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## **Sentiment Analysis and Topic Modeling Study: The Comparison of Cosmetics Product Online Reviews**

Meizhen Hannah Zahirah<sup>a\*</sup>, Tri Widarmanti<sup>b</sup>

<sup>a,b</sup>*School of Economics and Business, Telkom University, Jln. Telekomunikasi No 1, Bandung, 40257, Indonesia*

<sup>a</sup>*Email: meizhen@student.telkomuniversity.ac.id*

<sup>b</sup>*Email: triwidarmanti@telkomuniversity.ac.id*

### **Abstract**

In the competition, companies must orient themselves to serve clients, engage with rivals, and launch products to build a dynamic and competitive corporate environment. The need to meet basic requirements such as clothes, food, and boards, which were formerly straightforward, became increasingly complicated. This can be proven by the development of the cosmetic industry which is marked by the variety of cosmetics on the market. There is currently a need for brand comparison in the business competition since it can make it simpler to understand the strengths and weaknesses of rival companies and serve as a model for enhancing the quality of well-liked items and marketplaces. Indonesia is a very attractive cosmetic market where cosmetic sales data are consistently rising from year to year. Due to the rapid advancement of information technology, buyers now write reviews on social media in addition to conducting online shopping. These online reviews can be helpful for comprehending the shopping process and discussing a product, and affect the customer's plans to make additional purchases in the future. This study compared customer perception of three cosmetics products: powder foundation products from local brands that are Make Over Powerstay Matte Powder Foundation, ESQA Flawless Powder Foundation, and Luxcrime Blur&Cover Two Way Cake, using an online review that was extracted and scraped from a website through the Octoparse Windows program version 8.5.0. This study uses sentiment analysis and topic modeling to compare online reviews of customer perceptions of the three cosmetic products. The result shows the sentiment comparison among three cosmetics brands. The first position is the ESQA brand, followed by the Luxcrime brand, and the last rank is Make Over, with the smallest positive sentiment. The positive brand topics of the three products, in general, are about formulas that are long-lasting and have good coverage, while the negative brand topics, in general, are about formulas that must be reused and transferred when wearing masks.

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\* Corresponding author.

**Keywords:** Comparison; Online Customer Review; Sentiment Analysis; Topic Modeling.

## **1. Introduction**

The Indonesian cosmetic market is growing from year to year, and the trend of selling cosmetics in Indonesia continues to increase even though it has decreased due to the COVID-19 pandemic [1]. The Association of Indonesian Cosmetics Companies and Associations (PPAK Indonesia) projected this year's sales to grow in the range of 7% to \$7.45 million USD from last year's \$6.95 million USD [1]. The Indonesian cosmetic market continues to grow and innovate. Not only are beauty products from foreign countries, but local products also keep popping up and the demand for them increases over time. The result of a survey about beauty trends by Jakpat in the year 2021 shows that among all cosmetic items, lip cosmetics are the best. The product for the face is utilized in the second position the most frequently[2]. The three most popular face complexion types in Indonesia are BB cream, compact powder, and foundation [2]. According to surveys from the Kompas team's internal research, powder foundation is currently one of the most popular choices. For the period from August 1 to August 15, 2021, the best-selling powder foundation brand on Shopee and Tokopedia was Luxcrime, with a market share of 11%, followed by the Make Over brand with a market share of 10.6% [3] and the rating value obtained from the three local makeup powder foundation products was the same as a rating of 4.6/5 with various reviews [4]. The three products compete with the same rating value. A large number of customers utilize social media on a regular basis to share their own views and opinions about the products and services they use. Different social media platforms for buying and selling things online are growing at an exponential rate these days. This enables customers to post about their experiences on social media. Customers are sharing their experiences and behaviors on social media platforms. Experiences and behaviors are becoming increasingly valuable information for businesses as they develop their marketing strategies and compete in the market[5]. All the information contained in the post of customer experience can be scraped off from social media platforms using certain programs. There is a growing interest in using automatic methods such as text mining and sentiment analysis to process large amounts of user-generated data and extract meaningful knowledge and insights. The text mining aims to extract meaningful information from a large number of textual documents quickly [6,7]. The comparison is an important means for a human to understand things by discovering the similarities and differences among objects. Comparative opinion is also a kind of expression style common-used in online reviews [8]. Mining such opinions is of great interest both from researchers' and business perspectives [9,10]. It is important to compare online consumer reviews of the cosmetic powder foundation products to know how to improve product quality, find out the positive sentiments of the products, and find out what topics and words were discussed, and which topics are positively represented by consumers. It is also important to compare the results of the comparison analysis of brand sentiment and brand topics to be the basis for consideration in facing competition in the cosmetic industry, especially for powder foundation products.

## **2. Materials and Methods**

This study used a qualitative method by observing the phenomenon of customers reviewing local Indonesian makeup products. The customer review utilized to see the comparison of Brand Sentiment and Brand Topic from three cosmetics brands through sentiment analysis and topic modeling methods. Data collected from online

review at Sociolla website from three brand cosmetics – powder foundation products (MAKE OVER, ESQA and LUXCRIME). The online reviews are scrap using Octoparse Scraper windows 8.5.0. This study collected 2,420 reviews, that consisting of 1637 reviews of Make Over brand, 274 reviews of ESQA brand, and 509 reviews of Luxcrime brand, and preprocess the data before analyzing to eliminates data and words that irrelevant to topic of study. In the preprocessing data this study removing the duplicates, case-folding in the form of lower cases, tokenizing, filtering stopwords, and stemming. The result of preprocessing data are 2,413 reviews, that consisting of 1,631 reviews on the MAKE OVER brand, 273 reviews on the ESQA brand, and 509 reviews on LUXCRIME. Text Mining is the stages “Reading text documents” and “Converting into a structured format (Text preprocessing)” that are related to the preprocessing the text from the scientific papers. Each paper is a text file that is handled and presented as a word vector [11]. The text preprocessing includes, Tokenize – splits the text of a document into a sequence of tokens; filter tokens - based on their length, with set value, Filter tokens - removes the words with a small length of 2-3 characters, Stem - words using the Porter stemming algorithm applying an iterative, rule-based replacement of word suffixes, intending to reduce the length of the words until a minimum length is reached, Filter stop words - removes stop words from a document, Transform cases - transforms all characters in a document to lower ones [11]. The data then carried out with Sentiment analysis. Sentiment analysis is the process of detecting and analyzing views, sentiments, emotions, and subjectivities in text using a computer [9,10]. By Plotting the data based on positive, negative, and neutral labels. TF-IDF, perform feature extraction using TF-IDF to calculate each word of text in customer reviews, after that this study split data training dan data testing is the distribution of training data and testing data is 80:20 because the system requires more training data to be studied so that the test results can provide better results. Decision Tree, modeling before performing SVM classification. Confusion Matrix SVM, this operator processes data by SVM method and is based on corpus. Confusion matrix SVM is a model validation technique which is primarily intended to estimate the accuracy of data classification when it is run to estimate the accuracy of data classification when run by the system. Classification system performance describes how well the system in classifying data. Confusion matrix is one of method that can be used to measure the performance of a classification method. Basically, the confusion matrix contains information that compare the results of the classification carried out by the system with the results of the classification that should be [14]. There are four terms as representation of the results of the classification process. First, True Positive (TP) is the number of positive data classified as positive data. True Negative (TN) is the number of data negative classified as data negative. False Positive (FP) is the amount of data negative classified as data positive. False Negative (FN) is the number of data positive classified as data negative [14]. After Confusion Matrix SVM process, positive, negative, and neutral sentiment results can be compared. The data online review that has known positive, negative, and neutral sentiments can be identified topics and words that are often discussed and can also know what positive topics are always discussed through the topic modeling process. Topic modeling methodologies such as latent Dirichlet allocation (LDA) are particularly promising. They are capable of identifying a document collection's concealed thematic structure. LDA is a commonly used technique in topic modelling [15]. To find out the functions used in topic modeling in Google Collaboratory, the script used is as follows. First, import pandas as pd: In this stage the dataset that has been obtained from the dataset preprocessing process is inputted in csv and excel formats. Import gensim (Create Bigram& Trigram Models) script model for calculate the coherence score, From gensim.models.coherence model and Lda Model plt.xlabel (Num topics, coherence score, and coherence

values: To obtain the number of topic, coherence score, and coherence values. Building topic modeling, print the result word topic from the highest coherence value. The result of Sentiment Analysis and Topic Modeling is Brand Sentiment and Brand Topic. Brand Sentiment is can be used as a comparing for positive, negative, and neutral labels of the review and Brand Topic is can be used for suggestions to improve the quality of local makeup brand products. After determining the brand sentiment and topic it can be conduct a brand comparison, which involves comparing the words used in customer reviews on the Sociolla website.

### 3. Result and Discussion

The data is cleaned using preprocessing data before going through the preprocessing stage and deleting duplicates, which prepares the data for analysis. Case folding (lower cases), tokenization, filtering stop words, and stemming are the four stages of preprocessing. The preprocessing results produced 2,413 review data, including 1631 reviews of powder foundation products from Make Over, 273 reviews of powder foundation products from ESQA, and 509 reviews of powder foundation products from Luxcrime.

#### 3.1 Sentiment Analysis

After going through the preprocessing data stage, the data will be processed using Google Colaboratory tools. The following Table 1 shows the comparison of brand sentiment from Make Over, ESQA, and Luxcrime brand powder foundation products.

**Table 1:** Brand Sentiment Comparison of Make Over, ESQA, and Luxcrime brand powder foundation products

Brand	Brand Sentiment			Brand Sentiment Rating			
	Positive	Negative	Neutral	Positive		Negative	
Make Over	35,8%	4,5%	59,7%	1.	ESQA	1.	Luxcrime
ESQA	46,2%	4%	49,8%	1.	Luxcrime	2.	Make Over
Luxcrime	38%	6,3%	55,7%	2.	Make	3.	ESQA
					Over		

#### 3.2 Topic Modeling

##### 3.2.1 Make Over

Before going through the LDA-Topic Modeling stage, it is required to calculate a Coherence Score to determine the most optimal number of topics. Coherence Score measures score a single topic by measuring the degree of semantic similarity between high scoring words in the topic. These measurements help distinguish between topics that are semantically interpretable topics and topics that are artifacts of statistical inference [16]. After conducting a Coherence Score analysis, it can be seen that the largest value is reached when the number of topics is 9th with a value of 0.2295. In this research, the highest Coherence Score value is in the 9th number, which is 0.2295, that up to the 9th topic, the information shows a high Coherence value, meaning that the number of 9 topics is relevant to the words that tend to appear in the document. Next, perform an analysis of LDA-Topic Modeling. The results of the analysis are represented in Table 2.

**Table 2:** List of Top Topics and Brand Topics in Make Over Brand User and Customer reviews

<b>Topic</b>	<b>Brand Topic</b>	<b>Coherence Score</b>
<b>Topic_1</b>	long_lasting, powder_foundation, acne_scars, coverage, don't_make, at_all	0,1223
<b>Topic_2</b>	make_over, make_up, don't_make, long_lasting, compact_powder, touch_up, matte_powder, coverage	0,1887
<b>Topic_3</b>	compact_powder, hold_oil, powder_foundation, long_lasting, coverage, oil	0,2150
<b>Topic_4</b>	long_lasting, make_over, hold_oil, make_up, smooth_texture, oil, touch_up, matte_result	0,2145
<b>Topic_5</b>	make_over, use, powder_foundation, long_lasting, for_daily, cover_scar, touch_up	0,1972
<b>Topic_6</b>	long_lasting, powder_foundation, touch_up, not_too, buy,matte_result, acne_scars, coverage	0,2048
<b>Topic_7</b>	make_over, packaging, powder_foundation, long_lasting, acne_scars, repurchase	0,2005
<b>Topic_8</b>	long_lasting, coverage, first_time, matte_powder	0,2196
<b>Topic_9</b>	Hold_oil, long_lasting, coverage, don't_make, cover_scars, face, worth_it	0,2295

Based on Table 2 the topics and words distributed from the results of the LDA-Topic Modeling analysis based on user and customer reviews of Make Over brand powder foundation products on the Sociolla website are 9 topics. From the results of the analysis, it can be seen that the value of Topic\_9 gets a Coherence Score of 0.2295 containing keywords Hold\_oil, long\_lasting, coverage, don't\_make, cover\_scars, face, worth\_it. Based on user and customer review data of the Make Over brand on the Sociolla website, the interpretation and the analysis what topics are discussed from each topic are presented in Table 3. It can be concluded that the Make Over brand powder foundation has a positive brand topic sentiment regarding the long-lasting formula ingredients, its coverage covers acne scars, retains oil when used, has a smooth matte texture, the product is worth it for the price and customers will repurchase. The neutral brand topic discusses the positive and negative sides of the product, and the negative brand topic is about the ingredient formula that must be re-apply or touch-ups for Make Over brand products.

**Table 3:** The results of Interpretation and Analysis of Brand Topics on Each Topic of Make Over Brand Reviews

Topic	Brand Topic	Analysis
<b>Topic_1</b>	long_lasting, powder_foundation, acne_scars, coverage, don't_make, at_all	This shows that Make Over's powder foundation's formula is long-lasting and, covers acne scars. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_2</b>	make_over, make_up, don't_make, long_lasting, compact_powder, touch_up, matte_powder, coverage	This shows that the powder foundation formula is matte, has coverage, lasts long, requires touch-ups, or must re-apply the product. The brand's topic shows a neutral sentiment with positive and negative sides.
<b>Topic_3</b>	compact_powder, hold_oil, powder_foundation, long_lasting, coverage, oil	This shows that the powder foundation ingredient formula is durable, has coverage, is in the form of a compact powder, and holds facial oil when using this brand. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_4</b>	long_lasting, make_over, hold_oil, make_up, smooth_texture, oil, touch_up, matte_result	This shows that the powder foundation formula lasts long, retains oil on the face when applied, and has a smooth, matte texture. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_5</b>	make_over, use, powder_foundation, long_lasting, for_daily, cover_scar, touch_up	This shows that the powder foundation ingredient formula lasts a long time, covers acne scars, is suitable for daily or daily use, and must be re-applied. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_6</b>	long_lasting, powder_foundation, touch_up, not_too, buy,matte_result, acne_scars, coverage	This shows that the powder foundation ingredient formula lasts a long time, the result is matte, the coverage covers acne scars, and the product will be repurchased and reused. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_7</b>	make_over, powder_foundation, acne_scars, repurchase, packaging, long_lasting,	This shows that the powder foundation ingredient formula lasts long, covers acne scars, discusses product packaging and that customers will repurchase Make Over brand products. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_8</b>	long_lasting, coverage, first_time, matte_powder	This shows that the powder foundation formula is long-lasting, the coverage is good, and the result is matte. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_9</b>	Hold_oil, long_lasting, coverage, don't_make, cover_scars, face, worth_it	This shows that the powder foundation ingredient formula lasts a long time, covers acne scars, and retains facial oil when used, and the makeover brand products are worth the price. The brand's topic of the review is dominantly showing positive sentiment.

3.2.2 ESQA

After conducting a Coherence Score analysis, it presented that the largest value is reached when the number of topics is 9th with a value of 0.2830. In this study, the highest Coherence Score value is in the 6th number, which is 0.2830, so that up to the 9th topic, the information shows a high Coherence value, meaning that the number of 9 topics is relevant to the words that tend to appear in the document. Next, perform an analysis of LDA-Topic Modeling. The results of the analysis are presented in Table 4.

**Table 4:** List of Top Topics and Brand Topics in ESQA Brand User and Customer reviews

<b>Topic</b>	<b>Brand Topic</b>	<b>Coherence Score</b>
<b>Topic_1</b>	shade, product, long_lasting, soft, reasonable	0,1618
<b>Topic_2</b>	really, powder_foundation, very, acne_scars, don't make	0,1779
<b>Topic_3</b>	long_lasting, full_coverage, stand, dry, daily, use	0,2713
<b>Topic_4</b>	powder_foundation, acne_scars, smooth, not enough, compact	0,2358
<b>Topic_5</b>	powder_foundation, overly, packaging, full_coverage, look_like, heavy	0,2512
<b>Topic_6</b>	Product, look_like, acne_scars, long_lasting, really	0,2830
<b>Topic_7</b>	powder_foundation, acne_scars, reasonable	0,2770
<b>Topic_8</b>	really, flawless, good, long_lasting, acne_scars, price, appropriate	0,2790
<b>Topic_9</b>	use, acne_scars, suitable, no, purchase, increase, face	0,2807

Based on Table 4 the topics and words distributed from the results of the LDA-Topic Modeling analysis based on user and customer reviews of ESQA brand powder foundation products on the Sociolla website are 9 topics. From the results of the analysis, the value of Topic\_6 gets a Coherence Score of 0.2830 containing keywords Product, look\_like, acne\_scars, long\_lasting, really. Based on user and customer review data of the ESQA brand on the Sociolla website, the interpretation and the analysis what topics are discussed from each topic are presented in Table 5. It can be concluded that the ESQA brand powder foundation has a positive brand topic sentiment regarding the long-lasting formula ingredients, the coverage covers acne scars, the facial texture when used is flawless, suitable for daily use, and the product is worth it for the price. The neutral brand topic discusses the positive and negative sides of the product, and the negative brand topic is about the ingredient formula, which is not soft when used, feels heavy when used, and does not buy to repurchase the ESQA brand powder foundation product.

**Table 5:** The results of Interpretation and Analysis of Brand Topics on Each Topic of ESQA Brand Reviews

<b>Topic</b>	<b>Brand Topic</b>	<b>Analysis</b>
<b>Topic_1</b>	shade, product, long_lasting, soft, reasonable	This shows that the ESQA brand's powder foundation formula is long-lasting, has a soft texture, and has a decent range of shades. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_2</b>	really, powder_foundation, very, acne_scars, don't make	This shows that the powder foundation ingredient formula does not cover acne scars. The brand review topic is dominantly showing negative sentiment.
<b>Topic_3</b>	long_lasting, full_coverage, stand, dry, daily, use	This shows that the powder foundation formula is long-lasting, has full coverage, is suitable for daily use, and makes the skin dry when used. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_4</b>	powder_foundation, acne_scars, smooth, not enough, compact	This shows that the powder foundation ingredient formula does not cover acne scars, the texture is not smooth. The brand review topic is dominantly showing negative sentiment.
<b>Topic_5</b>	powder_foundation, overly, packaging, full_coverage, look_like, heavy	This shows that the powder foundation formula has full coverage and feels heavy on the skin when used. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_6</b>	Product, look_like, acne_scars, long_lasting, really	This shows that the powder foundation formula is long-lasting and covers acne scars. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_7</b>	powder_foundation, acne_scars, reasonable	This shows that the formula of powder foundation ingredients is sufficient to cover acne scars. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_8</b>	really, flawless, good, long_lasting, acne_scars, price, appropriate	This shows that the powder foundation ingredient formula lasts a long time, the facial texture is flawless, covers acne scars, and the price is by the goods issued. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_9</b>	use, acne_scars, suitable, no, purchase, increase, face	This shows that the powder foundation ingredient formula covers acne scars, and is suitable but does not repurchase the product. The brand review topic shows a neutral sentiment with positive and negative sides.

### 3.2.3 Luxcrime

After conducting coherence score, the highest Coherence Score was achieved up to the 9th topic with a Coherence Score of 0.2693. In this study, the highest Coherence Score value is in the 7th number, which is 0.2693, so up to the 9th topic, it shows high Coherence value information, meaning that the number of 9 topics is relevant to the words that tend to appear in the document. Next, perform an analysis of LDA-Topic Modeling. The results of the analysis are presented in Table 6.

**Table 6:** List of Top Topics and Brand Topics in Luxcrime Brand User and Customer reviews

<b>Topic</b>	<b>Brand Topic</b>	<b>Coherence Score</b>
<b>Topic_1</b>	acne_scars, fall_in love, not_too, true, correct, if, use	0,2069
<b>Topic_2</b>	long_lasting, worth_it, pores, mask_transfer, cute_packaging	0,2250
<b>Topic_3</b>	not_too, acne_scars, coverage, really, pores	0,2203
<b>Topic_4</b>	long_lasting, acne_scars, really, acne_scars	0,2475
<b>Topic_5</b>	touch_up, acne_scars, long_lasting, really, coverage	0,2544
<b>Topic_6</b>	acne_scars, long_lasting, make_up, pores	0, 2538
<b>Topic_7</b>	long_lasting, not enough, oil, first_time, coverage, reasonable	0,2693
<b>Topic_8</b>	acne_scars, first_time, two_way, long_lasting, don't make, scars	0,2658
<b>Topic_9</b>	pores, long_lasting, mask_transfer, oil, pores	0,2544

Based on Table 6 the topics and words distributed from the results of the LDA-Topic Modeling analysis, based on user and customer reviews of Luxcrime brand powder foundation products on the Sociolla website are 9 topics. From the results of the analysis, the value of Topic\_7 gets a Coherence Score of 0.2693 containing keywords long\_lasting, not enough, oil, first\_time, coverage, reasonable. Based on user and customer review data of the Luxcrime brand on the Sociolla website, the interpretation and the analysis what topics are discussed from each topic are presented in Table 7. It can be concluded that the Luxcrime brand powder foundation has a positive brand topics sentiment regarding the long-lasting formula ingredients, the coverage covers acne scars, and customers feel the product is worth the price. The neutral brand topic discusses the positive and negative sides of the product, and the negative brand topic is about the formula of ingredients that are less resistant to face oil when used and when using a Luxcrime brand powder foundation product, it can transfer to the mask and make the mask user dirty.

**Table 7:** The Result of Interpretation and Analysis of Brand Topics on Each Topic of Luxcrime Brand Reviews

<b>Topic</b>	<b>Brand Topic</b>	<b>Analysis</b>
<b>Topic_1</b>	acne_scars, fall_in love, not_too, true, correct, if, use	This shows that when the Luxcrime brand powder foundation formula is used, the texture is not too soft and covers acne scars. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_2</b>	long_lasting, worth_it, pores, mask_transfer, cute_packaging	This shows that the powder foundation ingredient formula lasts a long time, talks about the pores after use, the packaging is cute, and it's worth it and the procedure transfers to the mask when using the product. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_3</b>	not_too, acne_scars, coverage, really, pores	This shows that when used, the powder foundation coverage formula does not cover acne scars and pores too much. The brand review topic is dominantly showing negative sentiment.
<b>Topic_4</b>	long_lasting, acne_scars, really, acne_scars	This shows that the powder foundation formula is long-lasting and covers acne scars. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_5</b>	touch_up, acne_scars, long_lasting, really, coverage	This shows that the powder foundation ingredient formula lasts a long time, the coverage covers acne scars, and needs re-use or touch-ups. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_6</b>	acne_scars, long_lasting, make_up, pores	This shows that the powder foundation formula is long-lasting and covers acne scars. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_7</b>	long_lasting, not enough, oil, first_time, coverage, reasonable	This shows that the powder foundation ingredient formula is durable, does not hold facial oil when used, and has sufficient coverage. The brand review topic shows a neutral sentiment with positive and negative sides.
<b>Topic_8</b>	acne_scars, first_time, two_way, long_lasting, don't make, scars	This shows that the powder foundation ingredient formula lasts a long time, the coverage covers acne scars, and does not leave scars when used. The brand's topic of the review is dominantly showing positive sentiment.
<b>Topic_9</b>	pores, long_lasting, mask_transfer, oil, pores	This shows that the powder foundation ingredient formula lasts long, retains oil when applied, and transfers to the mask. The brand review topic shows a neutral sentiment with positive and negative sides.

### 3.3 Analysis of Brand sentiment and Brand topics Comparison Results

After knowing the brand sentiment and brand topics of each powder foundation product brand, a comparative comparison can then be made. A comparative comparison of each brand can be seen in Table 8.

**Table 8:** Brand sentiment and Brand topics Comparison Analysis Results

Brand	Brand Topics		Brand Sentiment		Sentiment Brand Ranking			
	Positive	Negative	Positive	Negative	Positive	Negative		
Make Over	Long-lasting formula ingredients, its coverage covers acne scars, retains oil when used, has a smooth matte texture, and customers feel that the product is worth the price and will repurchase it.	The ingredient formula that must be re-apply or touch-ups.	35,8%	4,5%	1. ESQA 2. Luxcrime 3. Make Over	1. Luxcrime 2. Make Over 3. ESQA		
ESQA	Long-lasting formula ingredients, the coverage covers acne scars, the facial texture when used is flawless, suitable for daily use and customers feel the product is worth it for the price.	The ingredient formula is not soft, feels heavy when used, and does not buy to repurchase the ESQA brand powder foundation product.	46,2%	4%				
Luxcrime	With long-lasting formula ingredients, the coverage covers acne scars, customers feel the product is worth the price.	The formula of ingredients is less resistant to face oil when used and when using a Luxcrime brand powder foundation product can transfer to the mask and make the mask user dirty.	38%	6,3%				

The transformation of raw data into pertinent knowledge that can advance or address a problem is a crucial strategic goal of data processing. Reports, charts, and graphs are frequently produced through data processing. Among the various benefits of data processing are improved decision-making, increased productivity, and financial gains. It is the procedure for gathering data and turning it into information. Data processing must be done correctly in order to avoid altering the final outcome or output of the data [17]. These table is interpretation of analysis of the data, from the table comparison above, it can be seen that, there are different rankings of all the analytical methods carried out. From the results of the sentiment analysis (Brand Sentiment and Sentiment Brand Ranking), the highest-ranking on positive sentiment is the ESQA brand, followed by the Luxcrime brand, and the last is the Make Over brand. The highest ranking on negative sentiment is the Luxcrime brand, followed by the Make Over brand, and the last is the ESQA brand. When viewed from the ranking of these two sentiments, namely positive and negative, it can be seen that the ESQA powder foundation product is a superior brand, because it has the most positive sentiment but the least negative sentiment. Based on the results of the sentiment analysis, can be as reference so that the brand sentiment ranking increases better than it is competitor brands and continuously improves the quality performances of its products. The results of topic modeling can be used as information to find out and be more responsive to what topics are most discussed by consumers. The common positive topics of the three powder foundation products brand Make Over, ESQA, and Luxcrime can show what topics are of interest so that they can attract the attention of consumers, such as, the ingredients of durable product formulas, covering acne scars, holding face oil when wearing can be suggestions for improving the quality of the product. Brand Topic can be used to make suggestions and comparisons to customers who use makeup powder foundation products, as well as recommendations to manufacturers to improve product quality and adjust marketing strategies to compete with other brands. In addition, local brand cosmetic companies can see the interaction of their competitors' reviews based on suggestions and criticisms derived from the results of sentiment analysis and topic modeling for further analysis of competitive perceptions regarding product quality and become the basis for strategic decisions regarding local brand cosmetic products.

#### **4. Conclusion**

Based on the Sentiment Analysis result, it is known that the Brand Sentiment of each product formed in the review of powder foundation brands Make Over, ESQA, and Luxcrime with the ranking of the best positive sentiment is the ESQA brand, the second place is the Luxcrime brand, and the last is the Make Over brand. While brand that has the most significant negative sentiment is the Luxcrime brand, the second place is the Make Over brand, and the last is the ESQA brand. From the analysis of Topic Modeling, it is known that the Brand Topic of each of the Make Over, ESQA, and Luxcrime powder foundation products. Positive topics often discussed for the Make Over brand are its long-lasting formula ingredients, its coverage covers acne scars, retains oil when used, has a smooth matte texture, and customers feel that the product is worth the price and will repurchase it. Positive topics that are often discussed for the ESQA brand are long-lasting formula ingredients, the coverage covers acne scars, the facial texture when used is flawless, suitable for daily use and customers feel the product is worth it for the price. Positive topics often discussed for the Luxcrime brand are long-lasting formula ingredients, the coverage covers acne scars, and customers feel the product is worth the price. The negative topic often discussed for the Make Over brand is the ingredient formula that must be re-applied or touch-ups. The negative topic that is often discussed for the ESQA brand is that the ingredient formula is not

soft when used, feels heavy, and does not buy to repurchase the ESQA brand powder foundation product. The negative topic often discussed for the Luxcrime brand is the formula of ingredients that are less resistant to face oil when used and when using a Luxcrime brand powder foundation product can transfer to the mask and make the mask user dirty.

## References

- [1] PPAK Indonesia, "PPA Kosmetika," *PPAK Indonesia*, 2021. <https://ppakosmetika.com/>.
- [2] Jakpat.net, "blog.jakpat.net," 2021. <https://blog.jakpat.net/2021-beauty-trends-jakpat-survey-report/> (accessed Sep. 06, 2022).
- [3] Kompas.co.id, "Data Penjualan 10 Brand Bedak Terlaris Shopee dan Tokopedia: Lokal Bersaing!," 2021. <https://kompas.co.id/article/bedak-terlaris/>.
- [4] Review.soco.id, "review.soco.id," 2022. <https://review.soco.id/product/pressed-powder/81390-flawless-powder-foundation> (accessed Feb. 21, 2022).
- [5] I. Ahmad, T. Ali, A. Nazir, and S. Kamal, *Social Media Competitive Analysis of Shoe Brands on Customer Experiences*, vol. 932. Springer Singapore, 2019.
- [6] W. He, S. Zha, and L. Li, "Social media competitive analysis and text mining: A case study in the pizza industry," *Int. J. Inf. Manage.*, vol. 33, no. 3, pp. 464–472, 2013, doi: 10.1016/j.ijinfomgt.2013.01.001.
- [7] B. Liu, S. G. Cao, and W. He, "Distributed Data Mining for E-Business. Information Technology & Management," vol. 12(1), pp. 1–13, 2011.
- [8] J. Jin, P. Ji, and R. Gu, "Identifying comparative customer requirements from product online reviews for competitor analysis," vol. 49, pp. 61–73, 2016.
- [9] H. Wang, S. Gao, P. Yin, and J. N. . Liu, "Competitiveness analysis through comparative relation mining: evidence from restaurants' online reviews," *Manag. data Syst.*, vol. 117 (4), pp. 672–687, 2017.
- [10] Y. Kim, R. Dwivedi, J. Zhang, and S. . Jeong, "Competitive intelligence in social media twitter: iphone 6 vs. Galaxy S5," vol. 40 (1), pp. 42–61.
- [11] S. Sulova, L. Todoranova, B. Penchev, and R. Nacheva, "Using text mining to classify research papers," *Int. Multidiscip. Sci. GeoConference Surv. Geol. Min. Ecol. Manag. SGEM*, vol. 17, no. 21, pp. 647–654, 2017, doi: 10.5593/sgem2017/21/S07.083.
- [12] N. Li and D. D. Wu, "Using text mining and sentiment analysis for online forums hotspot detection and forecast," *Decis. Support Syst.*, vol. 48, no. 2, pp. 354–368, 2010, doi: 10.1016/j.dss.2009.09.003.

- [13] B. Pang and L. Lee, "A Sentimental Education: Sentiment Analysis Using Subjectivity Summarization Based on Minimum Cuts," pp. 271–278, 2004, doi: 10.3115/1218955.1218990.
- [14] I. Rasila, U. Ristian, J. Rekayasa Sistem Komputer, and F. H. MIPA Universitas Tanjungpura Jl Hadari Nawawi, "Implementasi Metode Naive Bayes Classifier Pada Sistem Pengklasifikasi Berita Otomatis Berbasis Website (Studi Kasus: Berita Lokal Dari Mediamassa Online Kalimantan Barat)," *Coding J. Komput. dan Apl.*, vol. 07, no. 2, pp. 49–60, 2019.
- [15] D. M. Blei, "Probabilistic topic models," *Commun. ACM*, vol. 55, pp. 77–84, 2012.
- [16] K. Stevens, P. Kegelmeyer, D. Andrzejewski, and D. Buttler, "Exploring topic coherence over many models and many topics," *EMNLP-CoNLL 2012 - 2012 Jt. Conf. Empir. Methods Nat. Lang. Process. Comput. Nat. Lang. Learn. Proc. Conf.*, no. July, pp. 952–961, 2012.
- [17] J. Yang, P. Xiu, L. Sun, L. Ying, and B. Muthu, "Social media data analytics for business decision making system to competitive analysis," *Inf. Process. Manag.*, vol. 59, no. 1, p. 102751, 2022, doi: 10.1016/j.ipm.2021.102751.