Sentimental Insights: Harnessing Text Analytics For Marketplace Reviews Evaluation

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ARTICLE INFO	ABSTRACT
            	E-commerce growth speedily alters market dynamics, thus emphasizing the importance of appreciating customer feelings to improve services and goods. The main objective of this research is to find out what customers' emotions are about the big marketplaces in Indonesia and determine factors influencing their perception. This study employed a quantitative approach where review or customer review data was collected and processed using sentiment analysis algorithms based on the Chi-Square Test and the Mann-Whitney Test to compare positive and negative sentiments. The results depicted a significant difference in the ratings given by groups with negative sentiments compared to those with positive sentiments on ABC Store Market Place. The p-value obtained from this analysis is less than 0.05, which is 0.00022. The results showed a significant difference in customer sentiment towards the customer service aspect and the speed of delivery on the marketplace. These findings offer strategic insights for e-commerce stakeholders to improve customer satisfaction through more effective service and operational strategy adjustment.

1. Introduction

In the marketplace, sentiment analysis is a rapidly growing field that has revolutionized how businesses understand their customers. By analyzing the opinions, attitudes, and emotions expressed in online reviews, social media posts, and other sources of customer feedback, companies can gain valuable insights into consumer preferences and behaviour [1]. Such information can be used to improve products and services, customize marketing campaigns, and increase overall customer satisfaction. In this paper, we will explore the various methods and tools used in sentiment analysis and the benefits and challenges associated with implementing this technology in the market.

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Sentiment analysis allows organizations to not only know what their clients are saying but also how they feel about their products [2-4]. By identifying trends and patterns in customer feelings, companies can make more informed decisions on how best to meet the needs and expectations of their target audience. Ultimately, sentiment analysis can help businesses build stronger relationships with customers that lead to greater market success.

To provide real-time insights into customer behavior and preferences, sentiment analysis is essential for companies to recognize and address issues that may affect customer satisfaction quickly. It also helps companies improve their marketing campaigns and their customer service, making them more responsive to customer needs. However, there are some challenges in analyzing sentiment data. One of the main challenges is that sentiment data requires accurate data collection and analysis due to the possibility of misleading results as a result of the inability or lack of such information. Additionally, the potential benefits of sentiment analysis make it valuable for businesses looking to improve customer relationships and achieve success in the business market. In other words, sentiment analysis is of paramount importance to any business that wants to remain relevant in the stock market. Therefore, this data can help companies make adjustments to their inventory, marketing strategies, and customer service to better match what their target audiences want to hear, as taken from the previous study [4,5].

In addition to helping businesses understand customer preferences and improve their products and services, sentiment analysis can also provide valuable insights into a brand reputation and market trends [2]. In this case, by monitoring social media conversations and online reviews, companies can quickly spot and confront negative feelings about their brand to prevent a potential PR crisis. In addition, sentiment analysis can help put businesses ahead of competitors as it identifies emerging trends and customer preferences that support strategy adjustments [3]. So far, sentiment analysis is an excellent tool that gives companies a competitive advantage in today's rapidly evolving market. By using sentiment analysis, businesses can better understand what their target audiences like or dislike in order to adjust their marketing approaches accordingly [4,5]. It can also increase the level of customer satisfaction and loyalty, and it will create eventual business growth. Another goal is that data-driven decisions on marketing campaigns and optimizing strategies using numbers will yield better results that are also measured by sentiment. In conclusion, integrating sentiment analysis into business practices can be a game changer in today's digital landscape. For example, a retail company can use sentiment analysis to analyze customer feedback on social media and online reviews to identify areas for improvement in their products or services [6,7]. Companies can increase customer satisfaction and drive sales by addressing these concerns and making the necessary adjustments. Additionally, sentiment analysis can help companies track the overall sentiment toward their brand over time, allowing them to gauge the effectiveness of their marketing efforts and make informed decisions for future campaigns. However, sentiment analysis may not always accurately reflect customer satisfaction, as it can be influenced by factors such as fake reviews or biased opinions [4]. In some cases, a company may receive very positive sentiment analysis results despite experiencing a decline in sales due to other external factors.

This will result in better customer satisfaction, increased loyalty, and higher profitability. In addition, the Mann-Whitney Test allows businesses to identify patterns and trends in customer sentiment that may not be apparent at first glance, thus providing valuable insights for targeted marketing strategies and product development, which are taken from the previous study [11-14]. Previous research by Titian *et al.*, [11], Overall, the use of statistical tools such as the Mann-Whitney Test in sentiment analysis can be very beneficial for companies who want to understand more and connect with their customers in today's competitive market advantage; doing this can ultimately result in increased Customer Satisfaction and Loyalty as well as Higher Profitability. In addition,

through the Mann-Whitney Test, companies can detect patterns or trends in customer feelings that may not be immediately apparent, providing important information useful for targeted marketing strategies and product development. However, overall, the use of statistical tools such as the Mann-Whitney Test during sentiment analysis can be very helpful for businesses that want to know more about their clients and communicate more with them in this era of industry competition.

The Chi-Square test can measure the relationship between the category and target variables. By using chi-square testing, they can find out if there is a significant relationship between a particular category variable and the target variable they want [5]. These analysis results can provide valuable insights into designing more effective and efficient marketing strategies. Thus, companies can improve their performance and their business goals. Careful data analysis using the Chi-Square Test can also help identify new opportunities and emerging market trends. With a better understanding of consumer preferences and behaviour, companies can better tailor their products and services to meet the market's needs. In addition, Chi-Square tests can also help measure the success rate of marketing campaigns and evaluate the effectiveness of implemented strategies [6]. Thus, Chi-Square testing can be one of the most valuable tools for optimizing business performance and achieving sustainable growth [7, 8]. For example, a fast food company can use the Chi-Square Test to analyze consumer preferences for its new menu. With the data obtained from these tests, companies can customize prescriptions and promotions to increase consumer interest and sales of their new products. However, a possible counterexample is if fast food companies rely only on Chi-Square tests to analyze consumer preferences without considering other factors, such as market trends [7], competition, and direct customer feedback. In this situation, even though the Chi-Square Test shows consumer preference for the new menu, companies can lose market share if they do not consider external factors that influence consumer purchasing decisions.

While many researchers have examined sentiment analysis in various domains, few focus on current events' real-time impact on consumer sentiment in a marketplace context. Many previous studies have examined how customer sentiment towards marketplace services can vary significantly in response to policy turnover, new product development, or operational issues. This poses research challenges, particularly in analyzing and understanding faster-changing consumer behaviour. Therefore, this study aims to answer the following questions: (1) How do consumers' minds function in the marketplace in response to important events on the platform? In the real-time context of events in the marketplace, there is not much research that explores how certain events directly influence consumer sentiment. (2) What is the significance of differences between product categories and customer demographics? Variations between categories and demographics are differences in sentiment between product categories and customer groups with different demographic characteristics that are rarely highlighted. (3) How can market participants use the results of this sentiment analysis to improve their operational and sales strategies? Practical applications of sentiment analysis still lack guidance for marketplace managers to utilize insights from sentiment analysis to optimize their strategies.

2. Methodology

Data gathering relies on surveys, social media monitoring, and online reviews from sites like ABC Store and Shopee, among others. In surveys, customers are asked about their experiences with products or services, while social media monitoring enables firms to follow conversations that mention their brands. In addition, other important sources of sentiment data are online reviews on e-commerce sites such as ABC Store, shopee, or Blibli. Data collected can be analyzed to learn whether there are any noteworthy differences among different sides regarding how they feel about

the same thing with the help of the Mann-Whitney test. These statistical analyses reveal helpful information about what clients want or how they feel about certain things. This is key for any business owner looking forward to making perfect decisions in relation to their marketing strategies or product development plans, as well as policies on branding. In summary, sentiment analysis, in conjunction with statistical significance tests like the Mann-Whitney Test, can give companies an edge in understanding their target audience and their brand perception. Such an approach will help companies make products or services based on the customer's desire, unlike just making goods and looking for clients afterwards. Figure 1 shows a visualization of the research methods we use to support the accuracy and validity of research results. Each step is explained in detail to provide a comprehensive picture of the process we undertake.
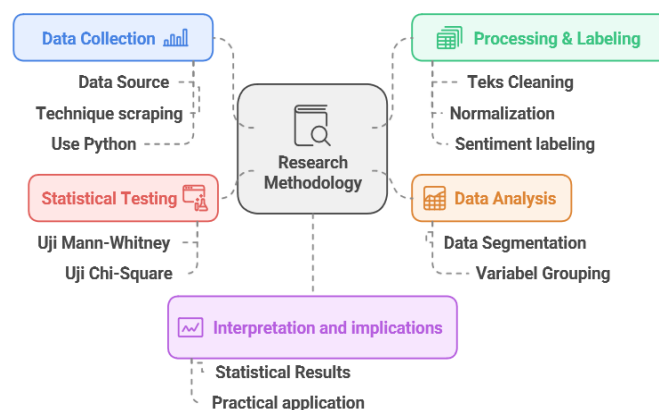
Fig. 1. Research methodology

2.1 Data Collection Methods for Analysis

This research data is obtained from marketplace review data on the Google Play page address. The data was collected by extracting or scraping information using Python software. One thousand seven hundred ninety-one review data was collected through web scraping from 2023 to 2024. In 2023, there were 94 reviews, and in 2024, there were 1697 reviews, making a total of 1791 reviews, but further data analysis is needed to draw significant conclusions about it. Data analysis reveals interesting trends and patterns in consumer sentiment towards products, highlighting areas for improvement and sources of strength that businesses can capitalize on. The increase in reviews from 2023 to 2024 indicates a growing interest in the product, but further investigation is needed to understand the spike in feedback. By digging deeper into the data and conducting additional analyses, businesses can gain valuable insights that will guide strategic decision-making and ultimately lead to greater success in the market.

Table 1
Details of data acquisition

Month	Year	Amount
Jan	2024	96
Feb	2024	376
Mar	2024	591
Apr	2024	634
Nov	2023	41
Dec	2023	53

2.2 Data Labelling

The reason why these comments are included in the database by labelling them is to help classify them, whether they belong to positive, negative, or neutral feelings. For example, ''Customers said that they had tried using discount vouchers worth Rp 300,000 and whatnot. At first, they got a discount, but after making a successful payment, the shop automatically cancelled the voucher. Buyers suggested that if there is no use for the discount voucher, then there is no need to accept it in the first place. Besides, the system cancels the payment immediately. It took a long time to withdraw the money, specifically 1 x 24 hours. Customers noted discrepancies in the refund process as other stores provide immediate refunds". Overall, customers were disappointed with their experience, stating that the store's handling of the discount and refund process was inefficient and disappointing. They argue that the store should have better policies in place to prevent issues like this in the future. A customer's bad experience may prevent them from shopping at a particular store again in the future.

Another example of a review is: "Buying musical instruments at the shop is easy and has many benefits. For future purchases of the same item, there will be more merchants selling musical instruments. Thank you for shopping. Always succeed in ABC Store, giving 5-star points for ABC Store. Get a positive feeling because users give good value to ABC Store services and have a pleasant shopping experience. Positive reviews can help attract new customers and build a loyal customer base for the ABC Store. By addressing and fixing the issues raised in negative reviews, these stores can continue to grow and thrive in the competitive online retail market. Businesses must listen to customer feedback and make the necessary changes to ensure customer satisfaction and loyalty. By prioritizing customer satisfaction and constantly striving to improve its services, a store can differentiate itself from competitors and build a strong reputation within an industry." Implementing advice from reviews can also result in increased sales and revenue as satisfied customers are more likely to return and recommend the store to others.

2.3 Testing Data

To mitigate or prevent failure risk associated with the adoption of sentiment analysis strategies, the Mann-Whitney Test can provide a way out. This is a non-parametric statistical method for comparing two different but related sets of data where the normality assumption does not hold for both sets. Consequently, we may find distinct sentiments in each group, resulting in better product and service customization decisions by corporations. Consequently, it is justified that businesses use the Mann-Whitney Test to enhance customer satisfaction and ensure continued prosperity amidst cutthroat competition.

The following is the Mann-Whitney *U* Test formula, which calculates the *U* value for both groups. At and is the number of observations for each group, then the result of the smaller *U* value between U_1 and U_2 is used for statistical testing.

$$U_1 = n_1 \times n_2 + \frac{n_1 \times (n_1 - 1)}{2} - R_1$$

$$U_2 = n_1 \times n_2 + \frac{n_2 \times (n_2 - 1)}{2} - R_2$$

(1)

3. Results

A relevant opinion is that consumers are delighted with the quality of products and services provided by the company. The analysis also shows that customers appreciate the speed of response and the individuality of the interactions that take place with their customer service team. In addition, the sentiment analysis has identified several areas for improvement, such as the need for more variety in product offerings as well as clearer communication about pricing and promotions. Overall, the data collected through sentiment analysis provides valuable insights, helping to improve the customer experience and stimulate business growth.

3.1 Result

Once a few examples of the opinions given have been analyzed, many things can be calculated, including the number of positive, negative, and neutral sentiments that will give a representative result of ABC Store's judgment.
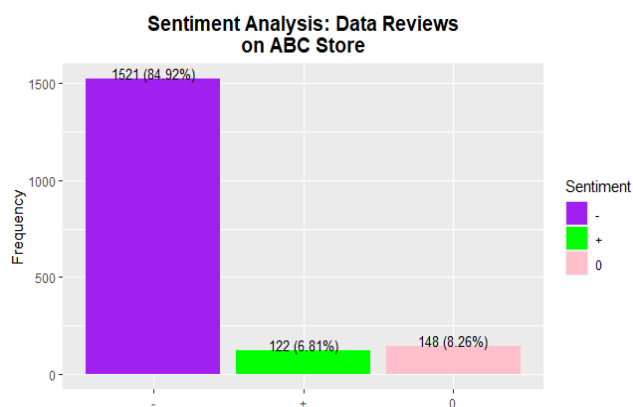

Fig. 2. Data reviews

Figure 2 shows a bar frequency chart that contains information about the number of feelings (positive, negative, and neutral). From this figure, it can be seen that the majority of users have negative judgments. Overall, there were 1521 (85%) negative feelings, 122 (7%) positive feelings and 148 (8%) neutral feelings. Further analysis will then be done to find out what should be improved and what benefits the shop has.

In the next step, we distinguish what complaints are most common in the survey data with negative feelings. This is done so that neutral words can be surfaced, i.e., providing information on the words that have the largest number of occurrences in the negative reviews. This will help us to recognize areas that need improvement in order to increase the level of customer satisfaction and loyalty. In Figure 3, the word cloud is based on review data on negative sentiment. A word cloud graphically represents words culled from customer reviews as a way of projecting word sizes that indicate their occurrence frequency. The more a word is seen in a piece of text, the larger it appears or the less, on average, its size compared to others around it. As such, larger ones like those above provide better visuals representing key customer value drivers. The words courier, application, and long are the words that appear the most in this negative cold word. This information is provided by customers that many couriers who make deliveries perform unpleasant actions on customers. The word application conveys in customer review data that the application is not stable when making

transactions, and the word long conveys information that delivery and response to customers are not fast or long.

Fig. 3. Negative sentiment word cloud

The distribution of words in the negative customer sentiment review data has a number of specifications, as shown in Figure 4.
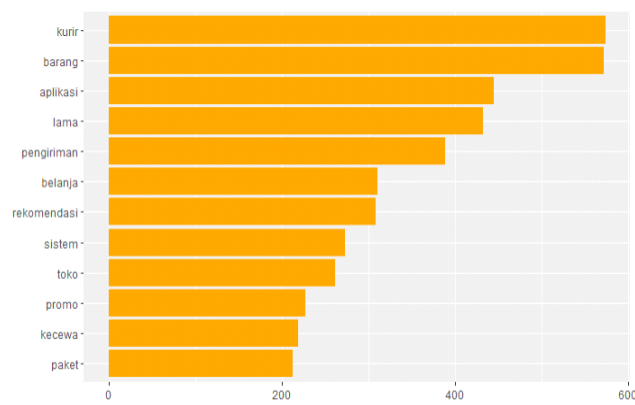

Fig. 4. Most number of words in negative sentiment

Moreover, we will analyze the positive feelings to find out what aspects of the business resonate with customers and play a role in improving their overall satisfaction. In this way, through the use of this sentiment analysis, we can make wiser decisions that ultimately benefit the business and improve the consumer experience. In Figure 5, this positive sentiment word cloud is beneficial in many ways, such as in Quick understanding, i.e., it provides a quick visual understanding of what the customers value in the services or products offered by the marketplace. Analysis and Improvement help companies identify strengths that can be maintained or improved; in communication and marketing, information from word clouds can be used to highlight positive aspects of marketing information or communication with potential customers. In general, positive sentiment word clouds are an effective tool for analyzing and visually presenting big data, making it easy to understand trends and sentiment in consumer reviews. In this picture, the words that often appear in the expression of positive feelings are shopping, app, promotion, and post.

Fig. 5. Positive sentiment word cloud
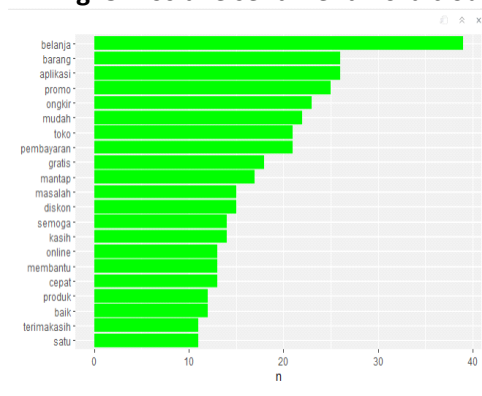
Fig. 6. The number of words with positive sentiment

The most frequently mentioned keyword is shopping. The following are some positive feeling review data related to shopping, including the easy way to shop at ABC Store, many promotions, more economical, free shipping, fast delivery, many original items, safety when shopping at ABC Store, and good product quality.

The Mann-Whitney test was used to assess if there was any significant disparity regarding ratings given by respondents who fell under categories of negative or positive sentiments. Results from this test indicated that between these two groups, there was a significant difference in ranking levels, meaning those customers on the latter side always rated ABC Store highly for good customer relations and quality products. It is important to keep up high standards persistently so that you remain relevant to customer satisfaction. Through various test applications that enable an analysis of feedback given by clients in relation to reviews provided on the ABC Store website, it becomes easier for the ABC Store management team to identify the areas of weakness within which they need improvements upon their service quality, thereby enhancing the overall customer experience. This approach will help ABC Store not only retain its existing customers but also attract new ones from the rest of its e-commerce platforms, hence ensuring that it maintains its position as one of the top players in the industry.

Based on table 2, it can be seen:
- Average in positive sentiment group = 4.549180
- Average in negative sentiment group = 1.339908

Table 2
Average sentiment rating

Sentiment	Amount	average rating	Standard deviation of ratings	Propose
+	122	4.549180	1.0531531	0.0742541
-	1521	1.339908	0.4873129	0.9257456

From this, we get the information that, on average, respondents from the positive feeling group gave a higher score of 4.549180 compared to the negative feeling group respondents of 1.339908. The first calculation, using the Mann-Whitney test, obtained a p-value of < 2.2e-16, which means the p-value = 0.00022 < the significance level of 0.05 or 5%, thus concluding that there is a significant difference in ratings between respondents in the positive sentiment group and respondents in the negative sentiment group. Furthermore, the Chi-Square proportion test will be used to test whether there is a significant difference between the number of positive sentiments and the number of negative sentiments. Based on the results of the Chi-Square proportion test, the p-value < 2.2e-16 is obtained, which means that the p-value = 0.0002 < the significance level of 0.05 or 5%, so it is concluded that there is a significant difference between the number of positive sentiments and the number of negative sentiments.

The Chi-Square test is a technique used to assess the relationship between categorical variables. It tests the null hypothesis that there is no relationship between the variables under study. In the context of this research, the Chi-Square Test can be used to explore whether the distribution of sentiments (positive, negative, neutral) differs significantly between different categories or segments in the data. In other words, review data with significantly more negative sentiments than review data with more positive sentiments. This result suggests that the difference in ratings between the two sentiment groups is not due to chance but a real difference in how they view the product or service. This suggests that there may be underlying factors contributing to the difference in ratings, such as different experiences or expectations. These findings emphasize the importance of considering sentimental analysis when understanding customer feedback and making informed business decisions.

3.2 Discussions

The research findings have significant implications for business and are taken from the previous study [20,21,22]. Knowing how sentiment affects customer feedback and valuable information on what causes satisfied or dissatisfied customers benefits companies. This will help companies customize their products and services to better suit customers' needs and expectations, which in turn will increase customer loyalty and retention.

Sentiment analysis is a great tool for businesses to understand customer opinions and preferences on social media. It helps customize marketing strategies, product offerings, and customer service initiatives to meet the needs of the target audience. It also helps identify potential problems before they become bigger, ensuring timely intervention to maintain customer satisfaction and loyalty. This proactive approach can drive growth, profitability, and competitive advantage in today's rapidly evolving marketplace. For example, analyzing customer responses on social media can identify common complaints about a product, thereby increasing customer satisfaction and loyalty, which are taken from the previous study [3,8].

By being on the lookout for social media, businesses are able to know consumer trends early enough so that they can make messages that fit their audience. With this kind of information, companies can better tailor-fit their messages and stay ahead of changes in what people think about

their products or services. Social media analytics also provide insights into competitors' strategies and customer perceptions, helping businesses stay competitive [9,10]. Utilizing social media data allows companies to understand customers, drive continuous improvement, and address customer concerns, ultimately leading to successful product launches and increased customer satisfaction.

As a recommendation for future research, researchers can explore the application of sentiment analysis more deeply in specific categories, such as subscription products or highly competitive marketplace ecosystems. Additionally, integrating machine learning-based approaches with classical statistical techniques can open opportunities to improve analytical accuracy and interpretability. Future studies could also focus on multilingual aspects in global marketplace reviews to expand the generalizability of the findings to international markets. This approach provides a practical contribution and a clear roadmap for research linking data analytics to corporate strategic decisions.

4. Conclusions

The use of the Mann-Whitney Test obtained $p < 2.2e-16$, which means the p-value = 0.00022 < the significance level of 0.05 or 5%, and the Chi-Square Proportion Test obtained p-value < 2.2e-16 which means p-value = 0.0002 < the significance level of 0.05 or 5%, it is concluded that there is a significant difference between the number of positive sentiments and the number of negative sentiments, with the test results above. It can hence be said that this era's commercial firms are likely to make much progress if they employ sentiment analysis since it is a very efficient tool nowadays when everything has gone digital. Further examination should consider new methods of analysis like machine learning so as to ensure that the sample cuts across platforms and timelines, improve sample validity, and combines qualitative data collection using sentiment analyses that can lead to understanding consumer behaviour.

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