Modified Analytic Hierarchy Process (MoAHP) Approach for Brand Selection in the Kho-Khun Beef Product

Aouypond Thawan[1], Phanthipa Pansuwan[2*] and Sirinat Chantanapelin[3]
[1,2*,3]Faculty of Business Administration and Liberal Arts,
Rajamangala University of Technology Lanna Chiang Rai, Thailand
(Received: August 29, 2023; Revised: March 27, 2024; Accepted: March 29, 2024)

Abstract

This research underscores the critical importance of brand selection in the fiercely competitive food industry and introduces the innovative Modified Analytic Hierarchy Process Model (MoAHP). This model integrates the Analytic Hierarchy Process (AHP) with the Item-Objective Consistency Index (IOC) and the Rating Scale. Centering on Kho-Khun beef products, the study offers a comprehensive decision-making framework. The prowess of the MoAHP Model shines through its hierarchical assessment of decision factors, providing enhanced precision in brand selection compared to current methods. By amalgamating expert insights with consumer preferences, the model emphasizes key factors like brand identity, lucid communication of product features, and consumer trust. The MoAHP Model bestows distinct scores upon the evaluated brands: Brand X at 82.65%, Brand Y at 91.34%, and Brand Z at 87.09%, with a clear inclination towards Brand X. Influential factors in brand selection comprise the product brand image (B1) with a weightage of 0.5579, and a confluence of interest, uniqueness, trust, and satisfaction associated with the product brand (B4) having a weight of 0.2633. Statistical analysis using paired sample t-tests confirms significant differences in brand selection scores between Brand X and Brand Y, Brand X and Brand Z, as well as Brand Y and Brand Z. Ultimately, the study introduces a groundbreaking approach to brand selection, providing practical insights for competitive markets and broadening the applicability of the AHP framework across various contexts.

Keywords: 1) Brand Selection 2) Kho-Khun Beef Products 3) MoAHP Model

[1] Lecturer, Bachelor of Business Administration and Liberal Arts; E-mail: aouypron@rmutl.ac.th
[2*] Lecturer, Bachelor of Business Administration and Liberal Arts; E-mail: phanthipha17@hotmail.com (Corresponding Author)
[3] Lecturer, Bachelor of Business Administration and Liberal Arts; E-mail: sirinat@rmutl.ac.th

Introduction

In the highly competitive global food industry, brand selection becomes pivotal in determining a product's market success (Mundt, et al., 2021, pp. 1-29). A compelling brand can generate consumer popularity and sway market trends, thus significantly impacting a business's ability to stand out among competitors (Hjelmgren, 2016, pp. 210-217). Achieving recognition in the global food market, which covers a vast array of sectors, including fresh and processed fruits and vegetables, sugar and confectionery, beverages, frozen seafood, and meat products, hinges upon this process (Hung, 2018, pp. 122-133; Kumar, et al., 2021, pp. 191-226). Yet, brand selection remains a multifaceted task that requires marketers to evaluate various critical factors including product price, product quality, packaging design, brand reputation, and its influence on consumers (Romadhona, Sudapet, and Subagio, 2018, pp. 68-78). In light of these complex considerations, a systematic and reliable approach is essential for brand selection (Takeyasu† and Higuchi, 2013, pp. 182-188). For instance, this study uses the Analytic Hierarchy Process (AHP) for the brand selection of Kho-Khun beef products, to bolster their competitiveness in the beef industry (Ikinci and Tipi, 2022, pp. 1-11) (Kho-Khun refers to cattle that have been fed an energy-rich diet for extended periods to accumulate fat within their muscles. These cattle are no older than 3 years. Cattle older than 3 years develop very strong connective tissue, resulting in meat with a tough, sticky texture, rather than the desired softness). AHP, with its ability to assign importance and weight to diverse brand selection factors, proves instrumental in decision-making (Hilali, Manouar and Idrissi, 2020, pp. 32-41).

Despite AHP's proven effectiveness in marketing strategies and diverse decision-making scenarios, a noticeable gap in the literature regarding its application to brand selection remains. Several studies have utilized AHP to evaluate various elements of marketing. Şalvarlı (2023, pp. 29-37) employed AHP to assess sustainable digital agriculture marketing, underlining the pivotal role of precision technology and digital platforms in fostering sustainable agriculture. Similarly, Liu and Zhang (2023, pp. 653-663) combined AHP with factor analysis to pinpoint the influential factors on the marketing effectiveness of advanced technology organizations, spotlighting the importance of innovation capabilities in marketing and key financial indicators. Lastly, Ersoy and Tehci (2023, pp. 35-45) leveraged AHP to gauge the significance of relationship marketing orientation in private health institutions, identifying communication as a key criterion. Despite these insightful AHP applications, its use in brand selection lacks thorough exploration, particularly concerning questionnaire weighting and the evaluation of the questionnaire's relationship to evaluations, which often involves the use of close ended questions without considering the average weighting of Rating Scales. This study aims to address this literature gap by proposing a Modified Analytic Hierarchy Process (MoAHP) model an integration of AHP, IOC, and Rating Scales for brand selection, specifically in the context of Kho-Khun beef products. Given the analytical potential of AHP

demonstrated in the studies by Şalvarlı (2023, pp. 29-37), Liu and Zhang (2023, pp. 653-663), and Ersoy and Tehci (2023, pp. 35-45), it is believed that the MoAHP Model can significantly improve the decision-making process in brand selection, which is a vital element for business success. Accordingly, this research has two main objectives to augment the theoretical understanding of integrating AHP in brand selection, and to provide practical insights that promote a more efficient brand selection process within the industry.

This study contributes to the existing literature by employing the AHP in the identification of the most suitable brand from three potential brands within the Kho-Khun beef product industry. The research utilizes a comprehensive approach to evaluate the relationship between the questionnaires by drawing from the expertise of industry professionals. Weights are assigned to the AHP scores by 20 experts across 4 professional groups, namely, media and marketing experts, distribution experts, meat distribution business operators, and meat restaurant business operators. Additionally, it incorporates a survey of 1,000 people in making brand choice decisions, providing systematic, reliable, and efficient data aligned with the research objectives. Consequently, the application of a MoAHP Model for brand selection within this particular industry supports the specified research objectives. This study raises several research questions:

1. How effective is the MoAHP Model in selecting Kho-Khun beef product brands when compared to other marketing decision methods? How does the MoAHP Model's hierarchical analysis integrate into the brand selection process, and what are its advantages over traditional AHP approaches?

2. What are the key tangible factors influencing brand selection in the Kho-Khun beef product, and how are these factors ranked according to consumer preferences?

Therefore, this research endeavors to analyze the importance of factors affecting brand selection and compare the efficacy of brand selection for Kho-Khun beef products. By fusing a stringent methodological approach with profound, industry-specific insights, the study contributes significantly to both academia and the Kho-Khun beef product industry. Leveraging the MoAHP Model for brand selection, the research seeks to improve the decision-making process for consumers. This aids businesses in navigating the highly competitive and ever-evolving food market by effectively integrating various components. Furthermore, the research aims to provide invaluable insights to the fields of business management and marketing, emphasizing brand selection within the Kho-Khun beef product sector.

This study is organized into six sections to provide a comprehensive exploration of the content. Section 1 introduces the subject matter. Section 2 reviews the relevant literature. Section 3 details the study's methods. Section 4 presents results using the MoAHP Model. Section 5 features expert discussions, conclusions, and forward-looking recommendations.

Literature Review

This literature review explores two crucial aspects of brand selection and the proposed methodology. In Section 1, we delve into the examination and analysis of the characteristics or factors that influence brand selection. Furthermore, in Section 2, we present the diverse applications of AHP in enhancing decision-making and providing valuable insights across various industries, including management and marketing courses.

1. Exploring influential factors in brand selection and decision-making

In the realm of brand selection, a multitude of studies have underscored the diverse factors and methodologies that steer decision-making. Pebri and Bakti (2022, pp. 177-182) highlighted the pivotal roles of brand trust and religiosity in the decision-making process when choosing mudharabah deposit products in Islamic Commercial Banks. In a similar vein, (Giráldez-Cru, Chica, and Cordón, 2023, pp. 59-79) proposed a comprehensive decision-making mechanism for consumer brand selection, employing 2-Tuple Fuzzy Linguistic Perceptions and Decision Heuristics. This approach not only enhanced the model's performance but also offered a realistic depiction of consumer perceptions. Tlapana, Ntobaki, and Hawkins-Mofokeng (2023, pp. 1-13), on the other hand, evaluated the influence of social media marketing on brand selection, underscoring its effectiveness as a potent communication tool that can sway consumer decisions. However, the study also pointed out the challenges businesses encounter when leveraging social media to bolster strategic marketing strategies. Lastly, Anfas, et al. (2021, pp. 356-379) investigated the role of word of mouth in fostering community trust and shaping the brand image of a university, specifically in the selection decision for UPBJJ-UT Ternate. The study found that both word of mouth and community trust significantly influence the decision to choose the university.

Likewise, Brand selection is a multifaceted process, influenced by a myriad of factors, as underscored by several recent studies. Widayat, Sakinah and Widjaya (2022, pp. 170-194) delved into the impact of advertising, Electronic Word-of-Mouth (e-WOM), and brand awareness on fashion product purchasing decisions in Indonesia, revealing that advertising and e-WOM significantly sway purchasing decisions, with brand awareness acting as a mediator. In a similar vein, Angriawan, et al. (2022, pp. 37-44) developed an application employing the Preference Selection Index (PSI) method to aid users in selecting a mobile phone for online learning activities, thereby demonstrating the instrumental role of technology in streamlining decision-making processes. Marbun, Zarlis, and Sembiring (2021, pp. 99-103) utilized the SMARTER method to assist a company's management in selecting the optimal brand ambassador for promoting cosmetic tools, thereby emphasizing the significance of decision support methods in brand selection. Sari Dewi, Edyanto, and Siagian (2020, pp. 1-10) conducted an analysis of the influence of brand ambassador, brand image, and brand awareness on the purchase decision of Pantene shampoo in Surabaya, Indonesia, highlighting the considerable impact of these factors on consumers' purchase decisions.

In brand selection, recent research highlights the complex decision-making process influenced by factors like brand reliance and brand perception. Sari and Sylvia (2020, pp. 329-336) studied university selection in Garut Regency and found that both brand reliance and brand perception significantly impact university choice, with brand perception having a stronger influence. Similarly, Haro, et al. (2020, pp. 329-336) explored brand perception and service excellence's effects on purchasing decisions for Samsung smartphones. They found these factors strongly affect purchase inclination, with implications for the final decision. Lastly, Savitri, Krisnatuti, and Hannan (2020, pp. 99-110) investigated the impact of innovation and marketing elements on brand perception in online food delivery. They found that marketing elements, including innovation and the marketing mix, play a significant role in brand perception and usage choices. However, innovation's influence on brand perception and brand perception's influence on engaging online food delivery lacked statistical significance.

In summary, within the realm of brand selection, the process is intricate and influenced by factors such as brand trust, image, social media, recommendations, communal reliance, promotions, e-WOM, service quality, and innovation. Various methods, including 2-Tuple Fuzzy Linguistic Perceptions, the PSI technique, the SMARTER approach, and marker-by-treatment analysis, are employed to understand this complex decision-making process. These insights are crucial for developing an integrated Analytic Hierarchy Process (AHP) strategy for brand selection in the Kho-khun beef product sector. This underscores the need for a comprehensive approach that considers the diverse determinants shaping brand preferences.

2. Optimizing choices: AHP Model's influence on management practices

The Analytic Hierarchy Process (AHP) method has been employed in various studies to aid decision-making. For instance, Muanley, et al. (2022, pp. 173-190) utilized AHP and sensitivity analysis to prioritize smartphone selection criteria, revealing Xiaomi as the preferred choice, followed by Vivo and Oppo. Meanwhile, Alghamdi (2022, pp. 3397-3402) employed AHP-GDM to assess furniture brands in the context of green supply chain management. He emphasized product pricing, value, and quality as crucial factors for the successful implementation of Green Supply Chain Management (GSCM) within the framework of Industry 4.0. Additionally, Hilmi, et al. (2022, pp. 1-7) utilized AHP to determine marketing strategy goals for UD.Azwan cashew, ranking increasing revenue, demand, product quality, and competitive prices as the most crucial objectives. Furthermore, Şalvarlı (2023, pp. 29-37) utilized AHP to evaluate alternatives in sustainable digital agriculture marketing, identifying precise agricultural technologies as the most significant alternative. Lastly, Liu and Zhang (2023, pp. 653-663) employed AHP and Factor Analysis Method to assess factors influencing the marketing performance of high-tech enterprises, with a specific focus on the considerable impact of marketing innovation capacity. These studies collectively underscore the valuable role of AHP in enhancing decision-making processes and providing

useful insights in management and marketing domains.

As well, Goswami, Behera, and Mitra (2020, pp. 1-18) utilized AHP and the weighted product model to select the best laptop model based on criteria such as processor, hard disk capacity, and brand. Including, Al Nawaiseh, Albtoush and Al Nawaiseh (2022, pp. 67-75) proposed a methodology using AHP and Simple Additive Weighting (SAW) to optimize software component selection, streamlining decision-making and providing explicit numeric preference indications. While, Ocampo, et al. (2021, pp. 1-28) evaluated online marketing strategies for the hospitality industry using AHP and the technique for order of preference by similarity to ideal solution (TOPSIS), revealing search engines as the most preferred and viable strategy for both customers and businesses. Also, Şekerci and Aydin (2022, pp. 649-662) established a production-distribution network system for a bottled water company using Fuzzy AHP to select provinces and optimization models for network development. Lastly, Mortezaei, et al. (2021, pp. 357-365) developed a brand equity model for health tourism in Iran, utilizing AHP, grounded theory, structural equation method, and fuzzy AHP to identify factors influencing hospital brand equity.

In summary, these studies highlight the versatile application of the AHP method across diverse domains, including brand selection, where it has been used to prioritize smartphone options, evaluate furniture brands for sustainable supply chains, establish marketing strategy objectives, and assess alternatives in agriculture. The method's capacity to enhance decision-making and yield insightful outcomes across industries is evident. Our research bridges a literature gap by introducing a MoAHP model that integrates AHP, IOC, and Rating Scales for brand selection in the context of Kho-Khun beef products. This study underscores the MoAHP model's potential as a robust approach for brand selection in the Kho-Khun beef product industry, with a focus on critical criteria like quality, value, and sustainability.

Methods

In this captivating academic article titled “Modified Analytic Hierarchy Process (MoAHP) Approach for Brand Selection in the Kho-Khun Beef Product”, we embark on a captivating research journey. The study intricately explores brand selection among three brands (as Figure 1), meticulously navigating through five essential steps: 1) The IOC concordance index, 2) The average weighting of questionnaires in the Rating Scale, 3) The AHP method, 4) The paired sample t-test of brand selection, and 5) The eloquent summarization of results. Each step acts as a gateway to uncovering the intricacies of effective brand selection in this dynamic field, providing essential insights to inform future marketing strategies and elevate brand prominence. By delving into these methodological intricacies, the article equips decision-makers with a profound comprehension of consumer preferences and market trends, ultimately guiding businesses toward strategic success and a prominent standing within the Kho-Khun beef product.

Figure 1 Brand design for selected options in the Kho-Khun beef product

1. The IOC concordance index.

A comprehensive data survey underpins questionnaire design, split into two parts: Part 1 captures respondent demographics, while Part 2 assesses product branding perceptions across 20 items in 4 categories. This meticulous approach boosts questionnaire accuracy for in-depth research.

For alignment with research objectives, 5 experts from diverse fields (marketing, consumer behavior, beef industry, market research) rate questions on a -1 to 1 scale (Index of Congruence; IOC). IOC scores of 0.50-1.00 indicate valid accuracy, while below 0.50 indicates need for improvement. The IOC is computed as per Equation (1), where $\sum R$ is expert review sum and N is the number of experts.

$$IOC = \frac{\sum R}{N} \qquad (1)$$

This rigorous process refines the questionnaire's effectiveness in data collection, adding credibility to research results. This meticulous foundation paves the way for insightful investigation into Kho-Khun beef product industry's brand selection.

2. Mean weighting on Rating Scale questionnaires

In this phase, we are commencing the deployment of an evaluative validation questionnaire, specifically utilizing the Index of Congruence (IOC), for an extensive survey across five distinct geographic locations within our distribution areas. The cumulative population across these regions is 275,923 people as of May 2023 (The Bureau of Registration Administration, 2023). To ensure methodological rigor, we are adopting Yamane's sampling equation at a 95% confidence level (Uakarn, Chaokromthong and Sintao, 2021, pp. 76-86).

$$n = \frac{N}{1+N(e)^2} \qquad (2)$$

Where n represents the sample size, N stands for the finite population size, and e signifies the level of significance, set at the 0.05 or 5% threshold of significance.

Using Equation (2), we determined a requirement of 399.421 questionnaires for each brand, even though the study encompassed 1,000 respondents for each brand. Every participant assessed the three brands via a questionnaire. The decision to survey 1,000 individuals was informed by the uneven market distributions across the five regions, with the smallest having a 5% share. Using a limited sample might yield inadequate or skewed data for regions with minor market shares. By surveying 1,000 participants, we ensure that even in areas with smaller proportions, the respondent count remains substantial. Such an approach offers invaluable insights

into brand perception, drawing from personal experiences and sentiments. The feedback, gathered on a detailed Rating Scales, enables a comprehensive brand assessment across diverse user segments, guaranteeing practical relevance and statistical reliability. By juxtaposing perceptions across brands, businesses can pinpoint prevailing market dynamics, including strengths and shortcomings. These findings can streamline decision-making and fine-tune brand strategies. For questionnaire distribution, participants were allocated based on market proportions across five districts: Phan District (600 participants, 60%), Chiang Rai City District (200 participants, 20%), Pa Daet District (100 participants, 10%), Mae Lao District (50 participants, 5%), and Mae Chai District in Phayao Province (50 participants, 5%). It's imperative to emphasize that respondents from all districts had opportunities to participate in surveys within their designated zones.

After completing 1,000 surveys per brand, we calculated the mean value per questionnaire and normalized it by dividing with a maximum score of 5 per question. To heighten criterion significance, we combined these normalized averages with Analytic Hierarchy Process (AHP) scores, illustrated in Table 11.

3. The AHP Method

The AHP is a decision-making method breaking down complex issues into tiers, combining qualitative and quantitative evaluations. AHP is useful for intricate challenges with diverse criteria. It involves comparative assessments, decision matrices, and weighting through characteristic value calculations. AHP ensures precise data for proficient decisions.

In the study of Kho-Khun beef product brands, three brands were assessed using 20 criteria. Drawing from the literature, we segmented the questionnaire into four categories: 1) Product Brand Image, 2) Interest and Uniqueness, 3) Engagement, and 4) Trust and Satisfaction. The Analytic Hierarchy Process (AHP) was employed to account for differences in criteria importance. For this, 20 experts across four specialized domains were consulted: 1) media/marketing, 2) distribution, 3) meat distribution, and 4) meat restaurants. These experts ranked the importance of each criterion, and their input was analyzed using AHP. The analysis then proceeded through a series of subsequent steps.

3.1 Comparing and evaluating the importance of decision criteria

In the decision-making process, it's crucial to compare and assess the significance of various criteria. This is typically done using pairwise comparisons, where two criteria are juxtaposed to ascertain their relative importance. As detailed in Table 1, numerical values denote these pairwise comparisons. Experts then leverage these values as comparison scores within the Analytic Hierarchy Process (AHP) methodology.

Table 1 Levels of intensity meaning used in pairwise importance comparison

Scale	Definition
1	*i* and j are equally important
3	*i* is a little more important than *j*
5	*i* is more important than *j*
7	*i* is very more important than *j*
9	*i* is extremely more important than *j*
2, 4, 6 and 8	Intermediate value of two adjacent judgements

3.2 Analysis of factor weight scores

After experts provide their assessed weights for criteria in numerical values, the subsequent phase involves computing cumulative importance scores for each hierarchy level. This process entails sequential analysis from the top-most to the lowest level. The methodology for calculating these weights follows a series of steps:

Begin by conducting pairwise comparisons of each criterion using a matrix format, encompassing all criteria both horizontally and vertically. Assign C_i as the primary decision-making criterion (where i = 1, 2, 3, ..., n) and A_j as the subordinate criterion in the assessed hierarchy level (where j = 1, 2, 3, ..., n). Compare C_i with A_j sequentially for each pair, leading to an nxn matrix, defined as $A = (a_{ij})$ with i and j ranging from 1 to n.

Next, calculate the Geometric Mean using Equation (3), where V_i represents the Geometric Mean value, a_{ij} is the numeric value in the matrix, and n. is the number of values for the mean calculation.

$$V_i = \left(\prod_{j=1}^{n} a_{ij}\right)^{1/n} \quad (3)$$

In Table 2, the process involves determining importance weights of factors. This begins with calculating the importance value for each horizontal row. For each factor within the row, its importance value is divided by the sum of importance values in that row. This generates a matrix of percentage values, which are averaged for each row using the matrix's horizontal direction. This average signifies the weight of importance for factors in that row, as illustrated in Table 3.

Where data synthesis allows, the importance weight of each criterion or option in each level can be calculated using Equations (4) and (5), where W_i is the weight of each criterion, V_i is the Geometric Mean, and n is the number of values taken for the mean. Equation (4) calculates W_i by dividing V_i by the sum of all V_i values, while Equation (5) ensures that the sum of all calculated W_i values equals 1.0.

$$W_i = \frac{V_i}{\sum_{i=1}^{n} V_i} \quad (4)$$

$$\sum_{i=1}^{n} W_i = 1.0 \quad (5)$$

To create the Normalized Matrix, which is the eigenvector (EV) of the matrix in each row, the mean value in each row is calculated, as shown in Table 3. This normalization process transforms the matrix into a standardized form.

Table 2 Table of sums of vertical rows

Factors		Factors 1	Factors 2	Factors 3	Factors n
$A_{nxn}(a_{ij})_{nxn}$	Factors 1	1	a_{12}	a_{13}	a_{1n}
	Factors 2	$a_{21};(1/a_{12})$	1	a_{23}	a_{2n}
	Factors 3	$a_{31};(1/a_{13})$	$a_{32};(1/a_{23})$	1	a_{3n}
	Factors n	$a_{n1};(1/a_{1n})$	$a_{n2};(1/a_{2n})$	$a_{n3};(1/a_{3n})$	1
Vertical Summation Results		X_1	X_2	X_3	X_n

Table 3 Eigenvector (EV) values.

Factors	Factors 1	Factors 2	Factors 3	Factors n	Eigenvector
Factors 1	$1/X_1$	a_{12}/X_2	a_{13}/X_3	a_{1n}/X_n	$\sum_{i=1}^{n} \frac{W_i}{n}$
Factors 2	a_{21}/X_1	$1/X_2$	a_{23}/X_3	a_{2n}/X_n	$\sum_{i=1}^{n} \frac{W_i}{n}$
Factors 3	a_{31}/X_1	a_{32}/X_2	$1/X_3$	a_{3n}/X_n	$\sum_{i=1}^{n} \frac{W_i}{n}$
Factors n	a_{n1}/X_1	a_{n2}/X_2	a_{n3}/X_3	$1/X_n$	$\sum_{i=1}^{n} \frac{W_i}{n}$
Vertical Summation Results	**1.00**	**1.00**	**1.00**	**1.00**	**1.00**

3.3 Calculation of the Consistency Ratio: CR

The evaluation of the consistency in scoring rationale involves comparing all established criteria. The process begins by summing the assessed values of each criterion vertically and then multiplying this result with the sum of average values horizontally. The result yielded by these successive multiplicative computations is subsequently combined. The resulting output corresponds to the overall count of criteria under evaluation. This aggregation of evaluation scores is denoted as Eigenvalues (λ_{max}), as exemplified in Equation (6). When the assessment within these criteria is entirely consistent, the Eigenvalues $\lambda_{max} = n$

$$\lambda_{max} = \sum_{i=1}^{n}\left[\sum_{j=1}^{n} a_{ij}W_j\right] \quad (6)$$

Concerning the Consistency Index (CI), as illustrated in Equation (7), its determination involves the multiplication of the significance weight coefficients of factors by their corresponding significance values within the same row, followed by the computation of the average value along the horizontal axis. This procedure generates a matrix of multiplied outcomes, employed for the evaluation of the coherence of the rationale. The Consistency Ratio (CR), as depicted in Equation (8), is calculable through a juxtaposition of the computed Consistency Index (CI), derived from matrix calculations, with the reference Random Consistency Index (RI). Here, n rep-

resents the count of factors. In this context, CR denotes the coherence ratio, CI stands for the coherence index, and RI pertains to the random index.

$$CI = \frac{(\lambda_{max} - n)}{(n-1)} \quad (7)$$

$$CR = \frac{CI}{RI} \quad (8)$$

Where the Random Consistency Index is a consistency index obtained through the random sampling of the reciprocal matrix, utilizing a standard scale of importance values ranging from 1 to 9. The average value of the Random Consistency Index is obtained through experimentation in each dimension of the matrix, with values ranging from n = 1 to 12, as shown in Table 4.

The CR value's acceptability criterion is straightforward: ≤0.10 is acceptable, >0.10 is not. If >0.10, reevaluate pairwise comparison weights for consistency. CR percentages based on criteria count: ≤10% for 5 or more criteria, ≤9% for 4 criteria, ≤5% for 3 criteria. If these percentages are exceeded, it indicates inconsistent judgments. In such cases, decision-makers must revisit and revise their judgments accordingly.

After assessing the IOC scores, the Analytic Hierarchy Process (AHP) involving 20 experts was executed. Through the steps (2.1)-(2.3), a judgment matrix was created for each individual item, illustrated in Figure 2 and Table 5-10.

Table 4 Values of consistency index according to the size of the matrix dimension.

n	1	2	3	4	5	6
RI	0	0	0.58	0.90	1.12	1.24

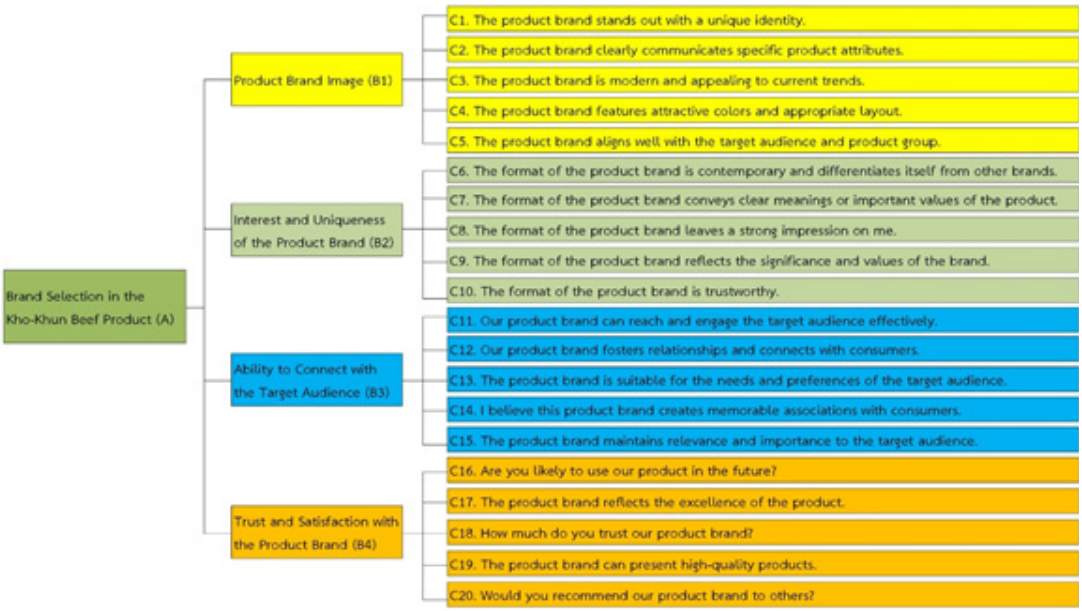

Figure 2 Structuring of decision-making hierarchy model

Table 5 Comparing the importance of main decision-making criteria

A	B1	B2	B3	B4	EV
B1	1	1/3	1/3	3	0.5579
B2	3	1	3	5	0.1219
B3	3	1/3	1	3	0.0569
B4	1/3	1/5	1/3	1	0.2633
Total	**1.68**	**9.33**	**16.00**	**4.53**	**1.0000**

Table 5 presents the average weights of decision criteria derived from expert scores ranging from 1-9, as detailed in Table 1. These weights pertain to the decision criteria for "Brand Selection in Kho-Khun Beef Product", also known as Target Criteria A. This target layer is subdivided into four main criteria: B1, related to the product's brand image, has a weight of 0.5579; B2, emphasizing the brand's uniqueness and appeal, is weighted at 0.1219; B3, reflecting the brand's alignment with its target audience, carries a weight of 0.0569; and B4, which measures the brand's trustworthiness and customer satisfaction, holds a weight of 0.2633. Cumulatively, these weights should sum to 1.00. Additionally, the total weight of each main criterion (B1-B4) corresponds to the full score of the respective second criteria, ranging from C1 to C20. Further details can be observed in Figure 2.

In the Tables 6-9 present the decision weights associated with each second criteria. Notably, the EV scores displayed within these tables correspond to B1-B4. Consequently, the combined decision weights for C1-C20 sum to 1.00.

Table 6 Matrices and judgment weights of product brand image (B1)

B1	C1	C2	C3	C4	C5	Weight	EV
C1	1	5	3	9	7	3.9363	0.2845
C2	1/5	1	1/3	5	3	1.0000	0.0723
C3	1/3	3	1	7	5	2.0362	0.1472
C4	1/9	1/5	1/7	1	1/3	0.2540	0.0184
C5	1/7	1/3	1/5	3	1	0.4911	0.0355
Total	**1.79**	**9.53**	**4.68**	**25.00**	**16.33**	**7.7176**	**0.5579**

Table 7 Matrices and judgment weights of interest and uniqueness of the product brand (B2)

B2	C6	C7	C8	C9	C10	Weight	EV
C6	1	1/3	3	5	1/7	0.4911	0.0078
C7	3	1	5	1/3	1/5	1.0000	0.0158
C8	1/3	1/5	1	1/7	1/9	0.2540	0.0040
C9	5	3	7	1	1/3	2.0362	0.0322

B2	C6	C7	C8	C9	C10	Weight	EV
C10	7	5	9	3	1	3.9363	0.0622
Total	**16.33**	**9.53**	**25.00**	**4.68**	**1.79**	**7.7176**	**0.0078**

Table 8 Matrices and judgment weights of ability to connect with the target audience (B3)

B3	C11	C12	C13	C14	C15	Weight	EV
C11	1	5	1/3	7	1/3	2.0362	0.0150
C12	1/5	1	1/7	3	1/3	0.4911	0.0036
C13	3	7	1	9	5	3.9363	0.0290
C14	1/7	1/3	1/9	1	1/5	0.2540	0.0019
C15	1/3	3	1/5	5	1	1.0000	0.0074
Total	**4.68**	**16.33**	**1.79**	**25.00**	**9.53**	**7.7176**	**0.0569**

Table 9 Matrices and judgment weights of trust and satisfaction with the product brand (B4)

X	C16	C17	C18	C19	C20	Weight	EV
C16	1	3	1/7	1/5	1/3	0.4911	0.0176
C17	1/3	1	1/7	1/5	1/3	0.3165	0.0113
C18	7	7	1	3	5	3.7433	0.1340
C19	5	5	1/3	1	3	1.9037	0.0681
C20	3	3	1/5	1/3	1	0.9029	0.0323
Total	**16.33**	**19.00**	**1.82**	**4.73**	**9.67**	**7.3575**	**0.2633**

Table 10 Consistency ratio verification result

Criteria	A	B1	B2	B3	B4
λ_{max}	4.1185	5.2426	5.2426	5.2426	5.2980
CI	0.0395	0.0607	0.0607	0.0607	0.0745
CR	0.0439	0.0542	0.0542	0.0542	0.0665

Table 10 checks the consistency ratio (CR) as determined by Equation (7). The CR percentages are based on the criteria count: ≤10% for 5 or more criteria and ≤9% for 4 criteria. As shown in Table 10, the weight values for the criteria in criteria A and B1-B4 all have percentages below 9%, ensuring the data's reliability.

4. The paired sample t-test of brand selection

Following the assignment of quantitative weighting scores in Table 11, we proceeded to use data from each brand to perform a paired sample t-test. This test was chosen over ANOVA or the F-test based on the data's

nature and our study's goals. The paired t-test is ideal for comparing two related groups, making it suitable since the brands were assessed in pairs. Conversely, ANOVA is meant for comparing three or more independent groups simultaneously, which wasn't applicable here. Our primary objective was to pinpoint specific differences between paired brands, with multiple t-tests facilitating the identification of brands with significant selection score variances. We set a significance level at 0.05; hence, any p-value below this indicates a significant difference between paired brands. The overarching aim was to test the hypothesis concerning the selection of three distinct products and determine if their mean scores had statistically significant discrepancies. Throughout this process, we consistently used the 0.05 significance level, with a p-value below this signifying the model's efficacy in discerning products of notable importance. The hypotheses for this study are defined as follows:

$H_0 : \mu_1 = \mu_2 = \mu_3$

$H_1 : \mu_1 \neq \mu_2 \neq \mu_3$ (at least one pair is different)

Where μ_1 signifies the outcome of product selection using assessment model "A", μ_2 represents the outcome of product selection using assessment model "B", and μ_3 denotes the outcome of product selection using assessment model "C".

Results

We can succinctly summarize the outcomes of the Kho-Khun brand selection using the 4-step operational method as follows:

1. The IOC reveals insightful discoveries across the questionnaire's two sections, guided by assessments from 5 experts. In Part 1, experts thoroughly evaluated all six specifications, assessing diverse factors on a scale of -1 to 1, encompassing demographics like Gender, Age, Marital Status, education, occupation, and income. Impressively, unanimous average scores of 1.00 indicated a consensus, underscoring the questionnaire's structure and confirming its reliability and validity.

In Part 2, the main criteria of "product brand image (B1), ability to connect with the target audience (B3), trust and satisfaction with the product brand (B4)" received notably positive scores, averaging 0.92. Additionally, Interest and Uniqueness of the Product Brand (B2) also received notably positive scores, averaging 0.96. This collectively signifies an overall favorable perception of the four main criteria (and their 20 secondary criteria) with an average score of 0.93. In conclusion, experts exhibited a positive sentiment towards the product brand, highlighting its effectiveness in fostering interest, trust, and satisfaction among the target audience.

2. The section part, a survey involving 1000 participants was conducted to evaluate brand preferences for three brands. The Part 1 results indicate a male majority at 71.20%, with females comprising 28.80%. The largest age group, 35-44 years old, accounts for 27.10%, while the age distribution maintains balance with the lowest representation in the below 15 years category. The majority are married (38.60%), followed by singles and those married but not cohabiting. Education-wise, 29.50% hold bachelor's degrees, closely followed by 24.10% with associate's degrees or diplomas. Agriculturists (25.40%)

form the primary occupation group, followed by freelancers and private sector employees. Monthly income trends place the largest segment (30.60%) within the 15,001-20,000 Baht range, with a notable portion earning between 20,001-25,000 Baht per month.

The survey, conducted across five distinct locations, the evaluation of three brands; Brand X, Brand Y, and Brand Z was performed using 20 criteria. Results reveal preferences for Kho-Khun brand products. Brand X averages a score of 4.121, excelling particularly in product format and differentiation (C6) with a peak score of 4.589. Additionally, the product brand effectively communicates specific attributes (C2) with a minimum score of 3.448. Brand Y achieves an average score of 4.451, standing out with a unique identity (C1) and a peak score of 4.773. Furthermore, effective communication of specific attributes (C2) is demonstrated with a minimum of 4.062. Brand Z averages a score of 4.256, similarly excelling in standing out with a unique identity (C1) and scoring a peak of 4.638. Additionally, despite a minimum score of 3.620, Brand Z is perceived to create memorable consumer associations (C14). Notably, Brand Y consistently garners the highest scores across all criteria, boasting an average score of 4.451 and achieving the highest maximum score of 4.773. This highlights a strong preference for Brand Y and underscores its distinct appeal, prompting further exploration into its specific attributes driving superior scores.

3. Table 11 presents a weighting table showcasing AHP scores from 20 experts across 4 occupational groups. The main criteria's weight distribution for product brand image (B1) is 0.5579, interest and uniqueness of the product brand (B2) holds a weight of 0.1219, ability to connect with the target audience (B3) scores 0.0569, and trust and satisfaction with the product brand (B4) is assigned a weight of 0.2633. Regarding the second criteria, the product brand's standout identity (C1) carries the highest weight at 0.2845, while the weight for creating memorable consumer associations (C14) is the lowest at 0.0019.

Subsequently, the assessment scores are used to calculate the score ratios, as depicted in Table 11, for each brand. These ratios are modified with the AHP process, culminating in weighted scores for each criteria, as shown in Table 11. The outcome reveals Brand Y attaining the highest score of 91.34%, followed by Brand X and Brand Z with scores of 82.65% and 87.09% respectively. The Brand Selection Percentage Score is computed from the aggregated Weight AHP. To determine this score, the AHP Score is multiplied by the Ratio Weight Score. The latter is obtained by taking the mean score from a Rating Scales, which is based on feedback from a sample. This Average Score is then transformed into a weight ratio value by dividing it by 5. For illustration, consider Brand X's secondary criterion, C1. Its Weight AHP is determined by the equation: AHP Score × Ratio Weight Score. Using given values, it's computed as 0.2845 × 0.8156 = 0.2321. By aggregating the Weight AHP from C1 through C20, we arrive at a brand selection percentage value of 0.8265, which translates to 82.65%.

4. From the Table 12 presents the assays conducted following the established hypothesis, utilizing the paired sample test

method. The brand selection score for each pair acts as a statistical indicator of the evaluation model's discrimination ability and its capability to select highly significant products. When the calculated P value falls below the threshold of 0.05, it signifies the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_0) This implies that the decision to select all three brands exhibited significant differences at the 0.05 significance level, underscoring the reliability of each brand's selection score.

Table 11 Percentage of selection of all 3 brands from the weighted value of the MoAHP Model

Specification			Brand X			Brand Y			Brand Z		
Main Criteria	Second Criteria	AHP Score	Average Score	Ratio Weight Score	Weight AHP	Average Score	Ratio Weight Score	Weight AHP	Average Score	Ratio Weight Score	Weight AHP
B1	C1	0.2845	4.078	0.8156	0.2321	4.773	0.9546	0.2716	4.638	0.9276	0.2639
0.5779	C2	0.0723	3.448	0.6896	0.0498	4.062	0.8124	0.0587	3.730	0.7460	0.0539
	C3	0.1472	4.559	0.9118	0.1342	4.713	0.9426	0.1387	4.557	0.9114	0.1341
	C4	0.0184	4.301	0.8602	0.0158	4.501	0.9002	0.0165	4.255	0.8510	0.0156
	C5	0.0355	3.862	0.7724	0.0274	4.222	0.8444	0.0300	3.831	0.7662	0.0272
B2	C6	0.0078	4.589	0.9178	0.0071	4.708	0.9416	0.0073	4.637	0.9274	0.0072
0.1219	C7	0.0158	4.294	0.8588	0.0136	4.610	0.9220	0.0146	4.388	0.8776	0.0139
	C8	0.0040	4.554	0.9108	0.0037	4.751	0.9502	0.0038	4.627	0.9254	0.0037
	C9	0.0322	3.579	0.7158	0.0230	4.225	0.8450	0.0272	3.767	0.7534	0.0242
	C10	0.0622	3.819	0.7638	0.0475	4.280	0.8560	0.0532	3.942	0.7884	0.0490
B3	C11	0.0150	3.885	0.7770	0.0117	4.254	0.8508	0.0128	3.957	0.7914	0.0119
0.0569	C12	0.0036	4.506	0.9012	0.0033	4.685	0.9370	0.0034	4.568	0.9136	0.0033
	C13	0.0290	4.567	0.9134	0.0265	4.747	0.9494	0.0275	4.639	0.9278	0.0269
	C14	0.0019	3.557	0.7114	0.0013	4.096	0.8192	0.0015	3.620	0.7240	0.0014
	C15	0.0074	4.258	0.8516	0.0063	4.521	0.9042	0.0067	4.330	0.8660	0.0064
B4	C16	0.0176	4.182	0.8364	0.0147	4.515	0.9030	0.0159	4.278	0.8556	0.0150
0.2633	C17	0.0113	3.835	0.7670	0.0087	4.277	0.8554	0.0097	3.902	0.7804	0.0088
	C18	0.1340	4.561	0.9122	0.1222	4.762	0.9524	0.1276	4.655	0.9310	0.1247
	C19	0.0681	3.565	0.7130	0.0486	4.102	0.8204	0.0559	3.664	0.7328	0.0499
	C20	0.03232	4.494	0.8988	0.0290	4.757	0.9514	0.0307	4.581	0.9162	0.0296
Brand Selection Percentage					82.65%			91.34%			87.09%

Table 12 Testing the established hypothesis using the brand's paired-sample test method

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Brand_X-Y	-.35340	.17810	.03982	-.43675	-.27005	-8.874	19	.000
Brand_X-Z	-.10365	.12805	.02863	-.16358	-.04372	-3.620	19	.002
Brand_Y-Z	.24975	.12979	.02902	.18901	.31049	8.605	19	.000

Conclusion and Discussion

This section rigorously analyzes the research findings in two primary aspects. Firstly, it critically assesses the efficacy of the MoAHP Model in streamlining brand selection processes. Secondly, it delves into the exploration of key tangible factors that wield substantial influence over brand selection within the industry's specific context.

1. Analyzing the effectiveness of MoAHP Model in brand selection

The study's findings align with established brand selection literature, focusing on factors like brand credibility, image, social media, trust, and product features (Anfas, et al., 2021, pp. 356-379; Tlapana, Ntobaki, and Hawkins-Mofokeng, 2023, pp. 1-13; Widayat, Sakinah and Widjaya, 2022, pp. 170-194). These factors correspond with the study's criteria: brand image, audience connection, credibility, satisfaction, and identity (Haro, et al., 2020, pp. 329-336; Sari Dewi, Edyanto, and Siagian, 2020, pp.1-10; Sari and Sylvia, 2020, pp. 362-370), facilitating a comprehensive assessment integrating expert opinions and consumer perceptions. In contrast to prior studies (Goswami, Behera, and Mitra, 2020, pp. 1-18; Muanley, et al., 2022, pp. 173-190), this study employs a MoAHP Model combining AHP, IOC, and Rating Scales, yielding insights from experts and respondents. This versatile approach holds promise for optimizing brand selection in the Kho-Khun beef industry, offering decision-making insights.

Comparing the MoAHP approach with Muanley, et al. (2022, pp. 173-190) utilized AHP and sensitivity analysis to prioritize smartphone selection criteria reveals distinctions. While both aim to enhance brand selection, the MoAHP's hierarchical structure accommodates various factors, creating a comprehensive evaluation framework. The MoAHP's systematic consideration of factors from product image to audience connection aids effective evaluation, unlike smartphone selection criteria lack of a structured hierarchy. The MoAHP's validation, supported by IOC and complemented by expert opinions and demographic data, contributes to the robustness of research a facet not extensively covered in Muanley, et al. (2022, pp. 173-190). By combining expert qualitative evaluations with quantitative survey data, the M-AHP provides more comprehensive brand perspectives, underscoring its relevance in academic research.

In conclusion, the MoAHP Model's outcomes in Kho-Khun beef industry brand

selection showcase AHP's effectiveness by integrating AHP, IOC, and Rating Scales for a comprehensive assessment gathering insights from experts and respondents. This versatile approach, well-founded in literature, has proven successful in various decision-making contexts, spanning product selection, marketing strategy, and network development.

2. Key tangible factors influencing brand selection

This study employs the MoAHP Model, combining AHP, IOC, and Rating Scales, to provide a comprehensive framework for brand selection in the Kho-Khun beef products domain. The robust results encompass expert evaluations and consumer preferences, with IOC consensus affirming the survey's reliability. Detailed demographic profiles enhance understanding of the target audience. Consumer survey outcomes strongly favor Brand Y, aligning with findings in studies like (Goswami, Behera and Mitra, 2020, pp. 1-18; Muanley, et al., 2022, pp. 173-190; Alghamdi, 2022, pp. 3397-3402), employing AHP for consumer preferences. The reinforced preference for Brand Y, validated by AHP-derived scores, resonates with previous AHP applications in various sectors (Liu and Zhang, 2023, pp. 653-663; Şalvarlı, 2023, pp. 29-37).

This study delves into pivotal determinants influencing brand selection in the Kho-Khun beef product industry and their prioritization according to consumer preferences. The literature review highlights numerous factors shaping brand choices, with studies emphasizing brand trust, image, social media, word of mouth, community trust, advertising, e-WOM, service quality, and innovation (Anfas, et al., 2021, pp. 356-379; Angriawan, et al., (2022, pp. 37-44); Giráldez-Cru, Chica and Cordón, 2023, pp. 59-79; Haro, et al., 2020, pp. 329-336; Marbun, Zarlis and Sembiring, 2021, pp. 99-103; Sari Dewi, Edyanto and Siagian, 2020, pp. 1-10; Sari and Sylvia, 2020, pp. 362-370; Savitri, Krisnatuti and Hannan, 2020, pp. 99-110; Tlapana, Ntobaki and Hawkins-Mofokeng, 2023, pp. 1-13; Widayat, Sakinah and Widjaya, 2022, pp. 170-194. Identifying and ranking core factors shaping brand preferences in this industry, the study underscores Brand Y's significance in consumer decision-making. It accentuates factors like distinctive identity, effective communication, and trust cultivation.

This study can be concluded that in the competitive food industry, brand selection profoundly impacts a product's market success. Addressing a research gap, this study introduces the innovative MoAHP Model, merging AHP, IOC, and Rating Scale. Focused on Kho-Khun beef products, it offers a comprehensive framework for industry decision-making.

The study unequivocally demonstrates the effectiveness of the MoAHP Model in enhancing brand selection. By integrating expert insights and consumer preferences, the model offers exceptional versatility and a detailed hierarchy that distinguishes it from methods like smartphone selection. Incorporating these insights into the model significantly amplifies its utility and relevance. Key factors influencing brand preferences within the beef industry emerge, emphasizing brand identity, effective communication, trust, and satisfac-

tion. These findings align with the literature and underscore the potency of the MoAHP Model.

When applied, the MoAHP Model yields distinct scores for the evaluated brands: Brand X at 82.65%, Brand Y at 91.34%, and Brand Z at 87.09%. Of these, Brand Y stands out as the consumer's top choice, indicating its pronounced appeal. The incorporation of statistical evaluations, particularly paired t-tests, strengthens the results, with computed p-values below the 0.05 significance threshold affirming notable variations in brand selection scores. Key drivers of brand preference in the beef industry encompass brand identity, effective communication, trust, and satisfaction. Brand X, although performing commendably with a score of 82.65%, has potential areas for enhancement, especially in light of its competitors. It should pinpoint and capitalize on its unique selling propositions. Brand Y, with its leading score of 91.34%, clearly resonates most effectively with consumers, prompting further exploration into its distinguishing features. Meanwhile, Brand Z, despite its respectable score of 87.09%, falls short when juxtaposed with Brand Y, suggesting areas that may benefit from further scrutiny and improvement.

In conclusion, this study introduces the innovative Modified AHP model for brand selection, merging expert insights, consumer perceptions, and statistical analysis to uncover crucial factors shaping preferences in the beef. The enhanced precision of the MoAHP model, drawing from a broader spectrum of data and insights, equips stakeholders with a robust tool for informed decision-making. The study offers practical guidance for strategic brand selection amid fierce market competition and holds implications for academia and the industry. The model's fusion of AHP, IOC, and Rating Scales enriches its applicability beyond brand selection, paving the way for future research and business strategies.

Bibliography

Alghamdi, S. (2022). Assessing furniture brands in marketing 4.0 for green supply chain management (GSCM) using Multi-Criteria Decision-Making (MCDM). In **the 3rd Asia Pacific International Conference on Industrial Engineering and Operations Management** (pp. 3397-3402). Malaysia: Johor Bahru.

Al Nawaiseh, A. J., Albtoush, A. and Al Nawaiseh, S. J. (2022). Evaluate database management system quality by Analytic Hierarchy Process (AHP) and Simple Additive Weighting (SAW) methodolog. **MENDEL,** 28(2), 67-75.

Anfas, A., Hidayanti, I., Umasugi, M. and Yusuf, I. S. H. (2021). The application of word of mouth in building community trust and university brand image on selection decision for UPBJJ-UT ternate. **Society,** 9(1), 356-379.

Angriawan, S., Dewi Nasien, M. Hasmil Adiya, Roni Sanjaya, Yenny Desnelita and Feri Candra. (2022). The best smartphone brand using the preference selection index method. **International Journal of Electrical, Energy and Power System Engineering,** 5(2), 37-44.

Ersoy, Y. and Tehci, A. (2023). Relationship marketing orientation in healthcare organisations with the AHP. Internal and external customer perspective. **Operations Research and Decisions,** 33(1), 35-45.

Giráldez-Cru, J., Chica, M. and Cordón, O. (2023). An integrative decision-making mechanism for consumers' brand selection using 2-tuple fuzzy linguistic perceptions and decision heuristics. **International Journal of Fuzzy Systems,** 25(1), 59-79.

Goswami, S. S., Behera, D. K. and Mitra, D. S. (2020). A comprehensive study of weighted product model for selecting the best product in our daily life. **Brazilian Journal of Operations & Production Management,** 17(2), 1-18.

Haro, A., Oktaviana, D., Trimulia Dewi, A., Anisa, W. and Suangkupon, A. (2020). The influence of brand image and service quality towards purchase intention and its impact on the purchase decision of Samsung smartphone. In **International Conference on Economics, Business and Economic Education 2019** (pp. 329-336). Semarang: Universitas Negeri Semarang

Hilali, W. E., Manouar, A. E. and Idrissi, M. A. J. (2020). AHP method to support decision making for sustainability. **Computer and Information Science,** 13(4), 32-41.

Hilmi, F. M., Aryanto, R. T. B., Handayani, S. D., Priutama, Y. E., Rahmalia, I., Sofiyah, E. S., Sarwono, A. and Suryawan, I. W. K. (2022). Selection of ammonia and TSS removal in effluent water from Duri Kosambi IPLT using Analytic Hierarchy Process (AHP). **Journal of Archive in Civil Engineering and Planning,** 5(1), 1-7.

Hjelmgren, D. (2016). Creating a compelling brand meaning by orchestrating stories: The case of Scandinavia's largest department store. **Journal of Retailing and Consumer Services,** 32, 210-217.

Hung, C. J. (2018). A study on the correlation among brand image, perceived risk, and purchase intention in food and beverage industry. **Revista de Cercetare si Interventie Sociala,** 61, 122-133.

Ikinci, M. and Tipi, T. (2022). Food supplier selection in the catering industry using the analytic hierarchy process. **Food Science and Technology,** 42, 1-11.

Kumar, D., Shamim, M., Arya, S. K., Siddiqui, M. W., Srivastava, D. and Sindhu, S. (2021). Valorization of by-products from food processing through sustainable green approaches. In R. S. Mor, A. Panghal and V. Kumar (Eds.), **Challenges and Opportunities of Circular Economy in Agri-Food Sector, Environmental Footprints and Eco-design of Products and Processes** (pp. 191-226). Springer: Singapore.

Liu, H. and Zhang, J. (2023). Research on the evaluation of marketing performance influencing factors of high-tech enterprises based on AHP and factor analysis. **Highlights in Business, Economics and Management,** 5, 653-663.

Marbun, N., Zarlis, M. and Sembiring, R. W. (2021). Aplication of The SMARTER method for the selection of the best ambassador brand. **IJISTECH (International Journal of Information System and Technology),** 5(2), 99-103.

Mortezaei, G., Otaghvar, H. A., Vazifehdoost, H., Saeedi, P. and Pegheh, A. (2021). Prioritization of brand equity components using an integrated structural equation modelling and fuzzy AHP. **Tehnički Glasnik,** 15(3), 357-365.

Muanley, Y. Y., Son, A. L., Mada, G. S. and Dethan, N. K. F. (2022). Analisis sensitivitas dalam metode analytic hierarchy process dan pengaruhnya terhadap urutan prioritas pada pemilihan smartphone android. **VARIANSI: Journal of Statistics and Its Application on Teaching and Research,** 4(3), 173-190.

Mundt, P., Cantner, U., Inoue, H., Savin, I. and Vannuccini, S. (2021). Market selection in global value chains. **BERG Working Paper Series,** 170, 1-28.

Ocampo, L., Besabella, O., Fallore, M., Guinandal, A. R., Merabueno, A., Himang, C. M. and Yamagishi, K. (2021). An integrated AHP-TOPSIS for evaluating online marketing strategies for the hospitality industry. **International Journal of Asian Business and Information Management,** 12(3), 1-28.

Pebri, P. and Bakti, S. (2022). The influence of brand trust and religiosity on the mudharabah deposit product selection decision. **Journal of Social Science,** 3(1), 177-182.

Romadhona, R. N. N., Sudapet, I. N. and Subagio, H. D. (2018). Influence of packaging design, promotion and brand image on consumer buying interest (Study case of consumers Glek-Glek Tea Nganjuk). **IJIEEB : International Journal of Integrated Education, Engineering and Business,** 1(2), 68-78.

Şalvarlı, M. S. (2023). Evaluation of sustainable digital agriculture marketing using the AHP method. **Journal of Marketing and Consumer Research,** 89, 29-37.

Sari Dewi, L. G. P., Edyanto, N. and Siagian, H. (2020). The effect of brand ambassador, brand image, and brand awareness on purchase decision of Pantene Shampoo in Surabaya, Indonesia. In **The 1st International Conference on Social Sciences and Humanities (ICSH 2019); SHS Web of Conferences**, 76, 1-10.

Sari, I. T. P. and Sylvia, E. (2020). The effect of brand trust and brand image toward university selection. **Almana: Jurnal Manajemen Dan Bisnis,** 4(3), 362-370.

Savitri, P. D., Krisnatuti, D. and Hannan, S. (2020). The effect of innovation and marketing mix toward brand image and usage decision in online food delivery services industry. **Asia Pacific Management and Business Application,** 9(2), 99-110.

Şekerci, A. Z. and Aydin, N. (2022). A stochastic model for facility locations using the priority of fuzzy AHP. **Sigma Journal of Engineering and Natural Sciences-Sigma Mühendislik ve Fen Bilimleri Dergisi,** 40(3), 649-662.

Takeyasu†, K. and Higuchi, Y. (2013). An analysis of brand selection. **International Journal of Advanced Computer Science and Applications,** 4(8), 182-188.

Tlapana, T. P., Ntobaki, P. P. and Hawkins-Mofokeng, R. H. (2023). The impact of social media marketing on consumer brand selection: A case of Durban customers. **CBR - Consumer Behavior Review,** 7(1), 1-13.

The Bureau of Registration Administration. (2023). **Official statistics registration systems.** Retrieved May 15, 2023, from https://stat.bora.dopa.go.th/stat/statnew/statMONTH/statmonth/#/displayData

Uakarn, C., Chaokromthong, K. and Sintao, N. (2021). Sample size estimation using Yamane and Cochran and Krejcie and Morgan and green formulas and Cohen statistical power analysis by G* Power and comparisions. **Apheit International Journal,** 10(2), 76-86.

Widayat, Sakinah, N. and Widjaya, R. (2022). The relationship modelling of advertising, electronic word of mouth and brand awareness on fashion product purchasing decision. **JBMP (Jurnal Bisnis, Manajemen Dan Perbankan),** 8(2), 170-194.