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USABILITY WEBSITE EVALUATION FOR FRESH FOOD PRODUCT IN SME's ONLINE BUSINESS WITH FUZZY AHP-TOPSIS INTEGRATION

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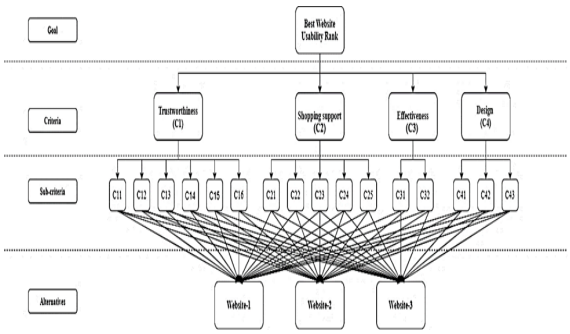
Graphical abstract



Abstract

Service providers are increasingly competing to give the highest quality services to satisfy website users with the increased competition. Therefore, small and medium-sized businesses (SMEs) should use technology in their product sales processes to become more competitive in the global market. This article will evaluate fresh food product e-commerce websites to see which one performs better in terms of usability. These parameters are investigated based on numerous research findings and the website attributes. To compare the outcomes, the evaluation was carried out using two alternative methods: fuzzy AHP and fuzzy TOPSIS. Fuzzy AHP results and analysis were used to determine the weights of the main and sub-factors, while Fuzzy TOPSIS was used to determine the ranking of alternatives. A Triangular Fuzzy Number (TFN) deals with poor assessments in biased judgments. The result from this study shows that the best website usability is website-1 because it closely follows crucial factors compared to the other two websites. The Website-3 comes in second, followed by the Website-2. Website-1 had the highest relative closeness score (0.5333), indicating that Website-1 has the best usability level among the three websites examined in this study. With a relative closeness of 0.5143, Website-3 came in second. Website-2 received the lowest score (0.5012), indicating that it has the least application of the critical success characteristics required for a fresh food product e-commerce website with the best usability level.

Keywords: Usability, Fuzzy AHP, TOPSIS, MCDM, E-commerce

1.0 INTRODUCTION

Many parties have been interested in measuring usability and user satisfaction on websites throughout the last few decades. The usability of any software, including websites, is a crucial quality metric to consider when evaluating it [1]. In addition, usability is a reliable criterion for assessing client trust in service providers. According to Nielsen, et al. [2], websites with a high level of usability have a greater chance of being visited by Internet users because their routines or behavior demand that information is obtained promptly and in a predictable manner. According to Lien, et al. [3] research, there is a link between usability and customer trust. Presently, service providers are racing to deliver the highest quality services to satisfy website users. However, no consensus exists on how to effectively operationalize and evaluate website usability at this time [4].

Multi-criteria decision making (MCDM) is the process of determining acceptable actions, choices, strategies, or policies from various options in a risky and unpredictable environment [1, 5]. MCDM is now frequently used in evaluating websites, both in terms of quality and As a result, gauging website usability might be considered an issue of Multi-Criteria Decision Making (MCDM). Creating an indicator system to assess each criterion's relative importance is critical in some cases. This needs to be developed because this research collects user input through questionnaires. Because this method relies on humans,

everyone has a different point of view, and there is always inherent uncertainty. The AHP and TOPSIS methods are unsuitable for this study because previous studies gave biased results. Therefore, the fuzzy method is widely used to measure usability and determine website rankings [6].

Similar studies have been conducted several times in various types of e-commerce. For example, in research Alptekin, et al. [7], [8], the types of products sold on the website are durable products that do not require special handling in the distribution process. However, in this study, the type of website being studied is currently a fresh food product e-commerce. If mishandled in the shipping process, the type of product sold will be vulnerable to damage because the product is classified as a short product life cycle. Customers have made various complaints via social media, such as website usability factors and the failures of updated payments. Moreover, other complaints include the interconnection between payments and website page and order schedule delivery. So based on the literature review and related problems, the results of this study are expected to be taken into consideration by companies to improve the usability of their websites to increase customer trust, increase the number of site visits, and increase buyer interest. This study is also expected to make it easier for prospective buyers to choose which site makes buying and shipping fresh food items more accessible. In this study, objective and subjective approaches were integrated. The objective and subjective methods were combined to determine the weights using Fuzzy AHP and TOPSIS.

2.0 METHODOLOGY

Previous research related to usability was carried out on various types of websites, such as educational websites, E-government, finance, ecological parks, hotels, and e-commerce [1, 9-11]. Similar research to the research conducted at this time is research in e-commerce because the business processes on the website being studied are buying and selling electronically or online. For example, Masudin and Saputro (2016) study was conducted on B2C websites using the Fuzzy AHP-TOPSIS method, where the websites used as research objects were Amazon.com and hepsiburada.com. Both websites provide various products ranging from books to electronic goods, household needs, games, and gadgets. Meanwhile, in the research conducted by Alptekin, et al. [7] that evaluates usability using the Fuzzy TOPSIS method, five websites are used as research objects, namely kitapyudu.co pandora.com, detayyayin.com, ideflix.com, and dr.com. Of the five websites, three are e-commerce that trades CDs and books.

The research carried out this time also examines the evaluation of website usability on online shopping sites. However, the type of website being studied is Fresh food product E-commerce, which refers to direct sales of fresh products, including vegetables, fruits, meat, poultry, and eggs. If mishandled in the shipping process, the type of product sold will be vulnerable to damage because the product is classified as a short product life cycle.

This study identifies and evaluates usability factors on fresh food product e-commerce websites. This criterion is very important and is considered a supporting mechanism to evaluate the website with the best usability factor. In this study, the literature review was analyzed in detail to determine the most appropriate factors for a fresh food product e-commerce website. So, in this study, four criteria and 16 sub-criteria were identified through a series of literature reviews and issues submitted by customers through social media. Usability factor assessment criteria in this study consisted of Security (C1), Shopping Support (C2), Efficiency (C3), and Design (C4). Table 1 presents the criteria and sub-criteria.

Table 1 Usability factor, subfactor, and their description

Criteria	Sub-Criteria	Description	Category
Trustworthiness (C1)	Security & privacy (C11)	Protect customers ' personal information and financial information.	Benefit
	Confirmation (C12)	Confirm order success.	Benefit
	Payment (C13)	Secure payment process.	Benefit
	Trust (C14)	Trust in the clarity of fresh food products.	Benefit
	Insurance (C15)	Guarantee to cover losses that may be incurred during the delivery process of fresh food products.	Benefit
	Tracking (C16)	Easy tracking of ordered products.	Benefit
Shopping support (C2)	Feedback (C21)	Provide feedback to customers regarding orders.	Benefit
	Ease of accessing shopping links to checkout (C22)	Easy shopping process to order checkout.	Benefit
	Contact (C23)	Easy to find contact customer service on the website.	Benefit
	Help and Support (C24)	The Help and Support	Benefit

		button on the web works well, and immediately provides feedback regarding problems that occur during the shopping process on the Fresh E-commarce web.	
	Transaction convenience (C25)	Payment methods can be done easily using several methods.	Benefit
Effectiveness (C3)	Ease of use (C31)	The website takes some time to load.	Benefit
	Easy to navigate (C32)	Easy to find navigation buttons such as the total product ordered button on the site.	Benefit
Design (C4)	Home Page (C41)	The website's general color scheme is pleasing.	Benefit
	Layout Web (C42)	Website features that are well-organized.	Benefit
	Product information (C43)	Prices, product descriptions, and fresh food storage guidelines are all clearly mentioned.	Benefit

Many decision-making problems are just too complex to be solved numerically. Due to its ability to cope with the multidimensionality of decision-making difficulties, MCDM proves to be the ideal solution in these situations[12, 13]. MCDM methods are combined with fuzzy set theory to reduce ambiguity and greyness in input. This research incorporates Fuzzy AHP and Fuzzy TOPSIS to rank e-commerce websites. First, fuzzy AHP and Fuzzy TOPSIS are defined and then introduced and presented in the proposed Fuzzy AHP and Fuzzy TOPSIS methodologies.

2.1 Fuzzy AHP Method

The development of the AHP theory combined with fuzzy theory was carried out by Van Laarhoven and Pedrycz [14] in his journal, namely the Fuzzy Development of the Saaty Scale Priority Theory. Here is the algorithm for the Fuzzy AHP method.

1. Generalize the problem by defining all major problems associated with the objectives and identifying criteria (i = 1,2,., n), sub-criteria (l = 1,2,., L), and alternatives (m = 1,2,., M).To control decision-makers (k = 1,2,... K)
2. Creating problems in a hierarchical arrangement.
3. Create a pairwise comparison matrix between criteria and sub-criteria using a scale of 1 to 9, such as the level of importance of Saaty [15].
4. Perform a consistency test on each pairwise comparison matrix. The Eigen max (λmax) was used to evaluate the effectiveness of the measurement. V represents the n-dimensional column vector, which indexes the number of weight values for the criterion importance scale symbolized by W, which the formula can determine

$$V = [vi]nx = AW^{T}\begin{bmatrix} 1 & \alpha_{12} & \cdots & \alpha_{1n} \\ \alpha_{21} & 1 & \cdots & \alpha_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ \alpha_{n1} & \alpha_{n2} & \cdots & 1 \end{bmatrix}[w1 \quad w2 \quad \cdots \quad w_n] = \begin{bmatrix} v_1 \\ v_2 \\ v_n \end{bmatrix} \quad (1)$$

i = 1,2,...,n

The geometric mean is calculated for each row of the matrix using the formula:

$$Wi = \sqrt[n]{ai1 \text{ x } ai2 \text{ x } ai3 \text{ x}, \ldots \text{ aij}} \quad (2)$$

Then (λmax) can be calculated by the formula:

$$\lambda max = \frac{\sum_{i}^{n} = 1 \frac{vi}{wi}}{n} ; i = 1,2, \ldots, n \quad (3)$$

Paired comparison matrices are checked for consistency by the consistency index (CI), and the consistency ratio (CR) can be estimated by the formula:

$$CI = \frac{\lambda max - n}{n-1} \quad (4)$$

$$CR = \frac{CI}{CR} \leq 0,1 \quad (5)$$

If CI = 0, then A is consistent. If $\frac{CI}{CR} \leq 0,1$, then A is declared consistent. If $\frac{CI}{CR} > 0,1$, then it is not consistent.

The random RIn index is the mean value of the CI chosen at random on A and given as:

N	2	3	4	5	6	7	8	9
RI_n	0	0,58	0,9	1,12	1,24	1,32	1,41	1,45

5. Converting the pairwise comparison matrix to a Triangular Fuzzy Number (TFN) using the Saaty scale as follows:

Table 2 Fuzzy Scale using TFN

Fuzzy Number	Triangular Fuzzy Number	Reciprocal fuzzy number
1	(1,1,1)	(1,1,1)
2	(1,2,3)	(1/3,1/2,1)
3	(1,3,5)	(1/5,1/3,1)
4	(2,4,6)	(1/6,1/4,1/2)
5	(3,5,7)	(1/7,1/5,1/3)
6	(4,6,8)	(1/8,1/6,1/4)
7	(5,7,9)	(1/9,1/7,1/5)
8	(6,8,9)	(1/9,1/8,1/6)
9	(7,9,9)	(1/9,1/9,1/7)

Table 2 show fuzzy scale using TFN. Make a geometric mean from a fuzzy comparison matrix (FCM), like the following equation:

$$\tilde{r}_i = \left[\prod_{j=1}^{n} \tilde{d}ij\right]^{1/n} \quad (6)$$

Where $\tilde{r}_i$ is still in the form of a triangular fuzzy number or with the Saaty equation.
The following is a formula for calculating the geometric mean.
6. Using Buckley [16] geometric mean approach, combining synthetic fuzzy elements into a pairwise comparison matrix for the criterion (aij) examined by the n-decision maker.

$$\tilde{w}i = \sqrt[n]{ai1\ x\ ai2\ x\ ai3\ x\ \ldots.\ aij} \quad (7)$$

Where $\tilde{w}i$ is already in the form of a triangular fuzzy number
7. Calculate the synthetic fuzzy value with the formula:

$$Si = \sum_{j}^{m} m_{gi}^{i} \left[\sum_{i}^{n} = 1 \sum_{j}^{m} = 1 m_{gi}^{j}\right]^{-1} \quad (8)$$

8. Calculate the global fuzzy weight for each sub-criteria with the formula

$$\tilde{w}_{Global} = \tilde{w}_{Criteria} \otimes \tilde{w}_{Sub\ Criteria}$$

2.2 Fuzzy Topsis Method

Fuzzy TOPSIS is a development of TOPSIS. Yoon and Hwang (1995) first introduced the fuzzy method in their book, which discusses Fuzzy Multi-Attribute Decision-Making (F-MADM). The following is an algorithm based on the Fuzzy TOPSIS method [17].

1. Creating viable options, deciding on evaluation criteria, and forming a decision-making panel. For example, assume there are m options, n criteria for evaluating them, and k decision-makers.
2. Select the linguistic variable for the weight of the importance of the criteria wj = (lij, mij, uij) and the linguistic rating for the alternative to the criteria (xij) as TFN. Table 3 show linguistic variable that used in this study:

Table 3 Linguistic variable

Linguistic Variable	Triangular Fuzzy Number
Verry Poor (VP)	(1, 1, 1)
Poor (P)	(1, 3, 5)
Fair (F)	(3, 5, 7)
Good (G)	(5, 7, 9)
Verry Good (VG)	(7, 9, 9)

3. Combining the weights of the criteria to obtain the fuzzy wj criteria weights from the cj criteria and the fuzzy xij assessment aggregates from the alternative Ai under the expert-owned Cj criteria

$$\tilde{x}_{ij} = \frac{i}{k}\left[x_{ij}^{1} + x_{ij}^{2} + \cdots + x_{ij}^{k}\right] \quad (9)$$

4. Create a fuzzy decision matrix.

$$\tilde{D} = \begin{array}{c} \\ A_1 \\ A_2 \\ \vdots \\ A_m \end{array} \begin{array}{c} \begin{array}{cccc} C_1 & C_2 & \cdots & C_n \end{array} \\ \begin{bmatrix} \tilde{x}_{11} & \tilde{x}_{12} & \cdots & \tilde{x}_{1n} \\ \tilde{x}_{21} & \tilde{x}_{22} & \cdots & \tilde{x}_{2n} \\ \vdots & \vdots & \vdots & \vdots \\ \tilde{x}_{m1} & \tilde{x}_{m2} & \cdots & \tilde{x}_{mn} \end{bmatrix} \end{array}; \tilde{w} = [\tilde{w}_1, \tilde{w}_2, \ldots, \tilde{w}_n] \quad (10)$$

i = 1,2,...,m ; j = 1,2,...,n

5. The fuzzy decision matrix should be normalized. R stands for normalization.

$$R = \left[\tilde{r}_{ij}\right]_{m\ x\ n} \quad (11)$$

The formula above can be calculated as follows:

$$\tilde{r}_{ij} = \left(\frac{l_{ij}}{u_j}, \frac{m_{ij}}{u_j}, \frac{u_{ij}}{u_j}\right) \quad (12)$$

Where $U_j = Max\ u_{ij}$
6. Construct the weighted, normalized fuzzy decision matrix. In order to account for the different importance of each criterion, we can construct the weighted normalized as a fuzzy decision matrix.

$$\tilde{V} = [v_{ij}]_{m\ x\ n} \text{ i = 1,2,3,...m ; j = 1,2,3...n} \quad (13)$$

Where :

$$\tilde{V}_{ij} = \tilde{r}_i \otimes \tilde{w}_j \quad (14)$$

$\tilde{w}_j$ is the global sub-criterion weight obtained from fuzzy AHP
7. The fuzzy positive ideal solution (FPIS) S^+ and the fuzzy negative ideal solution (FNIS) S^- should be calculated as follows:

$$A^+ = (\tilde{v}_{1^+}\ ,\ \tilde{v}_{2^+}\ ,\ \tilde{v}_{3^+}\ , \ldots \tilde{v}_{n^+}) \quad (15)$$

$$A^- = (\tilde{v}_{1^-}\ ,\ \tilde{v}_{2^-}\ ,\ \tilde{v}_{3^-}\ , \ldots \tilde{v}_{n^-}) \quad (16)$$

8. The distance between the fuzzy positive ideal solution (FPIS) d^+ and the fuzzy negative ideal solution(FNIS) d^-. The distance between two triangular fuzzy integers A1 (l_1, m_1, u_1) and A2 (l_2, m_2, u_2) is determined using the vertex approach as follows:

$$d(A_1, A_2) = \sqrt{\frac{1}{3}[(l_1 - l_2)^2 + (m_1 - m_2)^2 + (l_1 - l_2)^2]} \quad (17)$$

$$d_i^+ = \sum_j^n = 1\, d\,(\tilde{V}_{ij}, \tilde{v}_{j+})\,; \text{ i =1,2,3...,m} \quad (18)$$

$$d_i^- = \sum_j^n = 1\, d\,(\tilde{V}_{ij}, \tilde{v}_{j-})\,; \text{ i =1,2,3...,m} \quad (19)$$

9. Calculate the closeness coefficient (CCi) and rank the options by it. After collecting the distances d+ and d-, we use the formula below to compute the closeness coefficient of each alternative:

$$cc_i = \frac{d_i^-}{d_i^- + d_i^+}\,; \text{ i =1,2,3...,m} \quad (20)$$

We establish the ranking order of all alternatives from the highest to the lowest proximity coefficient based on each alternative's closeness coefficient value.

This research uses Fuzzy AHP and TOPSIS to evaluate the usability of fresh food product e-commerce websites from three online stores. The criteria and sub-criteria were chosen based on previous research, and the selected respondents were then requested to respond in pairs. The pairwise data matrix is then fed into AHP and fuzzy TOPSIS to determine the best fresh food product e-commerce website based on the criteria that have been chosen.

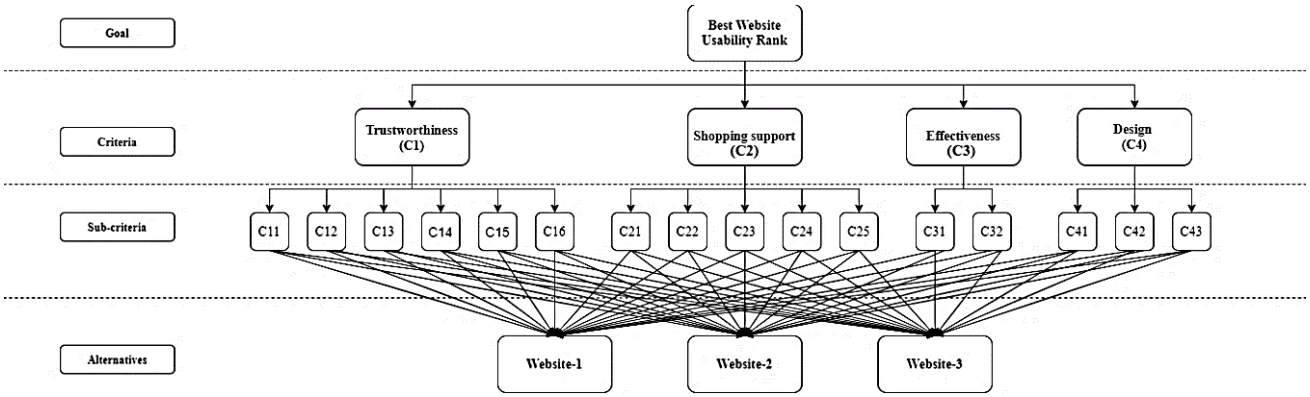


Figure 1 The hierarchical structure of the decision problem.

3.0 RESULTS AND DISCUSSION

The fuzzy AHP and TOPSIS methodologies are described in this paper in the context of a real-world scenario. This integrated decision framework lays forth a practical and comprehensive approach for businesses to evaluate and prioritize e-commerce website factors in creating websites. The following subsections show the results of the case study analysis.

3.1 Case Analysis

This case study is based on the Indonesian Freshfood product e-commerce website, which sells various fresh products to customers. These businesses use their websites to promote new food products and increase their market. Therefore, it is critical to understand how usability characteristics affect consumer convenience to compete successfully in the electronic market during the shopping process. This study uses the Fuzzy AHP and TOPSIS techniques to evaluate a practicable website in connection to the usability element of the proposed fresh food product e-commerce website. The information or names of the website are not exposed, and we define them as Website-1, Website-2, and website-3.

2.3 Fuzzy AHP Result

This study's findings are separated into two sections. The results and analysis of Fuzzy AHP, which is used to assign the weights of main factors and sub-factors, are presented in the first part. The ranking of alternatives computed using fuzzy TOPSIS is shown in the second half. Criteria and sub-criteria were rated by 100 decision-makers using linguistic values that were transformed into crisp values. Fuzzy AHP first turned the problem into a hierarchical structure, as seen in Figure 1.

2.4 Criteria Weight

Fuzzy AHP calculates the weight of the critical factors after putting the problem into a hierarchical structure (trustworthiness, shopping support, effectiveness, and design). The weights of the principal factors are obtained by solving the pairwise matrix. For example, with a weight of 1, the Shopping Support criteria are recognized as the most significant success factor in building a fresh food product e-commerce website, followed by trustworthiness, effectiveness, and design aspects, all with a weight of 0.

3.2 Weights of sub-Criteria

Following the computation of the major factor's weights, the Fuzzy AHP calculated the weights of subfactors concerning the main factor using similar processes to those used to compute the main factor's weights. A total of four pairwise matrices were constructed (one for each main criteria). We derive the sub-criteria weights concerning their respective main factor by solving these matrices.

The weights of subfactors concerning the trustworthiness criterion are presented in this section. Payment (C13) received the highest weight of 1 under this criterion, followed by

security privacy (C11), confirmation (C12), trust (C14), insurance (C15), and tracking (C16) all of which obtained the same weight of 0. The sub-criteria weights with respect to the Shopping Support criterion. It shows that the contact (C23) subcriterion obtained the highest weight of 0.455, followed respectively by the ease of accessing shopping to link checkout (C22) 0.421, help and support (C24) 0.081, Feedback (C21) 0.043, and Transaction convenience (C25) received the lowest weight of 0. Based on the weighting of the sub-factors for the effectiveness criteria, ease of use (C31) for 1 weight is the highest weight under the effectiveness criteria. Meanwhile, those that are easy to navigate (C32) have the lowest weight of 0. For the weighted average of the sub-criteria under the Design Criteria, the Home Page (C41) has the highest weight of 1. followed by web layout (C42) and product information (C43), each receiving a weight of 0.

3.3 Final Ranking of Overall Factors

After obtaining the main criteria and subcriteria weights, we eventually computed the final weights of subcriteria for the alternative rank in fuzzy TOPSIS. By multiplying the initial weights of subfactors with the weights of their corresponding primary criterion, the final weights of subcriteria were computed. The final weights of subfactors, as well as their overall order, are listed in Table 4. Among the 16 subfactors, Shopping Support (C2) was ranked as the most important.

Table 4 Final Weights of Overall Usability Factor

Criteria	Criteria Weight	Sub-Criteria	Sub-Criteria Initial Weight	Sub-Criteria Final Weight
Trustworthiness (C1)	0	Security & privacy (C11)	0	0
		Confirmation (C12)	0	0
		Payment (C13)	1	0
		Trust (C14)	0	0
		Insurance (C15)	0	0
		Tracking (C16)	0	0
Shopping support (C2)	1	Feedback (C21)	0.043	0.043
		Ease of accessing shopping links to checkout (C22)	0.421	0.421
		Contact (C23)	0.455	0,455
		Help and Support (C24)	0.081	0.081
		Transaction convenience (C25)	0	0
Effectiveness (C3)	0	Ease of use (C31)	1	0
		Easy to navigate (C32)	0	0
Design (C4)	0	Home Page (C41)	1	0
		Layout Web (C42)	0	0
		Product information (C43)	0	0

Fuzzy TOPSIS Result

Three fresh food e-commerce websites were ranked using the integrated Fuzzy TOPSIS technique, including four primary criteria and 16 sub-criteria. Experts were asked to rank alternatives based on the sub-criteria during this step. A choice matrix was created to compile the experts' feedback, then normalized. The relative closeness of each option is calculated after the Fuzzy TOPSIS calculation step, and the alternatives are sorted according to their relative closeness value. Table 5 shows the relative closeness of websites and their final rankings. As can be seen, Website-1 had the highest relative closeness score (0.5333), indicating that Website-1 has the best usability level among the three websites examined in this study. With a relative closeness of 0.5143, Website-3 came in second. Website-2 received the lowest score (0.5012), indicating that it has the least application of the critical success characteristics required for a fresh food product e-commerce website with the best usability level.

Tabel 5 The relative closeness and a final ranking fresh food product websites

Website	d+	d-	CCi	Rank
Website-1	0.410	0.469	0.5333	1
Website-2	0.453	0.455	0.5012	3
Website-3	0.437	0.462	0.5143	2

Three websites for Indonesian fresh food products e-commerce websites were chosen for case analysis in this study. The proposed website usability criteria and sub-criteria are used to evaluate each website. This choice problem was determined using an integrated decision process that included Fuzzy AHP and TOPSIS. According to fuzzy AHP results, shopping support, followed by trustworthiness, effectiveness, and design, is an essential parameter in the usability of a fresh food product e-commerce website. According to the Fuzzy TOPSIS study, Website-1 is the best website usability because it closely follows crucial factors compared to the other two websites. The Website-3 comes in second, followed by the Website-2.

This is the first study to establish and evaluate usability elements for e-commerce fresh food product criteria and sub-criteria. Various studies in the literature evaluate websites by determining the usability aspect of e-commerce. However, the products sold in these studies are not the same as those in this study. The writers share past research and their research findings in the literature review section. In addition, the authors present a different form of the website in this study, namely a fresh food items e-commerce website, where the types of products provided include foods that are easily destroyed or have a short lifespan. Alptekin, et al. [7], [8] research has evaluated the usability performance of e-commerce websites using the MCDM method, with the types of

products sold having a longer lifespan. In this study, we found that there are no researchers who use the type of fresh food product e-commerce when assessing the usability factors of e-commerce websites, especially in Indonesia.

The payment sub-criteria under the trustworthiness criterion had the most weight in this study. Hence payment security is the most important criterion for consumers when choosing a website. Consumer confidence in the website's transaction procedure is enhanced by payment security. According to Mukherjee and Nath (2003), the declaration of payment security on the website is an important aspect that impacts consumer confidence in online activities. It is feasible to impact consumers' views of security and trust in the e-payment process by informing and comforting them about the security of their payment options [18].

The contact sub-criteria under the shopping support criteria have the greatest weight. This is because it can be found that the ease of finding customer service is significant. It is believed that if the customer service contact is easy to find, it can solve their customer service problems or help them find information about products and services related to related businesses. This is in accordance with the research by Chandramowleeswaran and Uma [19] that the ease of access to communicate with customers affects customer satisfaction in business processes.

Under the effectiveness criteria, the ease of use sub-criteria has the most weight. Therefore, it can be claimed that the ease of use sub-criteria is the essential element that website users consider. The ease of use has a significant impact on its reputation. This is in line with Pavlou [20] study, which suggests that trust has a favorable impact on perceived utility and ease of use. The transaction cost theory provides the foundation for the impact of trust on perceived ease of use. The lower the customer's effort in scrutinizing the website's details to determine the merchant's benevolence, the higher the customer's faith in the website. Because customers trust the online merchant's good intentions, they would not waste time and cognitive effort reading the privacy policy, the terms of service, and the terms of sale on a trusted site, resulting in greater ease of use.

The homepage sub-criteria under the design criteria had the most weight in this study, with the homepage appearance being the primary priority of fresh food product website customers. The homepage of the website, in general, is viewed as a portal via which the user can access specific sorts of content. The design of a website's homepage is crucial since it impacts how quickly content can be found. A user-friendly homepage usually offers information that is easy to find and understand for website visitors. Many specialists in human-computer interaction have highlighted their opinions on how to interface design influences user experience. For example, the memory of recently read content is thought to indicate how thoroughly information has been absorbed [21]. Some experts argue that consumers can remember content better when the interface design is more straightforward and requires less effort to operate than people engaged with more complicated designs [22].

This case study for Indonesia validates the suggested Fuzzy AHP and Fuzzy TOPSIS techniques. The determined fresh food product e-commerce websites were assessed in a fuzzy environment, making it difficult to pinpoint the issue due to many doubts and ambiguity. As a result, the Fuzzy AHP method was used to analyze e-commerce criteria and sub-criteria. The Fuzzy TOPSIS approach was used to assess the usability factor of fresh food product e-commerce websites based on the criteria, and sub-criteria found. This study could aid businesses in improving the usability of their websites to increase client trust, site visits, and purchasing interest. This study is also intended to make it easier for potential buyers to decide.

3.4 Managerial Implication

Our proposition has direct managerial implications. First, this research clearly describes the problem from the end user's point of view regarding website usability, which should be fixed on the lowest-performing website. Second, these factors can mostly be controlled by managers, so they can be implemented to increase the market orientation of their organizations. This is in line with the Flavián, et al. [23], [24] study, which found that the level of usability can boost trust in a site, which can lead to increased consumer satisfaction and loyalty, as well as increased website sales. The study also emphasizes the need to include end users and do usability testing when evaluating a website's performance for fresh food products. Overall, our research provides managers' views on improving website usability factors based on criteria and sub-criteria assessed directly by end-users.

Furthermore, the Internet infrastructure is seen as a critical component in the success of electronic transactions. Several studies in developing nations have found that infrastructure quality significantly impacts electronic transaction implementation [25-27]. As a result, the government must focus on infrastructure and improve the quality of electronic services, such as expanding the internet network to expand electronic services and consumer adoption of e-commerce. This is similar to Al-Ghaith, et al. [28] research, which included a survey on electronic online adoption and a detailed examination of their services.

Technology trust is an asset that every organization should focus on, especially when introducing innovations. It also has to be assessed and managed daily, as it is difficult to regain once it has been lost [29]. The economy's digital era has shifted technical trust into one of the most crucial drivers of technology adoption. Technology trust defines and employs a concept of technological trust to fit the demands of those studies; consequently, no one definition of technological trust has been agreed upon among scientists since no single picture or understanding can be challenged[30].

Shoppers have demanded more personalized information delivery services, such as intelligent shopping agents, to obtain information about products. In addition, Shoppers trust websites that give complete contact information. Similar notions such as the availability of a product image, an order checking facility, an online payment option, product photos, and a return policy may affect buyers' decision to buy online[31].

The term "usability" refers to "the extent to which specified users can use a product to achieve stated goals with effectiveness, efficiency, and satisfaction in a given context of usage" (ISO 9241–11 1998). The authors found that usability testing can inform purchase decisions and future design improvements. Ease of use may also be defined as a customer's perspective of a product, especially whether it is simple to learn and use and minimizes the burden of memory while increasing satisfaction. Some studies found the following

aspect of website usability: the ease of use of a website, the clarity of functionality, and simplicity of navigation [32].

Information visualization is a method of displaying some type of gathered data. The main goal is to improve human cognition and perception so that data may be analyzed and reasoned about more efficiently and effectively. However, when displaying product data to customers on e-commerce platforms, the visualization idea is less often used. As a result, customers have a tough time shortlisting and comparing multi-attribute items before final selection. As a result of our research, we presented a new visualization-based interface for e-commerce websites that makes it simpler for users to identify and compare multi-attribute products/services, making product purchase decision-making more time-efficient and effective.

4.0 CONCLUSION

The decision-making issue in a fuzzy environment for evaluating the usability of the fresh food product e-commerce website, in particular, can be finished. The last option for consideration was observed by utilizing fuzzy AHP and fuzzy TOPSIS. Fuzzy AHP uses a fuzzy pairwise comparison matrix to handle evaluation criteria and sub-criteria. The Hierarchical Fuzzy TOPSIS is a useful tool for evaluating hierarchical decision-making problems. Fuzzy triangular numbers can communicate ambiguous conclusions. Different assessments and priorities were created from the merging of fuzzy AHP and fuzzy TOPSIS. The result from this study shows that the best website usability is website-1 because it closely follows crucial factors compared to the other two websites. The Website-3 comes in second, followed by the Website-2. Based on the results of calculations using fuzzy AHP, the priority criteria for websites with the best level of usability are in the Shopping Support aspect with a weight of 1, for the aspects of trust, efficiency and design have the same weight of 0. For the trust criteria, the Payment sub-criteria (C13) has the highest weight is 1. In the shopping support criteria, the contact sub-criteria (C23) has the highest weight, which is 0.455. Whereas in the Efficiency criterion, the Ease of use sub-criteria (C31) has the highest weight of 1. Whereas in the design criteria, the Home Page sucriteria (C41) has the highest weight, which is equal to 1. Website usability performance based on fuzzy TOPSIS calculations, namely website 1 with a proximity coefficient value of 1, website 3 with an attachment coefficient value of 0.4969, website 2 with a proximity coefficient of 0.5004. Websites that have the greatest closeness coefficient value is a website that has the best usability performance is owned by website 1 of 0.5011.

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