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SUPPLIER SELECTION OF HALAL KOREAN RESTAURANT USING FUZZY TOPSIS

Norpah Mahat[1]*, Nurul Aqilah Ahmad [2]

[1,2] Faculty of Computer and Mathematical Sciences, Universiti Teknologi MARA Cawangan Perlis, Kampus Arau

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Corresponding Author:
*norpah020@uitm.edu.my

ABSTRACT

The increasing popularity of Korean cuisine among Malaysians has led to the emergence of numerous Korean eateries. However, for Muslim consumers, the challenge lies in finding Halal Korean food options due to certain non-Halal ingredients commonly used in Korean dishes. This study focuses on the specific problem of sourcing Halal ingredients for Korean eateries in Malaysia, with Mr. Dakgalbi, a Halal Korean restaurant, as the central research subject. This research aims to employ the Fuzzy TOPSIS methodology to determine the best supplier for Halal Korean ingredients, particularly addressing the difficulty in finding Halal kimchi supplies. By comparing the outcomes of the Fuzzy TOPSIS methodologies and establishing the criteria for supplier selection, the study ranks Supplier 1 (S1) as the preferred choice based on criteria such as price, shipment, system, and relationship. The findings highlight the reliability and usefulness of the Fuzzy TOPSIS techniques in evaluating suppliers for Korean eateries, emphasizing the significance of supplier selection in ensuring the availability of high-quality Halal ingredients and meeting customer needs. The study's findings may utilize the restaurant managers to make informed decisions, streamline supplier selection processes, reduce expenses, and enhance operational efficiency.

1. Introduction

Nowadays, young Malaysians have become increasingly fond of Korean cuisine. The popularity of Korean meals has increased from watching Korean dramas and variety shows, such as Mukbang, also known as an online eating show, and fans' adoration of Korean idols (K-pop idols). Ramen, tteokbokki (spicy rice cake), Kimchi, Kimbap, Korean fried chicken, and other

popular Korean dishes are favourites among young people. To satisfy the increasing demand, Korean eateries have begun to open in Malaysia.

Some Korean dishes are occasionally not Halal for Muslims in Malaysia. Halal certification, an important religious guideline for Muslims, has evolved beyond the study of meat and alcohol to encompass various products, including food, chemicals, pharmaceuticals, and cosmetics. This development requires a thorough examination of the material sources and processing methods (Jawed et al., 2025). The Halal logo has played an essential role in delivering the product to market with trust and confidence given by producers to the consumers. Displayed halal logos will play a vital role in convincing Muslim consumers to purchase the food without having any suspicions about the quality and integrity (Nadzirah & Zeiad, 2024).

Today, Korean foods are offered in Korean-based restaurants with Halal certification, such as Seoul Garden, MyeongDong Topokki, Mr Dakgalbi, Kyochon, and Dubuyo. The taste and the ingredients mainly have altered according to Malaysian tastes without changing the original taste of the food. Therefore, these restaurants need the supplier's Halal Korean ingredients to run the business. Even though the Halal ingredients are now easy to get in Malaysia, they still need to implement strategies to reduce costs, continuously improve quality, and enhance customer service to meet consumer demand. Although searching for new restaurant food suppliers and placing new orders takes time, it is necessary because having high-quality ingredients and Halal certification will influence customer satisfaction. The continuous improvement and implementation of innovative ideas, optimising service processes, and incorporating advanced technologies can enhance customer satisfaction (Olayinka et al, 2024).

This research was intended to recommend the best Halal suppliers to Korean restaurants so that they could reduce their expenditures. Because they were aware of which supplier would increase their efficiency, the other Korean restaurants also benefited from this. As they could guarantee and serve the best Halal food, customer satisfaction also increased. Thus, the main objectives of this research are to determine the criteria for selecting a Halal supplier for a Korean restaurant and to identify the best Korean restaurant supplier by using Fuzzy TOPSIS techniques.

2. Literature Review

In the highly challenging restaurant industry nowadays, supplier selection is one of the most crucial factors for success. Restaurant owners need to acquire the best supplies and services at the optimal time, price, and quantity with the intention of producing food of the highest quality. Good service will ensure that customers are satisfied and more likely to remain loyal and recommend the business to others (Bittner, Ostron, & Morgan, 2021).

Supplier selection is the strategy of choosing a supplier to provide organisations with the essential materials to maintain their production. The selection of suppliers for restaurants requires a precise evaluation process involving various important criteria. The main thing that needs to be emphasised is the quality of the supplied products. Every restaurant operator highly prioritises suppliers who constantly deliver fresh and high-quality ingredients. The efficient operation of a restaurant business requires a consistent and stable delivery schedule, thereby meeting customer demand without any disruptions. Achieving a balance between product quality and competitive pricing is essential for optimising profit margins (Tang et al., 2024).

Mohammad and Saman (2021) define supplier selection as a strategic process in organisations that contributes to their success. The process requires considerable finance and human resources for any company, including identifying, screening, evaluating, analysing, and contracting with

suppliers. Suppliers' provision of quantity discounts is an advantage. Thus, each company can enjoy lower costs and place large orders with the supplier (Chai & Ngai, 2019).

However, Hamed and Aurelie (2019) explain that supplier selection is the process by which firms identify, evaluate, and contract with suppliers. The success of a company is when the company's financial resources can go through the precise supplier selection process. The priority in this process is to reduce purchasing risks, maximise the overall value for the buyer, and develop long-term relationships between the buyer and the supplier. Their study also allocates strategies on supplier selection criteria, research in supply chain management, and methods for supplier selection evaluation (multi-criteria decision-making). The study results indicate that the use of structured decision-making techniques is important, especially in resolving complex situations that involve both quantitative and qualitative criteria.

Currently, one of the most crucial steps restaurant owners must go through is selecting suppliers. While choosing the wrong suppliers can affect the success of their restaurant, the proper ones can help them raise profits and operate smoothly. Chai and Ngai (2019) carried out a systematic review of studies published between 2013 and 2018 that used decision-making approaches for supplier selection and discovered the methods which may be categorised into three techniques: Multicriteria decision-making (MCDM), Mathematical Programming, and Artificial Intelligence-based methods. The paper also explained how to use these strategies for supplier selection, as well as their limitations. Following their overview, MCDM approaches were generally used to solve supplier selection concerns. AHP remained the most often used MCDM approach for this purpose, with a frequency value of 13, followed by TOPSIS with a frequency of 8 and ANP with a frequency of 6.

Hwang and Yoon (1981) were the first to propose the TOPSIS method. The key element of this approach is that the choice must be the one that is nearest to the positive optimal solution and the one that is farthest away from the optimal negative solution. The criteria's weights and the evaluations of choices are precisely determined in the standard TOPSIS approach, and crisp values are employed in the evaluation process. Even so, in many cases, crisp data are insufficient to represent real-world decision issues. To solve these problems, the fuzzy TOPSIS technique is introduced, in which linguistic variables represented by fuzzy numbers analyse the weights of criteria and ratings of alternatives.

The fuzzy TOPSIS method is designed to resolve MCDM problems under uncertainty (Chen, 2000; Barry et al., 2025). The Fuzzy TOPSIS is a valuable technique for determining the weight (importance) of the suppliers. Fuzzy set theory enables researchers to consider uncertainty in the parameters. Fuzzy multi-objective programming considers uncertainty and the effects of some objectives on the problem (Mohammad & Saman, 2021). Sureeyatanapas et al. (2018) highlight how Fuzzy TOPSIS was chosen as the basis for assisting practitioners in correctly selecting a supplier even when uncertainty and a lack of evaluation information occur. The criteria are evaluated in the following order: product quality, product pricing, package quality, delivery performance, and serviceability.

Even though there are various methods for supplier selection, this study will use Fuzzy TOPSIS techniques and then choose the appropriate supplier from the pool of suppliers. The Fuzzy TOPSIS method was selected due to its simple calculation and success in supplier selection ranking (Nazim et al., 2022; Roya et al., 2021). Fuzzy TOPSIS that integrates expert input, supplier criteria data, and survey feedback will produce targeted recommendations (Nutchanat & Satith, 2025). There have also been previous studies that successfully select suppliers in the food or beverage industry using Fuzzy TOPSIS with effective results (Khaled & Ahmed, 2021; Mostafa et al., 2023).

Thus, this research aims to determine the criteria for selecting a Halal supplier for a Korean restaurant and to identify the best Korean restaurant supplier by using Fuzzy TOPSIS techniques.

3. Methodology

The data was gathered based on the supplier of Halal Kimchi in Malaysia. The criteria used to evaluate the best supplier involve price, shipment, system, and relationship. This study will gather data from Mr Dakgalbi's restaurant. Mr Dakgalbi's restaurant is a Halal Korean restaurant located in Aman Central, as the only branch located in Kedah, Malaysia. Three suppliers have been selected that supply Kimchi ingredients to this restaurant. The Fuzzy TOPSIS method was used to calculate the ranking of all criteria and suppliers.

The aim of this study is to develop a Kimchi supplier recommendation that utilises Fuzzy TOPSIS to improve the accuracy and relevance of supplier recommendations particularly for Mr Dakgalbi's restaurant. A recommendation based on Fuzzy TOPSIS that integrates expert input, supplier criteria data, and survey feedback to produce precise, targeted recommendations. Therefore, the manager of Mr Dakgalbi's restaurant was selected as the decision maker, who is an expert in the Halal Korean food business.

The criteria for selecting suppliers for Korean restaurants, starting from the decisions of restaurant managers and their subjective evaluations regarding the agreed criteria, were adequately considered in the review of competent suppliers. DM represented the decision maker, and the alternative suppliers were S_1, S_2, and S_3. The first criterion for the decision-makers to evaluate is Price (C1), which refers to the cost of the ingredients and the discounts that the supplier offers. The second criterion is Shipment (C2), which refers to the on-time shipment and no strict limits on the amount of ingredients to be ordered. The third criterion is System (C3), which refers to the procedures used to process the order and the refund procedure. The fourth criterion is Relationship (C4), which relates to trustworthiness and communication efficiency.

The manager of the Korean restaurant was the decision maker (DM) was interviewed in May 2025. Their linguistic judgements regarding the selected criteria (C1, C2, C3, C4) were to be considered in evaluating a competent supplier. Table 1 provides an overview of the evaluation criteria and their respective descriptions for decision-makers to assess suppliers based on these factors. Figure 1 depicts the hierarchical structure of the process for selecting alternative suppliers (S1, S2, S3).

Table 1
Supplier Evaluation Criteria

Criteria	Description
C1: Price	The cost of ingredients and any available discounts offered by the supplier
C2: Shipment	On-time shipment and no strict limits on the amount of ingredients to be ordered
C3: System	The efficiency of order processing procedures and the availability of the refund procedure
C4: Relationship	The level of trustworthiness and communication efficiency with the supplier

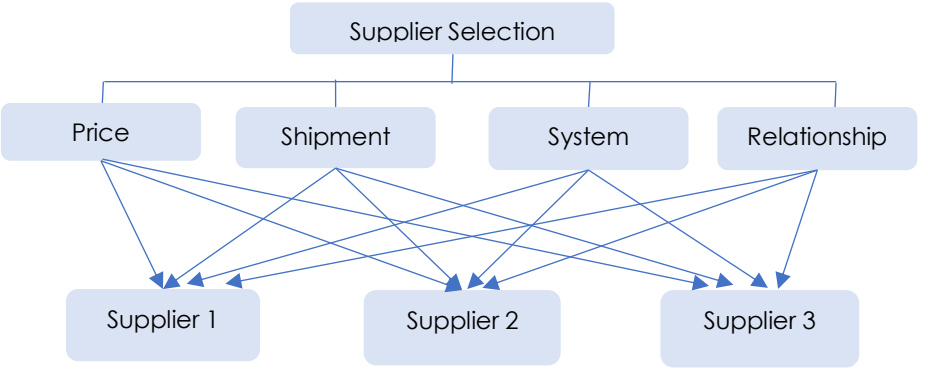

Figure 1. Hierarchical Structure of the Supplier Process

The TOPSIS extension approach proposed by Chen et al. (2006) was applied to the supplier selection process of the Korean restaurant. The Fuzzy TOPSIS procedure includes eight steps that are explained below:

Step 1: The committee has k decision makers, and their fuzzy ratings are $D_k\left(k=1,2,...k\right)$, which can be written as TFN $\tilde{R}_k=\left(k=1,2,...,k\right)$ with a membership function $\mu\tilde{R}_k\left(x\right)$. Determine the criteria for the evaluation procedure. The criteria and alternatives will be evaluated, and appropriate linguistic criteria will be used. The values for linguistic variables in Fuzzy TOPSIS are expressed using Triangular Fuzzy Numbers (TFN) as presented in Table 2.

Table 2
Linguistic Scale for Measuring the Weights of Criteria and Alternatives

Linguistic variables for ratings	**Triangular Fuzzy Numbers (TFN)**
Very Low (VL)	(0.0, 1.0, 2.5)
Low (L)	(2.0, 3.0, 4.5)
Medium (M)	(4.0, 5.0, 6.5)
Good (G)	(6.0, 7.0, 8.5)
Very Good (VG)	(8.0, 9.0, 10.0)

Step 2: The weights of criteria, alternatives, and decision-makers were added. $\tilde{R}=\left(a,b,c\right),k=1,2,...,k$ is the total fuzzy rating of all decision-makers, which *a, b* and *c* will refer to in Equation (1).

$$a=\min_k\left\{a_k\right\},\quad b=\frac{1}{k}\sum_{k=1}^{k}b_k,\quad c=\max_k\left\{c_k\right\} \tag{1}$$

The fuzzy rating and important weight of the k^{th} decision maker is $\tilde{x}_{ij}^k=\left(a_{ij}^k,b_{ij}^k,c_{ij}^k\right)$ and $\tilde{w}_{ij}^k=\left(w_{j1}^k,w_{j2}^k,w_{j3}^k\right)$, accordingly, considering i^{th} alternative on j^{th} criterion; where *i=1,2,…,m* and

j=1,2,…,n, then $\tilde{x}_{ij}^{k} = \left(a_{ij}^{k}, b_{ij}^{k}, c_{ij}^{k}\right)$ can be determined as the sum of fuzzy ratings $\tilde{x}_{ij}^{k}$ of alternatives *(i)* with respect to each criterion *(j)* . The values a, b and c will be referred to in Equation (2).

$$a_{ij} = \min_k \left\{a_{ij}^{k}\right\}, \quad b_{ij} = \frac{1}{k}\sum_{k=1}^{k} b_{ij}^{k}, \quad c_{ij} = \max_k \left\{c_{ij}^{k}\right\} \tag{2}$$

Each criterion's summed fuzzy weights $\tilde{w}ij$ are computed as

$$\tilde{w}_j^{k} = \left(w_{j1}, w_{j2}, w_{j3}\right) \tag{3}$$

$$w_{j1} = \min_k \left\{a_{j1}^{k}\right\}, \quad w_{j2} = \frac{1}{k}\sum_{k=1}^{k} w_{j2}^{k}, \quad w_{j3} = \max_k \left\{w_{j3}^{k}\right\} \tag{4}$$

Step 3: The normalised fuzzy decision matrix will be computed. The normalisation formula simplifies things by converting the numerous criteria values into equivalent ranges via linear scale transformation. The normalised fuzzy decision matrix $\tilde{R}$ is calculated using Equations (5), (6), and (7).

$$\tilde{R} = \left[\tilde{r}_{ij}\right]_{m*n}, \quad i = 1,2,...,m, \quad j = 1,2,...,n \tag{5}$$

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{c_j^*}, \frac{b_{ij}}{c_j^*}, \frac{c_{ij}}{c_j^*}\right), \quad c_j^* = \max\left\{c_{ij}\right\} \text{ for benefit criteria} \tag{6}$$

$$\tilde{r}_{ij} = \left(\frac{a_j^-}{c_{ij}}, \frac{a_j^-}{b_{ij}}, \frac{a_j^-}{a_{ij}}\right), \; a_j^- = \min_i \left\{a_{ij}\right\} \text{ for cost criteria} \tag{7}$$

Step 4: The combination of the criteria's significant weight ($\tilde{w}$j) with the values in the normalised fuzzy decision matrix $\tilde{r}$ij generates the weighted normalised fuzzy decision matrix $\tilde{v}$.

$$\tilde{v} = \left[\tilde{v}_{ij}\right]_{m*n}, \quad i = 1,2,...,m, \quad j = 1,2,...,n$$

$$\tilde{v}_{ij} = \tilde{r}_{ij} * \tilde{w}_j \tag{8}$$

Step 5: The Fuzzy positive ideal solution (FPIS, S^{+}) and fuzzy negative ideal solution (FNIS, S^{-}) are then expressed in the form:

$$S^{+} = \left(\tilde{v}_1^{+}, \tilde{v}_2^{+}, ..., \tilde{v}_n^{+}\right)$$

$$\tilde{v}_j^{+} = \max_i \left\{v_{ij3}\right\}, \quad i = 1,2,...,m, \quad j = 1,2,...,n \tag{9}$$

$$S^{-} = \left(\tilde{v}_1^{-}, \tilde{v}_2^{-}, ..., \tilde{v}_n^{-}\right)$$

$$\tilde{v}_j^{-} = \min_i \left\{v_{ij1}\right\}, \quad i = 1,2,...,m, \quad j = 1,2,...,n \tag{10}$$

Step 6: The distances (d_i^{+} *and* d_i^{-}) from each FPIS and FNIS for every alternative *i=1,2,…,m* would be followed by Equations (11) and (12).

$$d_i^+ = \sum_{j=1}^{n} d_v\left(\tilde{v}_{ij}, \tilde{v}_j^+\right), \quad i = 1,2,...,m \tag{11}$$

$$d_i^- = \sum_{j=1}^{n} d_v\left(\tilde{v}_{ij}, \tilde{v}_j^-\right), \quad i = 1,2,...,m \tag{12}$$

In which $d_v(\tilde{a}, \tilde{b})$ is the total distance fuzzy numbers $\tilde{a}$ and $\tilde{b}$, which is

$$d_v\left(\tilde{a}, \tilde{b}\right) = \sqrt{\frac{1}{3}\left[\left(a_1 - b_1\right)^2 + \left(a_2 - b_2\right)^2 + \left(a_3 - b_3\right)^2\right]} \tag{13}$$

Step 7: The FPIS S^+ and FNIS S^- distance are expressed by the closeness coefficient, CC_i . The CC_i of each alternative is computed as in Equation (14).

$$CC_i = \frac{d_i^-}{d_i^- + d_i^+}, \quad i = 1,2,...,m \tag{14}$$

Step 8: The closeness coefficients CC_i are utilised to evaluate the alternatives. The best option is the one with the highest total, which is closest to FPIS and farthest from FNIS.

4. Results

In this study, the chosen alternatives were Supplier 1 (S1), Supplier 2 (S2), and Supplier 3 (S3). Since it is difficult to find suppliers around the Kedah district, the supplier's location is around Kuala Lumpur and Selangor. The criteria examined were price (C1), shipment (C2), system (C3), and relationship (C4). The analysis in this study focuses on the selection of the best supplier for Halal kimchi, which is a classic Korean dish commonly offered in Korean restaurants.

For Fuzzy TOPSIS, the expert was interviewed to determine the importance of the weight of each criterion and linguistic variable for three alternatives. After the data had been collected, referring to the first step in methodology, the alternatives and criteria were rated based on their importance or significance by referring to linguistic scale variables as defined in Table 1.

Table 3 shows the results by decision maker on weight importance for each criterion. The expert has determined that the criteria of Price rates as medium, Shipment rates as good, System rates as very good, and Relationship rates as medium. Table 4 presents the results of the decision maker on linguistic variables for each alternative, where the linguistic variables have been determined for all suppliers on each criterion.

Table 3
Importance Of Each Criterion

Criteria	Decision Maker
Price (C1)	Medium
Shipment (C2)	Good
System (C3)	Very Good
Relationship (C4)	Medium

Table 4
Linguistics Variables for Three Alternatives

Criteria	Supplier	Decision Maker
Price (C1)	S1	Medium (M)
	S2	Good (G)
	S3	Good (G)
Shipment (C2)	S1	Good (G)
	S2	Medium (M)
	S3	Low (L)
System (C3)	S1	Good (G)
	S2	Very Good (VG)
	S3	Low(L)
Relationship (C4)	S1	Good (G)
	S2	Good (G)
	S3	Medium (M)

In the second step, the aggregate fuzzy weights ($\tilde{w}_{ij}$) for each criterion were calculated using Equation (4). For instance, for example criterion C1 (Price), the aggregate fuzzy weight was estimated using Equation (3), where the appropriate computations were conducted.

$$w_{j1} = \min_k \{4\} = 4, \quad w_{j2} = \frac{1}{1}\sum_{k=1}^{1}(5) = 5, \quad w_{j3} = \max_k \{6.5\} = 6.5$$

The next three criteria were likewise handled in the same way to calculate their total fuzzy weights.

Then, Equation (2) was used to get the aggregate fuzzy weights for the alternatives. For example, the manager's aggregate rating for alternative S1 for criterion C1 was computed as follows:

$$a_{ij} = \min_k \{4\} = 4, \quad b_{ij} = \frac{1}{1}\sum_{k=1}^{1}(5) = 5, \quad c_{ij} = \max_k \{6.5\} = 6.5$$

In the third step, the fuzzy matrix of alternatives was normalised using two approaches that were benefit criteria and cost criteria. In this study, criterion C1 was computed using the cost criteria equation, as stated in Equation (7). Using the preceding equation, for instance, the normalised rating for Suppliers1, S1 was calculated for criterion C1.

$$a_j^- = \min_i \{4, 6, 6, 6\} = 4$$

$$\tilde{r}_{ij} = \left(\frac{4}{6.5}, \frac{4}{5}, \frac{4}{4}\right) = (0.615, 0.8, 1)$$

While criteria C2, C3, and C4 were calculated using Equation (6) for the benefit criterion equation. As an example, the normalised rating of supplier S1 for criterion C2 was provided by

$$c_j^* = \max_i \{6.5, 8.5, 8.5, 8.5\} = 8.5$$

$$\tilde{r}_{ij} = \left(\frac{6}{8.5}, \frac{7}{8.5}, \frac{8.5}{8.5}\right) = (0.706, 0.824, 1)$$

In the fourth step, using Equation (8), the fuzzy weighted decision matrix for the alternatives was calculated. The fuzzy weighted normalised alternative was computed using the formula of $\tilde{r}_{ij}$ and $\tilde{w}_j$. For example, for supplier S1, the fuzzy weighting for criterion C1 is given by:

$$\tilde{v}_{ij} = (0.615, 0.8, 1) * (4, 5, 6.5) = (2.46, 4, 6.5)$$

In the fifth step, the fuzzy positive ideal solution (FPIS, S^+) and fuzzy negative ideal solution (FNIS, S^-) were derived using Equations (9) and (10), respectively. For example, for criterion C1, the FPIS was calculated by selecting the largest value of v^+, while the FNIS was calculated by selecting the smallest value of v^-.

$$\tilde{v}_j^+ = \max_i \{2.462, 4, 6.5, 1.882, 2.857, 4.333, 0.941, 1.429, 2.167\} = 6.5$$
$$\tilde{v}_j^- = \min_i \{2.462, 4, 6.5, 1.882, 2.857, 4.333, 0.941, 1.429, 2.167\} = 0.941$$

The sixth step will determine the distance d_v from FPIS and FNIS of each alternative were calculated using Equation (13). For example, for supplier S1 of criteria C1, the distance d_v (S_1,S^+) and d_v (S_1,S^-) were calculated as follow:

$$d_v(S_1, S^+) = \sqrt{\frac{1}{3}\left[(2.462 - 6.5)^2 + (4 - 6.5)^2 + (6.5 - 6.5)^2\right]} = 2.742$$
$$d_v(S_1, S^1) = \sqrt{\frac{1}{3}\left[(2.462 - 0.941)^2 + (4 - 0.941)^2 + (6.5 - 0.941)^2\right]} = 3.767$$

Then, the distances d_i^+ and d_i^- summed up using Equation (11) and Equation (12) respectively. For example, for supplier S1 of criteria C1, the d_i^+ and d_i^- are given by

$$d_1^+ = \sum_{j=1}^{4} d_v(S_1, S^+) = 2.742 + 2.925 + 2.924 + 2.529 = 11.12$$
$$d_1^- = \sum_{j=1}^{4} d_v(S_1, S^1) = 3.767 + 5.072 + 6.073 + 3.011 = 17.923$$

The seventh step will determine the closeness coefficient value for the alternatives using Equation (14) by utilising the distances d_i^+ and d_i^-. For instance, for calculation for supplier S1, the closeness coefficient was determined as follows:

$$CC_i = \frac{17.923}{17.923 + 11.121} = 0.617$$

Then, the value of CC_i for remaining alternative is computed and the results are presented in Table 5.

Table 5
Closeness Coefficient of Alternatives

Supplier	Closeness Coefficient	Value of CC_1
S1	CC_1	0.617
S2	CC_2	0.5
S3	CC_3	0.24

5. Discussion

Following the eight steps of Fuzzy TOPSIS, the alternatives were ranked by comparing the Closeness Coefficient (CC_i) values and the result is shown in Table 5. The closeness coefficient is defined to determine the ranking order of all alternatives by calculating the distances to both the fuzzy positive-ideal solution (FPIS) and fuzzy negative-ideal solution (FNIS) simultaneously (Chen, 2000). The CC_i value measure that quantifies how close an alternative is to both the fuzzy negative ideal solution (FNIS) and the fuzzy positive ideal solution (FPIS). It helps determine the ranking of different alternatives by considering their relative distances to these ideal solutions. A higher closeness coefficient indicates that the alternative is closer to the FPIS and farther from the FNIS, thus considered a better option. It explains that the alternative that received the highest total of CC_i will be in the first ranking.

Based on the results in Table 5, the options were ranked as follows: $CC_1 > CC_2 > CC_3$ means that S1 > S2 > S3. This result shows that supplier S1 was chosen as the best supplier for the Mr. Dakgalbi Aman Central branch, followed by suppliers S2 and S3. The results imply that supplier S1 was the preferred supplier based on the evaluated criteria, with a Closeness Coefficient value of 0.617.

This research proves that the Fuzzy TOPSIS technique demonstrates its reliability and appropriateness for evaluating suppliers in the context of Halal Korean restaurants. The Fuzzy TOPSIS method was successfully used to select the suppliers in the food or beverage industry due to its simple calculation and success in supplier selection ranking with effective results (Nazim et al. (2022); Roya et al. (2021)). Khaled & Ahmed (2021) used Fuzzy Topsis to assist the food and beverage industry of Saudi Arabia for a better supplier selection using the revealed set of ranked critical factors as selection criteria. Mostafa et al. (2023) conducted previous studies that also successfully selected the best supplier in the food industry using Fuzzy Topsis.

The analysis in this study focuses on the selection of the best supplier for Halal kimchi for Korean restaurants, with examined criteria that were price, shipment, system, and relationship. As Price criteria have rated as medium by experts, that is also concluded by Enty et al. (2025) that the total purchasing cost, or price, or total value purchasing, demonstrates that the changes in supplier capacity parameters significantly affect total purchasing costs. Hu et al. (2024) also discovered that price attributes are considered the most important in supplier selection. Cost analysis helps in selecting suppliers that offer the best value for money. Tang (2024) explains that measuring restaurant supplier selection criteria with a primary emphasis on cost involves a strategic and systematic evaluation process. The analysis begins with a thorough examination of the supplier's pricing structure, competitiveness, focusing on transparency and overall fairness to facilitate accurate budgeting. Additionally, considerations about economies of scale and sustainability practices are vital for achieving a balanced and successful supplier selection

strategy (Vasilakakis & Sdrali, 2023). A holistic view is adopted, considering not just the upfront purchase price but the total cost of ownership, encompassing ongoing expenses such as maintenance, support, and any hidden charges associated with the supplier's products or services (Cho et al., 2021).

The expert has also determined that the criteria for Shipment rates as good and System rates as very good indicate that the Shipment criteria are closely related to System criteria. This finding is also supported by Hu et al. (2024) mention speed criteria are considered the most important, followed by quality, and service offerings. Further investigation on how supplier selection criteria are adjusted based on order sizes and product features. They reveal that, as the order size increases, price and quality attributes become more important while speed and service attributes plummet in importance. Furthermore, they find that retailers attach a higher value to speed and service attributes with trendy innovative products, care more about the price dimension with long-life-cycle functional products. Chao et al. (2021) consider the system and shipment in restaurant supplier selection to be fundamental for ensuring operational efficiency and customer satisfaction. Suppliers must reliably deliver orders on time, communicate effectively, and provide responsive customer support. In essence, service factors play a pivotal role in ensuring that a restaurant can seamlessly operate and provide a high level of service to its patrons (Ngo, 2023).

The criteria of the Relationship are rated as medium by experts. Zhuo (2021) in their research explained that supplier relationship management will strengthen the management of suppliers, maintain good business progress, and maintain a win-win strategic idea. This criterion is also supported by Shi and Zhang (2023) described that the supplier relationship gives a win-win philosophy, information sharing, a trust mechanism, establishes risk awareness, and establishes a reward and punishment mechanism. Education on new products, transparent pricing, and consistency in service also contribute to a positive supplier relationship (Bag et al., 2023).

The importance of the selected criteria in this research has been proved by statistical analyses, completed by Abuzaid et al. (2024). Their study identified a correlation between supplier and manufacturer performance, which the findings show that the factors included price, eco-friendliness, flexibility, and delivery were statistically relevant to the performance of manufacturers, which added value to the decision-making strategy employed in supplier selection.

6. Conclusion

In conclusion, the objective of this study was to identify the best supplier of Halal Korean restaurants in Malaysia. When Fuzzy TOPSIS methods were applied, Supplier 1 (S1) ranked as the best supplier option based on the criteria of price, shipment, system, and relationship.

By accomplishing the objectives, this study offers significant insights to restaurant owners regarding the selection of competent suppliers of Halal Korean ingredients. The findings emphasise the significance of selecting suppliers to ensure the availability of high-quality ingredients, which directly impacts customer satisfaction and overall business performance. Furthermore, this study suggests the necessity of developing methods that effectively balance costs, quality improvement, and customer service in the restaurant business to meet consumer demand. Halal Korean restaurants can enhance their competitiveness and provide delicious and authentic cuisine to their customers by implementing a systematic strategy and choosing suppliers according to analysed criteria.

Overall, this study adds to our understanding of the supplier selection methods used in Malaysian Halal Korean restaurants. The findings help restaurant owners make informed decisions, which leads to the selection of dependable suppliers, consumer satisfaction, and overall business success.

For further research, it is recommended that the scope of the study be expanded to include a wider variety of Halal Korean restaurants located throughout Malaysia. This broader approach would provide a more comprehensive understanding of supplier selection practices and ensure that the findings are representative of the entire industry. Additional factors, such as product quality, supplier dependability, and sustainability, should also be included to provide a more thorough evaluation of potential suppliers.

In addition, future research should collect information from various sources, including restaurant owners/managers and suppliers. By considering various perspectives, researchers can attain a more complete understanding of the supplier selection process. Researchers might also investigate other decision-making processes and perform comparison studies to validate the methods' outcomes.

Future studies should try to gather data from various sources, such as restaurant owners, managers, and suppliers. By considering different views, researchers may gain a more thorough knowledge of the supplier selection process. Researchers might also investigate other decision-making processes and perform comparison studies to validate the methods' outcomes.

By implementing these recommendations, future researchers can contribute to a better knowledge of supplier selection procedures in the restaurant industry. This will allow for better informed decision-making and will help the long-term development of businesses in this sector.

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