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Selection of the Best Marketplace Using the Weighted Product Method (Case Study in Jabodetabek Area)

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Abstract: The rapid growth of internet users has a major impact, especially in providing opportunities for producers and consumers to conduct business transactions online. During the Covid-19 pandemic, the marketplace can be said to be one of the businesses that has not experienced a decline like other conventional businesses. How to choose a marketplace that sells products at the cheapest price, product quality and the best online customer reviews is an interesting study to research. Research conducted on 5 marketplaces. The analytical tool used in this study uses the Weighted Product (WP) method. Tokopedia is the best marketplace that consumers can choose to shop. The marketplace with the cheapest price is owned by Blibli.com and the best online customer review is owned by Lazada.

Keywords: Marketplace, Weighted Product, WP, Online Shopping, Covid-19

INTRODUCTION

Information technology is a tool for humans in managing, packaging, and storing information. This information technology is expected to facilitate every human work. Currently, the advancement of information technology is growing rapidly so that it brings many changes in human life, especially in the field of communication, to be very broad and unlimited. The advancement and development of information technology occurs because of the internet (interconnection-networking).

The rapid growth of internet users has a major impact, especially in providing opportunities for producers and consumers to conduct business transactions online. During the Covid-19 pandemic like today, the marketplace can be said to be one of the businesses that has not decreased like other conventional businesses because consumers tend to choose to purchase various basic needs and supporting needs through the marketplace.

Based on data presented by katadata.ac.id the highest number of visitors for e-commerce sites in Indonesia in the second quarter of 2022 was Tokopedia with a total monthly visitor of 158.3 million. In second place is occupied by Shopee with a total of 131.3 million monthly average visitors during the second quarter, then in third position occupied by Lazada with a total of 26.6 million, followed by Bukalapak with 21.3 million, and Blibli occupies fifth position with a total monthly visit of 19.7 million visitors (katadata.ac.id, 2022).

The Decision Support System (DSS) can be an alternative in determining the selection of the best marketplace. Decision Support System (DSS) is part of computer-based information systems including knowledge-based systems used to support decision making in an organization or company. DSS consists of several methods, including the Analytic Hierarchy Process (AHP), Analytic Network Process (ANP), Weighted Product (WP), and Simple Additive Weighting (SAW) methods.

The AHP method is a method whose main input is human perception. Analytical Hierarcy Process (AHP) can simplify complex and unstructured, strategic and dynamic problems into parts, and turn variables into a hierarchy. The analytical hierarcy process (AHP) method has the ability to solve multi-objective problems based on a comparison of the preferences of each element and hierarchy. The Analytic Network Process (ANP) method is a development of the Analytical Hierarchy Process (AHP) method. The ANP method is able to improve the weaknesses of AHP in the form of the ability to accommodate linkages between criteria or alternatives. There are two types of linkages in the ANP method, namely linkages within a set of elements (inner dependence) and relationships between different elements (outer dependence). The existence of this relationship causes the ANP method to be more complex than the AHP method.

In addition to the AHP and ANP methods, other methods in the Decision Support System (DSS) are Simple Additive Weighting (SAW) and Weighted Product (WP). The SAW method is known as the weighted addition method. The basic concept of the SAW method is to find the weighted sum of performance ratings on each alternative on all attributes. The Weighted Product (WP) method is a multi-criteria decision-making method used to solve cases that have data with many attributes. The WP method uses multiplication to relate attribute ratings, where the rating of each attribute must first be raised to the weight of the attribute in question. This Weighted Product (WP) method has advantages compared to other SPK methods in the multiplication process to link attribute ratings that have been ranked, so that the resulting preference value to be ranked more precisely and accurately. In addition, WP is a method that is easy to calculate so it takes a relatively short time to perform computations.

From the description above, choosing the best marketplace is an interesting topic to study using the Weighted Product (WP) method.

LITERATURE REVIEW

Decision Support System (DSS)

Decision Support System (DSS) is an interactive information system that provides information, modeling and data manipulation. This system is used to assist decision making in semistructured and unstructured situations, where no one knows exactly how decisions should be made (Kusrini, 2007). Another opinion states that the Decision Support System (SPK) is a computer system that can assist users in determining a decision where processing raw data or documents into accurate information. SPK can be used individually or in groups. Therefore, DSS is quite commonly used to make decisions. In addition, DSS can also increase performance effectiveness, saving time and effort. According to Simon, there are three main phases in the decision-making process, namely the intelligence phase, design, and choice. Then the fourth phase is implementation.

The Decision Support System (DSS) has several methods, including: 1) The AHP method is a method whose main input is human perception. Analytical Hierarcy Process (AHP) can simplify complex and unstructured, strategic and dynamic problems into parts, and turn variables into a hierarchy. The Analytical Hierarcy Process (AHP) method has the ability to solve multi-objective problems based on a comparison of the preferences of each element and hierarchy in Susanti (2021). The use of the AHP Method has several shortcomings in the principle of pairwise comparison, requires time, and the fulfillment of the consistency index so

that these shortcomings make it difficult to solve which requires many alternative choices in Martin, Lina, and Yudi (2020); 2) The Analytic Network Process (ANP) method is a development of the Analytical Hierarchy Process (AHP) method. The ANP method is able to improve the weaknesses of AHP in the form of the ability to accommodate linkages between criteria or alternatives. There are two types of linkages in the ANP method, namely linkages within a set of elements (inner dependence) and relationships between different elements (outer dependence). This relationship causes the ANP method to be more complex than the AHP method in Dirayati, Samsyuryadi, and Sukemi (2021); 3) Simple Additive Weighting (SAW) method is known as weighted addition method. The basic concept of the SAW method is to find the weighted sum of performance ratings on each alternative on all attributes in Siti, Akmaludin, Sri, and Lestari (2019); and 4) The Weighted Product (WP) method is a multi-criteria decision-making method used to solve cases that have data with many attributes. The WP method uses multiplication to relate attribute ratings, where the rating of each attribute must first be raised to the weight of the attribute concerned in Kunti and Fery (2019). This Weighted Product (WP) method has advantages compared to other SPK methods in the multiplication process to link attribute ratings that have been ranked, so that the resulting preference values to be ranked more precisely and accurately in Guswandi, Hadi, M.Hafidz, Rita, and Devia (2022). In addition, WP is a method that is easy to calculate so it takes a relatively short time to perform computations in Kunti and Fery (2019).

The Weighted Product (WP) Method

The WP method is widely used in decision making because this method is able to find the best solution in the ranking system with a fairly easy calculation process without requiring a long time in calculation. The choice of the Weighted Product (WP) method is also based on its ability to provide optimal solutions in the rating system. The choice of this method is also based on computational complexity that is not too difficult so that the time needed to produce calculations is relatively short. The steps in applying the Weighted Product (WP) method, namely: 1) Determine criteria: The first step is to determine the criteria that are used as a reference in decision making along with the properties of each criterion. The criteria used in this writing consist of several factors that support the purchase of products by consumers in the marketplace, namely: price, product quality, and online customer reviews; 2) The second step is to determine the match rating: Determine the match rating of each alternative on each criterion and create a decision matrix and 3) The next step, normalizing weights: Weight normalization is normalizing or improving the weight of each criterion by summing the weight of each criterion followed by each initial weight of the criterion divided by the result of the sum of the criteria weights.

$$Wj = \frac{Wj}{\sum_{j=1}^{n} Wj}$$

W = Weight
j = Criteria
Σ = Total summation

After calculating the equation above, the W value will be between 0 and 1, the values of all W weights must meet the equation below.

$$\sum_{j=1}^{n} Wj = 1$$

Then, W is multiplied by 1 for the profit-valued attribute and W multiplied by -1 for the cost-valued attribute.

4. The fourth step is to determine the value of the vector S

The formula determines the preference value for the alternative Ai, given to the equation as follows:

$$Si = \prod_{j=1}^{n} Xij^{Wj}, i = 1, 2, 3, \dots, m$$

S = Represents an alternative preference analogous to vector S
x = Declare the criterion value
w = Declare the weight of the criterion
i = Declare alternatives
j = Declare criteria
n = Specifies the number of criteria

5. The fifth step is to determine the value of the vector V

The vector value V is the value used for ranking. The relative preference value of each alternative can be calculated by the following equation formula:

$$Vi = \frac{\prod_{j=1}^{n} Xij^{Wj}}{\prod_{j=1}^{n} (Xj)^{Wj}}; i = 1, 2, 3, \dots, m$$

V = Represents an alternative preference analogous to the vector V

6. The last step is to rank the value of vector V

The last step is to rank the value of vector V while making conclusions as the final stage. So once the vector value V is obtained, sort it by largest value. The largest V value is the best alternative.

RESEARCH METHODS

The objects in this study are the top five e-commerce with the most visitors in the second quarter of 2022, namely Tokopedia, Shopee, Lazada, Bukalapak, and Blibli.com. This research is to help consumers determine the best marketplace based on the cheapest price, the best product quality, and the best reviews given by consumers who have shopped online at the marketplace concerned. The method used is the Weighted Product (WP) method. This Weighted Product method uses multiplication techniques to relate rating attributes, where the rating of each attribute must first be raised to the rank of the corresponding weight attribute.

The criteria used are three criteria, namely price (C1), product quality (C2), and online customer review (C3). The total indicators used were 15 with four indicators for price, six indicators for product quality, and five indicators for online customer review. The population used in the study is consumers who have made a purchase through one of these marketplaces. The sample size was taken using the Hair Formula where the number of samples used was 150 people (with the number of indicators as many as 15 pieces multiplied by 10) from consumers who had shopped at least once through the marketplace and were in the Jabodetabek area.

RESULT AND DISCUSSION

Match Rating

Table 1 presents the match rating values obtained by changing the Likert scale value of each criterion obtained based on questionnaire data that has been filled out by respondents.

Table 1. Match Rating

No	Alternative	Price (C1)	Quality Product (C2)	Online Cust. Review (C3)
1	Tokopedia (A1)	3,962	3,954	4,455
2	Shopee (A2)	4,002	3,893	4,424
3	Lazada (A3)	4,400	3,900	4,520
4	Bukalapak (A4)	3,875	3,167	4,500
5	Blibli.com (A5)	3	3	3

Based on table 1, price criteria that have cost categories produce a range of numbers 3.0–4.4. In the opinion of respondents from the five marketplaces that were the object of research, the marketplace with the cheapest price in selling their products is Blibli.com because it has the lowest value of 3. While the marketplace with the highest price is Lazada, followed by Shopee in second place, Tokopedia in third place, and Bukalapak in fourth place.

The table above also displays the quality criteria of products that have benefit categories resulting in a value range of 3 – 3,954. Tokopedia ranked first in the product quality criteria because it has the largest value of 3,954. This can be interpreted that the products marketed in this marketplace have the best quality compared to the other four marketplaces. The second rank was achieved by the Lazada marketplace, then followed by Shopee, then Bukalapak in fourth position, and the last position was occupied by Blibli.com with a value of 3.

Online customer review is the third criterion used in the research and this criterion has a benefit category with a value of 3 – 4,520. The marketplace based on the best reviews from consumers is Lazada with the highest score of 4,520. Bukalapak took second place with a value of 4.5, then followed by Tokopedia in third position with a value of 4.455. Shopee ranked fourth with a value of 4,424 and ranked fifth was Blibli.com with a value of 3.

Normalization of Weight Values

Table 2 presents the weight normalization values for each of the criteria used in the study. Normalization is the process of scaling attribute values within a specific range of 0 to 1.

Table 2. Normalization of Weight Values

Normalization of Weight Values				
W1	=	$\frac{4}{4+2+5}$	=	0,364
W2	=	$\frac{2}{4+2+5}$	=	0,182
W3	=	$\frac{5}{4+2+5}$	=	0,454

The weight normalization results for W_1 are 0.364, W_2 is 0.182, and W_3 is 0.454. The normalization of these weights if added together is in accordance with a predetermined equation, namely the total weight must be equal to 1.

Ranking Vector V Values

Table 3 presents the ranking of vector values V. Ranking the value of vector V in the use of the Weighted Product (WP) method as one of the tools in decision making.

Table 3. Ranking Vector V Values

Alternative	Vector Value V	Ranking
Tokopedia	0,207	1
Shopee	0,205	3
Lazada	0,200	4
Bukalapak	0,206	2
Blibli.com	0,182	5

Based on the 3 above, Tokopedia marketplace obtained a value of 0.207, Shopee obtained a value of 0.205, Lazada obtained a value of 0.200, Bukalapak obtained a value of 0.206, and Blibli.com obtained a value of 0.182. The largest value is obtained V1 with a vector value V of 0.207 so that alternative A1 is the alternative chosen as the best alternative. This means that the Tokopedia marketplace is the best alternative marketplace among the four other marketplaces that have the highest number of visitors in the second quarter of 2022. The second

rank was obtained by Bukalapak with a value of 0.206, the third rank was obtained by Shopee with a value of 0.205, the fourth rank was obtained by Lazada with a value of 0.200, and the last rank was obtained by Blibli.com with a value of 0.182.

Discussion

Based on the results of the research conducted, it was found that the best marketplace based on price, product quality and the best online customer review is Tokopedia. The results of this study are the same as the results of research conducted by Liefran Satrio Sim, Michael Christopher, Hasna Dhiya Nafitra, Juan Septian Veron Panjaitan, and Nur Aini Rakhmawati (2023) that Tokopedia obtained the first rank in the calculation of e-commerce platform selection using the weighted product method. Tokopedia also has the highest value of product quality criteria (benefit), which can be interpreted that this marketplace sells products with the best qualities.

Marketplace Blibli.com has the lowest value for the price criterion (cost). This can be interpreted that the products sold on the marketplace are cheaper than the other four marketplaces. Blibli.com need to pay attention to the quality of the products sold to be even better so that it can increase the selling power of the marketplace because the increasing number of consumers who shop, it can add better reviews from consumers to attract other consumers who are hesitant or have never shopped at Blibli.com become interested in shopping and even subscribe to the marketplace.

Lazada marketplace has the highest score for online customer review (benefit) criteria. Lazada Marketplace needs to pay attention to the selling price of products because it has the highest value, this means that the products sold on Lazada have more expensive prices than the other four marketplaces. Consumers will be more interested in buying products at the cheapest prices and the best quality so that eventually it will produce good online customer reviews and can increase consumer confidence in shopping through this Lazada marketplace.

CONCLUSION

In this research, the best marketplace based on the five marketplaces with the highest number of visitors in the second quarter of 2022 is Tokopedia. Tokopedia is also considered a marketplace with the best product quality based on the results of calculations that have been done, this marketplace is considered able to meet different consumer expectations of product quality. The marketplace with the lowest price obtained Blibli.com, this marketplace sells goods at the lowest price and has the best price competitiveness compared to the other four marketplaces. Online customer review is a review from a consumer who has purchased a product at the online store, the best review by this consumer was achieved by the Lazada marketplace.

Shopping using the marketplace provides convenience for its users including time efficiency, there are many discounts, easy payment systems, and a variety of product choices. However, the marketplace also has several weaknesses, one of which is a product that does not match the expectations desired by consumers. This makes consumers lose their trust in the online shopping system, for example until now there are still many consumers who prefer to buy cars directly to the showroom rather than online because consumers still believe that seeing and touching products directly is considered more effective and reliable so that there is no disappointment when buying the car.

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