Twitter Data Analysis on Halal Labeling: Insights for the Food Industry in Indonesia

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This research uses text data mining techniques and the Drone Emprit Academic (DEA) system to identify and collect current problems related to the Halal label. The data analyzed includes 2,665 conversations from August 19, 2022 to March 15, 2023. The results show that conversations around the Halal label are closely related to the popular food franchise industry, with words such as "gacoan," "food," and "mixue" appearing the most frequently. In addition, this research found that sentiment towards the halal label varied, with 52% positive sentiment, 44% negative sentiment, and 3% neutral sentiment. Interestingly, in this finding, the initial discussion regarding Gacoan and Mixue which had a negative sentiment then turned positive after they both obtained halal certification and displayed the halal logo on their products. Thus, the implications of this research can contribute to further understanding of social media data analysis related to Halal labels in the food industry in Indonesia as well as increasing insight and thinking regarding this issue, and offering further research directions.

Keywords: Halal label; Sentiment analysis; Twitter; Drone emprit academic

INTRODUCTION

The development of the halal industry is now a top priority in several countries in building the world economy, not only Muslim countries, even non-Muslim countries also have a high level of awareness and concern for developing the halal industry in every field of the halal chain. This momentum can be utilized by non-Muslim producer countries such as Brazil, Argentina, Australia, New Zealand and Singapore as countries with the highest Global Islamic Economy Indicator (GIEI) values in 2017-2018 in the halal food sector (Zein et al., 2022).

Indonesia, which has the largest Muslim population, has significant potential to develop the halal industry. An important factor behind this potential is the country's large Muslim population, which accounts for 12.7% of the total number of Muslims worldwide. In 2020 alone, estimates suggest that around 229 million Muslims live in Indonesia. This figure is comparable to 87.2% of Indonesia's total population, which is estimated at 273 million (Fathoni, 2020).

The increase in these numbers is certainly in line with the increasing demand for halal products and services. In 2019, consumption of world halal products exceeded USD 2.2 trillion or grew 5.2% every year (KNKS, 2020). This makes the need for halal products not only a fulfillment of sharia rules for Muslims but is one of the standards recognized by the world. As a result, competition in the halal industry has become increasingly fierce, opening up opportunities for companies, especially in emerging markets to benefit from the potential of the halal product market (Zein et al., 2022).

However, Indonesia's readiness to compete in the halal product market is still considered minimal due to the weak level of public awareness of the importance of halal products (Kurniawati and Savitri, 2020). The lack of literacy about halal products makes people less concerned about halal food. If public awareness and concern for halal products is low, of course this makes producers less likely to seek halal certification. Therefore, it is important to understand people's views on halal awareness in Indonesia (Khasanah, 2020).

In the era of digital technology, social media is now an important choice in disseminating information and knowledge to build halal awareness. One example is twitter, a social media platform that provides space for users to exchange ideas, discuss and express their feelings and perceptions (Laato et al., 2020). With the number of twitter users in Indonesia reaching 11.3 million (Rahmanti et al., 2021), this creates an opportunity to explore how public insights related to halal labeling in the food industry in Indonesia.

There are several studies that have been conducted in the field of sentiment analysis on halal products involving several researchers. (Hidayat et al., 2021) conducted research with the aim of extracting data from twitter, analyzing keywords, and the polarity of twitter users' opinions on the halalness of products globally. The results show that the main keywords in twitter users' opinions include food, beverages, warranty, and environment, with the majority of positive views around 70%. (Afandi et al, 2023) focused their research on sentiment analysis related to changes in the halal logo on twitter using the Support Vector Machine (SVM) algorithm. The results show that SVM with oversampling produces high accuracy, while SVM with undersampling has lower performance. Finally, (Mustofa, 2018) studied sentiment related to halal food on social media and identified positive sentiment in general. Through clustering analysis, halal food consumers can be grouped into four different segments, showing significant diversity in their views on halal, including factors such as religiosity, individual identity, animal welfare, and food authenticity. These studies provide important insights into people's views on product halalness and its influence on business and consumer behavior.

This research found that the study of sentiment in the context of twitter social media is still less explorative, and there has been no previous research that specifically analyzes sentiment related to halal labels in the food industry using the Drone Emprit Academic (DEA) approach. Therefore, this research is the first step in exploring this relevant topic.

This study aims to fill the research gap by analyzing public sentiment related to the halal label on twitter. Data is obtained from Drone Emprit Academia (DEA) and various approaches are used to analyze activities, sentiments, and content related to the halal label on twitter. The main objective is to provide an overview of the diverse public sentiments related to halal labeling in the food industry. The hope is that the findings of this study have the potential to be a highlight for policy makers and related parties in taking the next steps in assessing public views on halal labeling in the food industry, as well as being of deeper concern to the general public.

Furthermore, this paper is organized as follows. First, this paper presents the background and objectives of the study, the second section reviews related

literature, while the third section describes the methodology, including data and models. The fourth section presents and reports the results. Finally, the fifth section concludes with a summary of the main discussion and recommendations.

LITERATURE REVIEW

Halal Industry

According to the language of the halal industry is a combination of two words, namely industry and halal. Meanwhile, according to the Big Indonesian Dictionary (KBBI) industry is an activity in managing or processing goods products using facilities and equipment, such as machines. Meanwhile, the word halal means not violating sharia rules. So it can be interpreted that the halal industry is an activity in managing or processing a product of goods or food using infrastructure that is permitted and does not violate sharia rules (Duratul Ummah, 2022). These activities have also been supported by Law No.33 of 2014 concerning Halal Product Guarantee which encourages the development of the halal industry in Indonesia.

The great need for Muslim consumers to guarantee the halalness of a product that will be used is the beginning of the creation of the halal industry (Fathoni, 2020). This will continue to grow along with Muslims' awareness of the importance of applying religious values in a broader scope (Ahmad Jamal, Juwaidah Sharifuddin, 2015). The halal industry involves the entire process of economic activity, from obtaining raw materials, processing, to producing final products that meet halal requirements (Harizah and Usman, 2022). Halal products are products that are declared allowed to be used in accordance with the provisions of Islamic law (Yunita, 2018). The halal products in question are not limited to food and beverages consumed, but also include every good and service used by consumers.

In its growth, several characteristics emerged in response to the growth of the halal business as follows (Bank Indonesia, 2021):

1. Halal products are not only intended to be consumed by Muslims, but can also be consumed by non-Muslims.
2. For a Muslim, halal products are a fulfillment of security requirements in the aspect of religiosity. As for consumers and industry players in general, halal is the fulfillment of quality, safety, and health requirements in using and consuming their products.

3. Products that are halal certified have been tested and audited for halalness.
4. Halal business actors can come from Muslim and non-Muslim producers, as long as they can meet halal standards which include human resources, raw materials, production processes, and financing.

Halal Labeling on Food

In terms of the Indonesian dictionary, food refers to any type of material that can be consumed, such as dishes, side dishes, and various types of cakes. Meanwhile, the meaning of beverages according to the terminology definition refers to liquid substances that can be drunk, whether it is ordinary water or liquids that have undergone changes in color and taste through processing. In accordance with Government Regulation of the Republic of Indonesia Number 28 of 2004, food includes everything that comes from biological sources and water, both processed and raw that is intended for human consumption. This includes food additives, food raw materials, and other components used in the process of preparation, processing, and manufacture of food and beverages (Evita Farcha Kamila, 2020).

MUI halal certification is basically a form of protection of consumer rights, especially Muslim consumers. Halal certification serves as a marker of whether a product is eligible to be labeled MUI halal or not (Nasution, 2020). The process of determining halal certification involves a team of auditors consisting of LPPOM MUI, BPPOM, the Health Office, and several related agencies. The benefits of MUI halal certification are very important and have various urgencies, not only for consumers and business actors but also for local governments and MUI itself. For consumers, halal certification provides confidence and a sense of security when consuming or using a product. Meanwhile, for producers, halal certification provides protection against issues that can harm and disrupt the sale of their products (Elif Izberk-Bilgin & Cheryl C. Nakata, 2016).

Twitter Text Mining Using Sentyment Analysis

The rapid advancement of information technology and the wide coverage of communication networks, especially the internet, has slowly become an integral part that is difficult to separate from human life. It has become a necessity and trend in society. Web media and social networks continue to generate large amounts of unstructured text data, such as personal or group blogs, platforms such as Facebook, forums,

groups, free posts, documentation and so on (Firdaus and Firdaus, 2021).

Text Mining is the process of discovering knowledge in textual databases, also known as Knowledge Discovery in Textual Database (KDT) (Feldman and Dagan, 1995). It can also be defined as the exploration or search of data in the form of text. The main objective is to identify new knowledge that may not have been known before. This process aims to understand, explore, and uncover the potential and practical patterns or knowledge contained in text data sets large and unstructured, as in a massive corpus (a large number of texts that comprehensively and densely cover the use of language in written or spoken form) (Tan, 2011).

Among researchers, Twitter is recognized as an impactful and accessible networking tool for individuals in different countries, which promotes accessibility and inclusion in the scientific world by utilizing a variety of alternative images and texts (Power, 2022). In addition, the social media platform Twitter also plays an important role in analyzing user sentiment by recognizing and classifying polarity in text, to determine whether a particular document has a positive or negative value according to predetermined categories (Watrianthos et al., 2022). In addition, some Twitter users have the freedom to express their views on various issues. Of course, this can be efficiently utilized to understand public responses, which has the opportunity to assist countries in influencing public responses. In practice, there are various branches of text analysis that can be applied depending on the specific purpose, one of which is sentiment analysis.

Sentiment analysis is a branch of research in the Text Mining domain that began to be widely used in the early 2002s (Rusydiana & Marlina, 2020). Sentiment analysis is crucial in assessing opinions that are rapidly developing among the public. In recent years communication platforms have experienced tremendous growth in terms of data volume that cannot be addressed and analyzed manually. Therefore, researchers have developed highly efficient methods to manage this data. Generally, the main steps in data processing involve data collection, text preparation, sentiment identification, sentiemn classification, and result presentation (Aqlan et al., 2019). Furthermore, sentiment analysis can reveal emotions such as happiness, sadness, or anger, so it can be the basis for the development of the halal industry in general and halal labeling in particular.

Previous Research

Since sentiemn analysis has become one of the most active research areas in the field of Natural Language Processing (NLP), researchers from various fields have realized that this method has advantages and facilitates in identifying sentiments or public views on certain issues, especially those related to halal labels on food on social media platforms.

Research conducted by Hidayat et al (2021) entitled "Mapping Keywords and Polarity of Twitter User Sentiments Towards Product Halal" with the aim of extracting data from Twitter and analyzing keywords and polarity of Twitter user opinions on product halalness globally. This research uses an experimental approach by collecting Tweet data for five years starting from 2015 to 2020 using keywords in English related to product halalness. The Twitter data was then processed using the Rstudio text mining technique and then the polarity was analyzed using the naïve bayes classifier method.

The results indicate that the main keywords in Twitter users' opinions regarding product halalness include food, beverage, warranty, and environment. In addition, the opinion polarity shows that the majority of Twitter users have a positive opinion about the halalness of these products, with around 70% adopting a positive view, 16% being neutral, and the rest being negative. These findings open up business opportunities in the field of halal food in the global market, and are expected to encourage entrepreneurs to obtain halal certification on their products.

The next research came from Afandi et al (2023) trying to analyze public opinion on Twetter social media regarding changes in the halal logo using sentiment analysis using a machine learning approach, namely the Support Vector Machine (SVM) algorithm. In this study, oversampling and undersampling were used to overcome the imbalance of sentiment classes in the data. The study results show that the Support Vector Machine (SVM) model trained with oversampled training data has high performance reaching 71% accuracy, 67% precision, 61% recall, and 61% f1-score. Meanwhile, training using undersampled training data resulted in lower performance, with 56% accuracy, 51% precision, 57% recall, and 52% f1-score.

Finally, research by Mohamed M. Mostafa (2018) examines the sentiment of halal food expressed on social media by analyzing a random sample of 3,919 halal food Tweets. In general, descriptive statistical analysis successfully identified positive sentiments of halal food. Meanwhile, through the partitioning around

medoids (PAM) clustering approach, it was revealed that halal food consumers can be grouped into four distinct segments. Thus, it appears that halal food consumers have significant diversity that can be classified based on various factors such as level of religiosity, individual identity, views on animal welfare, and concern for food authenticity. Other studies with a sentiment analysis approach can be seen in Aziza (2023), Maulida & Hakim (2022), Hakim et al., (2022), and Maliha (2023).

As revealed in the literature, researchers found that studies on sentiment in the context of Twitter social media are still limited, and there is no research related to sentiment analysis on halal labels using the Drone Emprit Academic approach. Therefore, this research is the first research to discuss the topic.

RESEARCH METHOD

This study collected data from Twitter using the Twitter Crawling technique with the Drone Emprit Academy (DEA) engine (https://dea.uii.ac.id/) developed by Media Kernel Indonesia by analyzing Twitter conversations by submitting the keyword "Halal Label" from August 19, 2022 - March 15, 2023 and obtaining 2,665 conversations on Twitter. Then the data collected includes user profiles (user id, username, number of followers) and tweet data (user, timestamp, geolocation, number of retweets, number of replies, and tweet content).

Furthermore, using the streaming method, the DEA system uses the Application Program Interface (API) service of the Twitter platform to collect

conversations in real time. By using the Twitter Crawling technique, the Drone Emprit Academic (DEA) engine (https://dea.uii.ac.id/) developed by Media Kernel Indonesia. Drone Emprit is able to monitor and analyze social media, online news, and other sources in near real-time (Fahmi et al., 2021). Twitter social media analysis is popularly used because it is a source of data that is quite large and easily accessible. In managing social media data, especially Twitter, the Drone Emprit Academic (DEA) system uses the Application Program Interface (API) service from the Twitter platform to collect conversations in real time using the streaming method (Fahmi, 2018). Furthermore, in Twitter developers provide the Twitter Search API to get real-time access to the latest collection of tweets published in the last 7 days filtered through a specific query (Miftahuddin et al., 2023). The results displayed are in the form of percentage trends, retweet relationships, mention trends graphs, most retweeted statuses, conversation trends. Thus, these data can make a reference to read various and current social phenomena (Arianto, 2020). The "lexicon" method is utilized to classify public conversations based on sentiment by collecting words classified as positive, negative, or neutral (Miftahuddin, 2023). As for the research process shown in Figure 1, the API will perform a DEA search (Step 1) to collect the requested tweets and data collected from Twitter Streaming and Twitter Crawl (Step 2) and process them into the index server based on the SOLR system described in the DEA big data architecture framework as addressed in Figure 2.
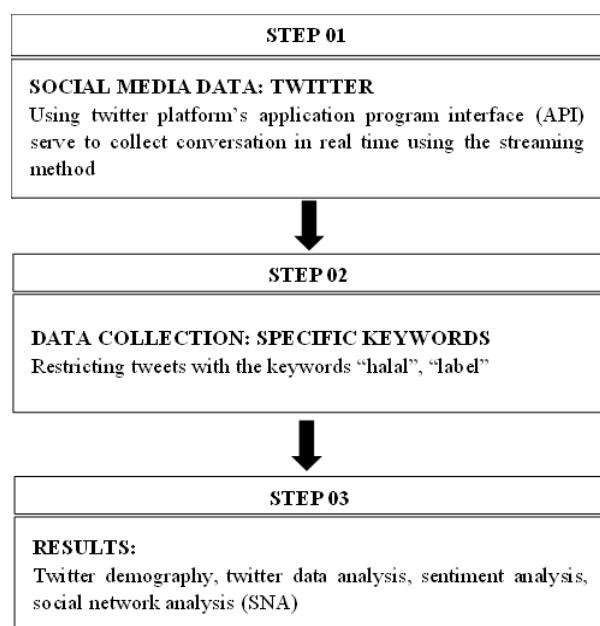

STEP 01

SOCIAL MEDIA DATA: TWITTER
Using twitter platform's application program interface (API) serve to collect conversation in real time using the streaming method

↓

STEP 02

DATA COLLECTION: SPECIFIC KEYWORDS
Restricting tweets with the keywords "halal", "label"

↓

STEP 03

RESULTS:
Twitter demography, twitter data analysis, sentiment analysis, social network analysis (SNA)
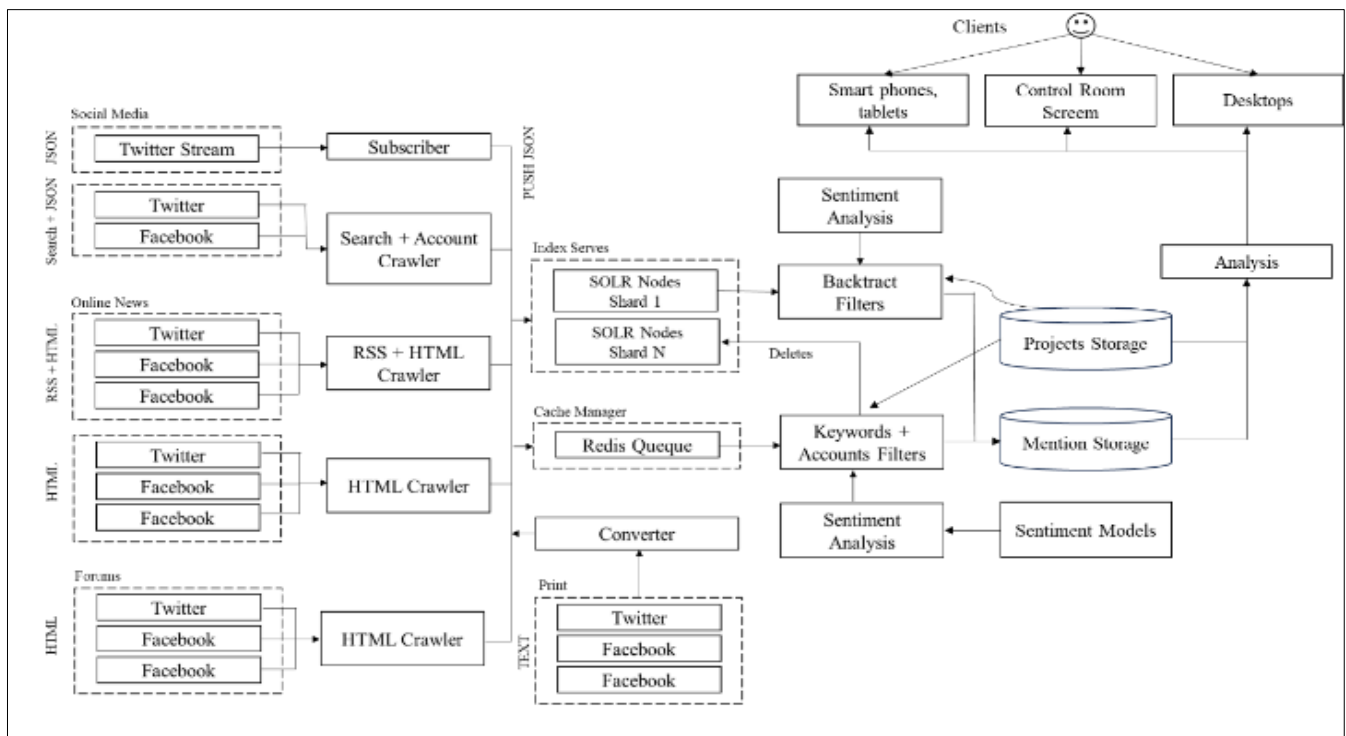
Figure 1. Research Steps

Figure 2. Drone Emprit Academy (DEA) Big Data Architecture (Fahmi, 2016)

RESULT AND DISCUSSION

Twitter Demographics

In analyzing the demographics of Twitter users both by age and location, it is done to understand the point of view of certain groups. Especially in the halal industry. Knowing the demographics of Twitter users helps evaluate how relevant the research results are to the intended market. Demographics can inform possible market segments, such as Muslim consumers in certain countries or people of a certain age who are more active on social media. This information can help companies or groups create marketing plans that are more targeted and cater to specific market needs.
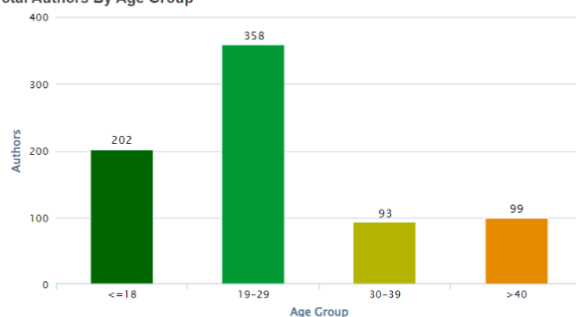
Demographics by Age

Statistics by Age Group

Age Group	Authors	Authors (%)	Posts	Posts (%)	Retweeted	Mentions	Replies
18	202	26.86 %	223	26.45 %	99	51	73
19-29	358	47.61 %	397	47.09 %	207	64	126
30-39	93	12.37 %	102	12.10 %	49	23	30
40	99	13.16 %	121	14.35 %	44	37	40

Author Statistics

Active authors
2,350

Identified Authors
752

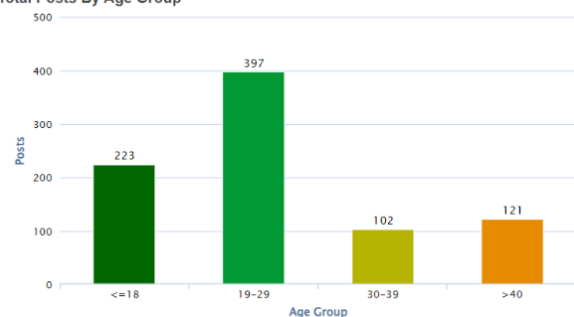Identified Authors (%)
32.00 %

Demography By Age

Figure 3. Number of Users and Posts by Age

Of the 2,665 tweets collected through the Drone Emprit Academic (DEA) engine, there are 2,350 active users involved in the halal label conversation. Of the 2,350 there are 752 identified users. The conversation was dominated by the millennial generation as much as 47.61% or 358 active users and the zillennial generation as much as 26.86% or 128 active users on Twitter social media. This number indicates that there is halal awareness in responding to the halal label issue among millennials and zillennials. This is in line with the 2019-2024 Indonesian Sharia Economic Masterplan, which states that the millennial generation is a player in economic development around the world (Bappenas, 2018). Therefore, the development of the halal industry in Indonesia must pay attention to the profiles of the two generations, namely millennials and zillennials. In short, millennials are increasingly aware and concerned about the integrity of halal status and are also always curious about the processes and activities involved along the supply chain whether the products they buy are truly halal until the end of consumption (Osman & Aziz, 2018).

There are many factors that influence halal awareness including religiosity which has a positive effect on increasing halal awareness (Mutmainah, 2018). In addition, what is no less important is that knowledge or literacy in halal awareness is also a factor that encourages awareness of switching to halal products and becomes a behavior or lifestyle among Muslim communities. Finally, from the results of this analysis, it can be seen that the comparison between the number of authors and the number of posts has a gap that is not too large or correlated. This means that the topic of halal labels is still a hot topic and is widely discussed on Twitter social media.

Demographics by Location
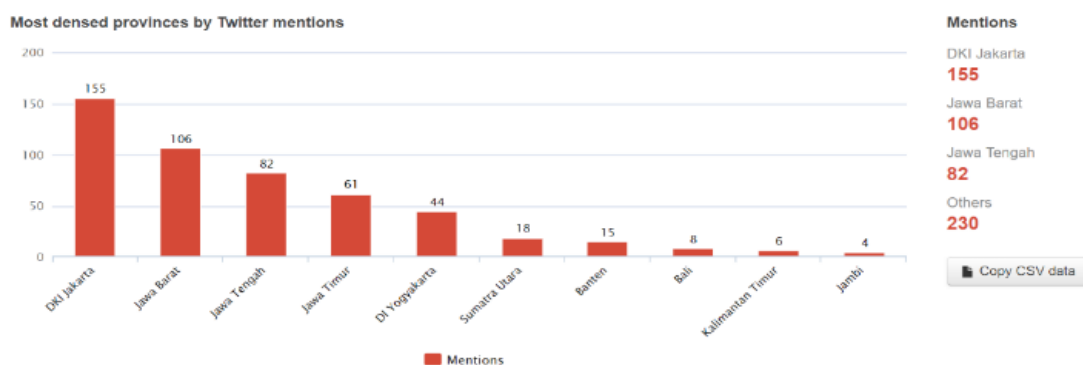

Figure 4. User Demographics in Indonesia

Figure 5. User Demographics by Province

Figure 6. User Demographics by City

Next is the demographic data of users from twitter conversations with the keyword halal label which includes provinces and cities in Indonesia. In general, it can be concluded that the topic of halal labels is a topic that is widely discussed in provinces dominated by Java, which consists of big cities such as DKI Jakarta (155 conversations), West Java (106 conversations), and Central Java (82 conversations). While the city of Jakarta is the city with the most conversation centralization. From this, a red thread can be drawn showing the level of halal awareness in provinces and big cities.

Twitter Data Analysis
Wordcloud

Figure 7. Wordcloud

Furthermore, from the results of the conversation, analysis is carried out through the word frequency tool through wordcloud aims to find problems/issues that are often discussed with the highest repetition. The size of the word in the word frequency results shows a higher frequency of occurrence than others. With the help of keyword analysis, it is intended to gain an understanding of the current trends of research topics. Based on the 100 wordcloud word frequencies, it was found that the words with the highest frequency were gacoan (76), food (73), and mixue (56). In addition, the results also showed some other interesting relevant terms such as mui, guarantee, safe, clear, kemenag, bread, pork, logo, drink, and product.

Sentiment Analysis

Drone Emprit Academic (DEA) presents interesting and significant results in conducting social media analysis in the form of netizen/public sentiment on the analyzed topic. According to Miftahuddin et al. (2023) the "lexicon" method is used to classify public conversations based on sentiment by collecting words classified as positive, negative, or neutral (Rusydiana & Izza, 2022) as shown in Figure 7 which is the result of sentiment analysis on the topic of halal labels and presented in more detail regarding sentiment trends based on time periods:
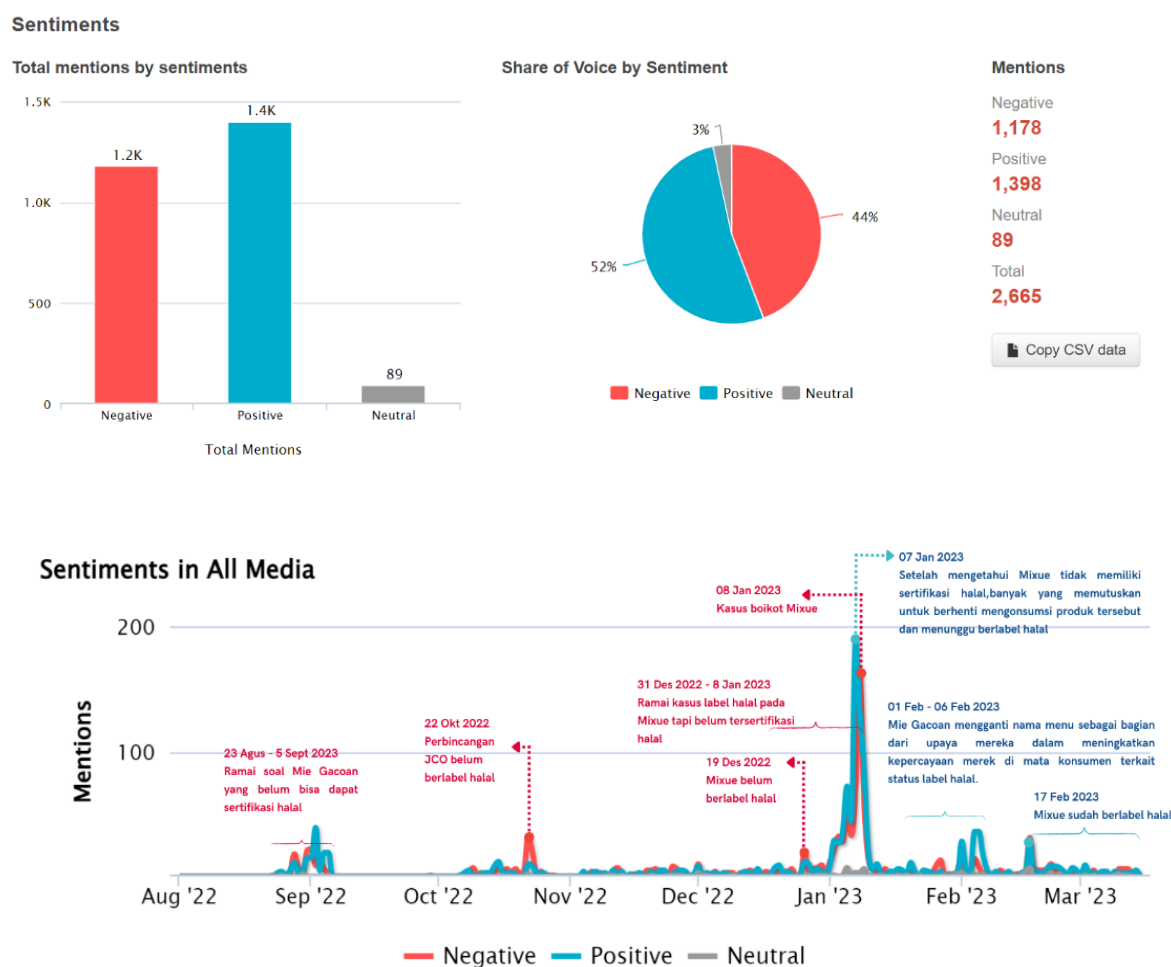
Figure 8. Sentiment Analysis

Based on the analysis period, 52% or 1,398 netizen conversations had positive sentiments and 44% or 1,178 conversations had negative sentiments. Meanwhile, only 3% or 98 mentions were recorded as neutral. The sentiment analysis results show some interesting findings in netizen conversations related to the food industry in Indonesia. During the analysis period, there were significant fluctuations in netizen sentiment towards the issue of halal labeling in the food industry. Negative sentiment appeared on August 25 to September 5, 2022, mainly related to Gacoan which did not yet have a halal label (Republika, 2022). Furthermore, a new issue with negative sentiment reappeared on October 22, 2022 related to JCO which does not yet have a halal label (Media Pemalang, 2022). The conversation then focused on Mixue on December 19, 2022, which was also not halal certified. The peak of negative sentiment occurred in early January 2023, when consumers expressed disappointment that Mixue had put up a halal logo without having a valid halal certificate. In fact, this led to a boycott case against

Mixue. The analysis confirms that halal labeling plays an important role in consumers' views on food products. Consumers tend to have negative sentiments towards brands that do not have halal certification, and this can have an impact on their brand image and sales.

Finally, the findings related to the conversation about Gacoan and Mixue had faded, positive conversations resurfaced in February 2023 after both obtained halal certification and displayed the halal logo on their products. This shows that the act of obtaining halal certification and communicating the halalness of products through the halal logo can change consumers' positive perceptions and sentiments towards these brands.

Overall, the results of this analysis highlight the importance of halal labeling in the food industry in Indonesia and how consumer sentiment can change along with brands' actions to obtain halal certification. This sentiment can also impact brand image and consumer trust, which should be carefully managed by stakeholders in the food industry.
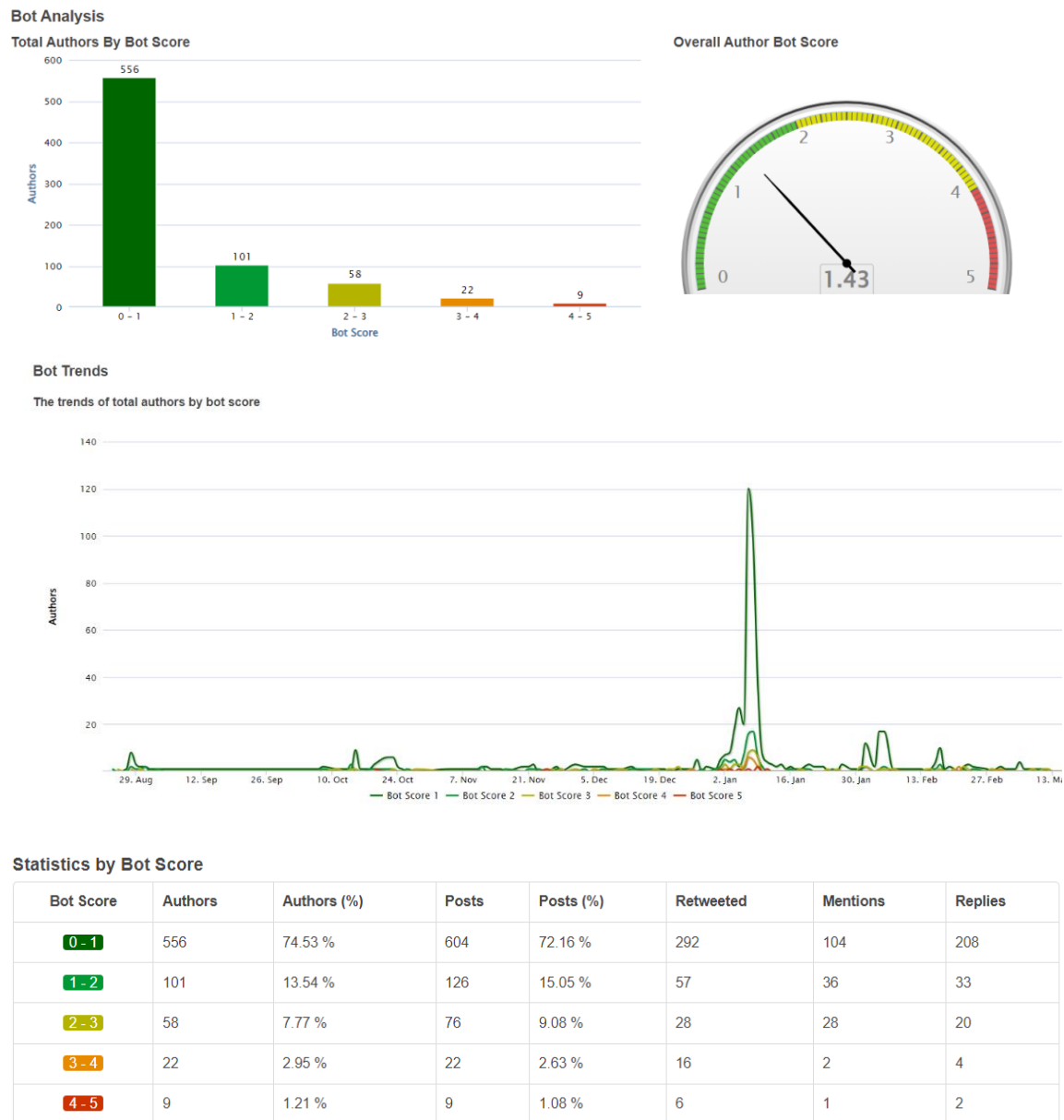
Table 1. Conversations Based on Sentiment Results

Sentiment	Account	Mentions	Retweet
Positive	@fathoughts__	@Alyanayhn @fathurizalhbllh @tanyakanrl the previous gacoan did not get a halal label not because the food is not halal, just the naming is not appropriate because the mui halal label has provisions for naming. it's the same as snacks with strange names, it's still halal, but if you apply for halal certification, you can't.	128
	@BayuAngora	At first, we loved Mixue. But after we found out that Mixue does not have a halal label, we were finally guided to stop following the halal label.	175
	@belajarlagiHQ	Finally, Mie Gacoan changed the name of the menu to get the halal label, after years of debate. This is part of their efforts to increase "brand trust" in the eyes of consumers. Especially now that consumers are increasingly critical & selective in choosing brands. https://t.co/Uu9U0ro9dO	119
	@ataspinggir	@mojokdotco No halal label does not mean haram, but mixue blm dapet halal logo because 90% of the raw materials are imported from china. So I have to get halal certification from China first. Instead of insisting on buying something that you don't know is halal or haram, it's better to eat halal ice cream, of which there are thousands.	41
	@coklatpanasku	@Askrlfess Even though not all of RI's population is Muslim. So if there are outlets that haven't gotten the halal label, Muslims should have the awareness not to buy their products. I really wanted to buy it, then I found out that there was no halal certificate yet, so I just waited for halal.	14
Negative	@PFTee	This is so forced, isn't it? If there is no HALAL LABEL, people who are not allowed to eat should NOT BUY. It's not the person's business that is being demoed/closed down. Police officers @ListyoSigitP @DivHumas_Polri must be firm, don't allow thuggery in the name of anything including religion. @kemendagri @gibran_tweet https://t.co/B0BLrxljMq	198
	@panjimascom	Ministry of Religious Affairs: Halal logos and labels can only be installed if they are certified, currently, Mixue does not have a Halal Certificate https://t.co/pwtq7IzaXF	5
	@cinnamonbunss_	@Askrlfess Honestly, I'm really confused why it has to be boycotted because it doesn't have a halal label, from the beginning mixue didn't claim that they were halal? There are also many other f&b businesses that don't have a halal label, why is it only mixue that is boycotted? Besides, if you know that there is no halal label and you have doubts, THEN BUY IT 😭	3

Bot Analysis

Finally, bot analysis is carried out to find out whether the conversation is happening naturally or not. In short, this analysis is aimed at finding out whether bot or fake accounts are accounts in social media that are controlled by certain software programs for their content and behavior. Bot accounts themselves can distort the hubbub of voices on social media so that it

appears as if many people are talking about it or, even worse, be perceived as a public voice and even become a strategy for manipulation of public opinion on social media (Mosioi & Mailoa, 2021). Therefore, in analyzing conversations in cyberspace, it is important to detect the presence of bots and what are the patterns of conversations using bots, to see whether there is manipulation of public opinion or not.

Bot Analysis

Total Authors By Bot Score

Overall Author Bot Score

Bot Trends

The trends of total authors by bot score

Statistics by Bot Score

Bot Score	Authors	Authors (%)	Posts	Posts (%)	Retweeted	Mentions	Replies
0 - 1	556	74.53 %	604	72.16 %	292	104	208
1 - 2	101	13.54 %	126	15.05 %	57	36	33
2 - 3	58	7.77 %	76	9.08 %	28	28	20
3 - 4	22	2.95 %	22	2.63 %	16	2	4
4 - 5	9	1.21 %	9	1.08 %	6	1	2

Figure 9. Bot Account Analysis by User

Figure 9 shows the botometer which is a tool for checking the activity of a Twitter account and giving a score of the possibility (probability) that the account is a bot (robot) with the score (Fahmi, 2020) as follows:
- Score 0-1, indicates that the activity and interaction are consistent with the pattern expected from a

human account, and there are no suspicious signs related to bot activity.
- Score 1-2, has some very minimal signs of bot activity, but generally considered as a legitimate human account. The interaction pattern may vary

slightly, but still tends to be towards a human account.

• Score 3-4, The interaction pattern may be more mixed, and there are clearer signs of bot activity. The activity may be suspicious and inconsistent with the human interaction pattern that is usually seen on the platform.

Score 4-5, considered to have very strong signs as a bot account. The activity is very suspicious and often does not have the characteristics of natural human interaction. From the analysis of bot accounts based on the number of posts from users, it can be concluded in general that the posts from users occur naturally, dominated by bot scores ranging from 0-1 as many as 604 posts (72.16%) with users involved as many as 556 users (74.53%), followed by posts with a range of 1-2 as many as 126 posts (15.65%) with users involved as many as 101 users (13.54%). On average, the overall score of posts based on bots is known to be 1.43. With that, the number of 1.43 confirms that the robot account is quite small which proves that the conversation that occurs on Twitter is natural. In other words, the conversation that occurs is not engineered or manipulated. Therefore, it can be concluded that the conversation that occurs on the discussion of halal labels, both supporting and criticizing, is a manifestation of public aspirations represented by netizens. This further confirms that social media is a channel of civic aspirations related to the discussion of halal labels on social media Twitter.

FINDINGS

In the era of digitalization that is taking place, Twitter has become one of the most popular social media platforms for many people. This is a place where individuals can freely talk about various topics that interest them, ranging from politics to popular culture, as well as various relevant social issues (Jackson et al., 2018; Rusydiana & As-salafiyah, 2022). Furthermore, from the analysis that has been done, it reveals a number of interesting findings in Twitter conversations related to the issue of halal labels. The first finding is based on the number of tweets dominated by millennials and zillennials (Figure 1). This number indicates that there is a high awareness of halal labels among the millennial ang zillennial generation. This is in line with the Masterplan of Islamic Economy of Indonesia 2019-2024, which emphasizes the important role of the millennial generation in the global economic growth (Bappenas, 2018). Therefore, in the development of the halal industry in Indonesia, it is necessary to pay attention to the preferences of these two generations. It is important

to understand what they are looking for in halal products and adopt promotion and literacy strategies that suit their style and values (Nasution, 2020; Harahap et al., 2022).

The second finding is the analysis through the word frequency tool through wordcloud (Figure 7) related to the issues that are often discussed with the highest repetition and there are words that appear with the highest frequency, namely "gacoan" (76 times), "food" (73 times), and "mixue" (56 times). These findings indicate that the discussion around halal labels is closely related to the food franchise industry which is currently experiencing high popularity. According to data from the Ministry of Trade, the franchise industry in Indonesia has grown rapidly, with a total of 93,372 outlets spread across the country. The food and beverage sector dominates this franchise industry, covering about 59.37% of the total outlets with the total turnover generated from the franchise industry reaching around Rp 54.4 billion (Franchise, 2021). The fact is that the majority of Indonesia's population is Muslim makes the halal label have a very important role in the selection of products and franchise brands that they consume (Ridwan & Fanani, 2023). Halal criteria become a key factor that influences consumer preferences and decisions in Indonesia, especially in the food franchise industry sector (Katuk et al., 2021). Therefore, it is natural that the halal label becomes a topic of discussion that often appears in netizen conversations, considering its significant impact on consumer preferences and business success in this industry.

The third finding highlights the significant fluctuation of netizen sentiment related to halal labels in the food industry during the analysis period. Positive sentiment reached 52% compared to 48% negative sentiment, and 3% neutral sentiment. Negative sentiment touched on the lack of halal logos of famous franchises such as Gacoan, JCO, and Mixue. The peak of negative sentiment occurred in early January 2023, related to Mixue who installed a halal logo without a valid halal certificate, even causing a boycott case by the public (IDN Times, 2023). The results of this analysis reinforce the importance of halal labels in consumer perceptions of food products. They tend to respond negatively to brands that are not halal certified, and this can have an impact on their brand image and sales. Although the discussion about Gacoan and Mixue had faded, positive conversations reappeared in February 2023 after both obtained halal certification and displayed halal logos on products, showing the important role of certification and halal logos in changing consumer

perceptions (Aziz & Chok, 2013). Thus the halal label has a significant impact on consumer purchase preferences and is important for brands in the food industry.

This last finding refers to the results of bot analysis in conversations related to halal labels on the social media platform Twitter. The average overall score of posts that can be attributed to bot accounts is around 1.43. This result indicates that the use of bot accounts in this conversation is relatively low, and the conversation can be considered as a result of natural interaction between Twitter users. This means that this conversation is not the result of engineering or

manipulation, but rather an expression of public aspirations represented by netizens. Therefore, this finding emphasizes the importance of paying attention to the views and aspirations of the people that are realized through social media. This also has implications for the government, academics, and stakeholders, especially in the food industry in Indonesia, to understand and respond to relevant issues with halal labels discussed by the public online.

Finally, from these findings, this study identifies some points related to further research that can be taken by the next researchers in the context of halal labels so that they can help the food industry as a whole.

Table 2. Further Research Direction

Topic	Further Research
Influence of Halal Promotion	Examine the impact of halal product promotion on social media, including Twitter, on consumer perceptions and purchase intentions and consumer preferences.
The Role of Influencers	Examining the role of influencers on Twitter in influencing consumer views and preferences towards halal products and how influencers can be used to support halal brands.
Deeper Sentiment Analysis	Advanced studies can conduct a more in-depth sentiment analysis to understand the nuances and variability in positive and negative sentiments associated with halal labels as well as certain factors influencing sentiment changes.
Comparison with Other Platforms	Comparing data from Twitter with other social media platforms such as Instagram, Facebook, or TikTok can provide additional insight into how views on halal labels differ across platforms.
Brand-Specific Case Studies	Investigate the reaction and impact of halal labels on specific food brands in more depth and how certain specialty brands deal with changing sentiments and how they respond to them.
The Influence of Social Media on Government Policy	Examine how conversations on social media, including Twitter, can influence government policymaking regarding halal labels in the food industry.
Influence of Religious Factors	Examining how religious factors influence consumer attitudes and preferences towards halal labels, especially in the context of the majority of Indonesia's Muslim population
Effects of Changes in Halal Rules	Identify how changes in halal regulations, including certification, may affect the views of consumers and the food industry.

CONCLUSION

With the increasing global Muslim population, the demand for halal products is also increasing, supported by the growing public awareness of halal products. The addition of halal labels on products acts as a means of making it easier for consumers to choose halal products and as the responsibility of producers. Evolving technology provides opportunities to understand people's response to halal-labeled products, including through social media platforms such as Twitter. Twitter is the leading social media platform used by the public

in expressing their perceptions or behavior on various issues including halal labels. Therefore, this study focuses on analyzing Twitter data related to halal labels using the Emprit Academic (DEA) Drone approach.

The research found that the words that appeared most frequently were "gacoan" (76 times), "makanan" (73 times), and "mixue" (56 times), indicating that discussions about halal labels are closely related to the food franchise industry, which is currently experiencing high popularity. In addition, the research shows that opinions on halal labels tend to vary, with a positive sentiment of 52%, followed by a negative sentiment of 44% and a neutral sentiment of 3%. An interesting

finding in this study is that the discussion about Gacoan and Mixue had a negative sentiment, but shortly thereafter, positive conversations reappeared in February 2023 after both obtained halal certification and displayed the halal logo on their products. Furthermore, this research offers several points for further research. Thus, this research is expected to contribute to additional insights into social media data analysis related to halal labels, especially in the food industry in Indonesia. In addition, as a recommendation and research suggestion for relevant parties:

1. **The government**
   - **Tighter Monitoring and Regulation.** The government needs to consider increasing supervision and regulation related to Halal labels in the food industry. This includes ensuring that every product that displays a Halal label has met valid certification requirements.
   - **Consumer Education and Awareness.** Efforts to educate and increase consumer awareness about Halal labels can help avoid confusion and disappointment in the future. The government can think of more effective educational campaigns and promotions.
   - **Collaboration with Industry.** Collaboration between the government and the food industry in supporting valid Halal certification can ensure that consumers get products that are in line with their needs and beliefs.

2. **Food Industry Stakeholders**
   - **Transparency in Halal Certification.** The food industry needs to prioritize transparency in the Halal certification process, including undergoing valid certification and ensuring that the Halal logo is only used on products that meet the requirements.
   - **Halal Product Research.** Food companies can consider further research on consumer preferences related to Halal products. This can help the industry develop products that are more suitable for the market's needs.
   - **Response to Consumer Sentiment.** It is important for the food industry to respond to consumer sentiment quickly and effectively, as was the case with Gacoan and Mixue. This can include changes in product marketing and communication strategies.

3. **Academics**
   - **Further Research.** Academics. can continue research in accordance with the suggestions

listed in Table 2 regarding potential directions for further research.

4. **Regulators**
   - **Policy Improvement.** Regulators can consider policy improvements related to Halal certification, including increasing transparency, supervision, and law enforcement.
   - **Collaboration with Relevant Parties.** Regulators can work more closely with the government, food industry, and academics to develop more effective policies to support valid halal labels.

Finally, it should be noted that this study has limitations with data that only represent Twitter and findings that are dynamic for the future. Future research may consider other social media analyses, such as Facebook, Instagram, YouTube, Tiktok, and others, to gain a more comprehensive picture. In conclusion, this research is expected to draw the attention of policymakers and stakeholders in taking forward-looking steps based on public sentiment towards halal labels, as well as increasing the general public's understanding and awareness of halal labels in Indonesia.

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