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Integrating IndoBERT-Based Sentiment Analysis and PSI-TOPSIS Into a Decision Support System for Convection Production Prioritization

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Abstract. Determining production priorities in the convection industry remains challenging due to the diversity of product alternatives and the complexity of operational and customer-related factors. This study develops a Decision Support System (DSS) by integrating IndoBERT-based customer sentiment analysis with Multi-Criteria Decision Making (MCDM) approaches to identify optimal production priorities at Kenisya Gallery. A total of 371 Shopee customer reviews were analyzed using IndoBERT to extract customer sentiment information, which was then integrated with eight operational criteria. The Preference Selection Index (PSI) method was applied to determine the importance weights of each criterion, while the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method was used to rank 28 product alternatives. The results indicate that 84.4% of customer reviews expressed positive sentiment. Among the evaluation criteria, raw material availability (C8) achieved the highest PSI weight of 25.06%. The PSI-TOPSIS approach identified the Azella Black Series as the highest-priority product for production, achieving a closeness coefficient (Ci) value of 0.8730. This research demonstrates the effectiveness of combining customer sentiment analysis and MCDM techniques to support data-driven production planning. Nevertheless, this study is limited to a single case study and does not yet incorporate expert validation or evaluation of actual production performance.

Keywords: Decision Support System, E-Commerce Reviews, IndoBERT, MCDM, Production Priorities, PSI-TOPSIS, Sentiment Analysis

1. INTRODUCTION

Determining production priorities is one of the important activities in the convection industry because it relates to the selection of products to be produced when production capacity, raw materials, and other resources are limited [1], [2]. The decision is influenced by various factors, such as customer demand, sales, profits, production costs, production time, product return rate, and raw material availability [3], [4]. If production priorities are not determined correctly, companies can experience delays in order fulfillment, inventory build-up on products that are less in demand, and increased operational costs [5]. Therefore, prioritizing production requires an approach that is able to consider multiple criteria simultaneously.

Kenisya Gallery is an MSME that produces and markets various convection products through Shopee. The determination of production priorities still refers to the business owner's experience and sales data. In its implementation, the company faces fluctuations in customer demand, limited raw materials, and production capacity so that not all products can be produced at the same time. This condition makes it difficult for companies to determine which products to prioritize when several products have different levels of demand. This shows the need for a Decision Support System (SPK) that can help the process of determining production priorities based on available data [5].

In addition to operational data, customer reviews on e-commerce platforms can be used as a source of information regarding product quality and customer preferences [6], [7]. However, review data is still in the form of text so it needs to be processed through sentiment analysis before being used in the decision-making process. Transformer-based models, such as IndoBERT, have been widely applied to Indonesian-language sentiment analysis because they are able to understand sentence context better than traditional word representation-based methods [8], [9]. In this study, 371 customer reviews were used from 28 Kenisya Gallery products. All available reviews are used as research data so that the resulting sentiment score reflects the condition of each product and can be used as one of the criteria in determining production priorities [10].

Determining production priorities is included in the problem *Multi-Criteria Decision Making* (MCDM) because it involves more than one criterion in the alternative selection

process [11]. Various studies have used the AHP, Entropy, CRITIC, Best Worst Method (BWM), PSI, and TOPSIS methods to solve MCDM problems in various fields [12], [13]. Among these methods, the Preference Selection Index (PSI) produces criteria weights based on the characteristics of the data in the decision matrix without the need for paired comparisons such as AHP and BWM or information calculations such as Entropy and CRITIC [14]. Once the weights are obtained, TOPSIS is used to determine the order of priority based on the proximity of each alternative to the positive ideal solution and the negative ideal solution.

Several studies have applied IndoBERT for the classification of customer review sentiment and shown good results in understanding the Indonesian context [15]. Other studies use the MCDM method to support alternative selection in a variety of areas, including product selection, suppliers, and production planning [16], [17], [18]. However, most of these studies only utilize sentiment analysis to find out customer responses or apply the MCDM method based on operational data. The research that combines the results of IndoBERT-based sentiment analysis with PSI weighting and TOPSIS ranking in determining the production priorities of convection products is still limited. In addition, the comparison of ranking results using several MCDM methods through Spearman correlation and sensitivity analysis has not been widely carried out.

Based on previous research, there are still several research gaps. Conceptually, the results of sentiment analysis have not been widely used as a criterion in determining production priorities. Methodologically, previous studies have used AHP, Entropy, or CRITIC more as weighting methods, while the application of PSI in priority cases of production of convection products is still limited [19]. Evaluatively, most studies have not compared the consistency of ranking results using several MCDM methods. Therefore, this study developed a web-based Decision Support System that integrates sentiment analysis using IndoBERT with the PSI-TOPSIS method to determine the production priorities of convection products.

In contrast to the previous study, this study uses the sentiment score of the IndoBERT result as the first criterion (C1) in the process of weighting PSI and TOPSIS ranking along with other operational criteria. This study also compared the results of TOPSIS ranking with SAW, VIKOR, and Weighted Product using Spearman correlation and sensitivity

analysis to see the consistency of the results obtained. The purpose of this research is to develop a web-based Decision Support System that can help determine the production priorities of convection products at Kenisya Gallery based on the results of customer sentiment analysis and operational criteria.

2. METHODS

The method This study proposes a Decision Support System (SPK) model that integrates IndoBERT-based sentiment analysis with the Preference Selection Index (PSI) method and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) to determine the production priority of convection products at Kenisya Gallery. The research was conducted through the stages of problem identification, collection of operational data and customer reviews, sentiment analysis, weighting of criteria, alternative ranking, validation of results, and implementation of models into web-based applications [20], [21].

2.1. Research Object

The object of the research is Kenisya Gallery, an MSME that produces and sells convection products through Shopee. Companies face fluctuations in demand, limited raw materials, and production capacity, so a mechanism is needed to determine production priorities. The study used 28 products as an alternative decision with eight criteria, namely Customer Sentiment (C1), Sales (C2), Demand (C3), Profit Margin (C4), Production Cost (C5), Production Time (C6), Product Returns (C7), and Raw Material Availability (C8).

Table 1. Reseacrh Object

Data Source	Description	Period	Quantity	Purpose
Shopee Reviews	Customer reviews	Jul 2025–Apr 2026	371 reviews	Sentiment analysis
Operational Data	Sales, demand, production, returns, inventory	Jul 2025–Apr 2026	28 products	Decision criteria

2.2. Data Collection

The research used primary data and secondary data. Primary data is obtained through observation, interviews, and documentation to obtain operational data that includes sales, demand, profit margins, production costs, production time, product return rate, and raw

material availability. Secondary data is in the form of 371 Shopee reviews from 28 Kenisya Gallery products. Reviews are grouped by product, then analyzed using IndoBERT to generate a sentiment score that is used as a Customer Sentiment (C1) criterion. All reviews are derived from public data and the identity of the customer is anonymized before the analysis process.

Table 2. Decision Criteria

Code	Criterion	Type	Source	Description
C1	Customer Sentiment	Benefit	Shopee Reviews	Sentiment score
C2	Sales	Benefit	Operational Data	Total sales
C3	Demand	Benefit	Operational Data	Customer demand
C4	Profit Margin	Benefit	Operational Data	Profit margin
C5	Production Cost	Cost	Operational Data	Production cost
C6	Production Time	Cost	Operational Data	Production time
C7	Product Returns	Cost	Operational Data	Product returns
C8	Raw Material Availability	Benefit	Operational Data	Material availability

2.3. Proposed Research Method

This study integrates IndoBERT-based sentiment analysis with the Preference Selection Index (PSI) method and the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) to determine production priorities. Customer reviews are processed through the stages of case folding, cleaning, tokenization, and normalization, then classified using IndoBERT's fine-tuned model to obtain the probability of positive, neutral, and negative sentiment on each review [22], [23]. The sentiment score of each product is then combined with seven operational criteria to form a decision matrix. The weight of each criterion is calculated using the PSI method, then used by the TOPSIS method to produce a sequence of production priorities. The ranking results were compared with the SAW, VIKOR, and Weighted Product (WP) methods using the same weight. Next, tests were carried out using Spearman correlation and sensitivity analysis to evaluate the consistency and stability of the ranking results. The best-performing model is then implemented into a web-based Decision Support System. The research flow is shown in figure 1.

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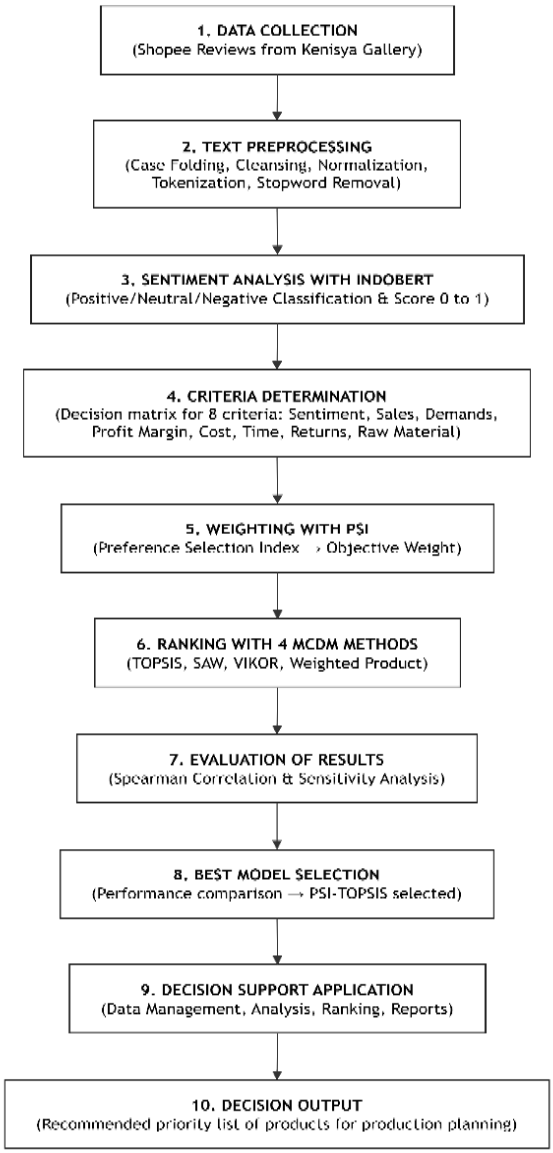

Figure 1. Proposed Research Framework

Figure 1 presents the proposed research framework, which comprises ten sequential stages ranging from data collection to model evaluation and deployment. The process begins with the collection of customer reviews of Kenisya Gallery products from the Shopee e-commerce platform, followed by text preprocessing to prepare the textual data for classification. The preprocessed reviews are then classified using a fine-tuned IndoBERT model to obtain the sentiment probability of each review, from which the sentiment label and sentiment score are derived and subsequently aggregated at the product level, as formulated in equations (1)–(3). The resulting product-level sentiment

score is incorporated as the Customer Sentiment (C1) criterion into the decision matrix, together with seven additional operational criteria. The criteria weights are then determined using the PSI method and employed by the TOPSIS method to generate the production priority ranking, which is further benchmarked against the SAW, VIKOR, and Weighted Product (WP) methods under the same weighting scheme. The consistency and stability of the resulting rankings are subsequently evaluated through Spearman correlation and sensitivity analysis, before the best-performing model is implemented into a web-based Decision Support System, as detailed in the following subsections.

The sentiment labels of each review were determined using the IndoBERT model based on the probability of positive, neutral, and negative sentiment classes [24]. The class with the highest probability is selected as the final sentiment label using the argmax function, as shown in equation (1).

$$L_i = \arg\max\left(P_i^+, P_i^0, P_i^-\right) \quad (1)$$

$L_i$is the sentiment label of the review, while $iP_i^+ P_i^0 P_i^-$, and each are the positive, neutral, and negative sentiment probabilities generated by the IndoBERT model. Next, the sentiment probability is converted to a continuous sentiment score in the range of 0–1 so that it can be used as a numerical value in the decision matrix. The calculation of the sentiment score is shown in equation (2).

$$S_i = \frac{P_i^+ - P_i^- + 1}{2} \quad (2)$$

$S_i$is the sentiment score of the review. A value close to 1 indicates positive sentiment, a value close to 0 indicates negative sentiment, while a value around 0.5 indicates neutral sentiment. Since a single product can have more than one review, a product sentiment score is obtained by averaging the entire review score associated with that product as shown in equation (3).

$$S_p = \frac{1}{n_p} \sum_{i=1}^{n_p} S_{ip} \quad (3)$$

S_{ip} is the sentiment score of the product, is the sentiment score of the review to the product, and is the number of reviews on the product. The next value is used as the Customer Sentiment (C1) criterion in the decision matrix along with seven other operational criteria. The weight of each criterion is calculated using the Preference

Selection Index (PSI) method, then used by the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method to produce production priorities. The ranking results were compared with the SAW, VIKOR, and Weighted Product (WP) methods using the same weights $pS_{ip}ipn_pS_p$ [25], [26]. Furthermore, the consistency of results was evaluated using Spearman correlation, while sensitivity analysis was used to measure the stability of the change in ratings due to changes in the weighting of the criteria.

3. RESULTS AND DISCUSSION

3.1. Sentiment Classification

The sentiment analysis process was conducted on 371 customer reviews of Kenisya Gallery products collected from the Shopee platform during the period from July 2025 to April 2026. These reviews represent customer feedback across 28 convection product alternatives considered in the production-priority decision-making process. The data processing followed the procedures described in the methodology, including text preprocessing, sentiment classification using IndoBERT, extraction of sentiment probabilities, and aggregation of sentiment scores for each product. The classification results consisted of three sentiment categories: positive, neutral, and negative. The distribution of the classified reviews is presented in Table 3.

Table 3. Distribution of Customer Sentiment Classification Results

Sentiment Categories	Number of Reviews	Percentage
Positive	313	84,4%
Neutral	45	12,1%
Negatives	13	3,5%
Total	371	100%

Based on Table 3, 313 reviews (84.4%) were classified as positive, 45 reviews (12.1%) as neutral, and 13 reviews (3.5%) as negative. The results indicate that positive sentiment dominated the customer reviews analyzed in this study. The average prediction confidence was 97.6%. However, this confidence value represents the model's prediction confidence and does not constitute accuracy, precision, recall, or F1-score, because the study did not employ a separately human-labeled test set for supervised validation. Therefore, the sentiment classification results are used as computationally derived inputs

for the subsequent decision-making process rather than as independently validated sentiment performance metrics. The sentiment probabilities obtained from IndoBERT were subsequently converted into numerical sentiment scores and aggregated for each of the 28 product alternatives. The resulting C1 Customer Sentiment Score for all alternatives is presented in Table 4.

Table 4. Sentiment Score Aggregation Results for the 28 Product Alternative

Code	Product Name	No. of Reviews	Positive (%)	C1 Value
A1	Azella Black Series	140	88.3%	0.6524
A2	Batik Tenun Couple Series	53	80.6%	0.6431
A3	Safitri Navy Series	40	89.4%	0.6575
A4	Karina Series	35	90.2%	0.6635
A5	Kinanti Navy Series	21	83.3%	0.6417
A6	Mariposa Series	16	89.5%	0.6658
A7	Kartini Navy Series	10	83.3%	0.6493
A8	Couple Set Tenun Series	9	90.0%	0.6575
A9	Andin Gold Series	3	100.0%	0.6575
A10	Hasna Navy Series	3	100.0%	0.6750
A11	Maya Putih Series	3	100.0%	0.6750
A12	Gamis Azella Series	3	100.0%	0.6625
A13	Couple Etnik Series	3	100.0%	0.6750
A14	Belvia Putih Series	2	100.0%	0.6750
A15	Naomi Grey Series	2	100.0%	0.6750
A16	Gamis Lis Tenun Series	3	75.0%	0.5656
A17	Clara Cemara Series	2	100.0%	0.6750
A18	Dress Aurora Series	3	66.7%	0.6167
A19	Meyra Navy Series	2	100.0%	0.6750
A20	Siera Ivory Series	2	50.0%	0.5437
A21	Custom Set Series	2	100.0%	0.6750
A22	Custom Baju Anak Series	2	100.0%	0.6750
A23	Gamis Tsabina Series	2	100.0%	0.6750
A24	Gamis Padma Series	2	100.0%	0.6750
A25	Gamis Rania Series	2	100.0%	0.6750

Code	Product Name	No. of Reviews	Positive (%)	C1 Value
A26	Gamis Tenun Couple Series	2	100.0%	0.6750
A27	Kimono Outer Series	2	100.0%	0.6750
A28	Baju Tenun Series	2	100.0%	0.6750

Based on table 4, the C1 values range from 0.5437 to 0.6750. The highest C1 value of 0.6750 was obtained by several products, including Hasna Navy Series (A10), Maya Putih Series (A11), Couple Etnik Series (A13), Belvia Putih Series (A14), Naomi Grey Series (A15), Clara Cemara Series (A17), Meyra Navy Series (A19), Custom Set Series (A21), Custom Baju Anak Series (A22), Gamis Tsabina Series (A23), Gamis Padma Series (A24), Gamis Rania Series (A25), Gamis Tenun Couple Series (A26), Kimono Outer Series (A27), and Baju Tenun Series (A28). However, most of these products were represented by only two to four reviews, so their C1 values should be interpreted cautiously because the limited number of reviews provides less evidence for representing product-level customer sentiment.

Among alternatives with a larger number of reviews, Mariposa Series (A6) obtained a C1 value of 0.6658, followed by Karina Series (A4) at 0.6635 and Gamis Azella Series (A12) at 0.6625. Meanwhile, Siera Ivory Series (A20) recorded the lowest C1 value of 0.5437, followed by Gamis Lis Tenun Series (A16) at 0.5656. These results indicate that the number of reviews and the resulting sentiment score do not necessarily have a direct relationship. The C1 value was therefore treated as one quantitative criterion rather than as a standalone indicator of production priority.

3.2. Product Weighting and Product Ranking

The decision matrix was constructed using 28 convection product alternatives and eight criteria, consisting of customer sentiment score (C1), sales quantity (C2), demand quantity (C3), profit margin (C4), production cost (C5), production time (C6), total returns (C7), and raw material availability (C8). Criteria C1, C2, C3, C4, and C8 were categorized as benefit criteria, whereas C5, C6, and C7 were categorized as cost criteria. The C1 values were obtained from the aggregation of 371 customer reviews using IndoBERT, as described in Section 3.1. The remaining criteria were obtained from the operational data of Kenisya Gallery during the observation period. The PSI method was applied to determine the

objective weight of each criterion based on the variation of the decision matrix. The resulting criterion weights are presented in Table 5.

Table 5. Weighting Criteria Using PSI

Code	Criteria	Type	Weight
C1	Customer Sentiment Score	Benefits	16,95%
C2	Sales Quantity	Benefits	9,01%
C3	Number of Requests	Benefits	9,09%
C4	Profit Margin	Benefits	16,41%
C5	Production Costs	Cost	9,83%
C6	Production Time	Cost	10,95%
C7	Total Returns	Cost	2,69%
C8	Availability of Raw Materials	Benefits	25,06%
Total			100,00%

As shown in table 5, raw material availability (C8) obtained the highest weight at 25.06%, followed by customer sentiment score (C1) at 16.95% and profit margin (C4) at 16.41%. The relatively high weight of C8 indicates that raw material availability provides substantial discriminatory information among the alternatives. In contrast, total returns (C7) received the lowest weight at 2.69%, which is associated with the relatively limited variation in return values across the products. The PSI weights were then incorporated into the TOPSIS procedure to determine the relative priority of the 28 product alternatives. The complete ranking results are presented in Table 6.

Table 6. Complete Ranking of 28 Alternatives Using PSI-TOPSIS

Rank	Code	Product	Ci TOPSIS
1	A1	Azella Black Series	0.8730
2	A2	Batik Tenun Couple Series	0.7903
3	A4	Karina Series	0.5848
4	A3	Safitri Navy Series	0.5505
5	A5	Kinanti Navy Series	0.5065
6	A22	Custom Baju Anak Series	0.4644
7	A6	Mariposa Series	0.4479

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Rank	Code	Product	Ci TOPSIS
8	A7	Kartini Navy Series	0.4412
9	A8	Couple Set Tenun Series	0.3856
10	A12	Gamis Azella Series	0.3515
11	A27	Kimono Outer Series	0.3212
12	A9	Andin Gold Series	0.3204
13	A15	Naomi Grey Series	0.2970
14	A16	Gamis Lis Tenun Series	0.2900
15	A10	Hasna Navy Series	0.2815
16	A11	Maya Putih Series	0.2798
17	A18	Dress Aurora Series	0.2675
18	A25	Gamis Rania Series	0.2427
19	A28	Baju Tenun Series	0.2397
20	A19	Meyra Navy Series	0.2370
21	A13	Couple Etnik Series	0.2359
22	A17	Clara Cemara Series	0.2284
23	A14	Belvia Putih Series	0.2211
24	A24	Gamis Padma Series	0.2205
25	A23	Gamis Tsabina Series	0.2202
26	A26	Gamis Tenun Couple Series	0.2156
27	A21	Custom Set Series	0.1795
28	A20	Siera Ivory Series	0.1583

The PSI-TOPSIS results indicate that the Azella Black Series (A1) obtained the first position with a C_i value of 0.8730, followed by the Batik Tenun Couple Series (A2) with 0.7903 and the Karina Series (A4) with 0.5848. The first position of A1 indicates that, based on the decision matrix and the assigned PSI weights, this alternative has the closest relative proximity to the ideal solution. Its performance is supported by several operational indicators, including sales of 1,105 units, demand of 1,216 units, raw material availability score of 10, and a relatively low return rate of 0.27%.

To facilitate visual interpretation of the ranking results, Figure 2 presents the ten highest-ranked alternatives based on the PSI-TOPSIS results among the 28 alternatives.

The figure is intended to provide a concise visual representation of the production-priority ranking rather than to represent the customer sentiment score alone.

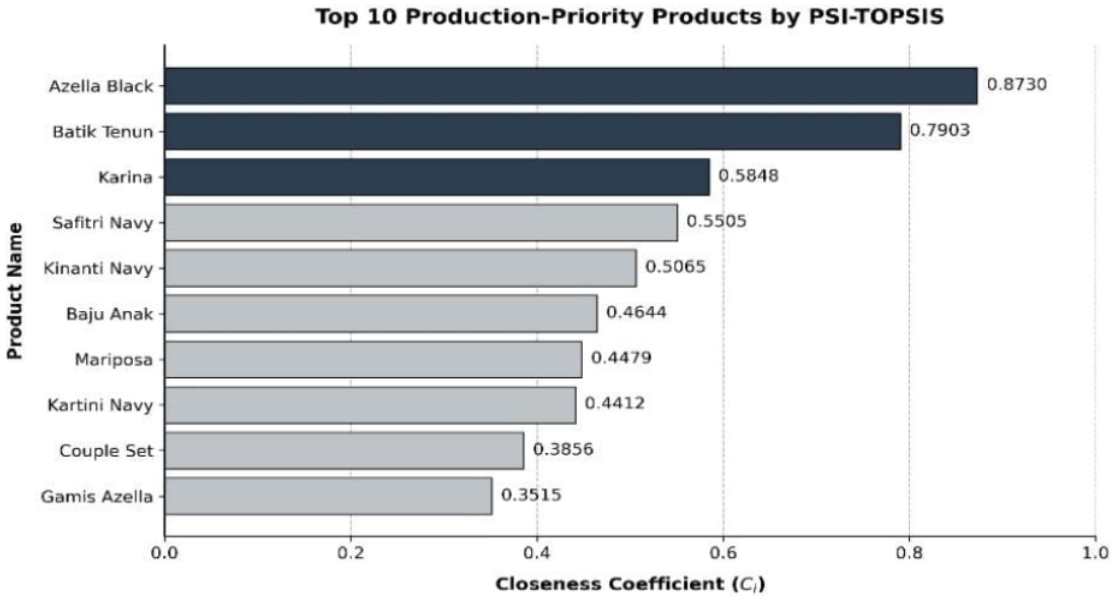

Figure 2. Top 10 Convection Products Based on Customer Sentiment Score (C1)

Figure 2 shows the top ten production-priority alternatives based on the PSI-TOPSIS method among the 28 convection products. The Azella Black Series (A1) occupies the first position, followed by the Batik Tenun Couple Series (A2), Karina Series (A4), Safitri Navy Series (A3), and Kinanti Navy Series (A5). The subsequent alternatives in the top-ten group are Custom Baju Anak Series (A22), Mariposa Series (A6), Couple Set Tenun Series (A8), Kartini Navy Series (A7), and Gamis Azella Series (A12).

The figure provides a visual comparison of the relative priority values among the top-ranked alternatives. A1 and A2 show substantially higher C_i values than the subsequent alternatives, indicating a larger relative proximity to the ideal solution based on the integrated customer sentiment and operational criteria. However, these rankings represent the output of the decision-support model and should not be interpreted as direct evidence of actual production performance or operational effectiveness. Therefore, the results provide a basis for short- to medium-term production-priority planning, while operational implementation requires further validation through expert assessment and actual production or sales outcomes. Overall, the results indicate that production priority is not determined by customer sentiment alone. Alternatives with

favorable sales and demand levels can obtain higher priority when supported by appropriate profit margins, production conditions, raw material availability, and other operational factors. The integration of customer-generated sentiment with operational criteria therefore provides a more comprehensive basis for production-priority assessment than relying on a single indicator.

3.3. Comparison and Validation of Ranking Results

To examine the consistency of the PSI-TOPSIS ranking, the 28 product alternatives were also evaluated using the SAW, Weighted Product (WP), and VIKOR methods with the same PSI-derived criterion weights. The complete ranking results of the four MCDM methods are presented in Table 7.

Table 7. Comparison of Ranking Results of 28 Alternatives Using MCDM Method

Code	Product	PSI-TOPSIS	SAW	WP	VIKOR
A1	Azella Black Series	1	1	1	3
A2	Batik Tenun Couple Series	2	2	2	8
A3	Safitri Navy Series	4	5	6	6
A4	Karina Series	3	4	5	2
A5	Kinanti Navy Series	5	6	8	10
A6	Mariposa Series	7	7	10	4
A7	Kartini Navy Series	8	8	11	14
A8	Couple Set Tenun Series	9	11	13	15
A9	Andin Gold Series	12	12	20	9
A10	Hasna Navy Series	15	16	25	13
A11	Maya Putih Series	16	15	26	11
A12	Gamis Azella Series	10	10	3	5
A13	Couple Etnik Series	21	22	9	22
A14	Belvia Putih Series	23	25	19	21
A15	Naomi Grey Series	13	14	7	12
A16	Gamis Lis Tenun Series	14	13	24	16
A17	Clara Cemara Series	22	24	18	23
A18	Dress Aurora Series	17	18	12	17
A19	Meyra Navy Series	20	20	16	20
A20	Siera Ivory Series	28	28	28	27

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Code	Product	PSI-TOPSIS	SAW	WP	VIKOR
A21	Custom Set Series	27	27	28	28
A22	Custom Baju Anak Series	6	3	4	1
A23	Gamis Tsabina Series	25	21	21	24
A24	Gamis Padma Series	24	23	22	25
A25	Gamis Rania Series	18	17	15	18
A26	Gamis Tenun Couple Series	26	26	23	26
A27	Kimono Outer Series	11	9	14	7
A28	Baju Tenun Series	19	19	17	19

Table 7 shows that the ranking patterns differ across the four MCDM methods, although several alternatives maintain relatively similar positions. The Azella Black Series (A1) consistently occupies the first position in PSI-TOPSIS, SAW, and WP, while it ranks third in VIKOR. The Batik Tenun Couple Series (A2) also shows relatively consistent performance, ranking second in PSI-TOPSIS, SAW, and WP, but eighth in VIKOR. In contrast, the Custom Baju Anak Series (A22) ranks first in VIKOR, third in SAW, fourth in WP, and sixth in PSI-TOPSIS. The Karina Series (A4) also shows a notable difference, ranking third in PSI-TOPSIS and second in VIKOR.

These differences reflect the distinct aggregation mechanisms of the MCDM methods in processing the same weighted decision matrix. Therefore, the differences in ranking do not necessarily indicate that one method is universally superior to the others. Instead, they show how each method responds differently to the performance profile of each alternative. The complete rankings of the 28 alternatives were subsequently used to measure the statistical relationship among the methods using Spearman rank correlation. The test results are shown in Table 8.

Table 8. Spearman Correlation Between MCDM Methods

Method	PSI-TOPSIS	SAW	WP	VIKOR
PSI-TOPSIS	1,0000	0,9858	0,7887	0,9261
SAW	0,9858	1,0000	0,7674	0,9354
WP	0,7887	0,7674	1,0000	0,7198
VIKOR	0,9261	0,9354	0,7198	1,0000

The The results in Table 8 show that the strongest relationship was observed between PSI-TOPSIS and SAW, with a Spearman correlation coefficient of 0.9858. This indicates a very strong positive association between the rankings produced by the two methods. PSI-TOPSIS also showed a very strong correlation with VIKOR, with a coefficient of 0.9261, while its correlation with WP was 0.7887, indicating a strong positive relationship. The positive correlation coefficients across all method pairs indicate that the rankings generally follow similar patterns, although differences remain for several alternatives.

In addition to rank correlation, a sensitivity analysis was conducted by perturbing the criterion weights by 5% and 10% to examine the stability of the PSI-TOPSIS ranking under changes in criterion importance. The results showed that the three leading alternatives, namely the Azella Black Series (A1), Batik Tenun Couple Series (A2), and Karina Series (A4), remained within the top-ranked group across the tested scenarios. The stability score ranged from 0.9153 to 1.0000, with the lowest value occurring when the weight of total returns (C7) was perturbed by 10%.

The sensitivity results indicate that the PSI-TOPSIS ranking was relatively stable within the tested weight-perturbation scenarios. However, this stability reflects computational robustness to changes in criterion weights and does not constitute evidence of operational validity or actual production effectiveness. Therefore, the ranking results should be regarded as decision-support information for short- to medium-term production planning rather than as a substitute for managerial judgment. Further validation through expert assessment, user acceptance testing, and comparison with actual production or sales outcomes is required before the model can be applied as an operational decision-making tool.

3.4. Discussion

For the merger, IndoBERT and PSI-TOPSIS produced a decision support model that integrates customer opinions from online reviews with production operational indicators. The IndoBERT classification confidence value of 97.6% indicates the model's confidence in the predicted results, but cannot be considered an accuracy value because accuracy requires testing of labeled data. Thus, the results of sentiment analysis are used as a representation of estimated customer perception in the decision-making process.

The Azella Black (A1) series received the highest production priority because it has a good combination of performance in several aspects, especially the number of sales, demand, availability of raw materials, and return rate. Although the raw material availability criterion (C8) has the greatest weight, the final ranking is not determined by just one factor, but based on the balance of all criteria. These conditions indicate that products with strong market demand and low operational risk are more relevant to support production planning and inventory management.

The difference in ratings between PSI-TOPSIS and VIKOR indicates that each method has a different evaluation mechanism. The higher position of A22 Custom Children's Clothing on VIKOR can be influenced by the characteristics of the method that emphasizes compromise solutions to certain advantages, such as cost efficiency or profit margins. Meanwhile, TOPSIS considers alternative proximity to ideal conditions based on all criteria. Therefore, the difference reflects different points of view, rather than suggesting that one method is entirely superior.

The high correlation between PSI-TOPSIS and SAW indicates the suitability of the ranking pattern. However, the similarity of results between the methods cannot be used as a basis for declaring absolute validity because all methods use the same criteria and weights. Testing using other weighting approaches, such as standard PSI, Entropy, or CRITIC, can be performed to evaluate the model's resistance to changes in the weighting scheme.

Customer sentiment criteria still contribute to the selection process, even though the range of values between products is relatively small. This causes the ability of the C1 criterion to distinguish alternatives to be more limited compared to operational indicators that have greater variation. Thus, the resulting recommendations depend not only on customer responses, but also on the company's internal conditions.

The developed model can help Kenisya Gallery determine production priorities in a more measurable manner through the use of customer and operational data. However, this study still has limitations on review sources coming from a single platform and a specific observation period. Subsequent developments can consider variations in data sources, alternative weighting methods, and dynamic changes in market conditions.

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4. CONCLUSION

This research developed a Decision Support System (DSS) model that integrates IndoBERT-based sentiment analysis, Preference Selection Index (PSI) objective weighting, and the TOPSIS method to support production-priority determination for convection products at Kenisya Gallery. The results demonstrate the feasibility of integrating customer-generated reviews with operational criteria to provide structured information for production-priority planning. The PSI weighting results showed that raw material availability (C8) obtained the highest weight of 25.06%, followed by customer sentiment score (C1) at 16.95% and profit margin (C4) at 16.41%. Based on the PSI-TOPSIS results, the Azella Black Series (A1) obtained the highest production-priority ranking with a relative closeness coefficient (C_i) of 0.8730. This finding indicates that production priority is determined by the combined performance of customer sentiment and operational criteria rather than by a single criterion. The comparative analysis showed a strong positive relationship between the PSI-TOPSIS rankings and the other MCDM methods, particularly SAW and VIKOR. The sensitivity analysis also showed that the ranking remained relatively stable under the tested ±5% and ±10% criterion-weight perturbations. However, these findings represent computational consistency and stability and should not be interpreted as evidence of operational effectiveness. The study is limited by the use of retrospective data from a single convection business case, the uneven distribution of customer reviews across the 28 products, the absence of human-labeled validation for the IndoBERT sentiment results, and the absence of expert, user acceptance, and actual production-outcome validation. Therefore, the proposed model should be regarded as a decision-support tool rather than an automated decision-making system.

Future research can address these limitations by incorporating human-validated sentiment datasets, developing Aspect-Based Sentiment Analysis (ABSA), comparing standard and modified PSI with other objective and expert-based weighting approaches, examining the potential redundancy between sales and demand criteria, and validating the recommendations through expert assessment, user acceptance testing, and actual production or sales outcomes. These efforts are expected to strengthen the practical applicability and generalizability of the DSS for short- to medium-term production-priority planning.

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REFERENCES

[1] M. Nuryanti and Suparjiman, "Analisis Manajemen Risiko pada UMKM Konveksi , Rancaekek , Kabupaten Bandung," *PENG J. Ekon. dan Manaj.*, vol. 2, no. 1, pp. 1654–1667, 2025, doi: 10.62710/3bgkez50.

[2] D. Nafisah, S. A. Wulandari, D. N. Mutmainah, and C. S. S, "Penerapan Metode FMEA Dan AHP Dalam Penentuan Prioritas Mitigasi Risiko Produksi Puding Buah Pada Umkm Salad Buah Rahma (SBR)," *J. Ilm. Penelit. Mhs.*, vol. 4, no. 4, pp. 551–566, 2026, doi: 10.61722/jipm.v4i4.2753.

[3] N. Surya and A. Nisa, "Analisis Pengambilan Keputusan Manajerial dalam Meningkatkan Kualitas Produk Analysis of Managerial Decision Making in Improving Product Quality," *Perad. J. Pengabdi. Masy.*, vol. 1, no. 1, pp. 21–32, 2025, doi: 10.66955/pjpm.v1i1.62.

[4] A. B. Efendi, B. Santoso, and P. Winahyu, "Pengaruh Kualitas Produk, Ketersediaan Produk dan Saluran Distribusi terhadap Keputusan Pembelian Telur pada UD Edy Horn," *JIMMA J. Ilm. Manaj. Muhammadiyah Aceh*, vol. 15, no. 2, pp. 195–208, 2025, doi: 10.37598/jimma.v15i2.31.

[5] F. Lestari and Ruztandi, "Penerapan Metode Economic Order Quantity dan Just in Time Guna Meningkatkan Optimasi Pengendalian Persediaan Produk (Studi Kasus Pada UMKM Mochi Ahmad Yani)," *J. Bisnisman Ris. Bisnis dan Manaj.*, vol. 5, no. 3, pp. 35–56, 2024, doi: 10.52005/bisnisman.v5i03.190.

[6] M. I. Fatoni, S. Aisah, and M. A. Ramadhani, "Analisis Pengaruh Strategi Pemasaran Digital terhadap Persepsi Pelanggan dan Loyalitas Di E-Commerce," *J. Econ. Manag. Bus. Entrep.*, vol. 2, no. 1, pp. 25–31, 2024, doi: 10.31537/jembe.v2i1.2243.

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[7] A. A. Putri, L. R. Aisyi, P. D. Permatasari, and T. Iskandar, "Analisis Perilaku Mahasiswi Sebagai Konsumen Muslim Terhadap Daya Beli Produk Online Di E-Commerce Shopee," *ESENSI J. Manaj. Bisnis*, vol. 27, no. 2, pp. 8–24, 2024, doi: 10.56943/esensi.v27i2.33.

[8] A. S. Rizkia, Wufron, and F. F. Roji, "Sentiment Analysis of Coretax : A Comparison of Manual , Transformers- Based , and Lexicon-Based Data Labeling on IndoBERT Performance Analisis Sentimen Coretax : Perbandingan Pelabelan Data Manual ," *MALCOM Indones. J. Mach. Learn. Comput. Sci.*, vol. 5, no. 3, pp. 1037–1048, 2025, doi: 10.57152/malcom.v5i3.2151.

[9] C. J. L. Tobing, I. G. N. L. Wijayakusuma, and L. P. Ida, "Perbandingan Kinerja IndoBERT dan MBERT untuk Deteksi Berita Hoaks Politik dalam Bahasa Indonesia," *J. Sains dan Teknol.*, vol. 14, no. 1, pp. 114–123, 2025, doi: 10.23887/jstundiksha.v14i1.92126 Perbandingan.

[10] M. R. Amalsyah, D. Kurniawan, A. Rifai, and P. Sari, "Analisis Sentimen Ulasan Pengguna Aplikasi Fintech menggunakan Framework CRISP - DM dalam Penentuan Prioritas Pengembangan Produk Sentiment Analysis of Fintech Application User Reviews Using the CRISP-DM Framework for Product Development Prioritization," *Sist. J. Sist. Inf.*, vol. 14, no. 2, pp. 813–825, 2025, doi: 10.32520/stmsi.v14i2.5064.

[11] I. G. I. Sudipa *et al.*, *Multi Criteria Decision Making : Teori & Penerapan Metode Pengambilan Keputusan dengan MCDM*. PT. Sonpedia Publishing Indonesia, 2023.

[12] S. Sepriano *et al.*, *Multi Criteria Decision Making:: Teori dan Praktik*. PT. Sonpedia Publishing Indonesia, 2025.

[13] H. Bunga and W. Wahyudi, "Design of an Environmentally Friendly Supplier Selection DSS Model using AHP-TOPSIS," *J. Ilm. Sist. Inf. VOL*, vol. 4, no. 1, pp. 86–99, 2025, doi: 10.51903/b8wpb307.

[14] Y. Dwi, P. Ariyanti, and D. Kamalia, "A Comparative Analysis of the CRITIC and Entropy Methods for Objective Weighting of Priority Criteria," *J. Masy. Inform.*, vol. 16, no. 2, pp. 148–161, 2025, doi: 10.14710/jmasif.16.2.73143.

[15] F. Salamah *et al.*, "Metode Aspect-Based Sentiment Analysis (Absa) Pada Ulasan Songket Di Google Maps Menggunakan IndoBERT," *JATI (Jurnal Mhs. Tek. Inform.*, vol. 10, no. 1, pp. 66–74, 2026, doi: 10.36040/jati.v10i1.16618.

[16] R. L. Mustofa and C. E. Widodo, "Analisis Sentimen Berbasis Aspek Pada Aplikasi Elektronik Survei Kepuasan Masyarakat (E-Skm) Jawa Tengah Menggunakan Aspect-Based Sentiment," *J. Teknol. Inf. dan Ilmu Komput.*, vol. 12, no. 4, pp. 867–874, 2025, doi: 10.25126/jtiik.124.

[17] A. N. Hakim and D. Setiawan, "Analisis Multi-Criteria Decision Making (MCDM) pada Pengambilan Keputusan Pemilihan Vendor dengan Metode Analytical Hierarchy Process (AHP)," *QOMARUNA J. Multidiscip. Stud.*, vol. 02, no. 02, pp. 10–21, 2025, doi: 10.62048/qjms.v2i2 .89.

[18] Ferdiansyah and R. R. Suryono, "Sentiment Classification of Indonesian-Language Roblox Reviews Using IndoBERT with SMOTE Optimization," *J. Appl. Informatics Comput.*, vol. 9, no. 4, pp. 1868–1877, 2025, doi: 10.30871/jaic.v9i4.10155.

[19] S. H. Hadad, "Analisis Prioritas Pemberian Cuti Karyawan Menggunakan Metode Pembobotan Entropy dan Simple Multi Attribute Rating Technique," *J. Artif. Intell. Technol. Inf.*, vol. 2, no. 2, pp. 106–117, 2024, doi: 10.58602/jaiti.v2i2.126.

[20] A. Mohib, I. Yuadi, I. Puspitasari, and Y. D. Patriani, "Lung X-ray Image Classification for Distinguishing Tuberculosis and Pneumonia Using Pretrained CNN Feature Extractors and Supervised Classifiers," *J. Inf. Syst. Informatics*, vol. 8, no. 3, pp. 3233–3251, 2026, doi: 10.63158/journalisi.v8i3.1595.

[21] M. F. Firdaus, D. E. Ratnawati, and N. Y. Setiawan, "Analisis Sentimen Berbasis Aspek Pada Ulasan Pelanggan Restoran Menggunakan Algoritma Support Vector Machine (Studi Kasus: Depot Bamara)," *J. Teknol. Inf. dan Ilmu Komput.*, vol. 11, no. 6, pp. 1265–1272, 2024, doi: 10.25126/jtiik.2024117564.

[22] D. Ilham, N. E. Putri, N. Patricia, and N. F. Nst, "Penerapan Metode TOPSIS untuk Memilih Laptop Terbaik Sesuai Kebutuhan Konsumen," *J. Manuf. Enterp. Inf. Syst.*, vol. 3, no. 1, pp. 32–40, 2025, doi: 10.52330/jmeis.v3i1.415.

[23] D. J. Rahmadi and S. Jaya, "IndoBERT vs SVM : Sentiment Analysis of Audience Comments on the Film Photocopier IndoBERT vs SVM : Analisis Sentimen Komentar Penonton Film Penyalin Cahaya," *MALCOM Indones. J. Mach. Learn. Comput. Sci.*, vol. 6, no. July, pp. 1479–1489, 2026, doi: 10.57152/malcom.v6i3.2784.

[24] S. T. M. Yessy Asri and M. K. Dr. Dra. Dwina Kuswardani, *MACHINE LEARNING & DEEP LEARNING: Analisis Sentimen Menggunakan Ulasan Pengguna Aplikasi*. Uwais Inspirasi indonesia, 2024.

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[25] A. Purnamawati, M. N. Winarto, D. Uki, and E. Saputri, "Sistem Pendukung Keputusan Penentuan Produk Terbaik Menggunakan Metode Preference Selection Index," *Chain J. Comput. Technol. Comput. Eng. Informatics*, vol. 1, no. 3, pp. 56–67, 2023, doi: 10.58602/chain.v1i2.27.

[26] A. Kautsar, Wahyuddin, Darpi, and S. Nurhayati, "Komparasi Metode Simple Additive Weighting , Weight Product," *J. Sist. Inf. danTeknologi Inf. Vol*, vol. 7, no. 3, pp. 788–797, 2025, 10.52005/jursistekni.v7i3.499.