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# FUZZY TOPSIS & FUZZY AHP IN SELECTING SUPPLIER FOR KOREAN RESTAURANT

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**ABSTRACT** - The growing popularity of Korean cuisine in Malaysia has led to the rise of Korean eateries, posing a challenge for Muslim consumers in finding Halal Korean food options. This study focuses on the problem of sourcing Halal ingredients for Korean eateries, with Mr. Dakgalbi, a Halal Korean restaurant in Aman Central, Kedah, as the research subject. The objective is to utilize the Fuzzy TOPSIS and Fuzzy AHP methodologies to determine the best supplier for Halal Korean ingredients, particularly addressing the difficulty in finding Halal kimchi supplies. Through comparing the outcomes of these methodologies and establishing supplier selection criteria, Supplier 1 (S1) consistently emerges as the preferred supplier based on factors including price, shipment, system, and relationship. The findings demonstrate the reliability and usefulness of these methodologies in evaluating suppliers for Korean eateries, emphasizing the importance of supplier selection in ensuring the availability of high-quality Halal ingredients and meeting customer needs. Restaurant managers can benefit from the study's insights to make informed decisions, streamline supplier selection processes, reduce expenses, and enhance operational efficiency. Future research can further expand on the scope and criteria to gain a comprehensive understanding of supplier selection practices in the fast-growing Halal Korean restaurant industry.

**Keywords:** Halal korean food, supplier selection, Fuzzy TOPSIS, Fuzzy AHP, restaurant management

## 1. INTRODUCTION

The success of a restaurant business relies heavily on selecting the best suppliers to ensure the highest quality food and services. Supplier selection involves assessing providers' skills and their potential for forming cooperative partnerships. In today's dynamic market, where customer demands are constantly evolving, choosing competent suppliers is crucial for ensuring the availability of high-quality ingredients that meet stringent regulations. However, supplier selection is a complex decision-making process influenced by various factors. To address this complexity, fuzzy set theory, along with methodologies like Fuzzy AHP and Fuzzy TOPSIS, offers effective tools to manage uncertainty and evaluate suppliers based on qualitative and quantitative criteria. This research aims to evaluate and compare the efficacy of these methodologies for supplier selection, considering factors such as the number of alternatives, adaptability, computational complexity, and suitability for group decision-making. By providing valuable insights into supplier selection, this study aims to assist restaurant owners in making informed decisions that enhance customer satisfaction and overall business success.

## 2. METHODOLOGY

This study involves the participation of restaurant managers as decision makers. The decision-making process is facilitated using questionnaires specifically designed for the Fuzzy TOPSIS and Fuzzy AHP methodologies. The questionnaire for Fuzzy TOPSIS is designed to capture the decision maker's preferences for the evaluated alternatives, while the questionnaire for Fuzzy AHP aims to assess the relative importance of the criteria. The restaurant manager is responsible for providing ratings and comparisons based on their expertise and knowledge of the Korean restaurant industry. The collected data from the questionnaires are then utilized to determine the weights of the criteria and rank the alternatives. The Fuzzy TOPSIS methodology is applied to calculate the closeness coefficients of the alternatives, while the Fuzzy AHP methodology is used to establish the relative weights of the criteria.

## 3. RESULTS AND DISCUSSION

The results of this study in the restaurant industry align with the findings of (Manivel & Ranganathan, 2019), indicating consistent supplier rankings using the Fuzzy AHP and Fuzzy TOPSIS methodologies. Both methodologies consistently ranked Supplier 1 (S1) higher than S2 and S3, based on criteria such as price, shipment, system, and

relationship. These findings reinforce the effectiveness and dependability of these methodologies in supplier selection across industries. The comparison between studies underscores the broader applicability of these techniques, emphasizing their potential in diverse sectors. Overall, the Fuzzy AHP and Fuzzy TOPSIS methodologies provide decision makers with reliable tools to optimize supplier selection processes and enhance overall business performance.

## 4. NOVELTY OF RESEARCH / PRODUCT

Supplier selection plays a crucial role in the success of restaurant businesses, ensuring the procurement of high-quality supplies at the right price and quantity. Previous research emphasizes the importance of assessing suppliers' skills and their potential for cooperative partnerships (Shyur & Shih, 2006; Ha et al., 2011). This study contributes to the existing literature by evaluating and comparing two popular methodologies, Fuzzy AHP and Fuzzy TOPSIS, for supplier selection. It addresses the limitations of traditional approaches by incorporating fuzzy set theory to handle uncertain criteria (Chai et al., 2013).

## 5. CONCLUSION

This research used Fuzzy AHP and Fuzzy TOPSIS methods to identify the preferred supplier for Halal Korean restaurants in Malaysia, with Supplier 1 consistently ranking highest. The study emphasizes the importance of supplier selection in ensuring high-quality ingredients and customer satisfaction. It highlights the need for balancing costs, quality improvement, and customer service in the restaurant industry. Overall, the findings provide valuable insights for restaurant owners to make informed decisions and enhance business success.

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