Volume 2 Issue 1 (2024) Pages 112-121
ISSN : 2987-5331 (Online)
JOURNAL OF ENTREPRENEUR, BUSINESS, AND MANAGEMENT

# Social Media Analysis to identify the Main Dimensions of Service Quality for Using BCA Mobile in Indonesia

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## Abstract

This research aims to analyze service quality in the banking sector in Indonesia. We will conduct consumer sentiment analysis on the use of the BCA Mobile application which is used to provide online services to consumers by Bank Central Asia (BCA). Data mining will be carried out to obtain consumer review data on the Google Play Store. The target amount of data is a maximum of 1,000 data. The data will then be analyzed to produce word clouds, topic modeling and sentiment analysis to produce dimensions that influence service quality. Analysis was carried out using the Orange Data Mining Application. The analysis results show dimensions that receive positive, negative and neutral sentiment from BCA Mobile users in Indonesia.

**Keywords:** *service quality, data mining, word cloud, topic modeling, sentiment analysis.*



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DOI: xx.xxx/JEBM.xxxx.xxx

## INTRODUCTION

The banking sector is one of the sectors in Indonesia that is greatly influenced by the development of information and communication technology. This development is marked by the development of various kinds of technological innovations such as artificial intelligence (AI), machine learning, internet of things (IoT), cloud computing, and augmented reality. In Indonesia, technological developments are marked by a significant increase in internet and smartphone users in people's daily lives. Data from WeAreSocial (2023) shows that the number of internet users in Indonesia is 212.9 million people or 77% of the population in Indonesia. Apart from that, the number of smartphone users in Indonesia is 353.8 million people or 128% of the population in Indonesia. This means that the banking landscape in the future will be much different from current conditions.

The rapid development of technology has brought radical changes to the banking business environment (OJK, 2020). This can be seen from changes in consumer expectations regarding the services provided in the banking sector. Consumer transaction patterns have changed since COVID-19, where payment transactions are no longer made in cash. Purba et al. (2021) found that the use of fintech platforms for digital transactions during the pandemic was very popular with users. Rizkiyah et al. (2021) found that digital payments using technology influence banking consumer behavior. Several other researchers have also found changes in consumer behavior patterns due to technological developments in the banking sector (Aulia, 2020; Donabella & Manzilati, 2022; Mutiasari, 2020).

Consumers also have high expectations for the quality of service provided by banks in Indonesia. Consumers today expect that banks can provide them with services in transactions 24/7 (Erica & Al Rasyid, 2018). Apart from that, consumers also want them to be able to make transactions anywhere and anytime. This causes the banking sector to develop products and services that can meet the needs and expectations of consumers. Therefore, the banking sector needs to transform into the digital realm.

Mobile banking is a technology that can be used by banks to provide quality digital services to their consumers. Lalitha & Balaji (2022) explain that mobile banking is a banking activity carried out online using a smartphone connected to the internet. Mobile banking allows consumers to make payment transactions, transfer accounts, view transaction history, create new accounts online, and many other features (Asali, 2021; Chen et al., 2022; Jain & Agarwal, 2019). The technology possessed by mobile banking can help banks to provide quality services that meet consumer expectations.

Another positive effect that banks can experience by implementing information technology is increasing performance. Alayli (2023) found the effect of using mobile banking on banking performance. This performance takes the form of increasing banking work efficiency, better engagement with consumers and stable financial performance in the banking sector. Mobile use can also increase the competitiveness of banks so they can compete with other banks and non-bank financial institutions

DOI: xx.xxx/JEBM.xxxx.xxx


(Cleveland, 2016). Several previous studies also confirm the role of mobile banking in improving banking performance (Bochaberi & Job, 2021; Makurumidze & Rwodzi, 2023; Santoso & Dharmastuti, 2024).

Bank Central Asia, Tbk. (BCA) is one of the largest private banks in Indonesia. BCA is one of the largest private banks in Indonesia today. The number of consumers using BCA services has now reached 34.68 million people (Mutia Annur, 2023). BCA can survive competition with state-owned banks in Indonesia because of its competitive advantages. BCA has a competitive advantage in always prioritizing customer satisfaction, such as building trust, financial advice, and providing quality digital services to its consumers (Aditya et al., 2023). One of BCA's mainstay platforms in providing digital services to its consumers is the BCA Mobile application.

BCA Mobile is a mobile banking service that can be used by BCA consumers to carry out banking transactions. By using BCA Mobile, consumers can check balances, transfer accounts, transfer and make bill payments easily and practically. Apart from that, the features on BCA Mobile allow consumers to top up digital wallets, shop and make transactions at ATMs without needing an ATM card. The large number of features and services that pamper consumers will cause BCA Mobile to become the mobile banking application with the most users in 2023 (Laras, 2023).

In this research, we chose to analyze the implementation of BCA Mobile. This is done because BCA Mobile is the mobile banking application with the most users in Indonesia, so knowledge about the factors that influence the performance and quality of services provided through the use of mobile banking will provide knowledge for the implementation of mobile banking in the future. We will use data mining methods to collect data that will produce knowledge about the main dimensions that influence service quality at BCA Mobile. This data will be analyzed using social media analysis to see user sentiment regarding the main dimensions that influence the quality of service at BCA Mobile.

## LITELATURE REVIEW

### Service Quality

Service quality consists of two words, namely quality and service. Service refers to an act or performance offered to another person and does not result in any ownership (Kotler et al., 2018). Quality is a strategy to obtain operational efficiency and good performance in business (Ramya et al., 2019). Service quality can be said to be the activity of offering goods or services in an effective and efficient manner that suits consumer needs. The best measure of service quality is how to retain consumers.

Academic research has subsequently studied the role of service quality in organizations (Abd-Elrahman et al., 2020; Arhas et al., 2022; Halvadia et al., 2022). The study conducted by Abd-Elrahman et al. (2020) found that service quality is the main dimension that influences organizational performance. Arhas et al. (2022) found the influence of service quality on consumer loyalty. Halvadia et al. (2022) conducted text mining and found that the dimensions of ease of use, security and comfort were the main dimensions that influenced service quality.

DOI: xx.xxx/JEBM.xxxx.xxx

### Data Mining

Currently, there is an increase in the amount of data and information stored on electronic media due to developments in information and communication technology. This data became known as big data. We can mine big data and then use this data to gain new knowledge. This data mining process is known as data mining. Data mining is the process of collecting data on a large scale and then finding patterns and knowledge in that data (Ha et al., 2011). Several researchers in the social field have used a data mining approach in their research. Sundari et al. (2022) apply data mining to measure service quality on consumer satisfaction. Halvadia et al. (2022) used text mining to measure the quality of online services in the banking sector in India. The use of a data mining approach in this research was proven to provide a very good picture of service quality.

### Social Media Analytics

Social media analysis is the activity of collecting raw data on social media applications whose contents can include conversations, reviews, images and other data (Nanda & Kumar, 2021). Before big data was known, organizations usually processed their internal data to extract new knowledge for their business. With the current development of big data, consumer comments and reviews on social media have also been used by organizations to gain new knowledge for their business. This is important because if the best measure of service quality is how to retain consumers, then consumer reviews and comments are very important to maintain it.

Social media analysis is basically divided into seven main layers, namely text, network, action, mobile, hyperlink, location, and search engine (Khan, 2015). Analysis at each of these layers will produce different outputs. Text-based social media analysis, for example, is generally used to determine consumer sentiment based on posts, reviews and comments given on social media. This social media analysis will provide a more detailed picture because currently, most social media users convey what they really feel on social media or in the reviews they provide.

## METHODOLOGY

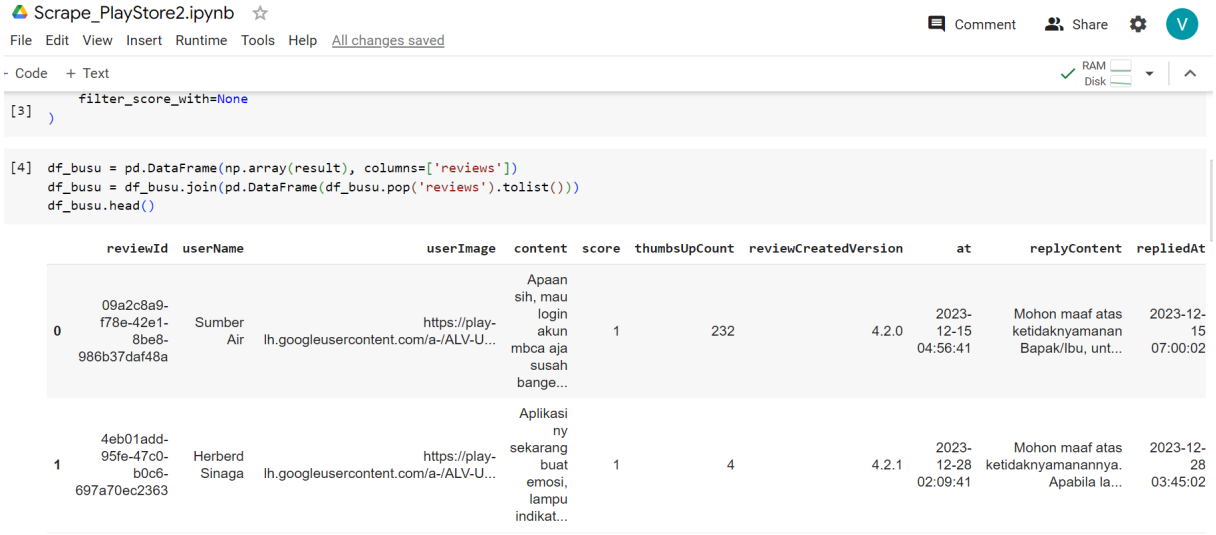
This research uses a mix method approach, namely a combination of qualitative and quantitative approaches. In this research we will try to look at the main dimensions of service quality perceived by consumers using the BCA Mobile application. The data used in this research comes from reviews given by consumers on the Google Play Store regarding their experiences when using BCA Mobile. The Google Collabolatory application is used to carry out data mining with commands using the Python programming language. The criteria for the data mined are using the Indonesian language, the location of the user providing the review is from Indonesia and the review is considered relevant by the Google algorithm. The target amount of data to be mined is a maximum of 1,000 data.

Data cleaning and data preprocessing will be carried out to clean unnecessary data and correct data that is not recognized in the Indonesian dictionary. After this process, the data will be converted into tokens at the tokenized stage and then the data is ready for analysis. Word cloud analysis and topic modeling were carried out to obtain the main dimensions that influence service quality by consumer BCA Mobile

users. In the final stage, we will conduct sentiment analysis to see consumer sentiment towards BCA Mobile. All activities starting from data cleaning, data preprocessing, tokenized, words cloud, topic modeling and sentiment analysis will be carried out using the Orange Data Mining Application.

## RESULTS AND DISCUSSION

In this research, we conducted data mining to use it to find the main dimensions that influence the quality of services used by BCA Mobile. We use the Google Collabolatory application to retrieve consumer review data on the Google Play Store using the Python programming language. The data that is mined has been filtered where the data attributes we take are only those needed for analysis, such as user name, review content, rating score, date, and thumbsUp. We then converted this data to a data type with *.csv file format for further processing. The data mining process can be seen in the following picture:


Scrape_PlayStore2.ipynb

File Edit View Insert Runtime Tools Help All changes saved

Comment Share

+ Code + Text

RAM Disk

```
[3]     filter_score_with=None
    )
```

```
[4] df_busu = pd.DataFrame(np.array(result), columns=['reviews'])
    df_busu = df_busu.join(pd.DataFrame(df_busu.pop('reviews').tolist()))
    df_busu.head()
```

| | reviewId | userName | userImage | content | score | thumbsUpCount | reviewCreatedVersion | at | replyContent | repliedAt |
|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 09a2c8a9-f78e-42e1-8be8-986b37daf48a | Sumber Air | https://play-lh.googleusercontent.com/a-/ALV-U... | Apaan sih, mau login akun mbca aja susah bange... | 1 | 232 | 4.2.0 | 2023-12-15 04:56:41 | Mohon maaf atas ketidaknyamanan Bapak/Ibu, unt... | 2023-12-15 07:00:02 |
| 1 | 4eb01add-95fe-47c0-b0c6-697a70ec2363 | Herberd Sinaga | https://play-lh.googleusercontent.com/a-/ALV-U... | Aplikasi ny sekarang buat emosi, lampu indikat... | 1 | 4 | 4.2.1 | 2023-12-28 02:09:41 | Mohon maaf atas ketidaknyamanannya. Apabila la... | 2023-12-28 03:45:02 |

Figure 1. Data Mining Process with Google Colaboratory

The next stage is to carry out data cleaning and preprocessing text. Data cleaning is carried out by removing words and characters that have no meaning in reviews given by consumers. We have created a stopwords dictionary first, to make the data cleaning process easier. After that we carry out pre processing and tokenizing so that the data can be analyzed at the next stage. The data cleaning, preprocessing and tokenized processes can be seen in the following image:

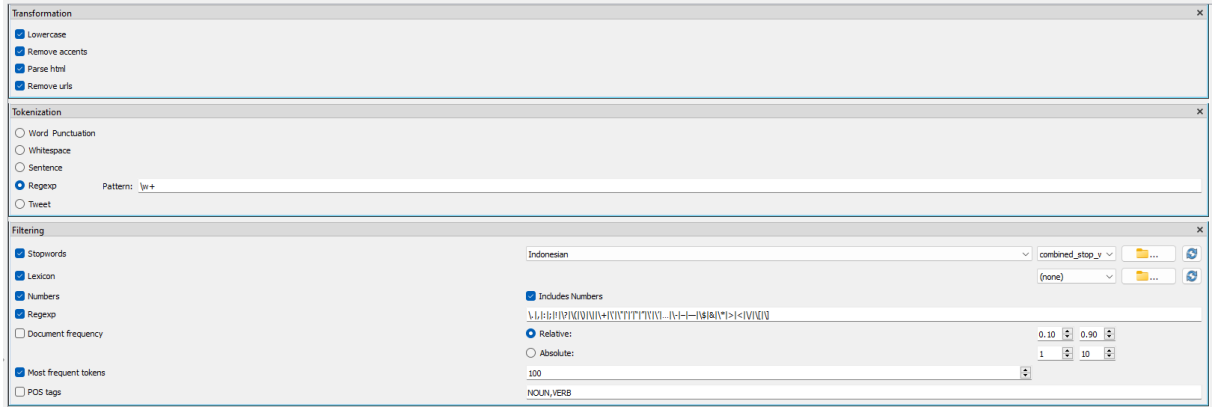


Figure 2. Data Cleaning, Pre Processing and Tokenized Stages

We then carried out word cloud analysis and topic modeling to see the main dimensions that influence the quality of service perceived by consumers through their reviews. The words that are repeatedly used in consumer reviews are verification, transaction, face, credit, failure, and login (can be seen in Figure 3). The word verification refers to the login stages carried out by consumers when using BCA Mobile. Many consumers complain that the verification stage makes things difficult for them, where the one-time password (OTP) verification often does not reach the user. This shows that the comfort of use dimension has an influence on service quality. Several previous studies have confirmed these findings (HC et al., 2019; Leavell, n.d.; Shaw & Sergueeva, 2016).


Figure 3. Word Cloud of BCA Mobile consumer reviews

Other words that are frequently repeated in consumer reviews are face, login and login. BCA Mobile has made it easy for its users when using the application, namely logging in using facial recognition. Another word is transaction which refers to the features on BCA Mobile which allow users to carry out financial transactions online quickly, anywhere and at any time. In other research, this refers to the dimensions of ease of use and usefulness in information system adoption research. Information technology adoption research has confirmed that ease of use and usability (such as fast, complete and easy access) will influence the adoption of technology such as the BTN Mobile application (Aris et al., 2016; Basuki et al., 2022; Kabara & Aris, 2023; Peng & Yan, 2022).

The cost factor is also one of the main dimensions that consumers pay attention to. Many consumers who provide reviews have already paid money (in the form of credit deductions) but the application does not provide the results they expected. This cost is considered reasonable if it provides appropriate value. In adoption research, this variable is usually known as perceived value. Empirical evidence regarding the

influence of perceived value on the use of technology to improve service quality has been confirmed by several previous researchers (Aini et al., 2019; Aris et al., 2016; Hu et al., 2023). Study by Topic modeling results can be seen in the following image:

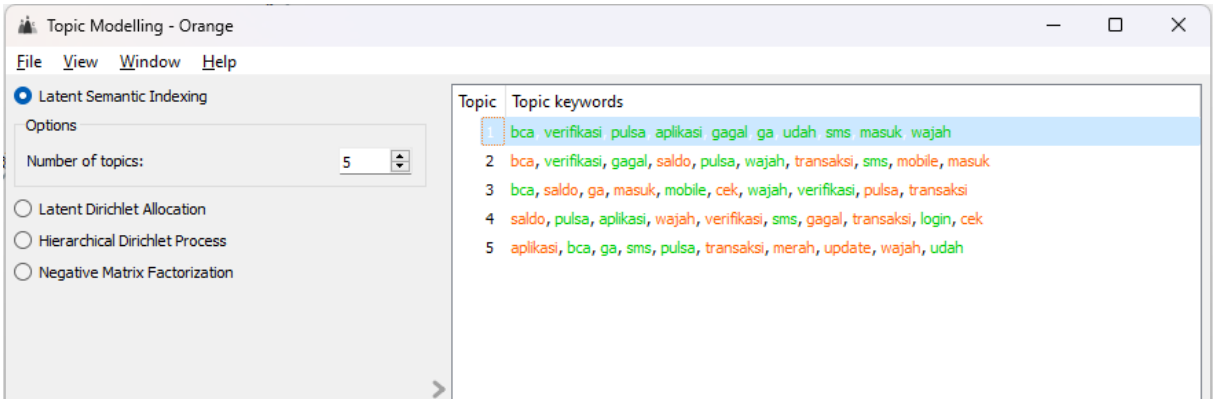



Figure 4. Topic Modeling of BCA Mobile consumer reviews

We then carried out sentiment analysis to see the quality of service provided by using BCA Mobile according to consumer reviews. This analysis will show user sentiment towards the BCA Mobile Application. The results of sentiment analysis using the multilingual sentiment method show that the majority of reviews given by consumers lead to negative sentiment. BCA needs to pay more attention to this because BCA Mobile has not been able to provide good quality service according to consumers. BCA must pay more attention to the main dimensions previously explained so that its users remain loyal to using BCA Mobile. Based on the review data we analyzed, improvements can be made to focus on ease of use and perceived value. Consumers feel that the login feature provided by the current application is very annoying and they often experience errors at the login verification stage. Apart from that, they also incur costs when logging into the system but they still experience errors, giving them a bad experience. Detailed results of sentiment analysis can be seen in the following table:

Tabel 1. Sentiment analysis uses a multilingual algorithm

| No. | Sentimen | Total (Reviews) |
|---|---|---|
| 1 | Positive | 121 |
| 2 | Negative | 423 |
| 3 | Neutral | 456 |
| | Total | 1.000 |

Tabel 2. Sentiment analysis based on ratings or review scores

| No. | Rating/Score | Total | Sentiment | Total |
|---|---|---|---|---|

DOI: xx.xxx/JEBM.xxxx.xxx

| | | | | |
|---|---|---|---|---|
| 1 | 5 Star | 126 | Positive | 173 |
| 2 | 4 Star | 47 | | |
| 3 | 3 Star | 118 | Neutral | 709 |
| 4 | 2 Star | 145 | Negative | 118 |
| 5 | 1 Star | 564 | | |
| | Total | 500 | | 1.000 |

We carry out sentiment analysis comparisons based on ratings or review scores given by consumers. This rating or review score is the value given by consumers when providing an online review of a product or service. The results of this analysis show that the majority gave reviews with a score of 3 which indicates neutral sentiment. However, in our search for review data, the majority of reviews provided had a negative sentiment with the topics of failure, complexity and errors during verification. This shows that the majority of BCA Mobile user sentiment is negative.

## CONCLUSION

The results of our research found dimensions that influence the quality of BCA Mobile services based on consumer reviews. These dimensions include application verification, transaction features, facial authentication, fees in the form of credit deductions, failed logins, and one-time passwords not entered. Referring to research on technology adoption which is usually carried out in the social sector, these dimensions are generally used in the variables of perceived usefulness, perceived convenience, perceived comfort and perceived value. Several previous studies, mentioned in the previous section, have also confirmed the influence of these dimensions.

The results of our analysis show that the implementation of BCA Mobile has not been able to provide good quality service to its consumers. This is proven by the high negative sentiment from consumers regarding the use of the BCA Mobile application. We recommend that improvements be made regarding verification when logging into applications that users consider very annoying. It is true that verification is carried out to increase data security, but if it is not working optimally it will actually disrupt the overall performance of the application. Apart from that, make sure that if you are going to charge consumers it must be in accordance with the value they receive. Improvements to the BCA Mobile application will improve the quality of consumer service and consumers will continue to use the BCA Mobile application.

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