



Identifying customer preferences on two competitive startup products: An analysis of sentiment expressions and text mining from Twitter data

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Abstract — Startups have great potential to grow and scale up their business quickly; moreover, they have an essential role in the growth of the country and the global economy. However, with the high risk of failure, startup success needs to be supported and concerned. The success of startups depends on market needs and expectations, which are currently highly uncertain, dynamic, and chaotic. Thus, it is necessary to identify and monitor customer preferences for startup products/services. This study identifies the customer preferences of two successful competitive food delivery startups, Go Food and Grab Food. With increasing customer opinions on social media, Twitter data can be used to explore customer needs and preferences. However, social media data like Twitter tend to be unstructured, informal, and noisy, so data mining mechanisms are needed. This study explores and compares customer preferences for successful startup products, using sentiment analysis and text mining methods, which have yet to be done in previous studies. The sentiment analysis results show the dominance of positive customer opinions and expressions of the products/services offered. Furthermore, customer product aspects reviewed positively and negatively by customers were analyzed more deeply using text mining to find the strength and weaknesses of these two businesses. The method and analysis of this paper help monitor customer opinions in real-time, both related to their satisfaction and complaints. Finally, the research results have been validated by comparing sentiment analysis classifications using machine learning and manual analysis by experts, which show an accuracy of 85% and 86% in Go Food and Grab Food reviews.

Keywords – customer preference, customer satisfaction, food delivery services, sentiment analysis, startups, text mining

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I. INTRODUCTION

Startups differ from other companies, especially in quickly scaling market growth [1]. Startups are distinguished from more established businesses by their unique organizational features. When entering the market, startups have a potentially scalable business model [2], [3]. Moreover, startups play an essential role in providing solutions to various existing problems, and their growth is critical to the country and global economy [4].

Usually, startups operate on technology development. It has a high potential opportunity to be developed and accepted by the market along with changes in more advanced technology today. However, these

startups also work with high uncertainty, especially regarding customers and market conditions, and have a high failure rate [5], [6]. It is no wonder that most startups fail, as reported by Startup Genome (2019) [7] that only 1 in 12 startups is a success and the failure rate is more than 90 percent.

The high risk of failure and intense market competition make startups need to continue to innovate and understand market needs to offer competitive advantages. The main factors that drive the success and failure of a product or service include dynamic changes in market needs, high R&D costs, and shortened product life cycles [8], [9]. Also, market needs and customer expectations currently are highly uncertain, dynamic, and chaotic [4]. To achieve success,

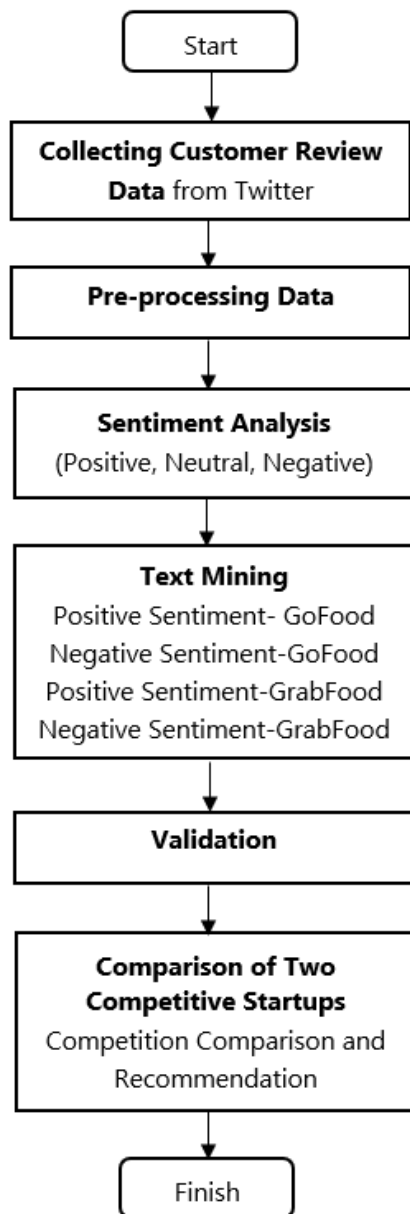


Fig. 1: The research stages.

analysis of customer needs is the key to product or service development [10], especially to avoid potential failures due to inappropriate exploration of ideas [11]. Thus, monitoring and identifying customer needs and satisfaction are essential in supporting the success of startup products or services.

Currently, social media provide large, immediate, and real-time that gives the most significant opportunity to identify customer needs and satisfaction. In social media, the flow of information between customers is beneficial to generate ideas and customer expectations related to products or services. Moreover, customers share various experiences related to using products or services through their accounts or discussions in comments on other users' posts. One of the social media, Twitter is among the most popular social

media in text mining-related studies [12]. However, information in social media is unstructured, informal, and noisy, requiring a mechanism to process information to get knowledge.

Therefore, using Twitter, this study identifies the customer preferences of two competitive startups using sentiment analysis and text mining methods. It identifies what aspects are customer satisfaction and dissatisfaction with the products offered and also compares the strength and weaknesses related to current products/services offered by the case of successful startups. Sentiment analysis is a well-established method to analyze and measure customer satisfaction. Previous research used sentiment analysis to measure product performance based on customer emotions because this approach is the most appropriate and accessible [13], [14]. In addition, several methods are also combined with sentiment analysis, especially to identify modeling topics carried out by [15].

Compared to previous studies, the identification of customer satisfaction using sentiment analysis and text mining has not been carried out in the case of startups by comparing the two most significant competitive food delivery applications in Indonesia. Based on statistical data, the most used app for food delivery orders in Indonesia as of August 2021, GoFood and GrabFood, are the two most used applications in Indonesia [16]. In addition, these two services are the two most prominent startups in Southeast Asia based on the valuation of Southeast Asia Unicorns in US Billion [17], where GoFood is a Gojek product from Indonesia and GrabFood is a Grab service from Singapore. This study aims to identify customer preferences and satisfaction related to food delivery services by comparing two competitive startups based on Twitter data, which is honest opinion data.

II. RESEARCH METHOD

We identify customer preferences and satisfaction using sentiment analysis and Text Mining methods. First, sentiment analysis is used to identify customer satisfaction with food delivery services, and then customer opinions are mapped into positive, neutral, and negative sentiments. Second, the positive sentiment group was analyzed using text mining to find essential and satisfying aspects based on customer reviews. Then, a deep analysis of negative aspects is conducted to evaluate customer complaint-related products/services. Furthermore, the case study in this research uses the two most popular and successful competitive food delivery services, GoFood and GrabFood, which then analyzes the competition for these two services. The research stages are shown in Fig. 1.

A. Data Collection and Preprocessing

The data was obtained from Twitter using Python software with the scraping module in the 2021 data

period. The keywords of "GoFood" and "GrabFood" were collected by Twitter, with the amount of data related to "GoFood" 6,188 tweets and "GrabFood" as many as 4,750 tweets.

Data pre-processing stage can be described as follows.

- 1) Eliminating tweet data from official accounts. Tweets from official accounts represent institutions or organizations that do not represent customer opinions.
- 2) Deleting multiple tweets. The review data that is retrieved allows it to be referred to repeatedly, so the possibility of the same review appearing over and over will be deleted first.
- 3) Translating tweets. This is done by translating the review language from Indonesian into English using Google Translate in Excel software.
- 4) Data cleaning. The pre-processing is done using Python software to clean the data. These steps include removing punctuation and usernames, tokenizing to convert opinions into tokens, removing stop words, and lemmatizing.

The results of pre-processing data obtained customer reviews related to "GoFood" 3,749 Tweets and "GrabFood" 3,984 Tweets.

B. Sentiment Analysis

Sentiment analysis is a method for determining the polarity of public opinion on an object, in this case, a product or service that is expressed as a review. Customer opinion or public opinion is classified into three categories: positive, neutral, and negative. A positive sentiment is a review group that has a polarity value of $0 < X \leq 1$, while negative sentiment has a polarity value of $-1 \leq X < 0$, and a value of 0 will be categorized into neutral sentiment [18]. Classification analysis is carried out using a lexical-based approach which classifies sentiments based on a corpus dictionary.

The Sentiment analysis stage was carried out using Python software. This analysis uses TextBlob, a python library for Natural Language Processing (NLP). TextBlob will determine the polarity value based on the words in each review. Furthermore, the polarity value will determine the sentiment of each tweet. Finally, at the level of the "GoFood" and "GrabFood" documents in the analysis period, it shows the direction of polarity, which is grouped into three categories: positive, neutral, and negative.

C. Text Mining

Previously, sentiment analysis results were classified as positive, neutral, or negative. In order to discover in-depth customer preferences, text mining analysis is performed on two groups of sentiments: positive and negative. Text mining identifies aspects

that indicate customer satisfaction (positive sentiment) and customer dissatisfaction (negative sentiment) with food delivery services.

1) Inputs

Input data in the form of reviews grouped into positive sentiment documents and negative sentiment groups for "GoFood" and "GrabFood" reviews. There are four data inputs, including positive "GoFood" reviews, negative "GoFood" reviews, positive "GrabFood" reviews, and negative "GrabFood" reviews.

2) Process

The text mining step is carried out by identifying terms/keywords from each text document, sorted by the 100 most keywords that appear from each document, along with their frequency of occurrence.

3) Outputs

Thus, by comparing the results of the sentiment analysis and text mining methods on two competitive food delivery services, "GoFood" and "GrabFood", it is possible to analyze the competition between these two startup services. The evaluation of customer satisfaction gives some recommendations for improvement and achieving the success of the services offered by startups. Furthermore, the results of this study are also helpful for other products/services, including new companies or other startups that can explore aspects that drive customer satisfaction to achieve success.

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III. RESULT

In this result section of our study, the findings of the sentiment analysis of two companies are presented. The detailed result of text mining of both companies' reviews are also presented on the Text Mining subsection.

A. Sentiment Analysis

In this research, the sentiments are divided into three categories of customer review: positive, neutral, and negative sentiment. According to the findings, sentiment analysis on 3,749 tweets related to GoFood yielded a percentage of positive, neutral, and negative 49.6%, 34.99%, and 15.41%, respectively, as shown in Fig. 2. (a). Meanwhile, sentiment analysis results on GrabFood reviews based on 3,984 tweets revealed positive, neutral, and negative sentiments of 37.5%, 46.76%, and 15.74%, respectively. Fig. 2 depicts the GrabFood sentiment classification case (b).

Based on these results, both cases of popular food delivery services in Indonesia show that customers are more dominantly satisfied (positive opinions) than the percentage of dissatisfaction. This is in line with the success of these two food delivery services, where GoFood and GrabFood are two successful startup services in Indonesia. This can be seen in the comparison of the positive sentiment of 49.6% and negative sentiment of 15.41% in the case of GoFood, which means customers tend to perceive the service positively, with a percentage ratio of about three times more than negative sentiment. Moreover, in the case of GrabFood, a ratio of 37.5% positive sentiment percentage is much more dominant than 15.74% negative sentiment.

Comparing the sentiment analysis results for the two startup services indicates that GoFood's food delivery service is more satisfying to customers than GrabFood's. Given that these two services are dominantly positive in customer reviews, GoFood is more satisfying at 49.6% and has a slightly lower negative sentiment at 15.41% compared to GrabFood, which has 37.5% and 15.71% for positive and negative sentiment, respectively. This is in line according a food delivery service survey to [19], discovering that the popularity of GoFood is superior to GrabFood, as shown in Fig. 3.

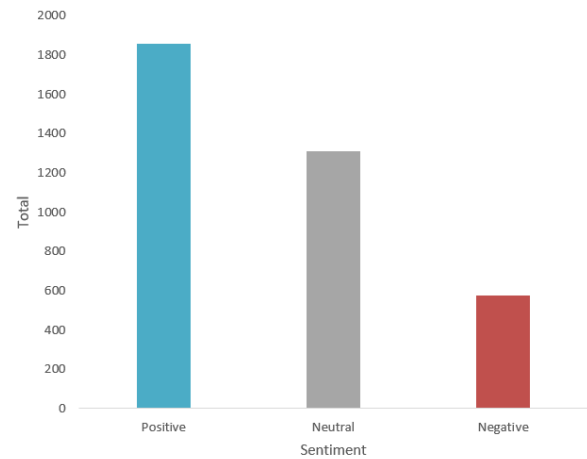
B. Text Mining

Text mining is used to extract information related to topics are most frequently reviewed by customer experience using GoFood and GrabFood. After identifying customer satisfaction, positive and negative sentiments treated in-deep analysis to give beneficial information related topics/aspects product. However, the neutral sentiment is not to be analyzed because cannot provide information for improving food delivery services in this case. Result of in-deep analysis using text mining logically possible to obtain important information. It is because topics/aspects obtain based on frequently reviewed by customers. Then, associations between two words that most often appear simultaneously indicating the specific information.

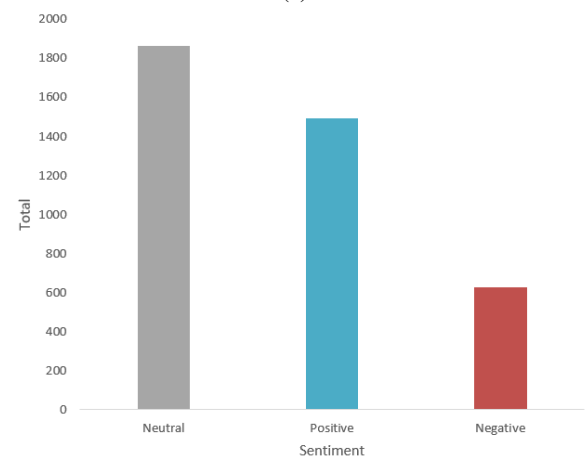
1) GoFood positive sentiment review

GoFood has mostly positive feedback, with 49.6% of reviews being positive. The positive aspects of the GoFood delivery service describe customer satisfaction and preferences, are shown in Fig. 4 (a). According to the figure, information-related positive aspects of concern to customers are explored using text mining. Furthermore, we identify further by grouping words into categories as follows.

- 1) Many variants of the menu. Some of the topics that the customer often discusses on Twitter include duck, martabak, sambel, cakes, seafood, rice, kebab, bakmie, pizza, nasgor, snacks, hokben, pempek, and meat. Word associations related to GoFood that customers review positively indicate customer satisfaction with the variety



(a)



(b)

Fig. 2: Sentiment analysis result; (a) GoFood, (b) GrabFood.

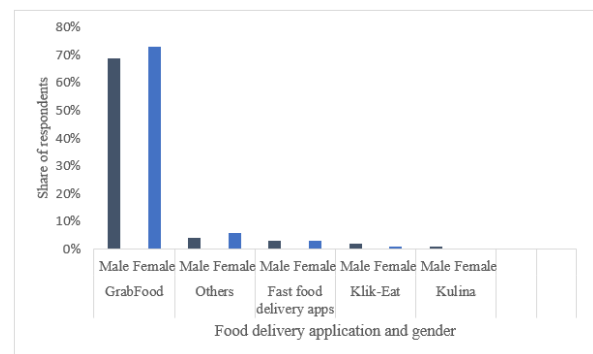
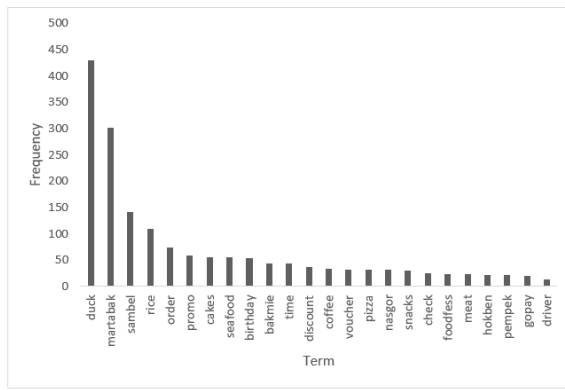


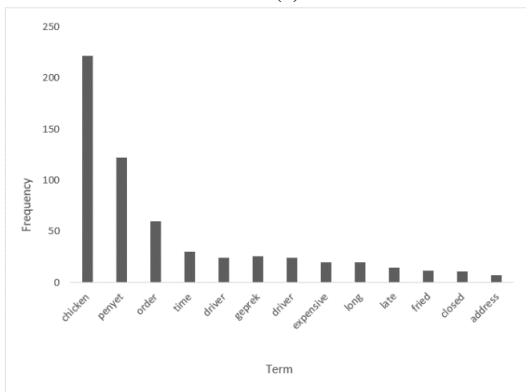
Fig. 3: Most used app for food delivery orders in Indonesia 2021, by gender.

and many variants of the menu offered by the application service. Based on the analysis result, we found that customer is satisfied with availability, suitability, and completeness of the menu variations available in this service.

Furthermore, we discovered keywords related to menu variants based on customer preferences. From the text mining results, most customers dominantly use GoFood services to order rice, chicken and duck, seafood, fast food, bakery,

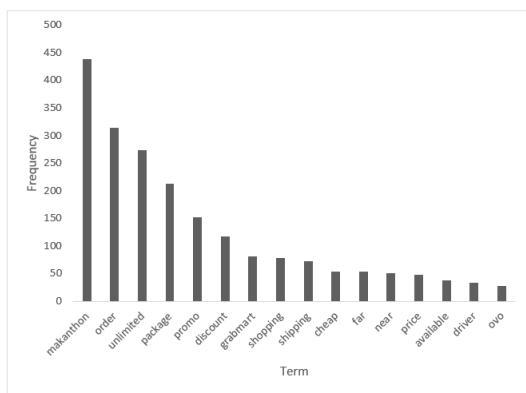


(a)

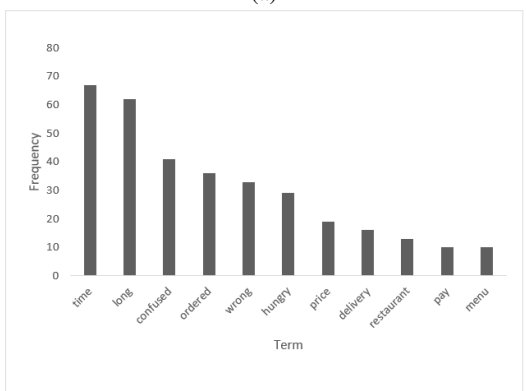


(b)

Fig. 4: Word's frequency rank of GoFood for, (a) positive sentiment, and (b) negative sentiment.



(a)



(b)

Fig. 5: Word's frequency rank of GrabFood for, (a) positive sentiment, and (b) negative sentiment.

sweets, and snacks. This food variant in-line with GoFood's product category are beverages, snacks, sweets, rice, chicken and duck, fast food, bakery, Japanese, bakso and Soto. Based on the analysis, we found customer preferences still lacking in the beverages, Japanese, meatball and Soto categories compared to the other group. These insights give great potential to improve the application based on customer preferences and to develop competitive strategies for startups.

- 2) Promotion. A promotion system from application services influences customer satisfaction. Some words that are often reviewed positively related to promotion aspects are promos, discounts, and vouchers. The result shows that the provision of promos and various programs, such as discounts or vouchers, have satisfied customers, and this strategy can be continued to increase service success. Furthermore, customers need various promos that benefit producers and customers in this service.
- 3) Drivers and Delivery. Customers tweeted their satisfaction related to drivers and deliveries. They have shared their experience of using the service related to the driver and delivery aspects, which met their satisfaction. Moreover, customers will be satisfied if the driver and delivery process are fast.
- 4) Easy to Use of Mobile App. Information-related mobile applications that satisfy customers are accounts, orders, checks, and payment methods. The application is easy to use, including the food ordering process that easy to monitor the order process from ordering food to delivering to the customer. Moreover, payment methods, especially GoPay, have increased customer satisfaction as an alternative to cashless payments.
- 5) Special Events. Some terms are narrowed in information on special events, including birthdays and foodfest. Birthday is one of the exciting moments customers usually use to order gifts in the form of food delivered through GoFood services. Customers usually ask the driver to give a greeting or special treatment during delivery. Moreover, the existence of GoFood events or programs such as foodfest in a certain period takes the customer's attention to their satisfaction. GoFood can design program ideas from these events or programs that refer to special events to increase customer satisfaction. Especially various programs to get a broader customer niche.

This study conducted a more in-depth analysis of customer needs based on gender. Men on Twitter expressed positive feelings about GoFood services, including menu options (martabak, sweet, sambal, nagor,

dimsum), user-friendly mobile apps, and delivery time. The results show that the ease of the order process is important for the male gender category regarding food delivery services. The diversity and availability of menus or merchants also improve their purchasing power. In contrast to the positive opinions of women, aspects of promotion and delivery time are more of a concern for this category. Furthermore, the availability of menu variants is essential, as evidenced by keywords like martabak, delicious, kebab, and fried.

2) *GoFood negative sentiment review*

Based on the sentiment analysis results, 15.41% of all customer reviews have negative opinions on GoFood. The topics related to negative sentiments are shown in Fig. 4 (b). Some of the topics that often discuss by customers are identified as follows.

- 1) Price. The price was a negative aspect responded to by customers. Based on the text analysis, the word relevant to the price is "expensive," which shows customer dissatisfaction with the expensive price aspect. This is because the list of food prices charged on the GoFood application is more expensive than the selling price at restaurants. In addition, customers are also charged application service fees and shipping costs. So, with the high price, customers are dissatisfied with this aspect. However, compared to positive reviews, customers will be satisfied if the service provides various promos in the form of vouchers or discounts to lower prices.
- 2) Merchant Availability. The customer's negative concern is the lack of menu options and merchants. Customers complain about the schedule of merchants that closed early and limited stock availability, which is a negative response by customers based on the term "closed".
- 3) Orders and Delivery. There are terms related to food menus that respond negatively, such as chicken, penyet, geek, and fried. Some customers ordered foods related to fried chicken, penyet, or geprek, which had a longer waiting time than ordering other types of food. It is also indicated on terms that are widely reviewed by customers, namely "time", "order", and "driver". Moreover, the term "address" also appears in negative reviews.

3) *GrabFood positive sentiment review*

GrabFood's positive reviews are classified as 37.5% of the overall opinion. Although lower than the results of positive GoFood reviews, some aspects make GrabFood's service superior to competitors that can satisfy customers. As shown in Fig. 5 (a), the favourable review terms for GrabFood, the aspects reviewed are analyzed as follows.

- 1) Promotion. Some of the aspects related to promotion are "promo", "voucher", and "discount". Both of GoFood and GrabFood show that pro-

motion is a satisfying aspect. This means that the promotion aspect dramatically impacts customer satisfaction in food delivery services, based on the satisfaction analysis results of two leading startups, GoFood and GrabFood, in Indonesia. Another specific term that appears is "unlimited". Based on the results of an in-depth analysis related to the term, this unlimited is a "Paket Ceria Unlimited" issued by GrabFood by providing a 60 times discount on shipping costs worth IDR 600,000, which is valid for 14 days. Customers expect this program to be significant in improving customer satisfaction with GrabFood application service. An example of a positive review is, "Since I subscribed to the unlimited cheerful package, all my worries immediately disappeared because I can buy food at my favourite merchant without thinking about expensive shipping."

- 2) GrabFood Culinary Festival. Some positive reviews related to special events of GrabFood are "Makanthon", "GrabMart", and "Shopping". Makanthon is a program by GrabFood to appreciate customers in GrabFood and GrabMart transactions by giving discounts and various prizes via a coupon system. This program attracts customers to encourage satisfaction and improve customer loyalty to use the GrabFood application services.
- 3) Prices and Orders. The price aspect of GrabFood shows customer satisfaction, such as the results of reviews related to "price" and "cheap". Providing lower prices compared to competitors, this strategy boosts customer satisfaction levels. In addition, the order process through GrabFood also received a positive response based on the reviews shown, including "order" and "driver". As with GoFood, the order is an important aspect that impacts customer satisfaction.
- 4) Availability. Terms relevant to this aspect are the availability of merchants and drivers. The terms "far" and "near" show that a merchant's availability, both near and far distances, satisfy the customers. Furthermore, the "availability" term also appears in a review, which shows sufficient variation in availability from merchants and drivers.
- 5) Payment method. The type of payment that most responded to is "ovo," which provides customer satisfaction with cash payment cash. Ovo payment service makes it easier for customers to use food delivery services, as in the review, "heavy rains like this sometimes feel it is profitable to use grabfood, especially using ovo payments will be profitable with the promos provided".

We have also analyzed positive expressions related to GrabFood based on gender. First, the most satisfying

aspect of GrabFood for men is related to promotion and food taste. Offering promotions and discounts is an attraction that can increase their satisfaction. Furthermore, the performance of food serving is an important consideration based on various keywords such as delicious food. Second, the women’s category focuses on various GrabFood facilities associated with promotions and festivals. This is demonstrated by female customers’ satisfaction with unlimited vouchers and the availability of discounts. Furthermore, festivals such as makanthon and the availability of menu packages via applications are a source of concern.

4) *GrabFood negative sentiment review*

Based on the sentiment analysis results, 15.71% of all customer reviews have negative opinions about the words that appear, as shown in Fig. 5 (b). Topics that show dissatisfaction are analyzed as follows.

- 1) Delivery time. The analysis results of aspects that were reviewed negatively by customers, primarily related to delivery time. This is indicated by the terms "long", "time", "hungry", and "delivery". Waiting time is essential in using food delivery services, and if it is not to customer expectations, it can make customers dissatisfied. In terms of customers, dissatisfaction was found that the delivery aspect tends to be reviewed negatively, which advice on application services to improve the delivery time process. In contrast to GoFood, which can make ordering transactions from more than one merchant at once, the GrabFood service can only make other transactions if the previous transaction has been completed.
- 2) Wrong Order. The inaccuracy of customer orders impacts customer dissatisfaction, as indicated by the "wrong" and "ordered" themes based on negative reviews. This can be affected by merchant errors in providing service, drivers needing to be reading correctly regarding the order ordered, or special requests added by customers. In addition, there are several reviews related to orders that did not match, such as, "very upset with grab, today ordered grab food, but the food did not arrive, but the order was completed. Very crazy, has the quality decreased, huh?".
- 3) Menu and Merchants. Negative reviews are also related to "menu" and "restaurant". In terms of menus and restaurants, one of the concerns of customers is that there are no other menu and restaurant variations offered, as in the review, "I have been monitoring the menu on GrabFood for a long time, the outlets and menus offered are the same, I want drinks in other branches, but It is very far away, it is a shame if the drink will not be cold anymore."

C. *Validation of Sentiment Analysis Results*

The validation process is carried out by ensuring and testing the accuracy of machine learning in clas-

sifying customer reviews. Using TextBlob, customer reviews are classified into positive, neutral, and negative sentiments. The validation process is carried out through manual review assessments based on expert assessments to prove that the classification results using machines are accurate compared to logical analysis based on expert analysis.

We Selected 100 GoFood reviews and 100 GrabFood reviews randomly. Then the expert will assess each review and classify the review into positive, neutral, and negative sentiments. The results of this manual assessment will be compared with machine learning performance in classifying sentiment analysis. Experts are selected based on good English language skills, education, and analytical skills to avoid bias from human error.

Sentiment validation is carried out using the confusion matrix calculation, shown in Table 1 and 2. Prediction is the result of sentiment analysis classification obtained based on TextBlob Machine Learning, while actual is the result of classification based on manual assessment. It shows the accuracy of the prediction results with the actual value. The accuracy value is obtained from (1).

$$Accuracy = \frac{True\ Pos + True\ Net + True\ Neg}{Total\ Data}, \quad (1)$$

where, True Pos is for every true positive data, True Net is for every true neutral data, and True Neg is for every true negative data.

Then the accuracy value of GoFood’s sentiment analysis is 85%, and the accuracy value of GrabFood’s sentiment analysis is 86%. These results show that the sentiment analysis classification of Twitter data based on the validation results of two cases has a very accurate level of prediction.

Table 1: Confusion Matrix of GoFood Sentiment Validation

		Prediction			Total
		Positive	Neutral	Negative	
Actual	Positive	38	3	3	44
	Neutral	4	37	3	44
	Negative	1	1	10	12
Total		43	41	16	100

Table 2: Confusion Matrix of GrabFood Sentiment Validation

		Prediction			Total
		Positive	Neutral	Negative	
Actual	Positive	28	1	1	30
	Neutral	4	45	7	56
	Negative	1	0	13	14
Total		33	46	21	100

D. Comparison of Two Competitive Startups

Table 3 shows the results of the comparative analysis of two competitive food delivery services, GoFood and GrabFood. These results are obtained from analyzing customer opinions on social media Twitter. The aspects that responded positively can be used as recommendations for the direction of service development as a strength based on customer satisfaction. This is useful for increasing the success of services by the market approach. On the other hand, to overcome weaknesses or aspects that were reviewed negatively by customers, this recommendation can be used as material for improving any aspects that significantly improve service and become one of the strategies in complaint management.

Table 3: Comparison of Two Competitive Food Delivery Services

	Strength (Customer Preferences and Satisfaction)	Weakness (Negative Sentiment Analysis)
GoFood	Many Variant Menus	Price
	Driver and Delivery (Fast Services)	Merchant Availability
	Easy to Use of Mobile Apps	Order
	Special Events	
GrabFood	Promotion	Delivery Time
	GrabFood Culinary Festival	Wrong Menu
	Price and Order	Merchants
	Availability	
	Payment Method	

IV. DISCUSSION

The sentiment analysis of two delivery food companies have been conducted on this research. The validity of our research also shows high level of prediction. The text mining aspect of all reviews also have been extracted. Finally we perform two comparison side by side showing the strength and weakness of each company respectively.

Apart from being useful for the industry in the case study, the results of this comparison are also helpful for other food delivery services by providing services that are to customer preferences and satisfaction and avoiding aspects that customers complain about. The important aspects based on customer preferences include price, promotion, menu variants, ease to use, and fast services that can satisfy customers.

V. CONCLUSION

Startups have the characteristics of a fast-growing market compared to other companies. Although it has high development potential in its growth, the risk of failure and market competition is also tighter than others. Therefore, the success strategy of startups is essential to develop by paying attention to market conditions and market needs. The success of startups depends on market needs and expectations. Thus, this

study aims to identify customer preferences for two competitive startup products in food delivery services.

Using Twitter data, customer opinion is widely obtained based on cases of food delivery services. The two most popular and successful food delivery services in Indonesia, GoFood and GrabFood, are identified. The study's results have identified customer expressions while using these two food delivery services. Sentiment analysis results provide information that positive opinion is more dominant than negative, in line with the success of these two startups in Indonesia. The percentages of positive, neutral, and negative sentiments related to GoFood are 49.6%, 34.99%, and 15.41%, respectively. Meanwhile, sentiment analysis results on GrabFood classified positive, neutral, and negative sentiments at 37.5%, 46.76%, and 15.74%. Therefore, comparing the results of sentiment analysis on these two startup services provides information that the level of customer satisfaction of GoFood is better than GrabFood, and the negative sentiment results for GoFood are slightly lower.

After identifying the customer preferences and expressions, a more in-depth analysis was conducted to explore the positive and negative topics of GoFood and GrabFood. First, in the case of GoFood, topics that increase customer satisfaction include a variety of menu options, promotions, drivers and delivery, user-friendly mobile apps, and special events. All whilst, for GrabFood, factors that increase customer satisfaction include a promotion, the GrabFood culinary festival, price and order, availability, and payment method. These topics must be maintained and improved in order to meet customer satisfaction and succeed. Second, topics obtained from negative reviews have also been analyzed, which help improve current services and are used to overcome customer complaints. Negative aspects of GoFood services include price, merchant availability, order, and delivery, as well as improvements to GrabFood services, including delivery time, wrong orders, menus, and merchants.

From the analysis of customer preferences for food delivery services, customers are concerned about price, promotion, menu variants, ease to use, and fast services that can satisfy customers. Sentiment analysis results have been validated by comparing sentiment classification results using machine learning and manual assessments by experts. The validation results show that the validation data sample has achieved an accuracy of 85% and 86% on GoFood and GrabFood review data. This study can be helpful to related companies that concern with customer satisfaction, especially for startups and products/services with high technology or dynamic change.

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