

Analysis Of Expedition Service Positioning Based On Consumer Perceptions Using The Multidimensional Scaling (Mds) Method

Anisa Fauzana¹; Parasian Sihombing²; Nurmin Arianto³

¹⁻³Universitas Pamulang, Email : anisafauzana2000@gmail.com; parasiansihombing13@gmail.com;
dosen01118@unpam.ac.id

Abstract. Expeditionary services are essential for consumers, the public, and online business actors, making the shipping industry increasingly competitive. In the competition between companies, each expedition service strives to highlight its unique product and service advantages. This study aims to analyze the positioning of expedition services based on consumer perceptions of service attributes using the Multidimensional Scaling (MDS) method, and to analyze the degree of similarity between expedition services based on consumer perceptions. The research uses a descriptive quantitative approach with objects consisting of JNE, SiCepat, Pos Indonesia, J&T, and TIKI. Data were collected through questionnaires from 100 respondents. The results show that the most competitive expedition services in terms of external facilities (service location, branches, and transportation) are SiCepat and J&T, as well as TIKI and Pos Indonesia, since these services occupy close positions on the two-dimensional perceptual map, indicating tight competition. The positioning similarity map also reveals that SiCepat and J&T, as well as TIKI and Pos Indonesia, have the highest similarity due to their proximity on the perceptual map.

Keywords: Similarity, Multidimensional Scaling, Perceptual Map, Positioning.

INTRODUCTION

The growth of business in the digital era occurs not only in the manufacturing and trade sectors but also in the service sector, especially expedition services. The increasing online shopping activity has driven the demand for delivery services across regions. This situation encourages expedition companies to provide the best service to retain customers.

Problems often experienced by consumers include delays in delivery, unstable prices, and branch locations that are difficult to reach. In addition, unattractive promotions may influence consumer perceptions of service quality.

To compete, expedition companies need to understand their position in consumers' minds compared to competitors. The Multidimensional Scaling (MDS) method can be used to describe positions and similarities among several objects (brands, products, or services) in a two-dimensional perceptual map based on consumer-rated attributes.

LITERATURE REVIEW

Multivariate analysis refers to the analysis of several variables in one or more aspects. This analysis includes any statistical method that simultaneously examines certain measurements

40 | HUMANIS (Humanities, Management and Science Proceedings) Vol. 06, No.1, December 2025

Special issue: HUMANIS 2025 The Application Of Artificial Intelligence To Develop Digital Transformation In Operational Management

of individuals or subjects (Santoso, 2017).

Multidimensional Scaling (MDS) involves creating a perceptual map to illustrate the position of one object relative to another (Santoso, 2017).

MDS is divided into two types:

- **Metric MDS**, which uses quantitative data (interval or ratio).
- **Non-Metric MDS**, which uses qualitative data (ordinal).

The smaller the distance between objects on the perceptual map, the more similar they are perceived by consumers.

Positioning is an action taken by a company to design its image so that it occupies a specific place in the minds of consumers. Product positioning refers to how current or potential consumers perceive a product, brand, or organization in comparison to its competitors (Kotler & Keller, 2016).

The **perceptual map**, also known as a *spatial map*, represents the relationship among perceptual stimuli expressed geometrically as points within a multidimensional coordinate space, illustrating the relative positions or perceptions of the stimuli (Suprato, 2010).

RESEARCH METHODS

His study employs a descriptive quantitative method, in which numerical data are analyzed statistically using the **Multidimensional Scaling (MDS)** approach.

The research was conducted in Cikupa District, Tangerang Regency, in October 2025, by distributing questionnaires to respondents who had previously used expedition (delivery) services.

The population in this study consists of residents of Cikupa aged 15 to 39 years. The sampling technique used is non-probability sampling with the purposive sampling method. The sample size was determined using the Slovin formula with a 10% margin of error.

The study used six variables (attributes) of expedition service quality, as follows: Timeliness, Price, Location, Branch availability, Transportation access, Promotion.

The data analysis was carried out through the following steps:

1. Calculating the mean value of respondents' ratings for each attribute.
2. Constructing a similarity (distance) matrix using the Euclidean distance formula.
3. Performing the double centering matrix process to obtain coordinate values.
4. Determining the position of each object on a two-dimensional perceptual map.
5. Evaluating the model's goodness of fit by calculating the **STRESS** and **RSQ** values.

RESULTS AND DISCUSSION

Table 1. Mean Values of Questionnaire Responses for Five Expedition Services

Expedition Service	Timelines	Price	Service Location	Branch	Transportation	Promotion
JNE	4,31	4,06	4,34	4,55	4,31	3,98
SiCepat	4,3	4,06	3,87	3,99	4,02	3,91
Pos Indonesia	3,9	3,83	3,89	3,9	3,87	3,70
J&T	4,25	4,13	4,14	4,18	4,11	4,05
TIKI	3,94	3,72	3,68	3,65	3,69	3,67

To begin the process of calculating similarities between expedition services, each pair of services is compared based on their mean values across the six attributes.

For instance,

1. Let $p = \text{JNE}$

$$w_{12} = \sqrt{\sum_{k=1}^6 (x_{1k} - x_{2k})^2}$$

$$= \sqrt{(x_{11} - x_{21})^2 + (x_{12} - x_{22})^2 + \dots + (x_{16} - x_{26})^2}$$

$$= \sqrt{(4,31 - 4,3)^2 + (4,06 - 4,06)^2 + (4,34 - 3,87)^2 + (4,55 - 3,99)^2 + (4,31 - 4,02)^2 + (3,98 - 3,91)^2}$$

$$= \sqrt{(0,0001) + (0) + (0,2209) + (0,3136) + (0,0841) + (0,0049)} = \sqrt{0,6236}$$

$$w_{12} = 0,789 \rightarrow 0,790$$

2. Let $p = \text{SiCepat}$

$$q = \text{TIKI}$$

$$w_{25} = \sqrt{\sum_{k=1}^6 (x_{2k} - x_{5k})^2}$$

$$= \sqrt{(x_{21} - x_{51})^2 + (x_{22} - x_{52})^2 + \dots + (x_{26} - x_{56})^2}$$

$$= \sqrt{(4,3 - 3,94)^2 + (4,06 - 3,72)^2 + (3,87 - 3,68)^2 + (3,99 - 3,65)^2 + (4,02 - 3,69)^2 + (3,91 - 3,67)^2}$$

$$= \sqrt{(0,1296) + (0,1156) + (0,0361) + (0,1156) + (0,1089) + (0,0576)} = \sqrt{0,5634}$$

$$w_{25} = 0,751$$

Table 2. Similarity (Distance) Matrix for Five Expedition Services

Expedition Service	JNE	SiCepat	Pos Indonesia	J&T	TIKI
JNE	0	0,790	1,057	0,480	1,407
SiCepat	0,790	0	0,537	0,380	0,751
Pos Indonesia	1,057	0,537	0	0,730	0,392

J&T	0,480	0,390	0,730	0	1,038
TIKI	1,407	0,751	0,392	1,038	0

From the stimulus coordinates obtained in the table above, a positional map was generated to illustrate the relative locations of the five expedition service providers.

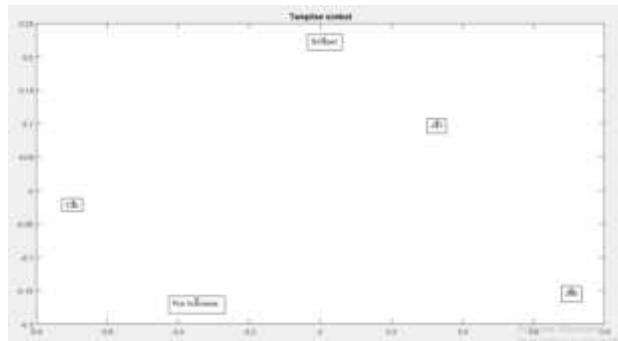


Figure 4.1. Positioning Map of the Five Expedition Services

From the figure above, several expedition services exhibit similarity: **SiCepat** is similar to **J&T**, and **TIKI** is similar to **Pos Indonesia**, whereas **JNE** appears distant because the isolated service occupies a distinct image in consumers' minds.

Calculation of the STRESS Value

Once the stimulus coordinates in the mapped space are obtained, the validity of those coordinates must be examined to determine whether they accurately represent the true positions of the objects. Disparities are the average of the mismatches between the observed dissimilarities and the corresponding distances in the configuration. The initial coordinates of each object can be obtained using procedures analogous to metric multidimensional scaling under the assumption that the input data are not exact distances but ordinal values treated as interval variables. The disparities for this study were computed using **MATLAB R2017b**.

The model fit is then evaluated using the Standardized Residual Sum of Squares (STRESS) statistic, which measures the degree of mismatch between the input dissimilarities and the distances in the fitted spatial configuration. A commonly used form of the STRESS formula is: 0 0,7893 1,0522 0,7893 0 0,5286 1,0522 0,4533 1,4070 0,5286 0,3404 0,7473 0 0,7245 0,37790,4533 1,40

After obtaining the disparities, the next step is to calculate the STRESS value. The STRESS value, calculated using MATLAB, was found to be $1.0806 \times 10^{-16} = 0\%$. Based on the established STRESS value criteria, this result falls under the "perfect" category, which means that the Multidimensional Scaling (MDS) model provides an excellent fit. This indicates that the perceptual configuration accurately represents the relationships among the expedition services according to consumer perceptions.

CONCLUSION AND RECOMMENDATION

1. Similarity of Expedition Services

Based on the similarity positioning map presented in the previous section, it can be observed that among the five expedition services JNE, SiCepat, Pos Indonesia, J&T, and TIKI the services that exhibit the highest level of similarity are SiCepat and J&T, as well as TIKI and Pos Indonesia, since these pairs occupy closely positioned coordinates on the perceptual map.

2. Expedition Service Positioning

a. The most competitive expedition services in terms of external facilities (service location, number of branches, and transportation access) are SiCepat and J&T, as well as TIKI and Pos Indonesia.

Their proximity on the two-dimensional perceptual map indicates intense competition between SiCepat and J&T, and similarly between TIKI and Pos Indonesia, as these pairs are perceived by consumers to have highly comparable service characteristics.

- b. From the perceptual positioning map, it can be seen that the expedition services that are most competitive are SiCepat and J&T, as well as TIKI and Pos Indonesia, since they are located close to each other on the map. This proximity indicates that the smaller the distance value between two services, the greater their similarity in consumers' perceptions, and therefore, the more intense the competition between them.

REFERENCE

Leisember, E. (2019). *The Influence of Brand Characteristics and Product Positioning on Repeat Purchase Decisions of Wardah Cosmetics among Female Students at the National Development University "Veteran" East Java*. *Jurnal Bisnis Indonesia*, 8(2).

Malhotra, N. K., Jain, A. K., Patil, A., Pinson, C., & Wu, L. (2010). *Consumer cognitive complexity and the dimensionality of multidimensional scaling configurations*. Emerald Group Publishing Limited.

Matrix and Vector Spaces: A Textbook. (2021). Media Nusa Creative (MNC Publishing).

Musfar, T. F. (2020). *Marketing Management Textbook: The Marketing Mix as Core Material in Marketing Management*. Media Sains Indonesia.

Nasution, N. B., & Jana, P. (2021). *Multidimensional Scaling Analysis for Mapping Online Learning Applications*. Statmat: Journal of Statistics and Mathematics, 3(1), 71-81.

Rifa'i, R. (2016). *Basic Matrix Algebra*. Deepublish.

Rinawiyanti, E. D., Hadiyat, M. A., & Yanto, H. (2018). *Positioning Analysis Using Multidimensional Scaling (MDS) and Factor Analysis for City Car Mapping in Makassar*. *Jurnal Manajemen Teori dan Terapan*, 11(1).

Riyanto, S., & Hatmawan, A. A. (2020). *Quantitative Research Methods in Management, Engineering, Education, and Experiments*. Deepublish, Yogyakarta.

Santoso, S. (2017). *Multivariate Statistics with SPSS*. Jakarta: Elex Media Komputindo.

Somba, L., Nainggolan, N., & Komalig, H. A. (2020). *Patient Satisfaction Analysis at RSUD Teep Amurang Using the Multivariate Method*. d'CARTESIAN: Journal of Mathematics and Its Applications, 9(1), 35-42.

Sundayana, R. (2016). *Educational Research Statistics*. Bandung: Alfabeta.

Ula, H. (2017). *Analysis of Instant Noodle Product Positioning Using the Multidimensional Scaling (MDS) Method among Students of the Faculty of Mathematics and Natural Sciences, State University of Surabaya*. MATHunesa, 2(6).