of 1 to 5 on the accuracy of ranking rankings.

Keywords —**critierion, alternative, weight, AHP, TOPSIS.**

I. INTRODUCTION

1.1. According to research Fure (2013) explains that the location of businesses have a significant effect on consumer purchase intentions, so it can be concluded that the location of the business is closely related to business success. According to Schmenner (New Service Development, 2000), argued about the procedure of approach to business location selection are :

- a. Choosing the area to be the place of business in general, the two choose a business location with certain considerations. The consideration is divided into two namely "musts" and "wants", where the business owner determines the business location that has met the criteria of "musts".
- b. Consider the criteria "wants" of the business

location.

1.2. Research Problems

This research divides 3 separate sub-components in order to make it easier to understand later. Of the three sub-components are as follows:

1.2.1. Identification of problems

Identify the problem of opening a new store for business development is as follows:

- a. The low income or turnover generated in the store even though the location in general has a strategic location category, resulting in losses.
- b. The distance between the store location with another store that serves as a stock supporter.
- c. The high competition with similar stores.

1.2.2. Scope of Problem

Limitations of the problem in this study are :

- a. The subject of research is about "Decision Support System of Location Business Determination (Cake Shop) Using AHP and

TOPSIS Method" by applying related methods and the result will be tested on a prototype, thus reducing the risk of loss in store opening investment.

- b. If the design of this decision support system is completed, the process stages will continue to computerized phase using MySQL database as storage medium.
- c. The results of decision support system research will be applied in a newly developed pastry shop and will open shop for business expansion elsewhere, so the result of this research is expected to give quick and precise contribution in making decision.

1.2.3. Formulation of the problem

Researchers formulate problem identification every new store opening is :

- a. How to determine the proper CMS method of managing the criteria available in opening a store based on the selected location?
- b. How to determine the right SPK method of managing ranking against available alternatives based on previously measured criteria ?
- c. What is the final result of the accuracy between manual and automatic values of the method used?

1.3. Objectives and benefits

The purpose of this research is to design decision making system to choose the right store location based on scoring value from AHP and TOPSIS in the form of alternative ranking based on criterion value and alternatives inputted by the expert. The benefits of the research of this thesis are:

- a. Theoretical benefits
 - 1) Produce an appropriate decision in determining the location position for the pastry shop business
 - 2)) Produce an appropriate decision support system method so that the results of the research will have accurate accuracy, and subsequent research on this subject will be more than the accuracy of the research.
 - 3) The results of this study can be used as a reference or reference in terms of determining the location of the ideal business position, especially the pastry shop
- b. Practical Benefits
 - 1) Results of Decision Support Systems can

analyze objectively in locating appropriate store positions.

- 2) The benefits of this research will produce output in the form of recommended location rankings in determining the location of the bakery position so as to facilitate the entrepreneur in determining the location of a good and proper store location.

2. THEORETICAL BASIS

2.1. Literature review

2.1.1 Understanding Business Location

Analytical Hierarchy Process (AHP) is a decision-making method developed by prof. Thomas. L. Saaty from the University of Pittsburgh in the 1970s. According to Saaty (1993), there are three principles in solving problems with the AHP method, namely the principles of hierarchy (Decomposition), Comparative Judgment, and Logical Consistency. Then Saaty formulated an AHP comparison scale assessment as below:

Value	Definition
1	Both elements are equally important
3	One element is slightly more important than the other elements
5	One element is more important than the other
7	An absolute element is more important than any other element
9	One element is absolutely essential from other elements
2, 4, 6, 8	The values between the two values of those considerations Adjacent

2.1.2 Understanding Shops and Retail

Ma'ruf (2005: 7) "Retail is a business activity selling goods or services to individuals for the purposes of self, family or household", while according to (Levy, 2009: 48) definition of retailing is a series of business activities that provide added value on products and services sold to customers for personal or family use.

2.1.3 Decision Support System

Marimin, Prof in Decision Support System and Expert System, Page 15, Decision Support System has 3 main components:

- a. Data management subsystem or database
- b. Management subsystem model or model base
- c. Organizational subsystem of dialogue

2.1.4 DSS Methods

This study uses a combination of 2 methods of AHP method to calculate the criteria weighted by TOPSIS method used to perform alternative ranking.

2.2 Study Overview

The following summarizes some of the studies that have discussed site selection with various SPK methods:

1. Cindra Onggodan Fiftin Noviyanto (2013: <https://media.neliti.com> - e-ISSN: 2338-5197) with title: "Sistem Pendukung Keputusan Untuk Pemilihan Lokasi Pembukaan Cabang Usaha Variasi Mobil Dengan Metode PROMETHEE". In the study discussed about the selection of locations for the opening of business branches variations of the car by using a promethee with the result of a ranking of locations used for the recommendation of opening the business branch variation of the car. This research does not explain how accurate the research is done because the research is only based on ranking level but not related to the weight assessment given in each criteria.
2. Faisol (2014: <http://jurnaleccis.ub.ac.id>) with title: "Komparasi Fuzzy AHP dengan AHP pada Sistem Pendukung Keputusan Investasi Properti". In this research is discussed about choosing the right investment location, by doing comparison to two commonly used SPK method that is between Fuzzy AHP method with AHP. The results of this study show that:
 - a. The process of weighting criteria or sub criteria with the FAHP method takes a relatively longer time than the process on the AHP method. However, the FAHP method has a faster advantage at the time of the alternative weighting process
 - b. The FAHP method has a higher accuracy rate of 84.62% than the AHP method which is only 23.08% in terms of the accuracy of the

results of the system with the recommendation of the property investment expert.

3. Noviana Eka P (2014: <https://jurnal.uns.ac.id>) do research on "Sistem Pendukung Keputusan Untuk Menentukan Lokasi Usaha Dengan Metode Simple Additive Weighting (SAW)". In this study aims to build a Decision Support System (SPK) that serves as a tool for entrepreneurs in decision making in the process of selecting business locations. The end result in this study, will be displayed in the form of maps. In this research, SPK method used is Simple Additive Weighting (SAW) method which serves to find the weighted sum of performance ratings on each alternative across all attributes.
4. Ian Maulana Zaky, Rekyan Regasari Mardi Putridan Sutrisno (2015: <http://filkom.ub.ac.id>) research by title: "Sistem Pendukung Keputusan Penentuan Kelayakan Lokasi Cabang Usaha Kuliner dengan Metode AHP TOPSIS". In this research, AHP method is done to find the weight of criteria and TOPSIS method is used to perform alternative ranking of culinary business branch. In this research, the calculation of preference value is done by random which directly choose one location randomly then directly process the weighted distance value, hence the big difference of value to current weighted value, it can be sure result of final feasibility status is different also. From the application of AHP-TOPSIS method in this study obtained an accuracy of 80%.
5. Yuni Afifah Setyorini, Yan Watequlis Syaifudin, Arief Prasetyo (2016: jurnalti.polinema.ac.id) research by title: "Pembangunan Sistem Pendukung Keputusan Penentuan Kelayakan Lokasi Cabang Baru Usaha Clothing Menggunakan Metode AHP-TOPSIS". This study aims to help solve the problem of determining the feasibility of new branches of clothing business is expected to overcome the problem by adjusting the weight and criteria. The methods used to assist and support this decision-making method are Analytic Hierarchy Process (AHP) and Technique Order Preference by Similarity To Ideal Solution (TOPSIS). The

accuracy result of this research is 90% with data test of 20 data tested as many as 18 matching test data and 2 unmatched test data, because of the weighting effect of the criterion which become the determinant.

6. Marko Vasiljević¹, Željko Stević (2016:<http://www.uklo.edu.mk>) research by title “Combined Fuzzy AHP And TOPSIS Method For Solving Location Problem”. In this study discussed the concept of Fuzzy AHP and TOPSIS. Fuzzy AHP and TOPSIS are used to enable us to estimate and assess three potential locations for the construction of a logistics center in the territory of the Republic of Srpska. Fuzzy AHP is used to determine the process of significance of criteria, which compares with criteria based on the fuzzy scale as a comparison whereas the topsis method is used to perform alternative ranking.
7. Vientientia Imanuwelita, Rekyan Regasari Mardi Putri, Faizatul Amalia (2018:<http://j-ptiik.ub.ac.id/>) research by title: “Penentuan Kelayakan Lokasi Usaha Franchise Menggunakan Metode AHP dan VIKOR”. In the study discussed the selection of locations for a franchise business by answering the problem of Multi Criteria Decision Making (MCDM) for the feasibility of franchise location by using AHP and Vikor methods. The AHP method is used to derive the weighting value of all criteria, while VIKOR focuses on rankings on alternative business locations and the proposed compromise solution. Based on the tests performed, the highest degree of accuracy is obtained by 85%, so the final result obtained in the form of eligibility status of each business location submitted.

3. SYSTEM DESIGN AND APPLICATIONS

3.1. AHP – TOPSIS Method

Implementation using 2 methods simultaneously using AHP method and TOPSIS method will be completed in the following way:

- a. Carry out criteria

This weighting to know the value of lamda and its CR, which if the value of CR <0.1, indicates that the assessment criteria of an expert is consistent.

- b. Weighing criteria with AHP

- c. Normalization

- d. Normalization weighs

- e. Calculates a positive ideal distance

- f. Calculate the ideal negative distance

- g. Calculating C-

- h. Calculating C +

3.2. Method of collecting data

At this stage, researchers perform the process of collecting data in the place of the object of research. Stages in the process of collecting data obtained from interviews (interviews), observation (Observation) and library research (Library Research).

4. CONCLUSION

In the above research, it can be concluded about the AHP and TOPSIS methods as one of the best alternative methods used in the case of this study, because:

1. Analytical Hierarchy Process (AHP) provides an assessment of the weight of each of the criteria. And with the AHP method has a more objective assessment of other methods, so that the expected results can be closer to the success in decision making.
2. The method of Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) is a method used in order to determine the ranking level of the alternative options provided with the weighted data processed through the AHP method, thereby facilitating a decision maker within make decisions based on the processes of the decision-making system.

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