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Identification of Karleen Hijab Fashion SMEs Competitors Based on Sentiment Analysis Using Naïve Bayes Classifier Algorithm

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Abstrak

Usaha Kecil Menengah (UKM) Hijab Fashion perlu mengembangkan merek keunggulan sebagai sumber daya saing UKM. Namun, sebagian besar UKM Fashion Hijab mengalami keterbatasan dalam mengembangkan keunggulan kompetitif merek mereka. Penelitian ini dilakukan untuk mengetahui dan memahami keunggulan bersaing dari kompetitor UKM Karleen Hijab Fashion sebagai obyek kajian. Metode yang digunakan adalah analisis sentimen dengan menggunakan algoritma Naïve Bayes. Analisis sentimen dilakukan dengan menggunakan data review dari e-commerce Shopee. Pengolahan data analisis sentimen dilakukan dengan menggunakan software Orange. Analisis sentimen menggunakan algoritma Naïve Bayes menghasilkan nilai rata-rata AUC, CA, F1, precision, dan recall yang memadai untuk seluruh brand UKM Hijab Fashion yaitu 0,72, 0,887, 0,856, 0,833, dan 0,887. Berdasarkan persentase sentimen positif terbesar pada masing-masing atribut fashion quality, diketahui keunggulan kompetitif Lozy terdapat pada atribut Fabric Quality (30,77%), dan Good Fit (15,38%), serta keunggulan kompetitif Halwa adalah pada atribut Design (34,19%). Keunggulan kompetitif Hijup terdapat pada atribut Serviceability (21,74%) dan Packaging(15,38%), dan keunggulan kompetitif Lafiye terdapat pada atribut Price (6,17%). Keunggulan bersaing merek Deenay terdapat pada atribut Reliability (20,89%), sedangkan Karleen tidak memiliki keunggulan relatif pada setiap atribut kualitas fashion karena persentase sentimen positif untuk masing-masing atribut masih berada di bawah pesaing.

Kata kunci: *analisis sentimen, ulasan online Shopee, atribut kualitas fashion, keunggulan kompetitif*

Abstract

Hijab Fashion Small and Medium-Sized Enterprises (SMEs) need to develop competitive advantages brands as a source of SME competitiveness. However, most Hijab Fashion SMEs experience limitations in developing the competitive advantages of their brands. This research was conducted to find out and understand the competitive advantages of Karleen Hijab Fashion SME competitors as the object of study. The method used is sentiment analysis using the Naïve Bayes algorithm. Sentiment analysis was carried out using online review data of Shopee e-commerce. Sentiment analysis data processing was done using orange data mining software. Sentiment analysis using the Naïve Bayes algorithm produced an average value of AUC, CA, F1, Precision and adequate recall for the entire Hijab Fashion SME brand, which is 0.72, 0.887, 0.856, 0.833, and 0.887. Based on the percentage of the largest positive sentiment on each fashion quality attribute, it is known that competitive advantages of Lozy are in the Fabric Quality Attribute (30.77%), and Good Fit (15.38%), and Halwa's competitive advantage is in the Design attribute (34.19%). Competitive advantages of Hijup are on the Serviceability Attribute (21.74%) and Packaging (15.38%), and Competitive advantages of Lafiye are on the Price Attribute (6.17%). Competitive advantages of Deenay brand are on the Reliability Attribute (20.89%), while Karleen does not have a relative advantage on any fashion quality attribute because the percentage of positive sentiment for each attribute is still below competitors.

Keywords: sentiment analysis, online review Shopee, fashion quality attribute, competitive advantages

I. INTRODUCTION

According to the State of the Global Islamic Economy Report of 2022, world Muslims' spending on fashion will increase by 5.7% in 2021, from US$279 billion to US$295 billion, and it is expected to grow by 6.0% in 2022 to US$313

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billion and reach US$375 billion by 2025 at a 4-year CAGR of 6.1%. Data from the State of the Global Islamic Economy Report in 2019 - 2020 shows that Indonesia as the country with the largest Muslim population in the world ranks third as the best developer of Muslim clothing. In addition, from the report data, it is also known that Indonesia spends around US$20 billion per year or equivalent to Rp300 trillion per year. The data shows that the potential for the growth of the Muslim fashion business is very promising, especially in Indonesia.

Currently, the most widely used online sales media by Muslim fashion businesses is e-commerce. E-commerce is a solution for Muslim fashion SMEs who have a limited budget in carrying out their marketing activities. Based on the results of research conducted by iPrice (2022) regarding the most influential e-commerce companies in Southeast Asia, it is known that Shopee, Lazada, and Tokopedia dominated the Southeast Asian e-commerce market in the first quarter of 2022. In addition, the results of NeuroSensum's research [1] show that Shopee is considered an ideal e-commerce for sellers because Shopee provides Relationship Manager (RM) as a seller service to help online sellers in their business development. In shopee e-commerce, there are at least 75 hijab fashion SME brands with shopee mall and or star status. This number does not include other hijab fashion SME brands with basic seller status. Therefore, it can be concluded that the competition for hijab fashion SMEs in online media is quite high.

In order to compete with fellow hijab fashion SMEs, hijab fashion SMEs can use the results of buyer's reviews on Shopee e-commerce as a basis for developing product competitiveness. One of the hijab fashion SMEs who use shopee as an online sales medium is Karleen Hijab. Based on the comparison of shopee rates, product similarities, and the number of shopee followers, it is known that there are at least 5 main competitors Karleen Hijab including (1) Lozy, (2) Deenay, (3) Lafiye, (4) Hijup and (5) Halwa. The comparison of the profile of Karleen Hijab with its competitors can be seen in Table 1.

Based on Table 1, it is known that Karleen Hijab has the lowest number of followers compared to its competitors. The greater the number of followers, the greater the opportunity to create sales. One of the efforts that can be made to increase the number of followers is to develop product competitiveness compared to competitors. The first step in developing product competitiveness is to identify competitors' competitive advantages so that aspects or product attributes can be further developed as a source of competitiveness. In this study, sentiment analysis was carried out using online shopee review data on the SME brand hijab fashion of Karleen and its competitors to find out and understand the competitive advantages of competitors.

Technological advances cause the need for the use of sentiment analysis to continue to increase in various forms of application [2]. Reference [2] shown by their research, found that sentiment analysis has been used on various topics such as social media monitoring, vehicle-based services, product or service reviews, tourism-based services, health-based services, and financial services. In addition, the use of sentiment analysis in business helps decision makers to understand how customers perceive and evaluate product and service performance. Sentiment analysis of online reviews also provides vital information about customer experience [3]. Reference [4] shown by their study, found that business people and consumers use reviews on online platforms as quality metrics which then influence consumer purchasing decisions. In addition, [5] in their research conducted a sentiment analysis of online review data taken from the Amazon e-commerce website to identify customer needs. The research resulted in a framework for analyzing online product reviews using a statistical approach so that creative product design processes can be carried out.

Table 1. Competitor comparison of Fashion Hijab SMEs – Karleen Hijab

Brand name	Shopee follower	Rate	Types of products					
			Hijab	Tops	Bottom	Long dress	Suits	Mukena
Lozy	340,5K	4,9	v	v	v	v	v	v
Deenay Official	108,4K	4,9	v	v	v	v	v	v
Lafiye	33,5K	4,9	v	v	v	v	v	v
Hijup	28,5K	4,9	v	v	v	v	v	v
Halwa Official	23,6K	4,9	v	v	v	v	v	v
Karleen	7,9K	4,9	v	v	v	v	v	v

In general, the sentiment analysis process consists of 4 stages [3] namely (1) Data Collection, (2) Data Preprocessing, (3) Analysis & Scoring (4) Data Visualization & Interpretation. In the first stage of Sentiment Analysis, data collection was carried out based on the research objectives. At this stage, the search and collection of datasets that meet the research requirements are carried out. Furthermore, in the second stage, data preprocessing is carried out where the data is cleaned using a series of certain procedures such as converting the upper case to lower case, removing unnecessary and multiple pronunciations, removing hashtags and URLs, text correction, and removing stop words. In the third stage, the researcher determines the method or model used to process the dataset that has gone through preprocessing in the previous stage. Based on the technical perspective, there are three methods of sentiment analysis including lexicon-based techniques, machine-learning-based techniques, and hybrid techniques. The last stage is data visualization & interpretation, at this stage the researcher visualizes the results of the dataset processing in charts or graphs to get insights that are easy to understand.

II. RESEARCH METHOD

In this study, sentiment analysis on online reviews was carried out using orange data mining software. The first step in this research is to take data (scraping) of online reviews on shopee e-commerce using web scraping techniques. Next, labeling was done manually into 3 label levels, namely positive, neutral, and negative. The labeling was carried out based on the word in the product review. In addition, product reviews were also classified based on fashion quality attributes, namely fabric quality [6], [7], [9], design [6], [7], price [6], [8], [9], reliability [10], serviceability [10], good fit [8], [11] and packaging.

The next step is to do data preprocessing, namely Transformation, Tokenization, Filtering, and N-Gram. Transformation is carried out to transform raw data into more uniform data so that the analysis process can be carried out easily [12]. The transformation procedures carried out include Lowercase, removing accents, parsing html, and removing URLs. The next process in data pre-processing is tokenization. The tokenization procedure used is Regexp or Regular Expression. With Regexp, data will be separated into words by removing punctuation marks such as periods (.) and commas (,). After tokenization, filtering was performed. Filtering serves to eliminate words that have no meaning and retain words that are considered important. The filtering procedures used in this research are Stopwords, Regexp, and Most frequent tokens. The last stage in data preprocessing is N-Gram. N-Gram allows word merging based on word prediction results [12]. After the N-gram procedure was performed, the data can be visualized in a word cloud so that the main topics in the dataset can be identified.

The next stage is Analysis & Scoring. The analysis method used is the Multilingual Sentiment method with Indonesian by using the Sentiment Analysis widget on the Orange Data Mining software. The source of the Multilingual Sentiment Database in the Orange Data Mining software is the Data Science Lab site that stores lexicon or word dictionaries. Meanwhile, for Scoring, the Naïve Bayes Algorithm was used. Scoring The Naïve Bayes algorithm produces statistical parameters that can be used to evaluate the results of sentiment analysis. The statistical parameters used are AUC, CA, F1, Precision and Recall. The last stage in sentiment analysis is data visualization & interpretation. At this stage, by using the distribution widget in the Orange Data Mining software, the percentage of sentiment for each fashion quality attribute can be seen. The data can be used to understand the weaknesses and strengths of the hijab fashion SME brand based on the fashion quality attribute. In addition, visualization and interpretation of data was also done with the Confusion Matrix widget. The Confusion Matrix widget was used to find out the misclassified data from the classification using the Naïve Bayes algorithm.

III. RESULT AND DISCUSSION

A. Stage 1: Data Collection (Scraping)

Data scraping was done by using the Web Scraper tool as an online review data retrieval tool. The online review data used in this study was taken from Shopee e-commerce. The online review data collected for five Hijab fashion SME brands is as much as 888 review data. The raw data was then labeled positive, neutral, and negative sentiment based on the words in the review. The online review data recapitulation based on the labeling results for each hijab fashion SME brand can be seen in Table 2.

B. Stage 2: Data Preprocessing

The data that has been given a sentiment label and classified per attribute was then entered into the data preprocessing stage. The stages of data preprocessing include Transformation, Tokenization, Filtering, and N-Gram. Data

preprocessing was carried out to prepare the data so that it can be more easily analyzed. The results of the data preprocessing were then visualized in a word cloud. Figures 1 to 5 are word cloud data online reviews for each Hijab Fashion SME brand that have gone through the data preprocessing stage. The comparison of the main topics in each Hijab Fashion SME word cloud brand can be seen in Table 3. In Table 3, it can be seen that the main topics commonly found in the six Hijab Fashion SME word cloud brands are "Material", "Color", “Good”, “Cozy”, “Like”, “Soft”, “Fast”, “Convenient”, “Comfortable”, “Price”, “Delivery”. Some of the main topics that only appear in one Hijab Fashion SME brand and become a differentiating topic compared to other brands are “Pas” – Lozy, “Original” – Deenay, “Wangi” – Lafiye, “Bonus” – Hijub, “Ramah“ – Karleen. On the other hand, only the Halwa brand does not have a main topic differentiator. The main topics of online review of the Halwa brand have similarities with the main topics of other hijab fashion SME brands.

Table 2. Recapitulation of total online review data based on sentiment labels

Hijab Fashion SME Brand	Online Review Sentiment			Total Data
	Positive	Neutral	Negative	
Lozy	106	0	11	117
Deenay	143	5	10	158
Lafiye	134	3	25	162
Hijup	139	5	17	161
Halwa	109	5	3	117
Karleen	154	7	12	173
Total Data				888

Table 3. Comparison of main topic word cloud brand UKM Hijab Fashion

Hijab Fashion SME Brand	Main topic word cloud
Lozy	“Bahan”,”Warna”,”Bagus”,”Adem”,”Suka”,”Lembut”, ”Cepat”, ”Sesuai”,”Nyaman”, ***“Pas”***,”Harga”
Deenay	***“Original”***,”Barang”,”Bagus”,”Cepat”,”Suka”,”Pengiriman”, ”Bahan”,”Sesuai”, ”Kualitas”
Lafiye	“Bahan”,”Bagus”,***”Wangi”***,”Tebal”,”Enak”,”Warna”,”Cantik”, ”Ringan”,”Suka”, ”Pengiriman”,”Nyaman”,”Sesuai”, ”Adem”,”Harga”
Hijup	“Bahan”,”Pengiriman”,”Bagus”,”Adem”,***”Bonus”***,”Warna”,”Cepat”,”Sesuai”, ”Nyaman”, “Lembut
Halwa	“Bahan”,”Warna”,”Bagus”,”Adem”,”Suka”,”Pengiriman”,”Cepat”, ”Sesuai”,”Cantik”
Karleen	“Bagus”,“Cepat”,”Sesuai”,“Pengiriman”,“Warna”,”Adem”,”Cantik”, “Bahan”,”Kualitas”,***”Ramah”,***”Harga”,”Nyaman”

Figure 1. Word Cloud Online Review Lozy Hijab

Figure 2. Word Cloud Online Review Deenay Hijab

Figure 3. Word Cloud Online Review Lafiye Hijab

Figure 4. Word Cloud Online Review Hijup Hijab

C. Stage 3: Analysis & Scoring

This study uses the Indonesian Multilingual Sentiment method as an analysis method, namely by using the Sentiment Analysis widget on the Orange Data Mining software. As for the Scoring stage, this research uses the Naïve Bayes Algorithm. The recapitulation of statistical parameter results from the analysis and scoring stages can be seen in Table 4. In Table 4, you can see the values of AUC, CA, F1, Precision, and recall. The AUC value is used to measure discriminatory performance based on the probability of positive or negative population output [13]. The greater the AUC value, the better the data classification results [14]. Based on the results of sentiment analysis data processing, the AUC value of the Naïve Bayes model for each Hijab Fashion SME brand is greater than 0.5. In addition, the CA or Classification Accuracy value shows the accuracy value of the classification results [15].

In Table 4, it is known that the CA value of all Hijab Fashion SME brands is greater than 0.8. Therefore, it can be concluded that the classification results from sentiment analysis have a high accuracy value, which is above 0.8 on average. On the other hand, the value of F1 can be interpreted as the harmonic mean of precision and recall.

Figure 5. Word Cloud Online Review Halwa Hijab

Figure 6. Word Cloud Online Review Karleen Hijab

The F1 value reaches the best value at 1 and the worst value at 0. The data in Table 4 shows the F1 value for all Hijab Fashion SME brands is greater than 0.8. In Table 4, there are Precision and Recall values where Precision shows the classifier's ability not to give positive labels to negative samples and vice versa while Recall shows the classifier's ability to find and classify all positive samples [15]. The value of Precision and Recall for all hijab fashion brands is greater than 0.8. Based on the values of AUC, CA, F1, Precision, and Recall, it can be concluded that the evaluation results of the Naïve Bayes model sentiment analysis are valid.

D. Stage 4: Data Visualization & Interpretation

The data visualization & interpretation stage was carried out to understand the weaknesses and strengths of the hijab fashion SME brand using sentiment percentage data for each fashion quality attribute through the distribution widget on the Orange Data Mining software. The recapitulation of sentiment distribution data per fashion quality attribute can be seen in Table 5. The percentage of positive sentiment data can be interpreted as a strength while negative sentiment data can be interpreted as a weakness of the Hijab Fashion SME brand.

Table 4. Recapitulation of evaluation results on Naïve Bayes Model

Hijab Fashion SME Brand	Evaluation Results: Naïve Bayes Model				
	AUC	CA	F1	Precision	Recall
Lozy	0.658	0.906	0.861	0.821	0.906
Deenay	0.658	0.899	0.857	0.819	0.899
Lafiye	0.875	0.895	0.885	0.876	0.895
Hijup	0.755	0.845	0.808	0.786	0.845
Halwa	0.581	0.889	0.889	0.901	0.889
Karleen	0.795	0.890	0.838	0.792	0.890

Table 5. Recapitulation of sentiment distribution data per attribute

Review	Fashion Quality Attribute	Hijab Fashion SME Brand					
		Lozy	Deenay	Lafiye	Hijup	Halwa	Karleen
Positive Sentiment	Fabric Quality	30.77%	20.25%	27.16%	19.88%	28.21%	24.86%
	Design	18.80%	20.25%	19.14%	12.42%	34.19%	15.03%
	Good Fit	15.38%	4.43%	12.35%	6.21%	0.85%	10.40%
	Packaging	3.42%	5.06%	1.85%	9.32%	6.84%	1.73%
	Price	4.27%	5.70%	6.17%	3.73%	0.00%	2.89%
	Reliability	9.40%	20.89%	6.79%	13.04%	13.68%	20.81%
	Serviceability	8.55%	13.92%	9.26%	21.74%	9.40%	13.29%
Negative Sentiment	Fabric Quality	2.56%	0.00%	11.11%	0.62%	0.00%	2.31%
	Design	2.56%	0.63%	1.23%	1.24%	0.85%	2.31%
	Good Fit	0.00%	0.00%	2.43%	2.48%	1.71%	0.58%
	Packaging	0.00%	1.27%	0.00%	0.00%	0.00%	0.00%
	Price	0.85%	0.00%	0.00%	0.00%	0.00%	0.58%
	Reliability	2.56%	1.27%	0.00%	5.59%	0.00%	1.16%
	Serviceability	0.85%	3.16%	0.62%	0.62%	0.00%	0.00%

Based on the data on the percentage of positive sentiment in Table 5, it can be seen that the Lozy brand and Lafiye brand have strength on the same attributes, namely Fabric Quality (Lozy 30.77%; Lafiye 27.16), Design (Lozy 18.8%; Lafiye 19, 14), and Good Fit (Lozy15.38%; Lafiye 12.35%). In addition, Brand Deenay, Brand Hijub, Brand Halwa, and Brand Karleen also have strength in the same attributes, namely the Fabric Quality attribute (Deenay of 20.25%; Hijup of 19.88%; Halwa of 28.21%; Karleen of 24.86%), Design (Deenay of 20.25%; Hijup of 12.42%; Halwa of 34.19%; Karleen of 15.03%), and Reliability (Deenay of 20.89%; Hijup of 13.68%; Halwa of 13.68%; Karleen of 20,81%). On the other hand, from the data in Table 5, it can be seen that brands that excel in each fashion quality attribute are based on the most positive Sentiment data on the attributes of Fabric Quality, Design, Good Fit, Packaging, Price, Reliability, and Serviceability which are Fabric Quality - Brand Lozy. (30.77%), Design - Halwa Brand (34.19%), Good Fit - Lozy (15.38%), Packaging - Hijup (15.38%), Price - Lafiye (6.17%), Reliability - Deenay (20.89%) and Serviceability - Hijup (21.74%). On the other hand, based on the most negative sentiment data on each sequential attribute, it is known that the weaknesses of each hijab fashion SME brand are Fabric Quality - Brand Lafiye (11.11%), Design - Brand Lozy (2.56%), Good Fit - Hijup (2.48%), Packaging - Deenay (1.27%), Price - Lozy (0.85%), Reliability - Hijup (5.59%) and Serviceability - Deenay (3.16%). Visualization and interpretation of data was also done using the Confusion Matrix widget. The output of the Confusion Matrix widget is misclassified data of the classification on Naïve Bayes algorithm. The recapitulation of misclassified data for each Hijab Fashion SME brand can be seen in Table 6. The data in Table 6 shows that the average amount of misclassified data is still relatively low, which is below 26 data, so it can be concluded that the accuracy of the classification results is good.

Tabel 6. Recapitulation of data missclasified

Hijab Fashion SME Brand	Data missclasified
Lozy	11
Deenay	16
Lafiye	17
Hijup	25
Halwa	13
Karleen	22

IV. CONCLUSION

Sentiment analysis of online review data using the Naïve Bayes algorithm for the entire Hijab Fashion SME brand resulted in an adequate widget test & score value, namely the average value for AUC, CA, F1, Precision, and sequential recall was 0.72, 0.887, 0.856, 0.833, and 0.887. In addition, from the results of online review data processing on the word cloud widget, it is known that the main topics which distinguish each Hijab Fashion SME brand is no different from other competing brands. The identification of the Competitive Advantages of Karleen's competitors, namely the Lozy, Deenay, Lafiye, Hijup, and Halwa brands, is known based on the distribution of positive sentiment on online reviews of data processing results on the Distribution widget. A large percentage of positive sentiment indicates the competitive advantages or strength of the brand. The Lozy brand and the Lafiye brand have strengths on the same attributes, while Deenay Brand, Hijub Brand, Halwa Brand, and Karleen Brand also have strength in the same attribute. On the other hand, based on the largest percentage of positive sentiment on each fashion quality attribute, it is known that the superior brand for the attributes of Fabric Quality, Design, Good Fit, Packaging, Price, Reliability, and Serviceability respectively is Fabric Quality - Lozy Brand (30.77%), Design - Halwa Brand (34.19%), Good Fit - Lozy (15.38%), Packaging - Hijup (15.38%), Price - Lafiye (6.17%), Reliability - Deenay (20.89%) and Serviceability - Hijup (21.74%), while Karleen does not have a relative advantage on any attribute because the percentage of positive sentiment for each attribute is still below competitors. Based on the online review sentiment analysis data, it can be concluded that Karleen does not yet have competitive advantages compared to its competitors. Therefore, Karleen needs to make improvements to the overall fashion quality attributes to be able to compete with its competitors.

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