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Online Social Sentiment Analysis: Discerning Customer Satisfaction via Twitter Reviews on Malaysia's Courier Service

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ABSTRACT

As e-commerce continues to grow, customers frequently encounter issues with courier services such as late deliveries, tracking problems, and unsatisfactory customer support. Although courier services are widely used, there is no dedicated platform that helps users choose the best provider based on social media sentiment. This study investigates customer satisfaction with courier services in Malaysia using Twitter reviews, focusing on three prominent providers: PosLaju, GDex, and DHL. A web-based application was developed using the Flask framework in Python and deployed on the Heroku platform. Sentiment analysis was performed using the TextBlob library, which classifies tweets into positive, negative, or neutral categories. TextBlob was selected for its ease of use and effectiveness in handling basic natural language processing tasks such as polarity detection and phrase extraction. The sentiment results were visualized to reveal trends in user feedback. The analysis showed that PosLaju had the lowest positive sentiment, with only 4.1 percent, and a relatively high negative sentiment of 14.9 percent. DHL received the highest positive sentiment at 39.6 percent and 20.8 percent negative, indicating a stronger approval among users. GDex showed moderate levels of both positive and negative feedback. This study provides valuable insight into customer perceptions of major courier services in Malaysia. By highlighting sentiment trends based on real user experiences from Twitter, the platform can assist future customers in selecting the courier service that best matches their needs.

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1. INTRODUCTION

Logical industries, such as courier services, involve numerous components in giving services to individual clients and businesses (Jamal et al., 2018). Courier services were originally formed to supply deliveries to customers. There are two sorts of courier services: international and domestic. International delivery covers deliveries outside of the country, whilst domestic delivery provides deliveries within the same country. Several examples of courier services are GDex, DHL, Pos Laju and many more. There are about 1000 PosLaju outlets in Malaysia available in 80% of the populated areas in Malaysia with a large coverage nationwide. GDex on the other hand was introduced in 1997 covering Malaysia and Singapore. As for DHL, which started its service in 1969, covering its delivery service over 220 countries.

E-commerce is growing rapidly all over the world, thus making the courier services increase in demand. Some famous e-commerce platforms in Malaysia includes Lazada, Shopee, and TikTok shop. According to International Trade and Industry Deputy Minister Datuk Ahmad Maslan, the e-commerce sector in Malaysia is growing significantly in terms of its contribution to the country's economic growth (NSTP Team, 2018). According to the statistics up to 2024, e-commerce users have reached up to 10.67 million and estimated to be increasing for the upcoming years (Statista Research Department, 2024). It is believed that efficient services by online retailers, especially in fast delivery, are crucial (Daroch et al., 2021). Moreover, Morganti et al. (2014) found that delivery service is the most important issue among e-shoppers and e-retailers. To improve delivery and return experiences, e-retailers are exploring selectively moving into logistics.

The rapid growth of online shopping has been significantly fueled by social media platforms, where consumers increasingly turn to social networks for product recommendations, reviews, and brand interactions (Anjorin et al., 2024). As social media becomes a primary channel for communication and commerce, businesses must pay close attention to customer sentiment expressed online to stay competitive (Susiang et al., 2023). In particular, courier services play a crucial role in the success of e-commerce, as timely and reliable delivery is a key factor in customer satisfaction. As such, analyzing customer feedback on social media platforms, particularly Twitter, offers valuable insights into public perceptions of courier companies (Liao et al., 2021). This study focuses on discerning customer satisfaction (Alqurafi & Alsanoosy, 2024) with Malaysia's leading courier services which are PosLaju, GDex, and DHL, by leveraging sentiment analysis on Twitter reviews, contributing to a deeper understanding of how these services are perceived in the age of online shopping and social media influence.

Hence, this work focuses on developing a web-based application that helps online sellers to choose the best courier service for item deliveries as there is still no website found up to this date that provides insights into the postal service. This paper is organized as follows: Section 2 will describe the literature review, followed by the methodology in Section 3. Then, the results and discussion are explained in Section 4, with the concluding remarks in Section 5.

2. LITERATURE REVIEW

Social media is widely used by people, who use it to express their opinions and sentiments about many subjects (Rosenthal et al., 2015). Because social media is so widely used, sentiment analysis has drawn the attention of researchers. Natural language processing based on user opinions is called sentiment analysis. It is therefore frequently used in social studies and business. This section reviews two key perspectives, which are: 1) courier services, exploring the role of logistics, supply chain optimization, and customer service in enhancing delivery systems and operational efficiency; and 2) sentiment analysis using diverse methodologies, examining the application of computational techniques like natural language processing (NLP), machine learning, and text mining in understanding consumer sentiment, market trends, and social dynamics.

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2.1 Courier services

Courier services are becoming increasingly important in our daily lives. Individuals and businesses rely on this service for quick delivery of commodities. Usman and Rehman (2017) noted that regardless of the distance, the products must be delivered to customers safely while employing a courier service. The purpose of courier services was to increase delivery safety and speed. It is better, while costing a little more, because it has many benefits over regular mail services, which can occasionally be delayed and charge for large, heavy things (Yao et al., 2022a). Parcel delivery service involves four parties: administrative workers, dispatch drivers, senders (consignors), and recipients. Administrative personnel oversee inspecting consignment notes and calculating delivery charges; the dispatch driver is in charge of delivering parcels and updating shipment status for tracking purposes; and the consignor is the parcel sender who is responsible for parcel delivery, while the consignee acts as the authorized recipient of the parcel (Haron et al., 2017).

In Malaysia, there are numerous courier services available, including Pos Laju, Nationwide, GDex, ABX, Aramex, DHL, J&T and Skynet. Each courier service offers distinct services in terms of price and delivery location. There are two sorts of courier services, which are domestic and international. Domestic courier services transport parcels within the country, whilst international courier services deliver parcels outside of the country. Fig. 1 depicts the postal infrastructure updated as of March 2024.

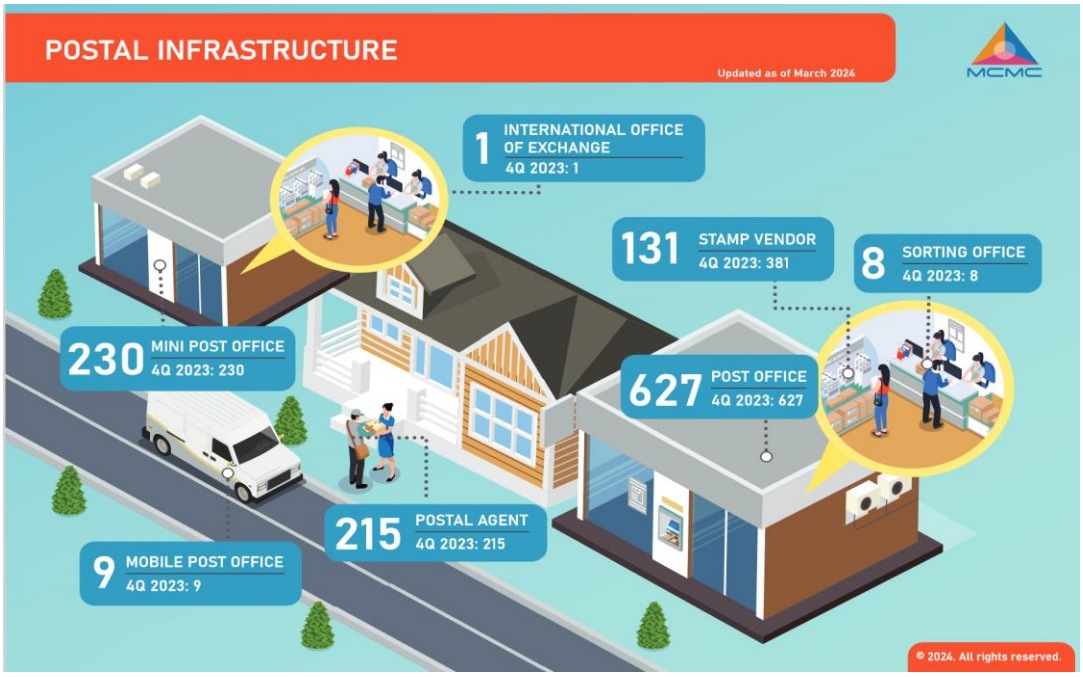

Fig. 1. The data of postal infrastructure in Malaysia (Malaysian Communications and Multimedia Commission, 2024).

From the statistics shown in Fig. 1, there is a reduction of 250 in the total number of stamp vendors since the previous year of 2023. This may be due to the increase in online stamping and barcodes that can be self-printed to do the shipping. In Malaysia, there are 14 states. Each state has several post offices including in urban and rural areas. Fig. 2 shows the postal office by state in Malaysia as of March 2024.

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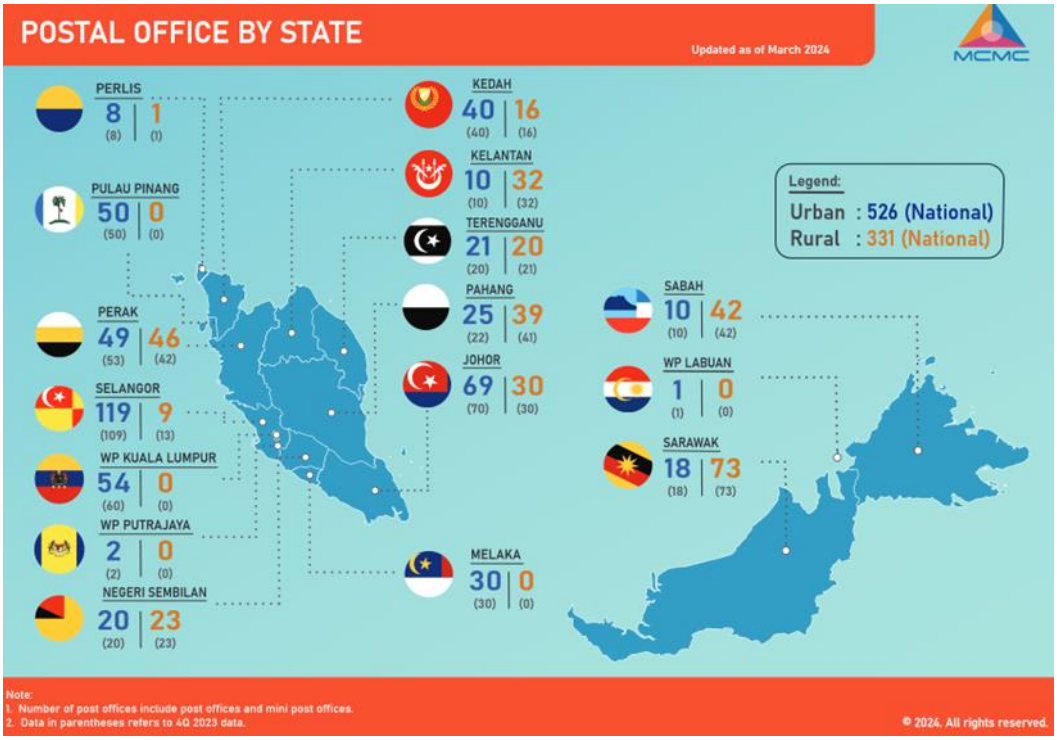

Fig. 2. The number of post office by state in Malaysia (Malaysian Communications and Multimedia Commission, 2024).

Based on Fig. 2, it can be observed that there have been some changes in the number of postal offices in Perak, Selangor, Kuala Lumpur, Terengganu, Pahang, and Johor since 2023. There is only a slight change in numbers in Terengganu and Johor with difference of one decrement and increment. While Perak has quite a reduction from 53 to 49 number of post offices in urban areas but increased from 42 to 46 number of post offices in the rural areas. On the contrary, Pahang has shown an increase of three number of post offices in the urban areas, while two post offices have been closed in the rural areas.

Customer satisfaction assesses the customer's expectations of the company's product or service (Jamal et al., 2018). SERVQUAL is one of the eminent models to measure service quality in businesses, that consists of five elements which are tangible, reliable, assurance, empathy, and responsive. According to Lien Yee & Daud (2011), three of the elements (i.e., tangible, reliable, and assurance) are more noteworthy on measuring customer satisfactions compared to the other two stated aspects.

2.2 Sentiment Analysis

People use social media extensively (Rosenthal et al., 2015) and utilize this channel to voice their views and feelings on a given topic. Social media has evolved into a global platform for internet businesses in addition to being a place for people to voice their opinions on particular subjects. Therefore, researchers employed a variety of sentiment analysis techniques, including lexicon-based and machine learning approaches, to investigate the sentiment features utilized in obtaining crucial information. A study by Chia et al. (2023) investigated the relationship between customer satisfaction and each of the SERVQUAL elements. From the findings, the relationship between tangible aspect and customer satisfaction has achieved the highest correlation (Pearson's correlation) of 0.908. This shows that tangible elements are the best predictor to analyse the customer's sentiment. Thus, multiple linear regression was used for sentiment

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analysis with an adjusted R^2 of 0.878, showing a good result in determining the customer's sentiment towards the courier services, with SERVQUAL elements as the features.

Similar research was conducted by Loo & Asrah (2022), using the Customer Satisfaction Score (CSAT) as the measurement to determine the best courier service. From the overall result, a CSAT score of 82.7% was achieved and it showed that J&T Express is the most chosen courier service by the customers. To further investigate the best courier services in Malaysia, this study implemented a lexicon-based approach using TextBlob to determine the percentage of positive and negative sentiment for each of the chosen courier service in the case study, thus, determining the most recommended courier service to be used through visualization.

3. METHODOLOGY

The data for this study were collected from Twitter using the Twitter API, focusing on tweets related to Malaysia's courier services (PosLaju, GDex, and DHL). The dataset was filtered for relevant keywords, hashtags, and mentions associated with popular courier companies in Malaysia, resulting in a corpus containing labelled tweets. The system architecture consists of four phases, which are: 1) Data Collection, where tweets are gathered and preprocessed to remove noise and irrelevant content, 2) Data Cleaning and Preprocessing, which involves tokenization, stop word removal, and text normalization to prepare the data for analysis, 3) Sentiment Analysis, where the text is analyzed using natural language processing techniques and machine learning models to classify sentiments into positive, negative, or neutral categories, and 4) Data Interpretation and Visualization, where sentiment trends are visualized and analyzed to assess customer satisfaction with Malaysia's courier services.

3.1 Data Collection

The data obtained in this study was collected from Twitter using the Python library of Tweepy and Beautiful Soup. The data were scraped using these keywords: "PosLaju Malaysia", "GDex Malaysia", and "DHL Malaysia". These three courier companies are the leading players in the Malaysian logistics industry, with a significant market share and widespread recognition among consumers. PosLaju, as the national courier service of Malaysia, has the largest customer base, while GDex and DHL are major competitors offering both domestic and international shipping options. This makes them ideal candidates for studying customer sentiment in the context of Malaysia's courier services (Zakiuddin, 2021). Moreover, choosing these three companies allows for a comparative analysis of customer satisfaction across different types of services either national or international, local or corporate-owned by offering insights into how service quality, delivery efficiency, and customer expectations vary (Yao et al., 2022).

In addition, their high social media presence ensures an ample volume of publicly available Twitter reviews, which is critical for conducting sentiment analysis with sufficient data. By focusing on these prominent courier services, the study aims to provide actionable insights into customer satisfaction trends that are representative of the broader Malaysian logistics industry (Abdullah et al., 2021). The data was scraped within the past 7 days. This is because Tweepy only limited scraping the data within the past 7 days. Furthermore, for this project the number of tweets scrapped only limited to 100 tweets in one time. Both English and Malay texts are taken for the analysis. The data is then saved in csv file.

3.2 System Architecture

Fig. 3 illustrates the system architecture with three phases. The first phase is the extraction of data from Twitter using the keywords for each courier service in the case study, where the extracted data were stored in a database (csv file). From the raw data, text cleaning and pre-processing were performed in phase two. The cleaned texts are then utilized in phase three in which the sentiment polarity is generated

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automatically using TextBlob and classification was done. The findings are displayed on a web-based platform for the users.

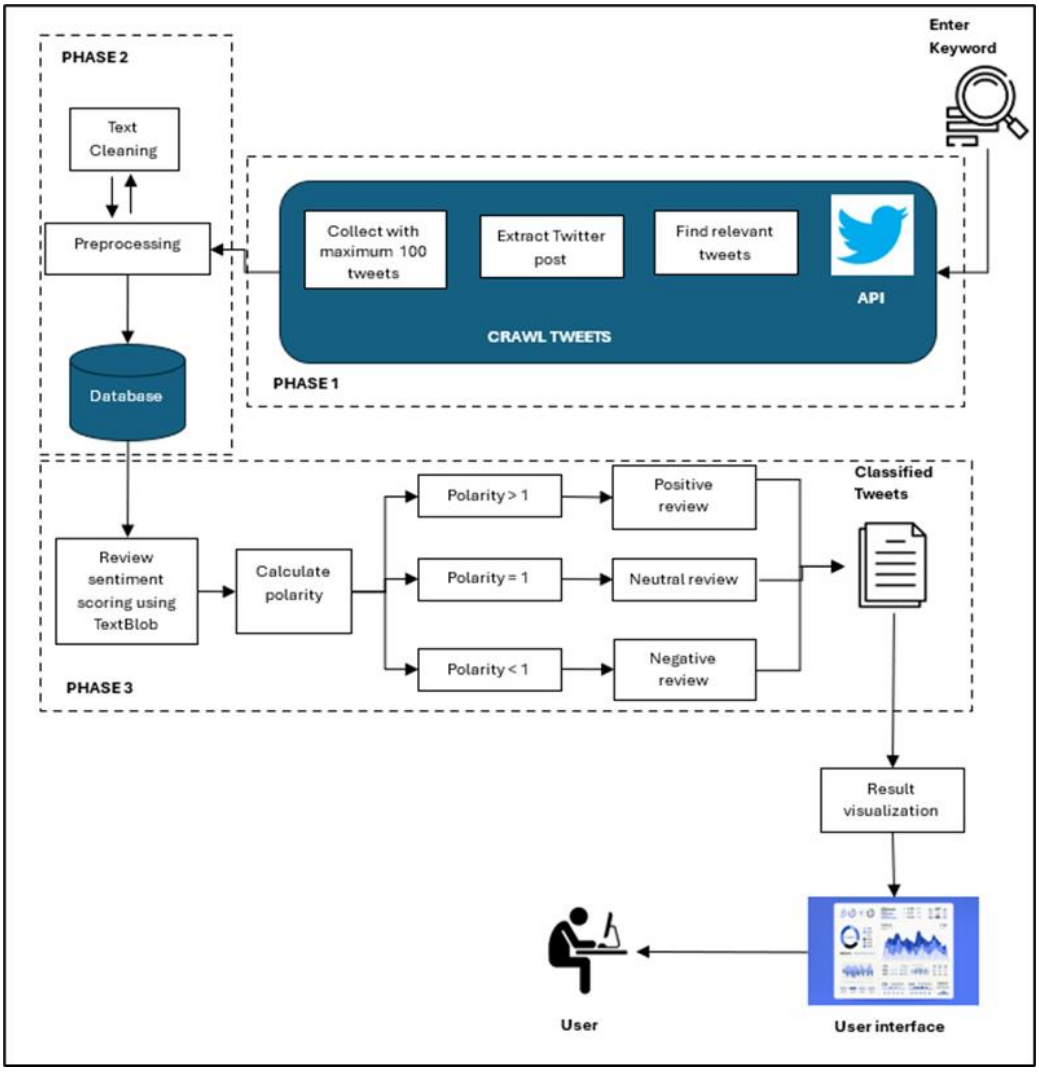

Fig. 3. System Architecture.

Phase 1: Crawl Tweets

The crawl tweets process is the process to retrieve data from Twitter. First, the system identifies the keyword entered by the user. Then, the related Twitter page will respond to the request, showing all the tweets in relevance to the searched keywords. Thus, a maximum of 100 raw tweets were extracted.

Phase 2: Preprocessing

Data cleaning is an important step in performing sentiment analysis. During this phase, the elimination of usernames (signified by @sign) and hyperlinks are done, but the punctuation is kept as is. This is because some punctuations denoting emoticons such as ":)" is considered important as it expresses a feeling. Fig. 4 shows an example of a tweet containing username (or also known as mentioned tweet).

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Fig. 4. An example of Twitter comment with mention.

After the removal of tweet's mention, hyperlinks, and insignificant noises in the text, the lexicon-based approach is performed during the sentiment analysis phase (phase 3).

Phase 3: TextBlob

TextBlob is one of the libraries provided in Python for text analysis. The sentiment property is used to calculate the polarity and subjectivity of the text. The polarity is in continuous values with the range [-1.0, 1.0], while the subjectivity is ranging [0.0, 1.0] where 0.0 is very objective and 1.0 is very subjective. In order to calculate the sentiment polarity, TextbBlob will go through every word in each sentence to calculate the polarity value. TextBlob contains its own value for each word to show its positivity and negativity. For example, the sentence "I Love Pos Laju" gives the value 0.888 for the sentence. Hence, the sentence is classified as positive since the value is more than 0, whereas negative class will be shown for value that is less than 0. The equation for polarity calculation is shown in equation (1).

$$Percentage\ of\ each\ polarity = \frac{Number\ of\ tweets\ for\ each\ polarity}{Total\ number\ of\ tweets}\ x\ 100 \qquad (1)$$

Based on the equation, the counting process must be done initially to obtain the number of tweets for each polarity. For example, the total number of positive tweets is 20 while the overall total of tweets 100. Therefore, the positivity percentage result is 20 percent.

Phase 4: Visualization

After sentiment analysis, the result is then visualized in a web-based system application using Pie chart and Word Cloud. Pie chart shows the percentage for each polarity while Word Cloud calculates the occurrence for each word. High Charts visualization tool was used for both visualizations.

4. RESULTS AND DISCUSSION

The user interface (UI) of the sentiment analysis system is designed to be intuitive, with an easy-to-navigate dashboard displaying real-time sentiment trends for the selected courier services. The UI presents visualizations such as sentiment distribution graphs and comparative bar charts, allowing users to quickly assess customer satisfaction levels. The results highlight key areas where each courier service can improve and demonstrate the effectiveness of social media sentiment analysis in providing actionable insights for business improvement.

4.1 User Interface

User interface is the most important element in the system where it gives the first impression to the user about the whole system. A good user interface allows the user to interact with the system by clicking the button, inputting data or some element on the user interface that can interact with the cursor. In this

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work, the main user interface consists of a query text box for the user to insert the keyword to extract the data. There are three buttons in total which are extract button, download button, and generate word cloud. In addition, there are three field areas to display the different output based on the data extracted. The visualization is also dynamic, where the cursor will show some information when being hovered on a certain element of the interface. The interface descriptions are shown in Fig. 5 and Table 1.

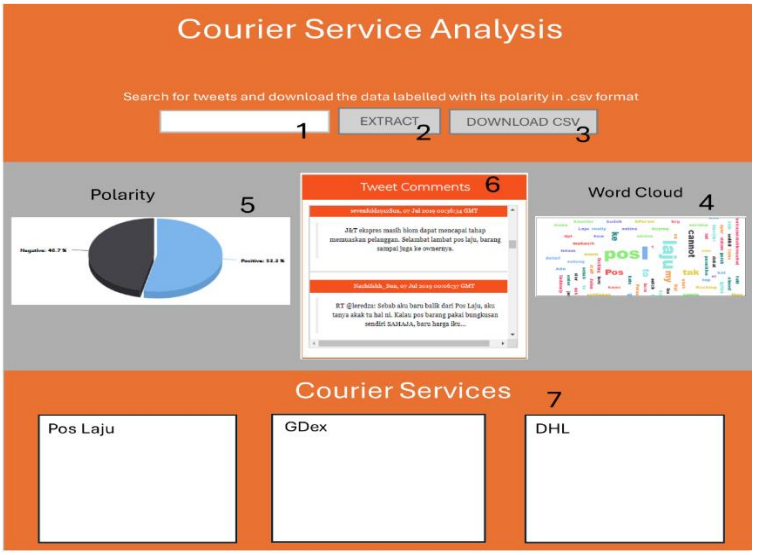

Fig. 5. User Interface (web-based).

Table 1. Functions of the user interface

Number	Description
1	This field is used to insert the keyword to extract the data from Twitter. Any keywords can be insert that are related between the three-courier service which are 'Pos Laju', 'GDex' and 'DHL'.
2	This button is used to extract the Twitter data based on the query.
3	This button allows user to download csv file that contains the current tweets.
4	This button uses to visualize the word cloud after extracting the Twitter data.
5	This field visualize chart using High charts that shows the positivity, negativity and neutral based on the result analysis of Twitter review.
6	This field display all the current Twitter comment that have been extracted.
7	This section provides courier service information for example contact and tracking. User can go to the official web of courier service by clicking the hyperlink provided

4.2 Output Results

Fig. 6 shows the output result on PosLaju courier service, when the 'Pos Laju' keyword was entered. The relevant tweets were extracted successfully and automatically displayed on the interface with each tweet's username and time. The word cloud shown was built using **High chart**. Word cloud calculates the frequency of the word in the Twitter comment. The biggest size of the word represents the most frequent word used in tweets.

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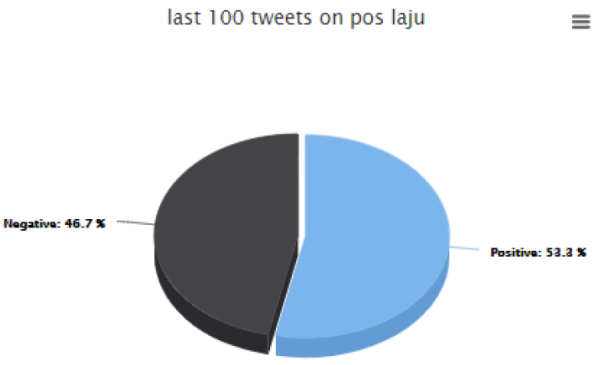

Fig. 6. Results on PosLaju courier service).

From the experiment, the result of the sentiment analysis on the three courier services based on the percentage of positive and negative is shown in Fig. 7.

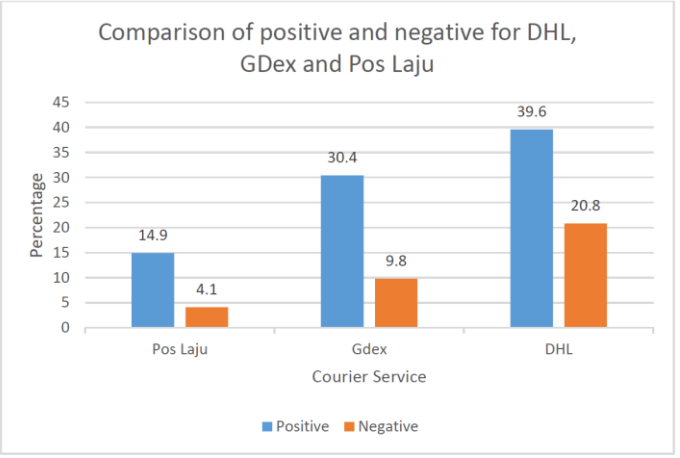

Fig. 7. The percentage of positive and negative for each courier service.

Based on Fig. 7, it shows the percentage of positive and negative for the three courier services which are Pos Laju, GDex and DHL. DHL shows the highest percentage of positive while Pos Laju shows the lowest percentage of positive. There is about 25% difference between the positive percentage for DHL and Pos Laju which shows a huge difference. For negative sentiment, Pos Laju shows the lowest negative percentage which is good despite showing the lowest percentage for positive sentiment. On the contrary, DHL shows the highest percentage of positive sentiment but the lowest percentage of negative sentiment. Moreover, there is a huge difference between DHL and Pos Laju for negative sentiment which is about 16%. Therefore, DHL has shown itself to be the best courier service among the three-courier services. However, Pos Laju shows the least percentage of negative sentiment, which infers good positive feedback from customers.

There are 11 respondents involved in the user acceptance testing, whom are from Malaysia and mostly do online shopping with some experience dealing with courier services in delivering their items. Before answering the questionnaire, respondents tested the website initially. The measurement tool applied to

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calculate the percentage is Acceptance Criteria Coverage (Rice, 2023), where it is computed by taking the number of acceptance criteria tested divided by the total acceptance criteria, multiplied by 100. From the user acceptance test, about 70% of the respondents stated that sentiment analysis is very helpful to help people analyze tweets for product or brand reviews. While the overall user acceptance test shows that the web-based interface for the courier service is useful for customers especially in Malaysia.

5. CONCLUSION

This study focused on the sentiment analysis aspect of Twitter reviews on courier services in Malaysia. There are three courier services selected as the case study which are Pos Laju, GDex and DHL. TextBlob was used for sentiment as it is suitable to be used in calculating the polarity of the Twitter reviews and classified them into positive, negative and neutral sentiment. Furthermore, the visualization of the most frequent word that are used in Twitter reviews for courier service offers summarized information for customers to identify the best courier service in Malaysia.

Despite its reliability to convey information in one platform, this work has some limitations such as in terms of the extraction tool capability that can only extract the Twitter data within the past 7 days that may affect the accuracy of classification since more data can lead to a better accuracy performance. The TextBlob library also limited to English text only, thus, Malay texts that were extracted tend to be lacking in the analysis. To cater the problem, this work has performed a translation from Malay text to English text. For future research, the sentiment analysis can be done by using other python library that caters both English and Malay texts to increase the accuracy of the analysis.

6. ACKNOWLEDGEMENT/FUNDING

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7. CONFLICT OF INTEREST STATEMENT

The authors declare there is no conflict of interest in the subject matter or materials discussed in this manuscript.

8. AUTHORS' CONTRIBUTIONS

Mohamad Zamani: Conceptualization, Investigation, Writing – Original Draft. Yusof: Writing – Editing. Muhamad Shukri: Methodology, Data Collection.

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