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# ASPECT-BASED SENTIMENT ANALYSIS OF SKINTIFIC BEAUTY PRODUCT REVIEWS USING A BERT MODEL

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**Abstract**

Product reviews are essential in e-commerce because they convey customer experiences and evaluate product quality. This is particularly crucial for cosmetics, as subpar quality might cause bodily harm. Customer interest in making a purchase is also increased by reviews. According to earlier studies, product reviews vary in several ways and contain different information, making it difficult for customers to rapidly evaluate them from multiple perspectives. This study employs a BERT model to perform aspect-based sentiment analysis of positive, neutral, and negative aspects in beauty product reviews on Skintific. In addition, the objective is to support customers in selecting the best products by providing more accurate sentiment classification across multiple parameters. To assess several characteristics of product reviews, such as benefits, quality, and price, a review of the circumstances surrounding the reviews was conducted. Overall, the results show that consumers of Skintific beauty products generally rated price, quality, and benefits positively; 64%, 76.1%, and 70.0% of evaluations, respectively, expressed this view. While there are a few unfavourable reviews across categories, positive reviews primarily highlight the product's appropriate and calming ingredients, efficient skin hydration and pore cleansing, and affordable prices with regular sales.

Keywords: Sentiment Analysis, Beauty Product, BERT, ABSA

## 1. INTRODUCTION

The beauty product industry in Indonesia has experienced significant growth in recent years. This development is driven by increasing public awareness of skincare, lifestyle changes, and the influence of digital media in shaping beauty standards and consumption behaviour. In addition, beauty products, particularly skincare, are no longer viewed as secondary needs but have become part of daily routines and personal identity, especially among younger and urban consumers.

Market data for Indonesia's beauty industry for 2023–2028 indicate consistent growth, with a Compound Annual Growth Rate (CAGR) of 4.6%. The total market value increased from IDR 123.0 trillion in 2023 to IDR 154.0 trillion by 2028. This growth reflects strong consumer demand for beauty products and the industry's expanding penetration across various segments of society (MarkPlus, 2024).

The rapid development of beauty products is also reflected in the wide variety of brands and product variants, differentiated by function and benefits, including cleansers, toners, serums, moisturizers, sunscreens, and other skincare products. In Indonesia, this dynamic is further reinforced by rising consumer awareness of skincare routines and the growing trend of ingredient-based skincare, in which consumers select products based on active ingredients. As a result, both local and international brands compete fiercely by offering innovative product claims, functional benefits, and competitive pricing, thereby prompting consumers to be more selective in their product choices.

In this competitive landscape, one prominent brand is Skintific. However, Skintific has generated strong consumer interest through its combination of products that address specific consumer needs (such as skin barrier repair, acne treatment, and skin texture improvement), aggressive digital marketing, and bundled product offerings that simplify skincare routines. This popularity is reflected in e-commerce data, where Compas reported that Skintific became the market leader in Indonesia in Q1 2024 with sales exceeding IDR 70 billion, demonstrating strong demand and effective commercial strategies.

Compared to other brands, Skintific also holds a strong position in popularity rankings. A survey conducted by Populix placed Wardah as the most favored brand, followed by Skintific, Somethinc, Avoskin, and Whitelab, indicating that Skintific is among the most frequently mentioned and chosen brands in the skincare category. Furthermore, Compas reports show that Skintific remained among the top beauty brands on Shopee in the first quarter of 2025, competing with major brands such as MS Glow and Glad2Glow. These findings suggest that Skintific's success is not merely driven by virality but is supported by measurable market performance.

The high level of consumer interest in Skintific has generated a large volume of customer reviews rich in information. These reviews not only express satisfaction or dissatisfaction but also discuss specific aspects, including texture, fragrance, packaging, price, effects of use, and skin compatibility. Customer reviews also play a crucial role in influencing purchasing decisions, as Rahman and Parvez (2023) found that online reviews and ratings significantly affect consumer purchase decisions on e-commerce platforms. Consumers tend to prefer products with positive reviews and a high number of ratings, as they are perceived as having higher quality and safety.

In practice, customer reviews appear in various forms, including textual reviews, star ratings, and consumer-submitted images (Imron et al., 2023). While this diversity enriches available information, it also presents analytical challenges. Textual reviews often contain complex, subjective opinions, and a single review may discuss multiple product aspects with varying sentiment polarities. Consequently, manual analysis is inefficient, time-consuming, and prone to bias, particularly when handling large-scale review data.

Moreover, most marketplace review systems are not yet capable of automatically filtering sentiment based on specific product aspects. Valuable information about attributes such as material quality, effectiveness, packaging, and price is often embedded in unstructured text, making it difficult for researchers and businesses to obtain accurate insights into which factors most strongly influence consumer perceptions of product quality.

This limitation highlights the importance of text-based analytical approaches. While sentiment analysis helps identify opinion polarity (positive, negative, or neutral), it is often insufficient to explain which specific aspects drive consumer evaluations (Liu, 2012). Therefore, Aspect-Based Sentiment Analysis (ABSA) is more relevant, as it enables sentiment mapping based on specific product attributes.

Aspect-Based Sentiment Analysis (ABSA) is an extension of sentiment analysis that focuses on identifying sentiment toward specific aspects or attributes of a product or service. Unlike traditional sentiment analysis, which assigns a single overall sentiment label to an entire text, ABSA can distinguish sentiments across multiple attributes discussed within a single review. A classic example is the sentence *"Service was slow, but the people were friendly," in which the service aspect conveys* negative sentiment.

In contrast, the people/staff aspect conveys a positive sentiment (Pontiki et al., 2016). This illustrates that consumer reviews are inherently multi-aspect and cannot be accurately represented by a single sentiment label. ABSA is therefore capable of differentiating sentiment toward various specific features of a product or service mentioned within a review (Perikos & Diamantopoulos, 2024).

Conceptually, ABSA consists of several primary levels. The first level is aspect extraction, which involves identifying words or phrases that represent product aspects in review texts, such as “price,” “texture,” “packaging,” or “effectiveness.” The second level is aspect category detection, where identified aspects are grouped into broader categories relevant to the research domain. The third level is aspect-level sentiment classification, which assigns a sentiment polarity (positive, negative, or neutral) to each identified aspect. Across these stages, a single review can yield multiple aspect–sentiment pairs that capture consumer opinions in greater detail.

The application of ABSA is particularly relevant for analyzing heterogeneous and multi-aspect review data. Long, unstructured textual reviews can be decomposed into detailed insights into consumer perceptions of each product attribute. Although star ratings provide a quantitative measure of satisfaction, they do not explain the underlying reasons for the ratings. ABSA complements this limitation by extracting contextual reasons from textual reviews, thereby offering a more comprehensive understanding of product quality in the market.

Since this study focuses on textual reviews from Skintific consumers, an advanced natural language processing (NLP) model capable of deeply understanding contextual meaning is required. One state-of-the-art approach in NLP is Bidirectional Encoder Representations from Transformers (BERT), introduced by Devlin et al. (2019). BERT processes text bidirectionally, making it more effective at capturing semantic nuances and word relationships than traditional bag-of-words or unidirectional models. This capability is crucial for ABSA, as consumer reviews often contain complex sentences with mixed sentiments across different aspects.

Previous studies have demonstrated that BERT outperforms traditional models in text classification and sentiment analysis tasks, including product reviews on marketplaces and social media (Devlin et al., 2019; Sun et al., 2020). The strength of BERT lies in its pretrained language model, which can be fine-tuned for domain-specific data such as skincare reviews. In the context of Skintific, applying BERT-based ABSA enables researchers to identify not only whether sentiments are positive or negative, but also which specific aspects (e.g., texture, effectiveness, price, or packaging) are being evaluated.

In addition to textual data, this study incorporates Likert-scale questionnaires to complement text-based sentiment analysis. The Likert scale is used to measure consumers’ levels of agreement or satisfaction with specific product attributes in a structured manner, ranging from strongly disagree to strongly agree. The use of Likert scales serves as a form of data triangulation, strengthening the objectivity and realism of the results by providing quantitative representations of consumer perceptions that can be compared with sentiment analysis outcomes derived from textual data. This mixed-method approach aligns with consumer behaviour research, which suggests that combining qualitative (textual) and quantitative (Likert-scale) data enhances the validity and reliability of research findings.

Beauty products are items used to care for, protect, and enhance the appearance of the human body, particularly the skin, face, hair, and nails. These

products include various cosmetics and personal care items applied externally to cleanse, beautify, maintain skin health, and enhance consumer confidence.
From a regulatory perspective, the Indonesian Food and Drug Authority (BPOM) define cosmetics as materials or preparations intended for use on the external parts of the human body, such as skin, hair, nails, lips, and external genital organs, with the purpose of cleansing, perfuming, changing appearance, and protecting or maintaining body conditions without permanently affecting physiological functions.

Before making a purchase, consumers' perceptions are greatly influenced by customer reviews, which are an essential source of product information. Reviews facilitate more informed purchasing decisions by reducing ambiguity and perceived risk in online shopping through the provision of thorough feedback. Online reviews not only help consumers make decisions, but they also help a brand or product gain credibility (Hasan et al., 2023).

Rather than presenting a single overall sentiment for the full text, Aspect-Based Sentiment Analysis (ABSA) is a fine-grained sentiment analysis technique that identifies and categorizes sentiments expressed toward aspects or features of an item (Pontiki et al., 2014). Additionally, aspect-based sentiment analysis (ABSA) is a more sophisticated method that recognizes and classifies sentiments expressed toward parts or features of a product, whereas standard sentiment analysis typically assigns a single overall polarity to a review (Pontiki et al., 2014). Instead of relying solely on broad sentiment, this fine-grained analysis enables firms to gain deeper insights into consumer attitudes toward specific product attributes.

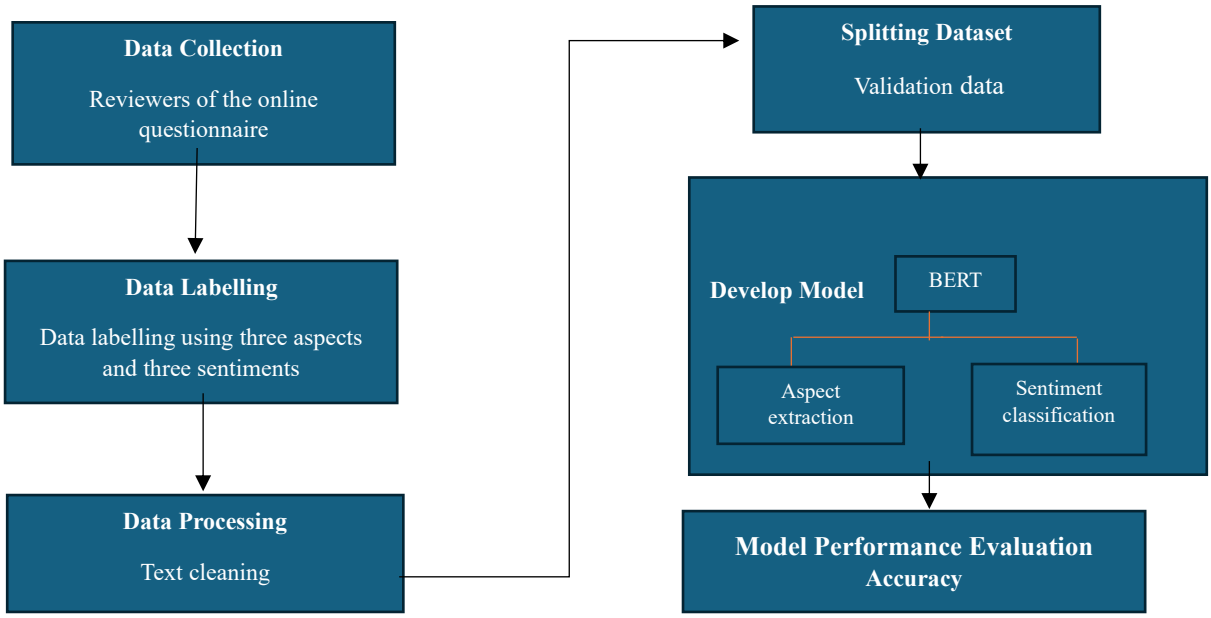
Sentiment Analysis (SA) is a technique in Natural Language Processing (NLP) that extracts, identifies, and classifies opinions, emotions, or attitudes expressed in text into categories such as positive, negative, or neutral. SA is widely used to analyze consumer opinions regarding products, services, or issues derived from unstructured text, such as product reviews or social media comments. It plays a crucial role in efficiently understanding public perception from large volumes of data, which would be impractical to analyze manually (Mao et al., 2024).

To overcome the shortcomings of conventional natural language processing models, Devlin et al. (2019) introduced the deep learning-based language representation model known as Bidirectional Encoder Representations from Transformers (BERT).

## 2. METHODOLOGY

A Likert-scale questionnaire designed to evaluate Skintific beauty cosmetic products was used to collect the dataset. These product categories were selected for their high frequency of user reviews and detailed descriptions that address a range of factors, including price, benefits, and quality. The study used a quantitative approach. From data collection to interpretation and presentation of outcomes, quantitative methods use quantitative data (Arikunto, 2013). The research workflow is illustrated in Figure 1.

Figure 1. An overview of the research flow




## 2.1 Data Collection.

This study collected data from 101 reviewers with a variety of professions, including students, teachers, freelancers, live co-hosts, employees, public servants, housewives, and entrepreneurs. The dataset included reviews that covered a variety of product attributes prior to text cleaning. The final dataset included 60 reviews on price (42 positive, 15 neutral, and 3 negative), 67 reviews on product quality (51 positive, 12 neutral, and 4 negative), and 50 reviews on product benefits (32 positive, 15 neutral, and 3 negative) following the text-cleaning process.

## 2.2 Data Labelling

The data was labelled with three aspects (benefits, quality, and price). The researcher labelled sentiments with three classes (positive, negative, and neutral) using values as markers. Pang and Lee (2008) emphasize that positive sentiment in reviews is characterized by approving language such as 'excellent,' 'very satisfied,' and 'highly recommend.' These words indicate pleasure and approval toward the product. Additionally, the reviewer emphasizes a positive experience by highlighting benefits such as fast service and high quality, which are commonly associated with favourable opinions. Negative sentiment analysis refers to the process of identifying and classifying text that expresses unfavourable opinions, dissatisfaction, criticism, or negative emotional states toward an entity, product, service, or event. Lastly, neutral sentiment analysis refers to the identification of text that does not express a clear positive or negative opinion toward an entity.

## 2.3 Data Preprocessing

The acquired dataset was unstructured; therefore, data preprocessing was conducted. This preprocessing stage included text cleaning to remove emojis and other irrelevant characters from the reviewers' questionnaire responses (Skarpathiotaki & Psannis, 2022).

### 2.4 Data Splitting

In this study, a subset of the dataset was designated as the validation set, with a predetermined percentage of the data reserved for validation.

### 2.5 Model Development

In this study, the researcher developed an Aspect-Based Sentiment Analysis (ABSA) model using the Bidirectional Encoder Representations from Transformers (BERT) method. BERT is a pre-trained language model that captures deep contextual relationships between words by considering both left and right contexts in text, making it highly effective for sentiment and opinion mining tasks. The ABSA model was designed to identify both aspects (specific features or entities) and their corresponding sentiment polarity (positive, negative, or neutral) in textual data.

### 2.6 Model Performance Evaluation

In this study, by evaluating the model on a labelled dataset of Skintific product reviews, the researcher ensured that the performance assessment reflects the model's ability to handle real-world textual data with diverse expressions and nuanced opinions. This evaluation provides insight into the model's reliability for practical applications in customer feedback analysis and sentiment monitoring.

## 3. FINDING AND DISCUSSION

### 3.1 Presentation of the Dataset

Using the BERT model, the Aspect-Based Sentiment Analysis (ABSA) of Skintific product reviews yielded informative insights into how customers assess different product qualities. The model successfully assessed the related attitudes as positive, neutral, or negative and identified important elements such as benefits, quality, and price.

### Pre-processed and Final Dataset

The collected Skintific reviews were pre-processed to ensure data consistency and quality prior to model building. The preprocessing stages included case-folding to standardize text and text-to-text cleaning to remove emojis and other non-textual characters. In accordance with linguistic norms, normalization was employed to convert informal or nonstandard words to their standard forms.

The preparation pipeline produced a clean, well-structured dataset suitable for training and evaluating a BERT-based Aspect-Based Sentiment Analysis (ABSA) model for positive, neutral, and negative sentiment classification, while preserving both lexical characteristics and semantic context.

**Table 1. Estimation Results of the Benefits Aspect of Skintific Beauty Products**

| Sentiment Analysis Category | Count | Percentage |
|---|---|---|
| Positive | 32 | 64.0% |
| Neutral | 15 | 30.0% |
| Negative | 3 | 6.0% |
| **Total** | **50** | **100%** |

**Table 1.1. Highest Positive-Sentiment Reviews of Skintific Beauty Products in the Benefits Aspect**

| Positive Sentiment: |
|---|
| Skin is bright, and pores are well covered; previously, powder faded quickly, now it stays. |

| |
|---|
| □ Controls oil and repairs skin barrier; initially severely oily, now it's more normal. |
| □ Skin became much more moisturized; dry. |
| □ Skin became smooth and moisturized; initially dry and sensitive, now moisturized. |
| □ Skin is quite moisturized; dry skin feels slightly more moisturized. |
| □ Blends with skin and lasts when worn; previously, the T-zone was oily, but after use, it feels more moisturized and oil is reduced. |
| □ Moisturized; oily. |
| □ Skin became clean; clean. |
| □ Better maintained because I use sunscreen; skin was slightly red but became calming. |
| □ Brighter, previously extremely dry, now moisturized. |
| □ Skin is more moisturized, doesn't make it dry; previously dry, now moisturized. |
| □ Smoother; slightly dry, now quite hydrated. |
| □ Skin is increasingly cared for; extremely dry. |
| □ Getting brighter; skin condition had many spots, now covered. |
| □ Skin moisturized, skin barrier improved; previously dry, now moisturized. Previously I had bumps often; now rarely. |
| □ The skin became bright; initially red, now moisturized. |
| □ The skin became bright; initially red, now moisturized. |
| □ Skin became moisturized; previously rough, now smooth. |
| □ Skin became bright; initially dry, now moisturized. |
| □ Brighter, slightly dry. |
| □ Healthier and glowing; initially redness, now has subsided. |
| □ Upon use it gets brighter; slightly dull, now slightly bright. |
| □ Skin is calmer; previously had bumps, now reduced. |
| □ Sensitive skin using this is safe; initially to clean face, quite helpful. |
| □ Lips became moisturized; previous condition pale, became brighter. |
| □ Skin became bright; initially oily, now not too much. |
| □ Skin became clean; previously clogged pores, now smooth. |
| □ Skin slightly bright; previously had spots, now slightly reduced. |
| □ Skin became moisturized; initially dry and itchy, now moisturized. |
| □ Skin became clean; oily skin condition is now slightly reduced. |
| □ Acne spots are disguised; the previous condition was acne-prone, now only scars remain. |
| □ Brighter with no blackheads, skin condition had blackheads, now somewhat clean. |

**Table 1.2. Highest Neutral-Sentiment Reviews of Skintific Beauty Products in the Benefits Category Neutral Sentiment:**

| |
|---|
| □ Became moisturized; dry became moisturized. |
| □ Skin became moist; serum spray = removes bumps on forehead. |
| □ Skin moisturized; after using skin is hydrated. |
| □ The product is good, though it also disguises acne scars; no changes because it's only powder. |
| □ Moisturized. |
| □ Acne dries fast, skin moisturized; dry. |
| □ Skin became moisturized; previously dry and then became moisturized, skin not peeling. |
| □ Calming acne; previously skin redness, afterwards skin more calming. |
| □ Skin became fragrant because of this spray sunscreen; no changes. |
| □ Reduces oil; just average. |
| □ Skin became moisturized; initially dry skin and now moisturized. |
| Skin became dull; beginning was dry, now became bright. |
| □ Skin slightly bright and clean; previously there were blackheads, after using face became cleaner; previously dry, after using became moisturized. |
| □ Initially the skin became dry, but after using several times subsequently started to see effects of skin becoming brighter; initially lots of blackheads, because indeed the goal was to remove blackheads around the nose, now the clearly visible blackheads are somewhat reduced. |
| □ Slightly bright; slightly dry and now remains dry. |

**Table 1.3. Highest Negative-Sentiment Reviews of Skintific Beauty Products in the Benefits Category Negative Sentiment:**

| |
|---|
| ● Not too compatible with the product. |
| ● It's ordinary, no effect. |
| ● No change. |

**Table 2. Estimation Results of the Quality Aspect of Skintific Beauty Products**

| Sentiment Analysis Category | Count | Percentage |
|---|---|---|
| Positive | 51 | 76.1% |
| Neutral | 12 | 17.9% |
| Negative | 4 | 6.0% |
| **Total** | **67** | **100%** |

**Table 2.1.** Highest Positive-Sentiment Reviews of Skintific Beauty Products in the Quality Aspect

| Positive Sentiment: |
|---|
| Niacinamide helps prevent too many breakouts. Still comfortable to use. |
| Skintific products containing niacinamide and salicylic acid are suitable for my skin. Comfortable, okay, basically used for daily wear or formal events. |
| The Ceramide is suitable for my skin. Yes, consistent and still in use today. |
| Suitable for my skin. Stays the same from start to finish. |
| Niacinamide makes it bright. Consistent, doesn't oxidize. |
| The ceramide is very soothing. Yes, from start to finish the result is consistent. |
| Its Niacinamide helps brighten my skin, "Suitable for my skin, doesn't cause breakouts. The cushion is good but, the makeup transfers if I get sweaty. |
| Cocok tdk menimbulkan jerawat. Iya dari awal smpei akhir ttp ok. Suitable doesn't cause acne. Yes, from start to finish it stays okay. |
| Ceramide because it helps remove bumps/texture. Yes, it is still used because it suits me. |
| Yes, it helps brighten. Consistent. |
| The Mugwort helps soothe acne, and the cushion ingredients also don't cause new acne. Was slightly different. Initially, I bought the small one, and it was okay, but when I upsized, the ingredients felt slightly different. |
| Becomes brighter. Yes. |
| The Ceramide helps moisturize the skin. Yes, from start to finish it remains comfortable to use. |
| Suitable. Yes. |
| The Mugwort makes it smooth and suits me. Okay consistent. |
| Salicylic acid really helps soothe redness and bumps on the face. The mask product is still safe to use until now and for the cushion, until finished, it doesn't cause problems for my skin. |
| Niacinamide and ceramide are good for skin over 40s, makes it bright and reduces fine spots. Yes, comfortable and lightweight when applied and until finished the product remains consistent, not changing color or smell. |
| Its Niacinamide helps brighten my skin, "Suitable for my skin, doesn't cause breakouts. From start to finish product quality remains the same. |
| Moisturizing. From start to finish, consistent. |
| Suitable for the Mugwort. The same until the end. |
| The Centella softens. Appropriate/Matches expectations. |
| The salicylic acid helps shrink bumps. Comfortable until the end. |
| The ceramide makes it safe. Until now still safe. |
| Suitable with all Skintific ingredients. Consistent. |
| The ingredients are soothing. The same until the end. |
| Niacinamide brightens, Centella softens. Good until the end. |
| The cushion is safe to use. Certain variants fade quickly but the blue cushion is good. |
| The Niacinamide and retinol are good on my skin. The result is consistent and helps prevent bumps. |
| Ceramide helps moisturize skin. From start to finish comfortable to use. |
| The ingredients soothe the skin. From start to finish good. |
| The ingredients soothe the skin. From start to finish good. |
| Suitable for my skin doesn't cause dryness. Initially good but nearing the end my skin became sensitive. |
| Used a few times felt not quite maximal because I didn't repurchase when product ran out and chose another product. Comfortable to use, just a few times felt there was no significant change (slow). |
| Suitable for my skin and doesn't cause irritation. Yes, from start to finish good. |

| |
|---|
| □ Moisturizing. Always the same.<br>□ For ingredients in the mask make it bright. The mask is good but must be used according to skin condition.<br>□ The AHA BHA brightens. Initially bright, eventually became average because the AHA BHA percentage needs to be increased.<br>□ Centella and squalene soothe the skin. Still just good.<br>□ The salicylic acid helps reduce bumps. Remains comfortable.<br>□ The panthenol content makes pores clean. Just okay until now.<br>□ Has a brightening effect. Still the same from start to finish.<br>□ The peptides help brighten. Good until the end.<br>□ The glycolic acid helps remove spots. Comfortable to use.<br>□ Quite brightening but a bit slow. From start to finish the same, but the progress is a bit slow.<br>□ Suitable for my skin so far. Still the same, nothing changed.<br>□ Suitable, the micellar content doesn't make skin feel tight. Comfortable to use until the end.<br>□ Suitable for deflating inflamed acne. Yes, it is suitable when used during acne breakout.<br>□ Helps smooth/even out skin. Still top notch.<br>□ Suitable for my skin so far. Comfortable to use, unchanged.<br>□ The Vit C brightens. Still comfortable to use.<br>□ The ingredients in the spray soothe and moisturize. Still comfortable to use from first purchase until now. |

**Table 2.2.** Highest Neutral-Sentiment Reviews of Skintific Beauty Products in the Quality Aspect

| Neutral Sentiment: |
|---|
| □ Coincidentally the product I used made my skin break out. Did not continue using it because the acne got worse.<br>□ Awal pake sampe saat ini yg msh saya pake masih terasa aman. Depending on the ingredients, the ones I still use are the retinol and serum spray, meaning they still suit me and don't cause any effects. From the first use until now, the ones I still use still feel safe.<br>□ Salicylic acid helps remove skin bumps. Yes, the product consistently moisturizes the skin.<br>□ Never tried it. Seems so.<br>□ Comfortable to use, however the effect was felt at the beginning, after repurchasing the effect wasn't felt as much (just the same), there was no improvement.<br>□ Mugwort is suitable for drying out my acne, ceramide makes the face smooth. Consistent from the start.<br>□ The effect isn't very visible. Yes.<br>□ Suitable doesn't cause breakouts. In the very beginning it was still okay but afterwards there was no significant effect.<br>□ No changes. Runs out quickly.<br>□ Not much effect.<br>□ Not suitable for my skin. Initially okay but towards the end it became dull.<br>□ Because of the ingredients that are not heavy and light for the face, the product I use helps to brighten the skin. For the product, it is consistent until the final use. |

**Table 2.3 Highest Negative-Sentiment Reviews of Skintific Beauty Products in the Quality Aspect**

| Negative Sentiment: |
|---|
| It doesn’t do anything for me. |
| Clean my pores |
| The formula has no effect on the skin. |
| Coincidentally the product I used made my skin break out. Did not continue using it because the acne got worse. |

**Table 3. Estimation Results of the Price Aspect of Skintific Beauty Products**

| Sentiment Analysis Category | Count | Percentage |
|---|---|---|

| | | |
|---|---|---|
| Positive | 42 | 70.0% |
| Neutral | 15 | 25.0% |
| Negative | 3 | 5.0% |
| **Total** | **60** | **100%** |

**Table 3.1. Highest Positive-Sentiment Reviews of Skintific Beauty Products in the Price Aspect**

| **Positive Sentiment:** |
|---|
| Yes comparable. |
| If possible, have promos often hahaha. Appropriate. |
| Yes comparable. |
| Standard price quite good quality. |
| price and quality match. |
| cheap. Just standard, consistent with its class. |
| Yes. |
| yes appropriate. |
| Ya. Yes. |
| Just enough in accordance with the claims given. |
| Yes, consistent with the packaging, also makes it easy to take the product. |
| Yes, the quality is comparable to the price. |
| Cheap. yes. |
| Consistent with the price and quality. |
| Standar. sometimes some are expensive. Standard. |
| consistent with the price. |
| Yes, quality consistent with price. |
| consistent with the quality. |
| for my screen product the price is standard yes. consistent with the price. |
| some are expensive some are cheap. consistent with price and quality. |
| standard. very appropriate. |
| Quality consistent with price. |
| Cheap. Comparable. |
| standard. comparable to price. |
| standard. yes comparable. |
| good, consistent with its class. |
| Cheap. Yes. |
| yes, comparable. |
| expensive. Yes, consistent with the price. |
| expensive. Yes, consistent with the price. |
| just standard consistent with class. |
| Yes, quality comparable to the price. |
| expensive. the quality is comparable to the price. |
| standart. sebanding. standard. comparable. |
| standard, better to buy during promo. so far appropriate. |
| Standard. Quality and price are the same. |
| it is though. Quality comparable to price. |
| some are cheap some are expensive. comparable quality. |
| just standard. in my opinion it is appropriate. |
| just standard. price is quite cheap in my opinion. |
| I think it's cheap. consistent with its class. |
| expensive but if buying on promo it's worth it. consistent with the price. |
| cheap for that size. comparable to the quality given.. |
| Consistent with the result. |

**Table 3.2. Highest Neutral-Sentiment Reviews of Skintific Beauty Products in the Price Aspect**

| **Neutral Sentiment:** |
|---|
| Standard for a cushion, because the cushion is good. Except the gold one, that oxidizes. |
| Just right. Just standard, appropriate. |
| Expensive. Standard. |
| yes. |

| |
|---|
| Not bad. Yeaaah decent.<br>standard.<br>Just standard.<br>Expensive. No, the price is more expensive with insignificant results.<br>worth the price.<br>Just standard.<br>just standard.<br>but there are local products cheaper and effective on my face, so I switched. Standard, because there is the same quality with a cheaper price.<br>cheap. just standard consistent with its class.<br>Expensive. Just standard appropriate.<br>appropriate. |

**Table 3.3 Highest Negative-Sentiment Reviews of Skintific Beauty Products in the Price Aspect Neutral Sentiment:**

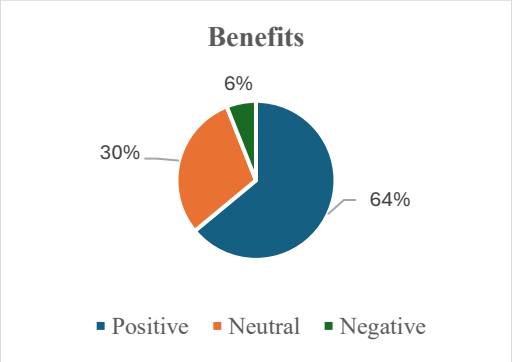
| |
|---|
| Yes standard.<br>appropriate for several products.<br>Not worth the price. |

## 3.2 Validation of the Dataset

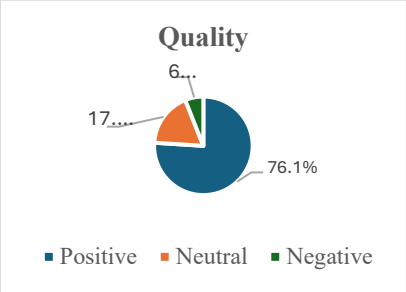
To assess the effectiveness of the BERT-based Aspect-Based Sentiment Analysis (ABSA) model, a subset of the pre-processed Skintific reviews was used as the validation dataset in this study. The validation set was carefully selected to reflect the range of opinions expressed regarding various aspects of the product, such as benefits, quality, and price.

The validation dataset was used to track model performance during fine-tuning, avoid overfitting, and optimize hyperparameters. To properly evaluate the model's capacity to correctly categorize each sentiment polarity, the validation set of sentiments comprised positive, negative, and neutral analyses.

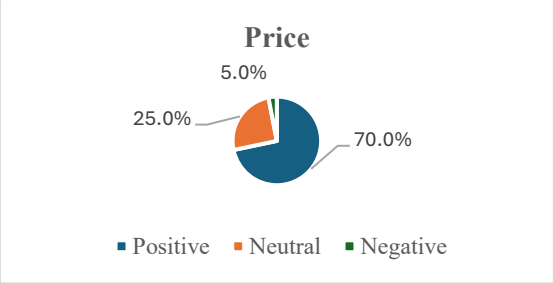
### 3.2.1. Sentiment Polarity Breakdown of Skintific Beauty Products' Benefits Aspect




### 3.2.2. Sentiment Polarity Breakdown of Skintific Beauty Products' Quality Aspect




### 3.2.3. Sentiment Polarity Breakdown of Skintific Beauty Products' Price Aspect




## 3.3 Accuracy of the Dataset

The percentage of sentiment labels predicted accurately across all aspects and reviews constitutes the model's overall accuracy. High accuracy indicates that the dataset preprocessing and validation procedures successfully prepared the data, enabling the BERT model to identify significant patterns and contextual relationships in the text.

First, the benefits aspect of Skintific beauty products was examined by analyzing 50 samples. Across 32 samples (64.0%), the results clearly demonstrate that positive sentiment was the most prevalent category, with almost two-thirds of replies positive. Fifteen samples (30.0%) had neutral sentiment, indicating that a sizable percentage of respondents neither strongly lauded nor criticized the products. Conversely, negative sentiment was the least prevalent category, appearing in just 3 samples (6.0%). All things considered, this distribution makes it abundantly evident that opinions regarding the benefits of Skintific cosmetics are overwhelmingly favourable, with very few objections.

Second, 67 data samples were used to conduct sentiment analysis of the quality aspect of Skintific beauty goods. With 51 samples (76.1%), the results clearly demonstrate that positive sentiment predominates and that most users are happy with the products' quality. Twelve samples (17.9%) exhibited neutral sentiment, indicating that some individuals were neither very satisfied nor very unhappy. On the other hand, there is very little negative sentiment: only 4 samples (6.0%), indicating that comparatively few customers reported poor product quality. Overall, the findings clearly show that people hold a favourable opinion of the quality of Skintific beauty products.

Third, a total of 60 samples were used to conduct sentiment analysis of the cost component of Skintific beauty goods. With 42 samples (70.0%), the results clearly demonstrate that positive sentiment predominates in the dataset, suggesting that most

customers are happy with the product cost. Fifteen samples (25.0%) exhibited neutral sentiment, indicating that some customers held neither extremely positive nor negative opinions about the price. Conversely, negative sentiment was the least prevalent category, appearing in only 3 samples (5.0%). Overall, these findings indicate that consumers generally hold a favourable opinion of Skintific beauty product prices, with minimal dissatisfaction.

## 4 CONCLUSION

In conclusion, the results indicate that, overall, consumers hold a favourable opinion of Skintific beauty products across all assessed areas. 64% of respondents were favourable, 30% were indifferent, and 6% were negative about the benefits. The product's capacity to efficiently cleanse pores and hydrate skin was the primary focus of positive evaluations. 76.1% of reviews were positive, 17.9% were neutral, and 6% were negative about the product's quality. While neutral reviews noted no obvious benefit, negative reviews reported skin outbreaks, whereas most positive reviews highlighted the product's calming properties and compatibility across various skin types. Moreover, of the respondents, 70.0% rated the price positively, 25.0% rated it neutral, and 5.0% rated it negatively. Frequent discounts and a price considered satisfactory for the product quality were major factors in the positive sentiment, whereas neutral opinions viewed the pricing as somewhat pricey but reasonable, and negative responses indicated that the price did not correspond to the perceived quality.

To ascertain whether attitudes toward Skintific beauty products vary by location and customer demographics, future studies could examine consumer perceptions across a wider geographic scope and cultural contexts. Furthermore, to better understand the occurrence of unfavourable reactions, such as skin breakouts, future research may examine the association between sentiment polarity and customer skin characteristics (e.g., oily, dry, sensitive, or acne-prone). Lastly, to further understand the causes of neutral and negative ratings, future studies might use a mixed-methods approach that combines sentiment analysis with in-depth interviews or focus group discussions.

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