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Consumer Decision Support System in Online Shopping in Market Place

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Abstract

Online shopping transactions are common in today's society. Many people have changed their conventional shopping methods to online modes, so research needs to be conducted to find out what supports consumer decisions in making online shopping transactions through the market place platform. The research method uses TOPSIS, a multi-criteria method that offers an easier and more effective way to find out how or what underlies someone in determining certain decisions. TOPSIS is used to determine the preference value and distance of positive and negative ideal solutions as offered in the study. The results show that free shipping is the main reason for a consumer to make online transactions and fashion products are the most purchased items in online transactions.

Keywords: *ecommerce, online shopping, decision support system, TOPSIS*

1. Introduction

Statistical data for 2024 shows that there are 2.71 billion people shopping online globally in 2024. There are 2.71 billion online shoppers worldwide in 2024, which means 33% of the world's population shops online. This shows that purchasing products online is a new transformation in the business sector. According to Bank Indonesia data, the volume of e-commerce transactions increased from 3.49 billion times in 2022 to 3.71 billion times in 2023. Even the value of e-commerce transactions in 2023 reached IDR 453.75 trillion. The results of this study prove that brand image, price perception and e-word of mouth simultaneously influence the purchasing decision of Jiniso.id fashion products in the Shopee marketplace [1]. Consumer preferences have a large influence on purchasing decisions [2]. A successful marketing strategy in the region must integrate various factors other than Flash Sale, in order to more effectively influence consumer purchasing decisions [3]. Research shows that the influence of Promotion, Service Quality, and Purchase Experience on Repurchase Interest in the Lazada Marketplace [4]. There is a significant influence between promotion through social media and product reviews on purchasing decisions in students [5]. Positive reviews indicate that buyers are satisfied with the quality, speed of delivery and price of goods have a positive impact on customer purchasing decisions [6]. Companies can choose the right brand ambassador, pay attention to product reviews because consumers use product reviews to consider purchasing decisions [7]. Research shows that there is a significant influence between the influence of product reviews on purchasing decisions and there is a significant influence between promotion and product reviews on purchasing decisions [8].

Currently in Indonesia there are many market place platforms that sell various products. Further research is needed on the reasons for consumers in Indonesia to find out what are the reasons for making online purchases. Research on decision support systems is currently being carried out a lot. Decision support systems are part of a computer-based information system that is used to support decision making in an organization or company. Decision support systems help organizations and individuals to decide on certain choices with a series of valid computational methods [9]. This research was conducted using the TOPSIS method, a method that is carried out in multi-criteria cases. The Technique for Order of Preference by Similarity to Ideal Solution is a multi-criteria

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2. Research Methodology

The research method uses the TOPSIS method. The Technique for Order of Preference by Similarity to Ideal Solution is a multicriteria decision analysis method that was originally developed by Ching-Lai Hwang and Yoon in 1981 with further developments by Yoon in 1987, and Hwang, Lai and Liu in 1993.[10].

The steps used in the TOPSIS method are the process of calculating the normalization matrix, the process of calculating the weighted normalization matrix, the process of determining the positive ideal solution and the negative ideal solution, the process of calculating the distance of each alternative to the ideal solution, and the process of calculating the value. The following are the research methods used, namely:

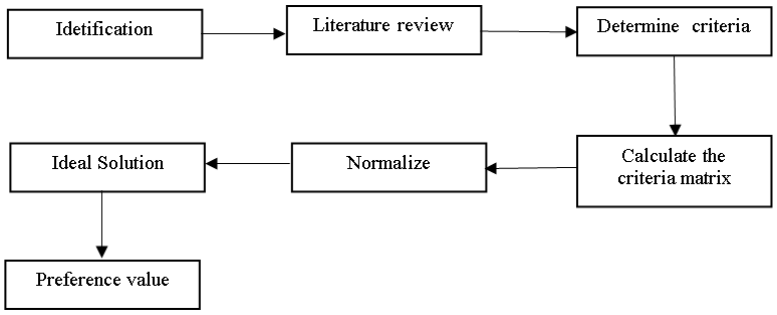

Figure 1. Research Method

The following are the research stages using the TOPSIS method, namely:

a) Normalized Decision Matrix Analysis

Creating a normalized decision matrix is a stage in the TOPSIS method that requires a performance rating of each alternative Ai on each of the normalized Ci criteria.

$$nij = \frac{X_{ij}}{\sqrt{\sum_{i=1}^{m} X_{ij}^2}} \quad (1)$$

b) Normalized Matrix (R)

Calculate the normalized matrix (R) with the following formula: where : i = 1, 2….., m; and j = 1, 2, ….., n

$$R_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \quad (2)$$

c) Weighted Normalized Matrix (Y)

Calculate the weighted normalized matrix (Y) with the following formula:

$y_{ij} = w_i r_{ij}$; with i = 1,2, …, m; and j = 1,2, …, n

d) Matrix of positive and negative ideal solutions

Calculating the weighted normalized matrix (Y) with the following formula: Calculating positive (A+) and negative (A-) ideal solutions with the following formula:

$$A^+ = max(y_1^+, y_2^+, \dots, y_n^+)$$
$$A^- = max(y_1^-, y_2^-, \dots, y_n^-) \quad (3)$$

e) Distance of the Ideal Solution Negative and positive

The distance of the ideal negative solution (D-) and the positive ideal solution (+) with

the formula, namely:

$$D_i^+ = \sqrt{\sum_{j=1}^{n}(y_i^+ - y_{ij})^2}\ ; \qquad i = 1,2, \ldots, m. \tag{4}$$

f) Final Alternative Preference Value

The next step is to find out what the preference value is based on the results of the previous ideal solution. The preference value is searched by the formula, namely:
where i = 1, 2, 3, . . . m

$$V_i = \frac{D_i^-}{D_i^- + D_i^+}, \tag{5}$$

3. Result and Discussion

The research was conducted on consumers who regularly make online shopping transactions. The following are the research criteria, namely:

a. Cheaper prices than offline stores (C1)
b. Save time and energy (C2)
c. Purchase discounts available (C3)
d. Ease of comparing prices with other stores (C4)
e. Free shipping (C5)

The following is the determination of the criteria weight in research:

Table 1. Asessment Criteria

Answer	Score
Very Good	5
Good	4
Enough	3
Bad	2
Very Bad	1

The following are the research data instruments, namely:

a. Fashion products (A1)
b. Beauty and care products (A2)
c. Electronics (A3)
d. Food and beverages (A4)
e. DIY goods and tools (A5)

Table 2. Data Instrument

Instrument	Criteria
Fashion Product	A1
Beauty and care product	A2
Electronic	A3
Food and beverage	A4
DIY items and tools	A5

The next stage is to give a value in the decision table based on table 3 criteria.

Table 3. Normalized Decision Matrix

Criteria	C1	C2	C3	C4	C5
A1	4	5	5	5	4
A2	5	5	4	5	4
A3	5	5	3	3	3
A4	5	4	3	3	3
A5	5	4	3	3	2

And the following is a table of criteria weight results based on research that has been carried out.:

Table 4. Criteria Weight

A1	A2	A3	A4	A5
5	5	4	3	3

The following are normalized data values based on the criteria weights from the previous table.

Table 5. Normalized Value

Criteria	C1	C2	C3	C4	C5
A1	4	5	5	5	4
A2	5	5	4	5	4
A3	5	5	3	3	3
A4	5	4	3	3	3
A5	5	4	3	3	2
Result	116	107	68	77	54
Score	10.77	10.34	8.24	8.77	7.34

The following are the normalization results for criteria C1, C2, C3, C4, C5.

Table 6. Normalized Value All Criteria

Criteria	C1	C2	C3	C4	C5
A1	0.37	0.48	0.61	0.57	0.54
A2	0.46	0.48	0.49	0.57	0.54
A3	0.46	0.48	0.36	0.34	0.41
A4	0.46	0.39	0.36	0.34	0.41
A5	0.46	0.39	0.36	0.34	0.27

The following are the criteria weight values

Table 7. Criteria Weight Value

Criteria	C1	C2	C3	C4	C5
A1	1.86	2.42	2.43	1.71	1.63
A2	2.32	2.42	1.94	1.71	1.63
A3	2.32	2.42	1.46	1.03	1.22
A4	2.32	1.93	1.46	1.03	1.22
A5	2.32	1.93	1.46	1.03	0.82
Min	1.86	1.93	1.46	1.03	0.82
Max	2.32	2.42	2.43	1.71	1.63

Then calculate using the following formula to get the results of the distance between the positive and negative ideal solutions. Based on the results of research conducted on respondents, the following are the results of the negative and positive ideal solution criteria and preference values.

Table 8. Criteria of the Ideal Solution Negatif and Positive and preference value

Result	C1	C2	C3	C4	C5
Criteria	1.86	1.45	1.46	1.37	2.45

Based on the results of the research conducted, most of the product purchasing decisions made by consumers in shopping online are based on Free shipping (C5), Cheaper prices than offline stores (C1), Available purchase discounts (C3), Save time and energy (C2), Ease of comparing prices with other stores (C4). Meanwhile, based on research conducted on respondents, it shows that the products that are often purchased

online are Fashion products (A1), Beauty and care products (A2), Electronics (A3), then Food and Beverages (A4) and DIY goods and tools (A5).

4. Conclusion

Shopping online through a marketplace is a common thing to do in today's era. This digital transformation of technology has brought about major changes in business that encourage global society to transact online on various digital platforms. This study was conducted on responses in the DKI Jakarta Province to find out what trends support a consumer's decision to make online transactions in the marketplace. The results of the study showed that Free shipping (C5), Cheaper prices than offline stores (C1), Available purchase discounts (C3), Save time and energy (C2), Ease of comparing prices with other stores (C4) are important factors that support a consumer's decision to make online transactions in the marketplace. The study was conducted using the TOPSIS method to find out the reasons consumers shop online, especially in the DKI Jakarta Province. This study also found that most people tend to spend their money to buy Fashion products (A1), Beauty and care products (A2), Electronics (A3), then Food and Beverages (A4) and DIY goods and tools (A5).

This research is still limited to the DKI Jakarta Province with a research population of 183 people. Future research can be conducted in other areas to find out other trends and phenomena related to online shopping transactions, for example the use of electronic money in online transactions.

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