Identify Issues That Influence Customer Satisfaction Using Sentiment Analysis and Topic Modeling

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ABSTRACT: The development of internet users in Indonesia continues to increase over time, this makes customers comfortable with digital transactions. Trinusa Travelindo Company or better known as Traveloka, which is engaged in the online travel agent sector, has proven its extraordinary achievement, namely becoming the E-tourism application that is ranked 1st most visited by the Indonesian people in 2022. However, these results are also directly proportional to the number of negative reviews created in the application review itself. This study aims to identify what issues affect customer satisfaction with topic modeling. This study uses the text mining method derived from the results of Traveloka application user reviews. The data source obtained in this study is secondary data by using the Traveloka application review data crawling technique with samples from January to May. Based on sentiment analysis, positive sentiment is more dominant (50.38%) compared to negative sentiment (49.62%). User reviews are grouped based on the results of sentiment analysis, then Topic Modeling is carried out to find out what issues affect customer satisfaction. The topic modeling of the data used is Latent Dirichlet Allocation (LDA) and Latent Semantic Analysis (LSA) with the help of phyton 6.3. to find out what words and topics often appear or as factors that influence customer satisfaction. The most influential negative issues include the refund and payment process, paylater services, and the ordering experience which is considered complicated. On the other hand, issues that contribute positively to customer satisfaction include product quality, service quality, and promos and discounts. This is reinforced by the results of topic modeling which show that these aspects are often the main concerns in user reviews on the Google Playstore. Thus, this study suggests that in order to increase customer satisfaction, Traveloka needs to focus on improving the quality of service, products, and offering more attractive promos, while simplifying the refund process and ordering experience in the application, some still say it is complicated

KEYWORDS: Customer satisfaction, Sentiment Analysis, Text Mining, Topic Modelling

INTRODUCTION

Indonesia has seen a consistent increase in the number of individuals using the internet over the past few years. Based on statistics provided by the Association of Internet Service Providers in Indonesia (APJII) for the period covering 2023 to early 2024, it was observed that there had been a 1.4% increase in the number of internet users in Indonesia (APJII, 2023). In recent times, technological advances have made significant contributions to improving the quality of human life in various fields. The ease of digital accessibility offers advantages to individuals in an era characterized by speed and pragmatism. E-commerce is the process of distributing, buying, selling, and promoting goods and services through electronic systems, such as the internet, television, or other computer networks. One source of e-commerce data is the Bank Indonesia dataset available on the Data Indonesia.id website (2023) which illustrates the growth of e-commerce transactions in Indonesia which continues to increase from 401 trillion rupiah in 2022 to 476.3 trillion rupiah. From the data results, the value of e-commerce transactions in Indonesia continues to increase, this shows changes in consumer behavior that are starting to change following the development of digital technology.

According to data from Kata data (2022), one of the most visited E-Commerce tourism by Indonesian people is Traveloka with 7.2 million visitors, followed by tiket.com with 6.2 million people and booking.com with 3.1 million people. Traveloka is one of the tourism e-commerce that is quite successful in competing among e-commerce players in similar categories. However, this data is inversely proportional to the data scraping carried out by researchers now with several previous competitors. The data used is application review data with the same number of 11,000. From the results of the review, Traveloka has the most negative reviews of 4,407, Tiket.com 3,203 and Booking.com 743 review data generated by the author in order to make pre-research data to raise the Traveloka case as a topic to be discussed. This makes the author want to identify what issues affect Customer Satisfaction using sentiment analysis and topic modeling.

In the study (Williady et al., 2022) stated that customer satisfaction is important for increasing demand, which will improve financial performance and efficiency. Therefore, it is necessary to identify what issues affect customer satisfaction, a review and improvement of service quality are needed in order to achieve customer satisfaction. From this, the author provides insight, based on text mining, into what customers say in their reviews on the Google Play Store. To identify these problems, this study aims to understand online travel agent applications by exploring issues that affect customer satisfaction through text mining of online customer reviews. Customer reviews of mobile applications on platforms and social media allow them to convey their evaluations of the products and services provided by the mobile application. In line with several studies using customer review data conducted by Song et al., (2022), Kumar et al., (2023), Chung et al., (2022), Williady et al., (2022) and Kitsios et al., (2021) to find out what factors are the key to customer satisfaction. However, in the research conducted by the author above, topic modeling has not been carried out using 2 methods and also in the selection of objects, there has been no such thing as an online travel agent application, especially in Indonesia.

The number of users on the Playstore application continues to increase from year to year. This is also conveyed by Katadata, the number of application downloads on the Google Play Store continues to increase from year to year, while the number of application downloads on the App Store has decreased. In 2020, it was explained that the Google Play Store recorded 24.4 billion application downloads, but this figure increased to 28.2 billion downloads in the first three months of 2022. On the other hand, the App Store decreased from 9.2 billion downloads to 8.4 billion downloads. This makes the author want to assess customer satisfaction with the Traveloka application on the Google Play Store. The following is data on the number of downloads of the Google Play Store and App Store applications in early 2021.

The purpose of this study is to examine issues affecting customer satisfaction through the application of text mining techniques to online customer reviews. The focus of this study is on Traveloka, one of the leading online travel brokers in Indonesia. The identification of the problem is done by utilizing the results of sentiment analysis and topic modeling techniques, specifically Latent Dirichlet Allocation (LDA) and Latent Semantic Analysis (LSA). This study involves examining and describing consumer data extracted from user reviews related to programs found on the Google Play Store. The data processing procedure uses text mining methodology, namely utilizing Latent Dirichlet Allocation (LDA) and Latent Semantic Analysis (LSA) techniques. These methods are recognized for their many advantages compared to traditional approaches. The current research being conducted by the author is entitled Identify issues that influence customer satisfaction using sentiment analysis and topic modeling

LITERATURE REVIEW

Marketing

Marketing In this case, the author provides the view that marketing is an activity, a process that is valuable to customers, clients, partners, and the general public. The purpose of marketing itself is to sell and promote a product or service or what is offered. Now many customers say that marketing is interpreted as the process of selling goods or services, but many of the definitions of marketing have broader aspects than the definition we explain or the explanation above. According to Kotler et al., (2022), marketing is identifying and providing needs and social in a way that is in line with the goals of the organization or company. According to Tjiptono and Diana (2020), Marketing is the process of creating, distributing, promoting, and pricing goods, services, and ideas. The goal is to facilitate exchanges that satisfy customers and to build and maintain positive relationships with stakeholders in an ever-changing environment. offering products or services that are attractive to everyone, be it goods, services, property, people, locations, events, information, ideas, or organizations. So, marketing management is an art in creating processes from planning to controlling related to product or service marketing activities to gain profit in achieving goals in an effective and efficient manner.

Customer satisfaction

According to (Berners & Martin, 2022), customer satisfaction is a parameter as a measure of the difference between customer expectations and customer responses to the products or services they receive. Meanwhile, according to Tjiptono (2019), customer satisfaction is defined as a comparison between expectations or hopes before or after making a purchase and expectations after making a transaction or purchase. According to Biesok & Wyród-Wróbel (2011), customer satisfaction is a process that occurs after a desire is fulfilled after realizing what we want. So customer satisfaction based on the explanation above is a measure of customer satisfaction expectations after they have carried out a transaction process for goods or services and the desires they expect are fulfilled.

Text Mining

Text mining according to (Williady et al., 2022), text mining is the process of extracting and analyzing large amounts of data from various different sources to find hidden patterns in data sets. Meanwhile, according to Banchs (2021), text mining is defined as the processing of natural language or text, retrieving information to provide competitive services to users and interpreting knowledge for business and marketing research applications. According to (Jo, 2019), text mining is considered a special type of data mining, as mentioned above, and we need to explore data mining conceptually, to understand data refers to the process of obtaining implicit knowledge from any type of data in a broad view. The conclusion from the explanation above text mining is the process of processing, analyzing text to provide information that is relevant to the needs of an organization or company to carry out a statistical analysis of the needs of each.

Sentiment Analysis

Sentiment Analysis According to Moreno & Iglesias (2020), sentiment analysis is language processing related to learning about the intensity of the emotional side expressed by a text. Meanwhile, according to Rajput et al (2018), sentiment analysis is an analytical approach, which is used for text analysis aimed at determining the opinion and subjectivity of each opinion, review or tweet, people's opinions can be classified into different polarities such as positive, negative or neutral this technique will be classified into various categories based on data size, document type, and availability. According to Suh & Anthony (2018) Sentiment Analysis is one of the fields in the field of natural language processing that aims to determine the attitude, emotion, or mood of the author of the text on various topics. One of the most famous measures of sentiment is polarity. From the explanation above, we can conclude that sentiment analysis is a processing carried out to find people's opinions or data that will show a goal in a field either positively, negatively or neutrally.

Topic Modelling

The use of topic modeling has been applied in various fields to analyze customer satisfaction levels using customer reviews found online. In the study of Heng et al., (2018), it is explained that the large number of reviews makes it impossible to manually read reviews and understand customer satisfaction factors. Furthermore, in the study of Kumar et al. (2023), online customer review (OCR) data containing the factors that customers consider most important, along with the level of satisfaction with these factors, can be used to study customer satisfaction in depth. This study uses topic modeling with (Latent Dirichlet Allocation) LDA and (Latent Semantic Analysis) LSA where each of these topic models has its own advantages. According to Bhutada (2020), Latent topic modeling has three types of latent models, namely LSA, PLSA and LDA Topic Modeling LDA is a generative probabilistic model often used for many documents with many topics, while LSA is a direct dimension reduction of a matrix, not built on strong probability theory and complex models like LDA, in most studies LSA works better with small document collections. In this study, two modeling topics were used, namely LDA and LSA, to see whether the results were the same or different from the number of documents used.

METHODOLOGY

The population in this study is every user review on the Traveloka application on the Google Play Store which is determined based on the application review. According to Indrawati (2015), a sample is a part of the population selected for use in research, to be observed, treated, or asked for opinions about what is being studied. The sample used for quantitative analysis in this study is review data from the Traveloka Google Play Store application, where the data collection period was carried out on the Traveloka Google Play Store application within a period of five months starting from January 2024 to May 2024. Data collection in this study with a quantitative approach using secondary data. This study uses secondary data collected from reviews on the Google Play Store which contain facts about Traveloka service users who have reviewed the application. The review data is a review, comment, input and user complaints about the services provided by Traveloka. The data collected is secondary data, namely information that describes the performance of the Traveloka application on the Google Play Store. Data collected through scraping, namely:

1) Username
2) Review
3) Rating
4) Date

5) Reply Review
6) Years
7) Month

Document analysis requires good examination, review, and interpretation of data in order to obtain meaning and empirical knowledge of the topic being studied. There are three types of documents, namely public records, personal documents, and physical evidence. This study uses public records type documents, namely documents in the form of online text available in application reviews on the Google Play Store regarding user facts related to Traveloka services that can be accessed publicly. Data collection is carried out using crawling techniques with the initial step of determining the application URL so that the data taken is in accordance with research needs.

The data collected are user reviews from the Traveloka application on the Google Play Store in the form of user reviews related to Traveloka services that can be accessed publicly. Data collection uses the scraping technique with the help of the Python application in Anaconda. In scraping, the researcher took several reviews and then took a sample of 11,000 review data. The data taken in the last five months includes username, content (review), score rating, reply content (user review replies from the admin), year and month, and collected in one .csv format file.

In this study, sentiment analysis is used to determine the tendency of user attitudes, both positive and negative, based on customer satisfaction with the information or reviews they load in the Traveloka application on the Google Play Store. The data is divided into two dimensions, positive and negative sentiment. The grouping of sentiment analysis in this study was assisted by research conducted by Koto & Rahmaningtyas (2017), using the Indonesian Sentiment Lexicon library, it can determine the content of the review given containing positive or negative reviews. given the label (1) and the negative is given the label (-1). The following is an example of mapping positive and negative views on the experience of using Traveloka:

Review	Sentiment
Dah bertahun - tahun menggunakan Aplikasi Traveloka untuk pencarian akomodasi dan sangat berguna, baik buat keperluan pribadi atau kerjaan. Saya rasa baru traveloka yang dapat diandalkan buat mencari penginapan atau transportasi dalam posisi last minute, mudah digunakan, dan dapat harga yang sangat related yg pasti ga kemahalan.. Mantap..!	Positif (1)
Sudah jadi penguna setia, sebelum pandemi aktif pakai Traveloka untuk berbagai keperluan traveling. Sampai dapat limit paylater lumayan tinggi, hanya karena transaksi yg saya batalkan akibat pandemi tapi bunga paylater tetap harus dibayarkan, saya aktif bayar, sampai tersisa bunga paylater yg hanya 82ribu saja masih saya pending bayar sebagai bentuk protes refund yg belum dibayar oleh Traveloka terkait pembatalan transaksi masa pandemi itu. Dan paylater saya dinonaktifkan dong, sangat kecewa.	Negatif (-1)

The application of topic modeling in this study was carried out with the help of phyton software. The LDA algorithm (Latent Dirichlet Allocation) to form factors and determine topics and modeling is a method in text mining that is used to identify topics in a text by analyzing the frequency distribution of words in the document. In the study of Kumar et al., (2023), it is explained that LDA is a set of texts or each review has a unique proportion of the topic mix it contains because LDA assumes that each

document is a probability distribution of hidden topics, while each topic is a probability distribution of words. According to Kumar et al., (2023), the LDA technique can also help companies in viewing user reviews submitted on their applications to track, monitor, and manage customer satisfaction for both their products and services. In the study of Masury et al (2019), it is explained that sentiment analysis and topic modeling can quickly measure the quality of mobile apps service quality which is useful for increasing user satisfaction, management will be better, and smooth integration in multi-platform businesses is very important. In relation to this, this study aims to find the most relevant topics or themes in the text. Here are 20 topics produced by LDA topic modeling. Topic modeling is divided into two, namely positive and negative LDA topic modeling results.

Latent Semantic Analysis (LSA) is a method for modeling that is commonly used in topic modeling. According to Bhutada (2020), LSA topic modeling is done by directly reducing the dimensionality of a matrix. In the study of Chung et al., (2022), topic modeling is used to identify latent factors that influence customer satisfaction by utilizing LSA. In running LSA, the author must prepare a matrix document from a set of texts in user reviews. In this study, the matrix was built based on Term Frequency-Inverse Document Frequency (TF-IDF). According to Minhui & Tiansen (2022), the TF-IDF algorithm is a comprehensive evaluation of the importance of words to text or text classes, TF (word frequency) is the frequency of words appearing in an article or document class, which intuitively indicates the importance of words to an article or document class; IDF (inverse document frequency) describes the ability of words to distinguish themselves from different text classifications. Furthermore, in the research of Chung et al., (2022), the LSA calculation combines the TF-IDF matrix and the singular vector decomposition (SVD) of the topic-document matrix and the term-topic matrix based on k latent factors with the following formula.

$$X = U \bullet \Sigma \bullet VT \qquad (1)$$

According to Indrawati (2015), descriptive research aims to identify factors or variables to measure an object but does not yet know the relationship between the factors and variables or present the units analyzed and determine the perceptions of service or product users. This study is classified as descriptive research because it aims to identify issues that affect customer satisfaction in the online travel agent service Traveloka in Indonesia in the Google Play Store using the text mining method using Phyton6.3 software. The following is a description of the research conducted by the author.
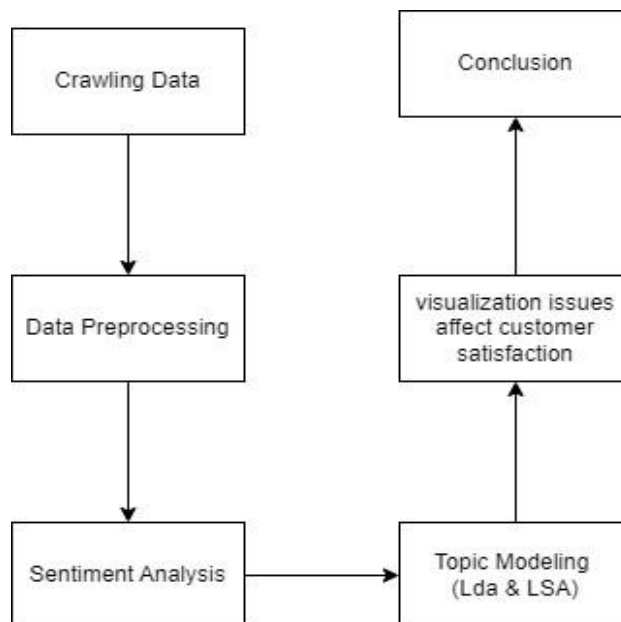

Figure 1. Research Framework
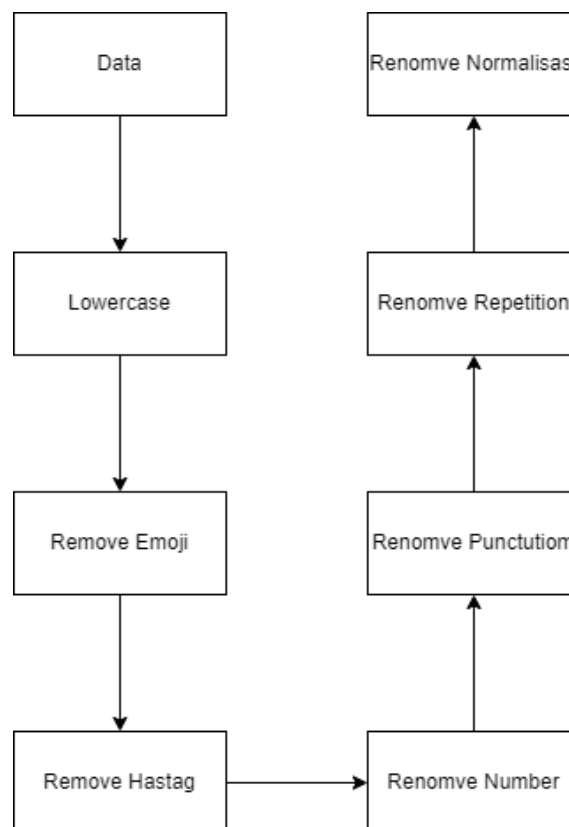**Source:** Processed by the author, 2024

RESULT

The data obtained in this study were taken from a certain period, namely from January to May 2023, which came from reviews of Traveloka application users on the Google Playstore. Data collection in this study used data crawling or scraping

techniques using the help of the Python application. According to research by Kumar et al., (2023), review data on the use of mobile applications found that user satisfaction in using the application plays a crucial role in the process, low levels of mobile application users by users can have a negative impact on profitability and even threaten the survival of the application because it requires significant resource allocation. The results of the data collection are in the form of a dataset formed in Comma Separated Value (CSV) format. The data collected are in the form of username, review, rating, date, reply review, years and month. The total results of the collection of user reviews obtained by the author are 6,000 data. After the data collection process is complete, the data will be prepared first before being used in the data processing stage.

After the data collection process is complete, the next step is data preparation. At this stage, the collected data will be translated into Indonesian first, considering that the user reviews of the application to be processed must use consistent Indonesian. In addition, the data will also go through a cleaning process, where inappropriate words or characters that have no meaning will be removed. Furthermore, the data will be re-checked to handle words that have typos or have more than one vowel (example: sukaaa, bagusss). Data containing duplication will also be removed before the data is divided into the next stage.

Figure 2. Data Preprocessing
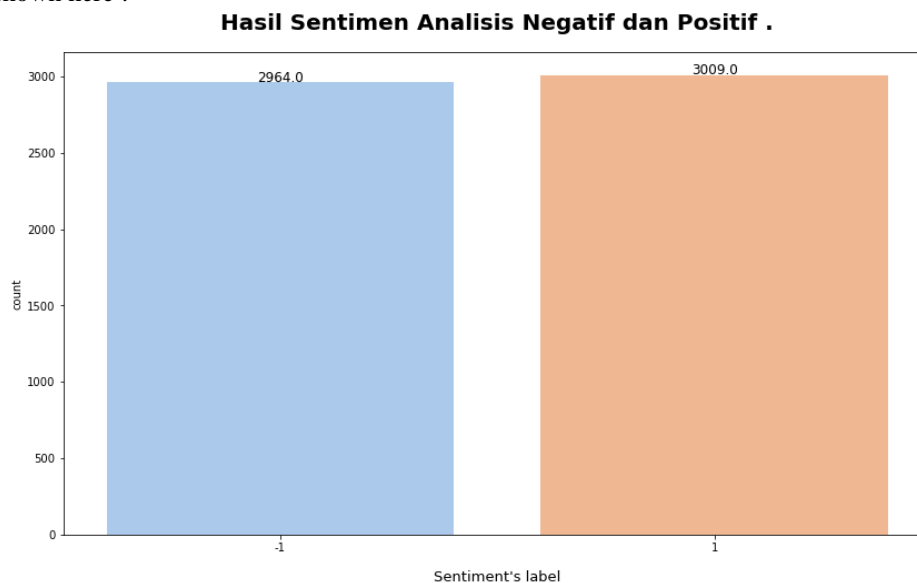**Source:** Processed by the author, 2024

Based on Figure 2 above, the data preprocessing process consists of:

1. Lowercase
Used to align the character size in the textual dataset to lowercase or all lowercase.

2. Remove Emoji
Used to remove all emojis in user reviews.

3. Remove Hastag
Used to remove all hashtags in user reviews.

4. Remove Number
Used to remove all hashtags in user reviews.

5. Remove Punction
Used to remove all punctuation in user reviews.

6. Remove Repetition
Used to remove all repeated words in user reviews.

7. Normalization

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Used to change all short or non-standard words into words that match the correct spelling. repeated in user reviews.

The results of the sentiment analysis are to make two types of perceptions shown by Traveloka application users, namely, positive and negative sentiments. Positive perceptions indicate that users feel happy or satisfied when using the services provided by Traveloka to meet their needs. While negative perceptions indicate that users feel insufficient or not yet satisfied when using the services provided by Traveloka. The results of the sentiment analysis based on the perception of Traveloka users positively (1) and negatively (-1) are shown here :

Figure 3. Sentiment Analyst
Source: Processed by the author, 2024

From the results of the Traveloka application sentiment analysis in the period from January to May 2023, it shows that positive sentiment is greater than negative sentiment with a total of 6,000 user review data. There are 3,009 data that are positive and 2,964 that are negative. If presented, positive sentiment is 50.38% and negative sentiment is 49.62%. This percentage shows that positive sentiment has a greater value than the total review data, but the value of negative sentiment is not much different from positive sentiment so it is considered that there are still many who are not satisfied and feel uncomfortable with the services provided by the Traveloka application.

In order to clearly see the responses and opinions of Traveloka application users, especially those related to customer satisfaction, the author uses topic modeling which functions to see various topics generated from user reviews of the Traveloka application. In line with research conducted by Masury et al (2019), explaining that sentiment analysis and topic modeling can quickly measure the quality of mobile apps service quality which is useful for increasing user satisfaction, management will be better, and smooth integration in multi-platform businesses is very important. Topics that appear in the form of keywords that often appear in application reviews. Understanding topic modeling has been at the heart of many studies, with two popular methods used being (Latent Dirichlet Allocation) LDA and (Latent Semantic Analysis) LSA. In this study, topic modeling was carried out after conducting sentiment analysis, so the data was divided into two, positive and negative topic modeling. Positive topic modeling sees the most topic appearances and takes as many as 3 top topics as issues that affect customer satisfaction and 3 negative topics are used as company suggestions to increase customer satisfaction. The results of a set of words by each topic modeling produce 10 topics consisting of a collection of words that will be interpreted by the author. The collected words represent the topics from the user review results in the following table.

Table 1. Positive Topic Modeling Using LDA

Topic Number	Term per LDA Topic	Interpretation
Topic 1	'alhamdulillah', 'traveloka', 'terima', 'kasih', 'mudah', 'tiket', 'harga', 'memang', 'lancar', 'puas'	Product Quality
Topic 2	'cepat', 'respons', 'proses', 'mudah', 'pelayanan', 'sangat', 'mantap', 'banget', 'kasih', 'fast'	Service Quality
Topic 3	'promo', 'banyak', 'memudahkan', 'mudah', 'bagus', 'cepat', 'mulu', 'efisien', 'diperbarui', 'traveloka'	Promo/Discount
Topic 4	'nan', 'praktis', 'refund', 'traveloka', 'sangat', 'membantu', 'keren', 'suka', 'mantap', 'selalu'	Payment Refund
Topic 5	'baik', 'terima', 'kasih', 'traveloka', 'sangat', 'mudah', 'cepat', 'saya', 'dalam', 'sudah'	Service Quality
Topic 6	'lancar', 'pelayanan', 'mudah', 'bagus', 'okay', 'banyak', 'diskon', 'bermanfaat', 'tidak', 'membantu'	Discount Offers
Topic 7	'banget', 'pelayanan', 'bagus', 'traveloka', 'baik', 'lebih', 'mudah', 'cepat', 'puas', 'terima'	Service Quality
Topic 8	'bagus', 'traveloka', 'booking', 'pelayanan', 'lebih', 'harga', 'pelanggan', 'belum', 'murah', 'nyaman'	Booking Experience
Topic 9	'nan', 'traveloka', 'aplikasi', 'harga', 'tiket', 'terbaik', 'bermanfaat', 'kasih', 'bagus', 'juga'	Product Quality
Topic 10	'terbaik', 'banget', 'nan', 'baik', 'goods', 'limit', 'aplikasi', 'pelayanan', 'topp', 'payleter'	Paylater
Topic 11	'cepat', 'terjamin', 'alhamdulillah', 'terbaik', 'promo', 'proses', 'mantap', 'sangat', 'great', 'mudah'	Promo/Discount
Topic 12	'puas', 'kasih', 'terima', 'sangat', 'traveloka', 'baik', 'membantu', 'mantap', 'your', 'selalu'	Service Quality
Topic 13	'terima', 'kasih', 'sangat', 'mudah', 'membantu', 'traveloka', 'baik', 'respons', 'fast', 'murah'	Service Quality
Topic 14	'sangat', 'mudah', 'traveloka', 'untuk', 'kasih', 'terima', 'membantu', 'tiket', 'bermanfaat', 'memudahkan'	Product Quality
Topic 15	'mudah', 'mantap', 'lebih', 'promo', 'cepat', 'pesan', 'transaksi', 'murah', 'baru', 'baik'	Promo/Discount

Topic 16	'mantap', 'traveloka', 'bismillah', 'cepat', 'mudah', 'aplikasi', 'dalam', 'kasih', 'terima', 'betul'	Service Quality
Topic 17	'mantap', 'kasih', 'terima', 'banget', 'traveloka', 'sudah', 'promo', 'punya', 'tidak', 'membantu'	Promo/Discount
Topic 18	'simpel', 'mudah', 'terbaik', 'traveloka', 'sangat', 'gampang', 'membantu', 'cepat', 'kemudahan', 'mantap'	Service Quality
Topic 19	'traveloka', 'mudah', 'hotel', 'terbaik', 'lebih', 'cepat', 'sekali', 'mahal', 'akses', 'fast'	Promo/Discount
Topic 20	'mantap', 'betul', 'nan', 'praktis', 'easy', 'mudah', 'traveloka', 'membantu', 'sekali', 'aplikasi'	In-App Booking Experience

Source: Processed by the author, 2024

Table 2. Positive Topic Modeling Using LSA

Nomor Topik	Term per Topik	Penafsiran Topik
Topic 1	'nan', 'lancar', 'aplikasi', 'sangat', 'gampang', 'semoga', 'promo', 'efisien', 'respons', 'sekali'	Promo/discount
Topic 2	'mantap', 'traveloka', 'cepat', 'betul', 'mudah', 'sangat', 'aplikasi', 'banget', 'membantu', 'sekali'	Service Quality
Topic 3	'baik', 'sekali', 'sangat', 'cepat', 'pelayanan', 'kasih', 'terima', 'traveloka', 'mudah', 'lebih'	Service Quality
Topic 4	'terima', 'kasih', 'mudah', 'cepat', 'traveloka', 'sangat', 'terbaik', 'membantu', 'puas', 'proses'	Service Quality
Topic 5	'terbaik', 'traveloka', 'aplikasi', 'memang', 'yang', 'selalu', 'travel', 'pokoknya', 'perjalanan', 'alhamdulillah'	Service Quality
Topic 6	'mudah', 'cepat', 'proses', 'sangat', 'praktis', 'puas', 'lebih', 'pelayanan', 'layanan', 'bagus'	Service Quality
Topic 7	'puas', 'sangat', 'membantu', 'bermanfaat', 'dengan', 'banget', 'selalu', 'memudahkan', 'pelayanannya', 'dalam'	Service Quality
Topic 8	'cepat', 'puas', 'proses', 'respons', 'pelayanan', 'layanan', 'banget', 'kasih', 'terima', 'aman'	Service Quality
Topic 9	'banget', 'traveloka', 'membantu', 'sangat', 'memudahkan', 'praktis', 'sudah', 'pelayanan', 'memang', 'keren'	Service Quality
Topic 10	'sangat', 'membantu', 'cepat', 'pelayanan', 'bermanfaat', 'proses', 'respons', 'praktis', 'bagus', 'layanan'	Service Quality

International Journal of Current Science Research and Review

ISSN: 2581-8341

Volume 07 Issue 09 September 2024

DOI: 10.47191/ijcsrr/V7-i9-26, Impact Factor: 7.943

IJCSRR @ 2024

www.ijcsrr.org

Topic 11	'traveloka', 'pelayanan', 'bagus', 'lebih', 'selalu', 'memang', 'sukses', 'banyak', 'semoga', 'dengan'	Service Quality
Topic 12	'bagus', 'pelayanan', 'banget', 'terima', 'kasih', 'mudah', 'terbaik', 'simpel', 'puas', 'luck'	Service Quality
Topic 13	'praktis', 'efisien', 'simpel', 'lebih', 'murah', 'jadi', 'kasih', 'terima', 'layanan', 'menu'	Service Quality
Topic 14	'memudahkan', 'perjalanan', 'promo', 'banyak', 'praktis', 'proses', 'dalam', 'lebih', 'tiket', 'sekali'	Service Quality
Topic 15	'proses', 'banyak', 'promo', 'lebih', 'membantu', 'praktis', 'simpel', 'diskon', 'murah', 'harga'	Service Quality
Topic 16	'simpel', 'respons', 'banyak', 'promo', 'fast', 'bagus', 'lebih', 'diskon', 'murah', 'harga'	Promo/discount
Topic 17	'simpel', 'proses', 'bagus', 'sangat', 'bermanfaat', 'traveloka', 'memudahkan', 'layanan', 'lancar', 'terjamin'	Promo/discount
Topic 18	'bermanfaat', 'proses', 'sangat', 'respons', 'bagus', 'promo', 'lebih', 'fast', 'memuaskan', 'kasih'	Promo/discount
Topic 19	'lebih', 'respons', 'proses', 'bagus', 'membantu', 'fast', 'murah', 'tiket', 'harga', 'dalam'	Service Quality
Topic 20	'sekali', 'lebih', 'murah', 'bermanfaat', 'harga', 'semoga', 'suka', 'tiket', 'selalu', 'jadi'	Promo/discount

Source: Processed by the author, 2024

Table 3. Negative Topic Modeling Using LDA

Nomor Topik	Term per Topik	Penafsiran Topik
Topic 1	'biasa', 'tidak', 'luar', 'saya', 'sangat', 'yang', 'sudah', 'traveloka', 'aplikasi', 'bisa'	Ordering Experience on the App
Topic 2	'saya', 'tidak', 'sangat', 'tiket', 'traveloka', 'yang', 'membantu', 'sudah', 'tapi', 'aplikasi'	Ordering Experience on the App
Topic 3	'saya', 'traveloka', 'tidak', 'tiket', 'sudah', 'bisa', 'untuk', 'pembayaran', 'yang', 'kasih'	Ordering Experience on the App
Topic 4	'bagus', 'lumayan', 'aplikasi', 'saya', 'suka', 'bisa', 'tidak', 'yang', 'semua', 'traveloka'	Ordering Experience on the App
Topic 5	'tidak', 'bisa', 'saya', 'refund', 'pakai', 'padahal', 'sudah', 'aplikasi', 'diperbarui', 'kenapa'	Payment Refund
Topic 6	'tidak', 'traveloka', 'saya', 'sudah', 'dari', 'bahkan', 'sangat', 'yang', 'paylater', 'saat'	Paylater

Topic 7	'sekali', 'sangat', 'membantu', 'bagus', 'traveloka', 'aplikasi', 'tidak', 'yang', 'mudah', 'kalau'	Ordering Experience on the App
Topic 8	'cukup', 'baik', 'tidak', 'yang', 'jelek', 'membantu', 'cepat', 'jika', 'kalau', 'bagus'	Ordering Experience on the App
Topic 9	'tidak', 'saya', 'sudah', 'bisa', 'yang', 'traveloka', 'bayar', 'aplikasi', 'pakai', 'tapi'	Payment
Topic 10	'sangat', 'membantu', 'bagus', 'tidak', 'aplikasi', 'saya', 'traveloka', 'bisa', 'rekomendasi', 'cepat'	Ordering Experience on the App
Topic 11	'tidak', 'easy', 'aplikasi', 'bagus', 'bisa', 'jelas', 'saya', 'traveloka', 'yang', 'buat'	Ordering Experience on the App
Topic 12	'tidak', 'yang', 'traveloka', 'saya', 'kenapa', 'bisa', 'aplikasi', 'tiket', 'bayar', 'sama'	Ordering Experience on the App
Topic 13	'rumit', 'tidak', 'traveloka', 'bagus', 'tiket', 'aplikasi', 'bisa', 'pakai', 'cepat', 'singkat'	Ordering Experience on the App
Topic 14	'aplikasi', 'saya', 'tidak', 'sudah', 'bisa', 'yang', 'traveloka', 'tiket', 'saja', 'untuk'	Ordering Experience on the App
Topic 15	'bagus', 'tidak', 'sangat', 'aplikasi', 'traveloka', 'saya', 'ragu', 'banget', 'yang', 'bisa'	Ordering Experience on the App
Topic 16	'sangat', 'bagus', 'membantu', 'tidak', 'traveloka', 'saya', 'bisa', 'aplikasi', 'lebih', 'dari'	Ordering Experience on the App
Topic 17	'tidak', 'aplikasi', 'bisa', 'tiket', 'yang', 'sudah', 'sangat', 'bagus', 'saya', 'untuk'	Ordering Experience on the App
Topic 18	'yang', 'tidak', 'lagi', 'saja', 'pesan', 'sudah', 'tanggal', 'tiket', 'bisa', 'jangan'	Ordering Experience on the App
Topic 19	'bagus', 'aplikasi', 'yang', 'tiket', 'banget', 'error', 'pesan', 'tidak', 'traveloka', 'sudah'	Ordering Experience on the App
Topic 20	'sangat', 'bagus', 'saya', 'membantu', 'cepat', 'sudah', 'memuaskan', 'tidak', 'aplikasi', 'tapi'	Ordering Experience on the App

Source: Processed by the author, 2024

Table 4. Negative Topic Modeling Using LSA

Nomor Topik	Term per Topik	Penafsiran Topik
Topic 1	'bagus', 'sangat', 'membantu', 'sekali', 'aplikasi', 'cepat', 'traveloka', 'banget', 'easy', 'yang'	Ordering Experience on the App
Topic 2	'membantu', 'sangat', 'sekali', 'aplikasi', 'memuaskan', 'saya', 'traveloka', 'perjalanan', 'yang', 'cepat'	Ordering Experience on the App
Topic 3	'tidak', 'saya', 'aplikasi', 'bisa', 'traveloka', 'tiket', 'sudah', 'yang', 'pakai', 'pesan'	Ordering Experience on the App
Topic 4	'sekali', 'membantu', 'aplikasi', 'cukup', 'biasa', 'luar', 'baik', 'pokoknya', 'jelek', 'susah'	Ordering Experience on the App
Topic 5	'aplikasi', 'mudah', 'yang', 'baik', 'memuaskan', 'cepat', 'sangat', 'memudahkan', 'keren', 'cukup'	Ordering Experience on the App
Topic 6	'memuaskan', 'sekali', 'sangat', 'cepat', 'rumit', 'proses', 'prosesnya', 'rekomendasi', 'mudah', 'tiket'	Product Quality
Topic 7	'tidak', 'bisa', 'rumit', 'cepat', 'pakai', 'jelas', 'kenapa', 'aplikasi', 'dibuka', 'daring'	Ordering Experience on the App
Topic 8	'biasa', 'luar', 'cepat', 'tidak', 'rumit', 'pakai', 'bisa', 'mudah', 'traveloka', 'saja'	Ordering Experience on the App
Topic 9	'cepat', 'mudah', 'rumit', 'tiket', 'proses', 'cukup', 'yang', 'mempermudah', 'traveloka', 'prosesnya'	Product Quality
Topic 10	'tiket', 'memuaskan', 'pesan', 'pesawat', 'membantu', 'mempermudah', 'traveloka', 'beli', 'untuk', 'bisa'	Product Quality
Topic 11	'memuaskan', 'membantu', 'saya', 'cepat', 'cukup', 'rumit', 'perjalanan', 'pakai', 'suka', 'mempermudah'	Service Quality
Topic 12	'traveloka', 'yang', 'kasih', 'terima', 'pakai', 'dengan', 'rumit', 'baik', 'lain', 'lebih'	Service Quality
Topic 13	'mempermudah', 'perjalanan', 'traveloka', 'terima', 'kasih', 'bisa', 'tidak', 'rumit', 'sangat', 'pakai'	Service Quality
Topic 14	'traveloka', 'cepat', 'pakai', 'bisa', 'pesawat', 'tiket', 'beli', 'aplikasi', 'terima', 'kasih'	Ordering Experience on the App
Topic 15	'lumayan', 'cepat', 'mempermudah', 'aplikasi', 'agak', 'bisa', 'sudah', 'lagi', 'tapi', 'banget'	Ordering Experience on the App
Topic 16	'cukup', 'baik', 'lumayan', 'mudah', 'bisa', 'saja', 'mempermudah', 'sangat', 'lebih', 'kenapa'	Service Quality

Topic 17	'rumit', 'lumayan', 'saya', 'cukup', 'baik', 'tiket', 'tidak', 'pakai', 'pesawat', 'mudah'	Service Quality
Topic 18	'banget', 'sudah', 'pakai', 'mempermudah', 'error', 'terus', 'saja', 'bayar', 'tapi', 'paylater'	Ordering Experience on the App
Topic 19	'mudah', 'keren', 'hotel', 'bisa', 'jadi', 'paylater', 'banget', 'pesan', 'pokoknya', 'menggunakan'	Service Quality
Topic 20	'banget', 'refund', 'lama', 'keren', 'saya', 'bisa', 'memudahkan', 'proses', 'susah', 'cukup'	Service Quality

Source: Processed by the author, 2024

The following image explains the emergence of positive topics produced by LDA topic modeling:
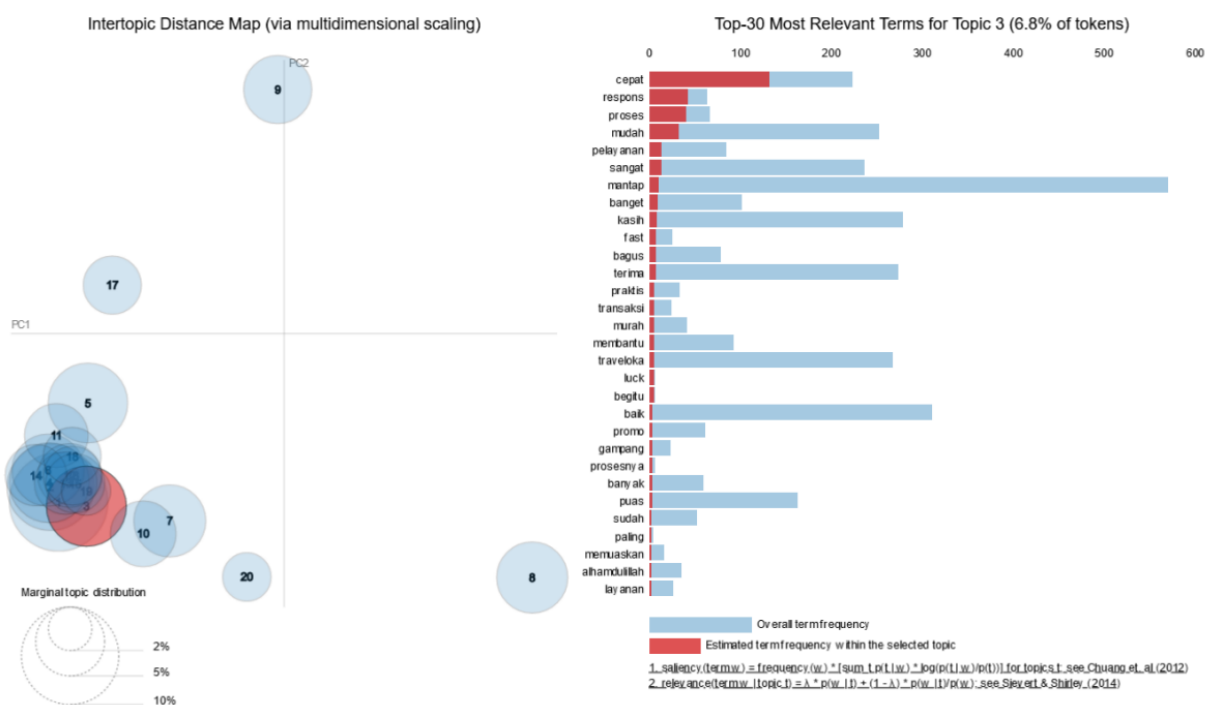

Figure 4 Topic Modeling Positive 1 (One) Using LDA
Source: Processed by the author, 2024

From the collection of words obtained by topic modeling 1 by LDA, the author interprets that this is related to customer satisfaction about the quality of products in the Traveloka application which is already satisfactory. The following is an example of a review given by a user related to the experience of ordering on the Traveloka application.

Figure 5. Example of a product quality review in the application
Source: Processed by the author, 2024

Figure 6 Topic Modeling Positive 2 (One) Using LDA
Source: Processed by the author, 2024

From the collection of words obtained by topic modeling 2 by LDA, the author interprets it as still almost the same because the words collected lead to the application that this is related to customer satisfaction about the experience of ordering a service or product in the Traveloka application is already satisfying. The following is an example of a review given by a user related to the experience of ordering in the Traveloka application.

Pengga Google

★★★★★ 30 Maret 2019

Aplikasi yg sangat bagus dan direkomendasikan. Banyak pilihan untuk perjalanan dan pihak Traveloka sangat efektif,responsif,ramah,dan bijak dalam menghadapi masalah ketika dihubungi para penggunanya. Tingkatkan dan pertahankan yang baik-baik!!!

Figure 7. Example of Ordering Experience on the App
Source: Processed by the author, 2024

Figure 8. Topic Modeling Positive 2 (One) Using LDA
Source: Processed by the author, 2024

From the collection of words obtained by topic modeling 3 by LDA, the author interprets that this is related to customer satisfaction about the experience of ordering a service that offers many promos and attractive prices on the Traveloka application, which is already satisfying. Here is an example of a review given by a user related to promos on the Traveloka application.

Sediana Tumorang

★★★★★ 2 September 2023

Aplikasi yang sangat membantu saya dalam mencari tiket pesawat dan hotel. Banyak juga penawaran menarik, promo dan cashback. Traveloka mudah di jalankan. 👍

2 orang merasa ulasan ini berguna

Figure 7. Example of promos and attractive prices on the App
Source: Processed by the author, 2024

The explanation related to the positive sentiment results with LSA topic modeling is as follows: Topic 1: ('nan', 'lancar', 'aplikasi', 'sangat', 'gampang', 'semoga', 'promo', 'efisien', 'respons', 'sekali') From the results obtained, the author interprets that the topic contains customer satisfaction about promos and discounts in the application that is already very satisfying. The following is an example of a review given by users related to promos and discounts in the Traveloka application.
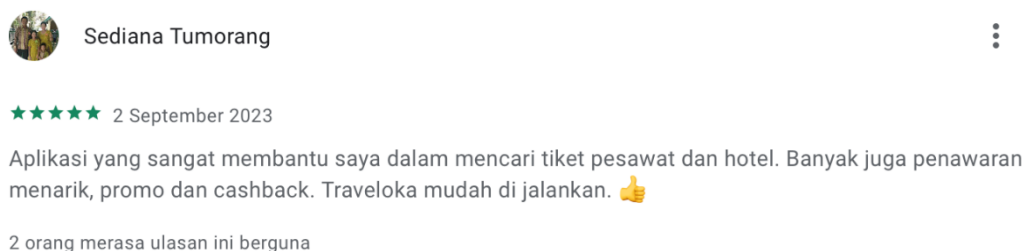
Figure 8. Example of promos and attractive prices on the App
Source: Processed by the author, 2024

Topic 2 : ('mantap', 'traveloka', 'cepat', 'betul', 'mudah', 'sangat', 'aplikasi', 'banget', 'membantu', 'sekali') 'sekali' From the results obtained, the author interprets that the topic contains customer satisfaction about the quality of service in the application that is already very satisfying. The following is an example of a review given by users regarding the quality of service in the Traveloka application.
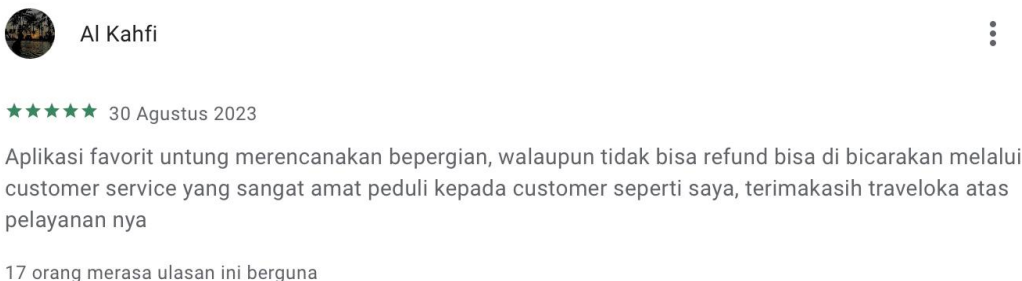
Figure 8. quality of service in the Traveloka application.
Source: Processed by the author, 2024

Topic 3 : ('memudahkan', 'perjalanan', 'promo', 'banyak', 'praktis', 'proses', 'dalam', 'lebih', 'tiket', 'sekali') From the results obtained, the author interprets that the topic contains customer satisfaction about promos and discounts in the application that is already very satisfying. Here is an example of a review given by users related to promos and discounts in the Traveloka application.
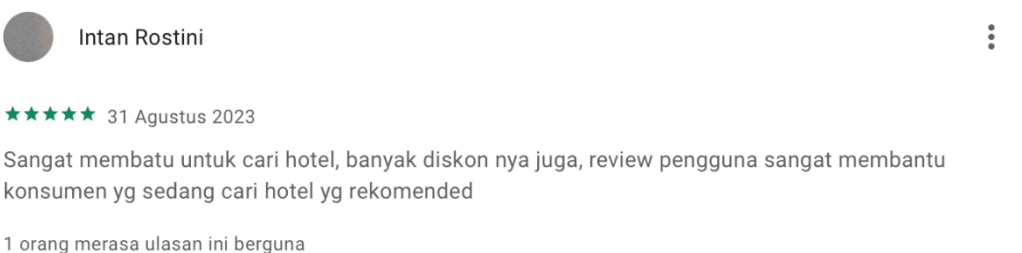

Figure 9. Example of Positive Reviews about promotions and discounts
Source: Author's Processing

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Topic Modelling for Negative Issue,

The following is an explanation related to the negative sentiment results with LDA and LSA topic modeling as follows:
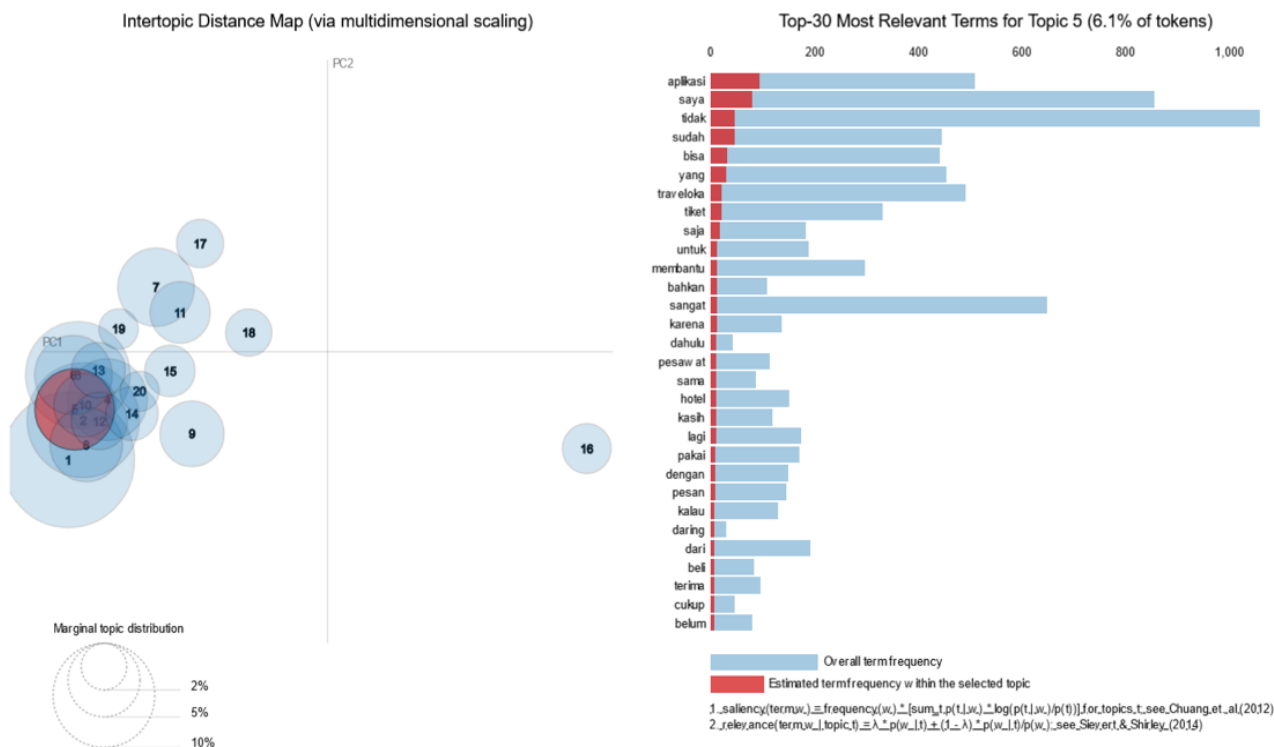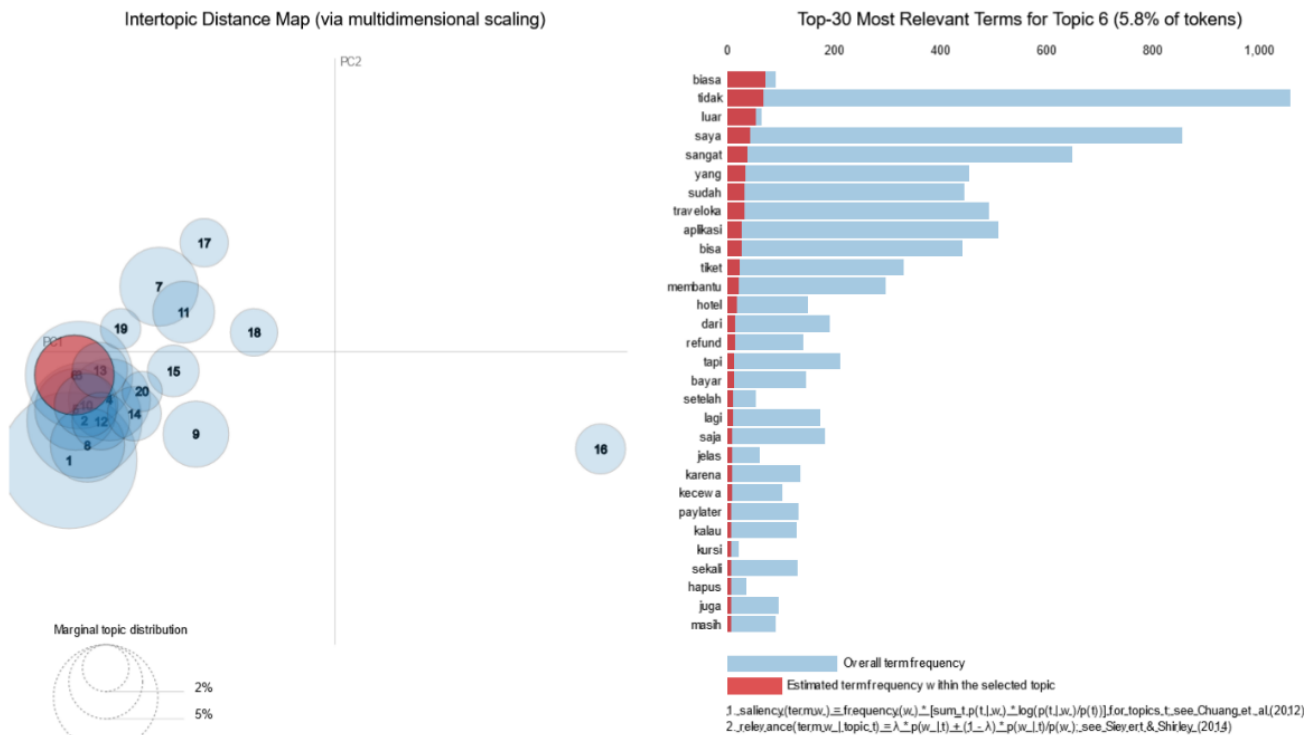

Figure 10. Negative topic modeling 1 using LDA
Source: Processed by the author, 2024

From the collection of words obtained by topic modeling 1 by LDA which are negatively charged, the author interprets that this is related to customer satisfaction about refund payments in the Traveloka application which are not yet optimal. The following is an example of a review given by a user related to refund payments in the Traveloka application which are not yet optimal.
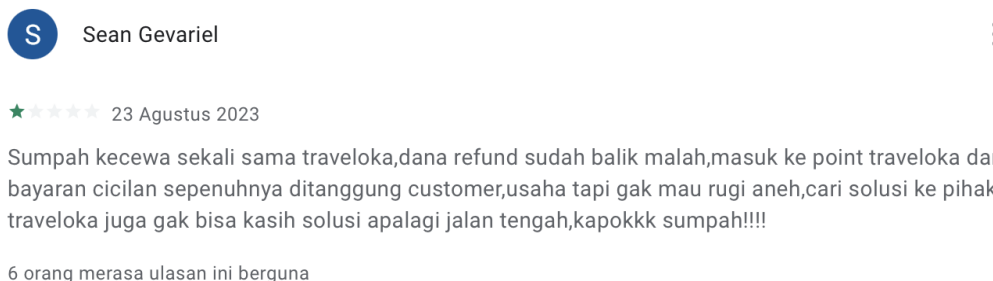
Figure 11. Example of a negative review of a refund payment
Source: Processed by the author, 2024

Figure 12. Negative topic modeling 2 using LDA
Source: Processed by the author, 2024

From the collection of words obtained by topic modeling 2 by LDA which are negatively charged, the author interprets that this is related to customer satisfaction about paylater in the Traveloka application which is not yet optimal. The following is an example of a review given by a user related to paylater in the Traveloka application which is not yet optimal.
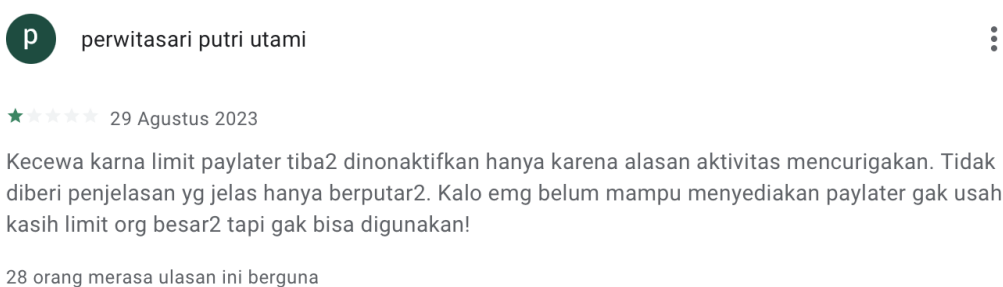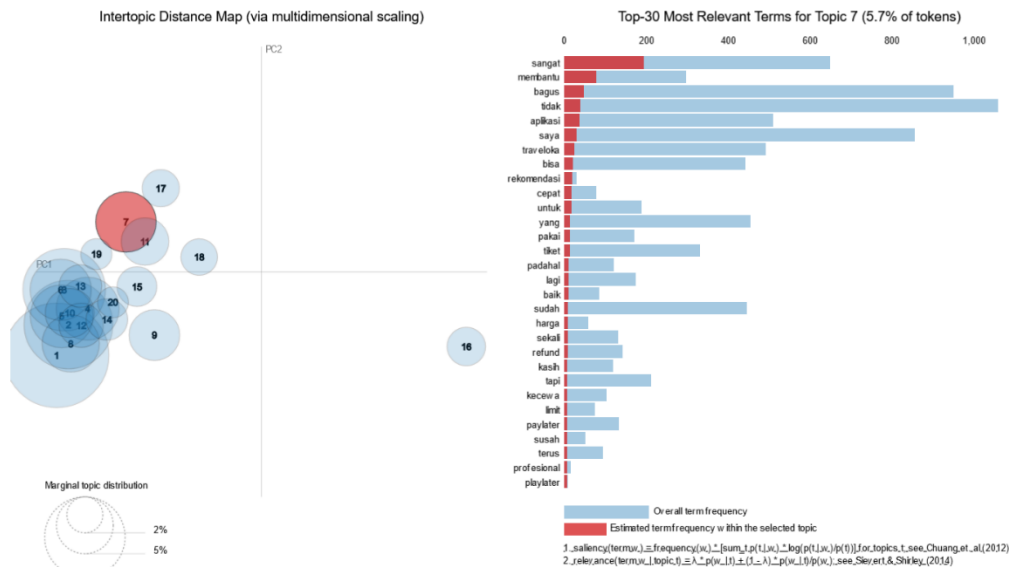

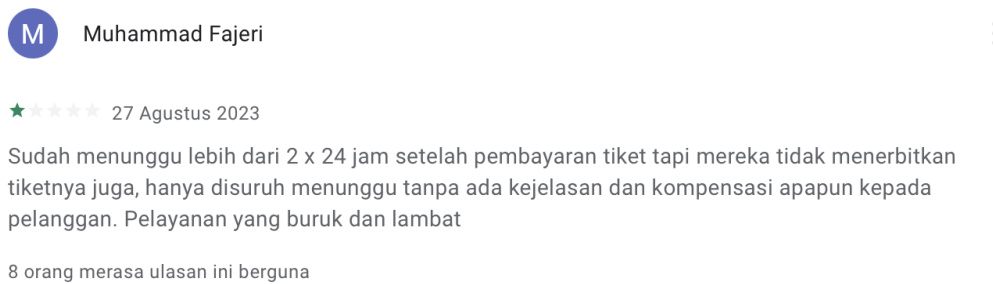**Figure 13. Example of a negative review of paylater**
Source: Processed by the author, 2024

Figure 14. Negative topic modeling 3 using LDA
Source: Processed by the author, 2024

From the collection of words obtained by topic modeling 3 by LDA which is negatively charged, the author interprets that this is related to customer satisfaction about the experience of ordering on the Traveloka application which is still not good, seen by many users who say it is complicated. The following is an example of a review given by users related to the experience of ordering on the Traveloka application in the Traveloka application which is not yet optimal.
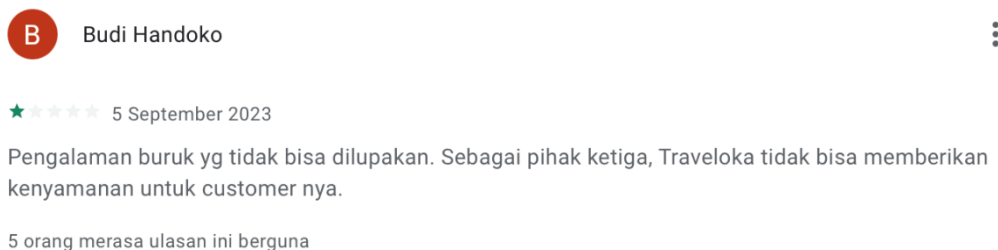

Figure 15. Example of a negative review of experience of ordering on the Traveloka application
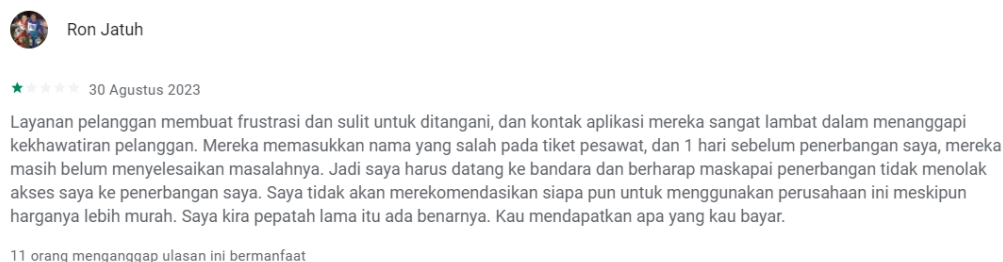**Source:** Processed by the author, 2024

The explanation related to the negative sentiment results with LSA topic modeling is as follows:

Topic 1: ('tidak', 'bisa', 'rumit', 'cepat', 'pakai', 'jelas', 'kenapa', 'aplikasi', 'dibuka', 'daring') From the results obtained, the author interprets that the topic contains customer satisfaction about the Ordering Experience in the Application in the application is not optimal because many of the Traveloka application users are still complicated in accessing the Traveloka application itself, as can be seen from the collection of words obtained by topic modeling 1 above. The following is an example of a review given by users related to promos and discounts in the Traveloka application.
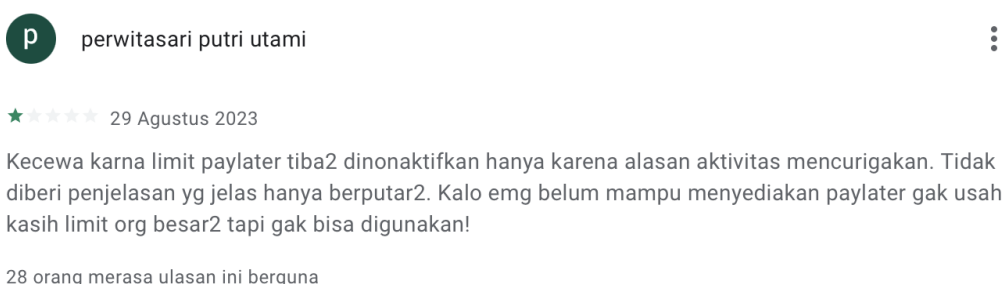
Figure 16. Example of a negative review of experience of ordering
Source: Processed by the author, 2024

Topic 2 : ('traveloka', 'yang', 'kasih', 'terima', 'pakai', 'dengan', 'rumit', 'baik', 'lain', 'lebih') From the results obtained, the author interprets that the topic contains customer satisfaction about the Quality of Service in the Application in the application is not optimal because many of the users of the Traveloka application are still complicated in the quality of Traveloka's own service, which can be seen from the collection of words obtained by topic modeling 2 above. The following is an example of a review given by users related to the Quality of Service in the Traveloka application.

Figure 16. Example of a negative review of experience Quality of Service
Source: Processed by the author, 2024

Topic 3 : ('banget', 'sudah', 'pakai', 'mempermudah', 'error', 'terus', 'saja', 'bayar', 'tapi', 'paylater') From the results obtained, the author interprets that the topic contains customer satisfaction about paylater in the application. The application is not yet optimal because many users of the Traveloka application still often experience errors when accessing the Traveloka application paylater itself, as can be seen from the collection of words obtained by modeling topic 3 above. The following is an example of a review given by users regarding paylater in the Traveloka application.

Figure 16. Example of a negative review of regarding paylater
Source: Processed by the author, 2024

Based on the results of the study, when compared, the proportion of positive sentiment in the Traveloka application is higher than negative sentiment with a positive percentage of 50.38% while the percentage of negative sentiment in Traveloka is

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49.62%. This shows that Traveloka is an Online Travel Agent application that is considered to have good service performance for customer satisfaction. Based on research, Widyawati et al. (2020) that the percentage of sentiment can be used as a basis for comparing the proportion of positive and negative sentiment to determine objects with the most superior service quality performance.

Discussion of research results on issues that affect customer satisfaction with topic modeling generated by topic modeling using the LDA and LSA methods is divided into 4, namely positive LDA, negative LDA, positive LSA and negative LSA. Discussion of issues that arise in LDA that are positively charged are: product quality, service quality, promos and discounts. Furthermore, positive LSA: promos and discounts, product quality, and promos and discounts. Negative issues generated by the author with LDA topic modeling are refunds and payments, pay later, and complicated applications. Furthermore, negative LSA is complicated applications, complicated applications and pay later. From the above, the researcher concluded that there are 3 positive issues that affect customer satisfaction based on user review data, namely: product quality, service quality and promos and discounts. And the negative issues are: refund payments, complicated applications and pay later. From the results of the topic modeling above, it is clear that the research conducted has several issues that are in line with the research conducted by Kumar et al., (2023), topic modeling of the category of ordering experience in the application has an effect on customer satisfaction.

CONCLUSION

The development of digital technology has changed the behavior patterns of tourists and also business patterns in the tourism sector. Currently, most tourists rely on digital devices to search for various information, book tickets, and arrange accommodation reservations. The increasing number of Online Travel Agent service providers has also made business competition increasingly tighter in how to get satisfaction from users who use the services they choose. Until now, Traveloka is still the number one application among its competitors. This study uses a text mining method using sentiment analysis to see the proposition of reviews that contain positive and negative content. Furthermore, this study uses topic modeling, namely Latent Dirichlet Allocation (LDA) and Latent Semantic Analysis (LSA) for modeling frequently appearing topics and what topics or issues identify customer satisfaction. In line with research conducted by Masury et al (2019), it explains that sentiment analysis and topic modeling can quickly measure the quality of mobile apps service quality which is useful for increasing user satisfaction, management will be better, and smooth integration in multi-platform businesses is very important.

The results of this study indicate that issues affecting customer satisfaction with the Traveloka application in Indonesia can be identified through sentiment analysis and topic modeling. The results of the sentiment analysis obtained positive sentiment are more dominant (50.38%) compared to negative sentiment (49.62%), this difference is small, indicating that there is still dissatisfaction among users. The most influential negative issues include the refund and payment process, paylater services, and the booking experience which is considered complicated. On the other hand, factors that contribute positively to customer satisfaction include product quality, service quality, and promos and discounts. This is reinforced by the results of topic modeling which show that these aspects are often the main concern in user reviews on the Google Playstore. Thus, this study suggests that in order to increase customer satisfaction, Traveloka needs to focus on improving the quality of service, products, and offering more attractive promos, while directing the refund process and booking experience in the application, some still say it is complicated. Suggestions for further researchers are to expand the research object which is not only limited to online travel agents on Google Playstore but also to use broader data, conduct similar research periodically because user responses regarding OTA can change along with the development and changes in consumer behavior and continue to develop the Topic Mapping stages to identify customer satisfaction.

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