

Data Mining and Social Media Analysis to Identify Key Dimension of Service Quality for BTN Mobile App in Indonesia

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ABSTRACT

This research aims to analyse the online service quality in Indonesia's banking sector. We will carry out a consumer sentiment analysis on the BTN Mobile application, which Bank Tabungan Negara (BTN) uses to provide online services to consumers. Data mining will be done to obtain consumer review data on the Google Play Store. The target amount of data is a maximum of 500 data. The data will then be analysed to produce word clouds, topic modelling, and consumer sentiment and 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 BTN Mobile users in Indonesia.

INTRODUCTION

Information and communication technology development has influenced the banking world in Indonesia. Consumer perceptions of the services provided continue to increase, so banks must consider strategies to attract customers to continue using their services and increase customer satisfaction. Consumer transaction patterns have also changed since the onset of the COVID-19 pandemic in Indonesia, where consumers have become accustomed to making non-cash transactions. These changes ultimately lead to changes in banking consumer behaviour (Raza et al., 2019).

Indonesia's significant increase in internet and smartphone users provides new opportunities for the banking sector to improve its services. 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. With technological developments and the high use of the Internet and smartphones, the banking sector can implement a strategy by building a digital ecosystem and introducing mobile banking services (Meghna Saikia, 2022).

Mobile banking is a platform that allows consumers to access the banking system using a smartphone connected to the Internet (Alalwan et al., 2015). 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). Mobile banking also provides services to consumers 24 hours a day and they can make transactions anywhere and anytime. This shows that mobile banking provides opportunities for banks to expand the reach of services to their consumers (Bharti M, 2016).

The use of mobile banking in the banking sector has also been proven to positively influence banks, apart from affecting consumers. Parera & Susanti (2021) found that mobile banking can increase consumer loyalty to continue using a bank's services. Daniyan-bagudu et al. (2017) found empirical evidence showing that mobile banking can improve bank performance in Nigeria. Cleveland (2016) explains that using mobile banking in the banking industry can increase the competitiveness of banks so they can compete with other banks.

Bank Tabungan Negara (BTN) Persero is one of the banks in Indonesia that has implemented mobile banking. In February 2023, BTN launched the SuperApp BTN Mobile platform, BTN's newest mobile banking service. At BTN Mobile, consumers can access various other digital solutions such as BTN Property, virtual branches, and e-partner (Kompas, 2023). The main features are online open account, split bill, auto-debit, BTN ecosystem, which connects to other BTN digital services, and cash flow tracker. With all the features that BTN Mobile has, it is hoped that it can make it easier for consumers to carry out banking transactions.

In this research, we chose to analyse the implementation of BTN Mobile. This is done because BTN Mobile has just been implemented, so knowledge regarding the factors that influence the performance and quality of services

provided through mobile banking will provide knowledge for implementing mobile banking in the future. Apart from that, BTN Mobile was chosen because this platform has been integrated with other ecosystems in BTN services, so the technology offered is newer compared to other mobile banking. We will use data mining and analyse it using social media analysis to see key performance indicators regarding service quality on BTN Mobile.

LITERATURE REVIEW

Service Quality

Kotler et al. (2018) suggest that service refers to an act or performance offered to another person and does not result in ownership. In providing this service, it must be adjusted to the service standards that have been set so that the results can be of high quality. This service quality generally starts with customer needs and ends with customer satisfaction. Much academic research then focuses on studying service quality in an organisation (Abd-Elrahman et al., 2020; Arhas et al., 2022; Halvadia et al., 2022).

Along with technological developments, services previously carried out offline can now be online, which we know as online service quality. Piercy (2014) explains that online service quality includes pre-purchase, purchase and post-purchase activities of goods or services through digital platforms or applications. Good online services will influence consumer satisfaction and improve organisational performance (Halvadia et al., 2022). Assegaf (2016) found that the quality of online services provided by banking institutions influences consumer satisfaction. The quality of service can be seen from the services available on internet banking, information on online platforms and bank products that can be accessed online.

Data Mining Approach

Technological developments and digitalisation have caused a very large increase in the amount of data and information stored on electronic media (Mustika et al., 2021). This then led to the introduction of the term data mining. Ha et al. (2011) explain that data mining is collecting data on a large scale and then finding patterns and knowledge in that data. If this data and information is managed and processed well, it will produce knowledge that is very useful for the organisation. 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 India's banking sector. Using a data mining approach in this research provided a good picture of service quality.

Social Media Analysis

Social media analysis refers to collecting raw data on social media platforms sourced from various kinds of conversations (Nanda & Kumar, 2021). One form of social media analysis is collecting review data related to products and services used by consumers. This data can then be utilised by businesses to gain knowledge about consumer trends. This social media analysis starts with

data collection (data capturing), which involves the data mining, then data understanding, and data presentation, better known as data visualisation.

Khan (2015) explains that, in general, social media analysis consists of seven layers, namely, text layer, network layer, action layer, mobile layer, hyperlink layer, location layer, and search engine layer. Each of these layers has its own method of analysing stages. For example, text layers generally look at consumer sentiment towards a product or service. The network layer is carried out by analysing social media networks to see the communication within the network. The Action layer is carried out by looking at likes, dislikes, and other actions taken by consumers on social media related to a product. The results of this analysis will provide new knowledge to organisations, considering that consumers have currently openly expressed their opinions about products and services on social media.

METHODOLOGY

This research uses a mixed-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 who use the BTN Mobile App. Data comes from reviews given by consumers on the Google Play Store regarding their experience in using the BTN Mobile App. Data mining was carried out using the Python programming language with the Google collaboratory application. The criteria set regarding the data mined are reviews in Indonesian, reviews deemed relevant by the Google algorithm, reviews from users originating from Indonesia, and the target amount of data is a maximum of 500 data.

The next stage after the data has been successfully obtained is that data cleaning or data preprocessing will be carried out to clean data that is deemed unnecessary for use at the analysis stage. The analysis stage is carried out by looking at topic modelling to find out the main topics that are often discussed in consumer reviews. We will also visualise data that is considered to provide additional knowledge. In the final stage, we will carry out sentiment analysis to see consumer sentiment towards the BTN Mobile App. Data analysis will be carried out using the Orange Data Mining Application.

RESEARCH RESULT

Data Mining

At this stage, we mined consumer review data from BTN Mobile App users on the Google Play Store. The tools used are Google Collaboratory with the Python programming language. The data mining results show that the data successfully mined is in accordance with the initial target of 500 data. We then filter the data and only take the necessary data attributes such as user name, rating, date, review, and thumbs-up count. This data is then collected in one data frame and converted into a file in *.csv format for later analysis with the Orange Data Mining application. The following is a picture of the data mining process using Google Collaborators.

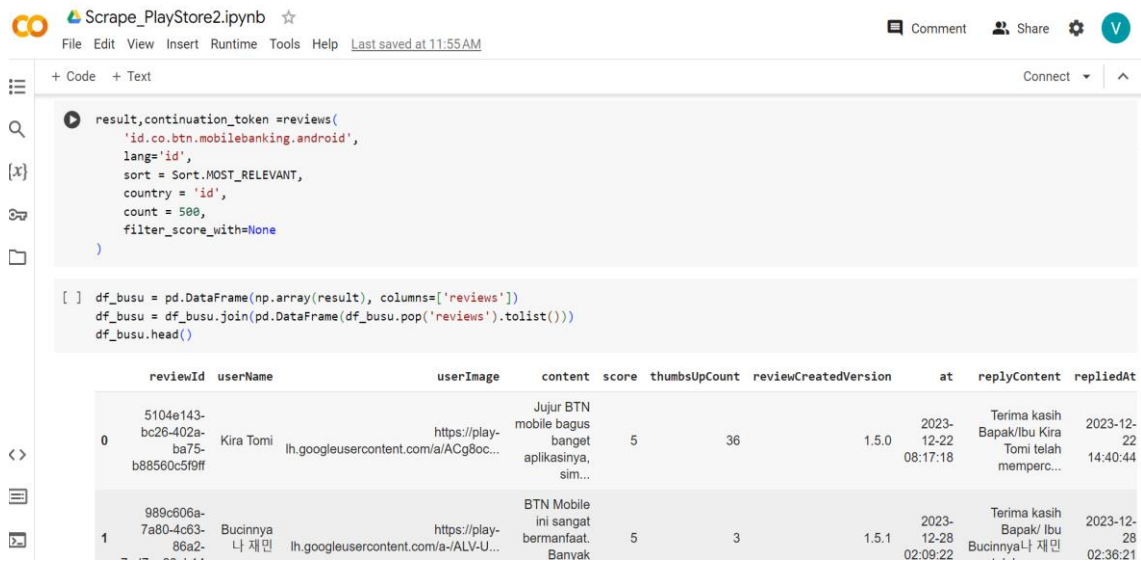


Figure 1. Mining Data with Google Collaboratory

Data Preprocessing

At this stage, we preprocess the data before using it in sentiment analysis. What is done in this process is to clean consumer review data from characters and numbers that could interfere with the next stage. We also normalise the data using a normalisation dictionary that we created previously. The data preprocessing stages can be seen in the following image:

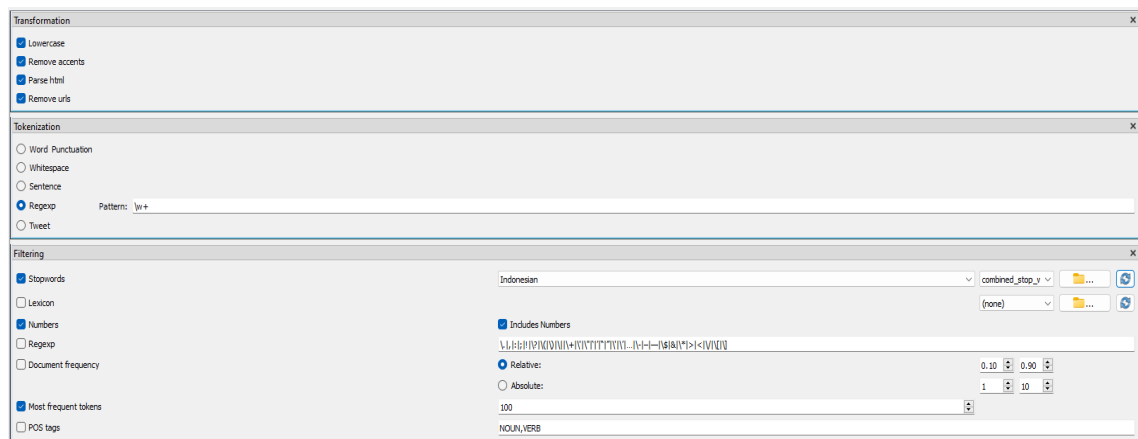


Figure 2. Pre-Processing Stages in the Orange Data Mining Application

Word Cloud and Topic Modeling

In the next stage, we analysed the topics and words that appeared most frequently in reviews provided by BTN Mobile users. The results of our analysis show that the words most frequently mentioned in consumer reviews are easy, transaction, application, features, good, and complete. This shows that most of the reviews given by consumers are directed at the features offered in the BTN Mobile application. Most consumers also commented that the BTN

Sentiment Analysis

Sentiment analysis was carried out on reviews provided by BTN Mobile application users. This analysis was carried out with the help of the Multilingual Sentiment Algorithm in the Orange Data Mining Application. The results of the analysis show that the majority of consumer reviews are felt to be good by consumers. The results of sentiment analysis using the multilingual sentiment algorithm can be seen in the following table:

Table 1. Sentiment Analysis Using Multilingual Sentiment Algorithm

No.	Criteria	Total
1	Positive	223
2	Negative	82
3	Neutral	195
	Total	500

We also carry out sentiment analysis based on ratings or review scores given by BTN Mobile users. When consumers provide reviews, consumers usually also provide ratings on the goods or services they use. This rating is usually marked with a Star or heart logo at the top of the review. The results of the analysis can be seen in the following table:

Table 2. Sentiment Analysis Based on Review Rating/Score

No.	Rating/Score	Total	Sentiment	
1	Five Star	218	Positive	260
2	Four Star	42		
3	Three Star	29	Neutral	29
4	Two Star	45	Negative	211
5	One Star	166		
	Total	500		500

DISCUSSION

Our research uses review data provided by users after using the BTN Mobile application. We mine this data on the Google Play Store with a maximum data target of 500 data. As a result of data mining, we succeeded in obtaining 500 pieces of data with the criteria that they were in Indonesian, the reviews were relevant based on the Google Play Store algorithm, and the reviews came from users of the BTN Mobile application located in Indonesia.

The analysis results show that based on word cloud and topic modelling, it can be seen that the words and topics that are often discussed in BTN Mobile user reviews are transactions, applications, features, goods, mobile, and updates. This shows that the dimension that influences application performance according to users is transactions. The transaction referred to here is that consumers can carry out various kinds of BTN services through this application, such as financial transactions, e-deposits, paying bills and the

housing ecosystem. Apart from that, this transaction can be done anywhere and at any time.

Another important dimension, according to consumers, is mobile and features. Consumers explained that the features that BTN Mobile has include being able to carry out transactions as well as bill management. Apart from that, the user interface/user experience (UI/UX) design is very good. Another feature, namely communication with customer service, is made easier with this application. The feature that consumers really like is that they can withdraw cash without using an ATM with the BTN Mobile application.

Other dimensions include ease of use, fast access, completion, and the ability to make transfers in an easier way than the previous version of the application. Users show positive sentiments towards these dimensions. 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). This shows that the data we mine can provide findings that are still relevant to theories of information technology adoption. The advantage of our method is that we summarise a lot of data to make conclusions and this data shows the dimensions that influence the quality of service experienced by consumers through the use of BTN Mobile.

Our research also found dimensions that received negative sentiment from BTN Mobile application users. Login is the dimension that gets the most negative sentiment from consumers. Many consumers complain that sometimes they have difficulty logging in to the application. Technical problems include failing to log in even though the network is good, forgetting your username, indications of a rooted cellphone (pirated operating system), and missing verification codes. Apart from that, users feel that the BTN Mobile application often experiences errors, such as the application often closing by itself. Applications also sometimes ask to be updated but there is no latest updated version on the Google Play Store. This needs to be a concern for BTN to continue to improve the quality of online services to its consumers.

The data in Table 1 and Table 2 show that the majority of BTN Mobile users provide positive sentiment. BTN can further increase positive user sentiment by paying more attention to dimensions to which users still respond neutrally. Dimensions such as faster information updates, applications that must be compatible with all smartphones, one-time passwords that sometimes don't enter, and account mutation checks that are not yet detailed can be used to develop BTN Mobile for the next update. By paying attention to these dimensions, BTN can provide better quality service to its consumers.

CONCLUSIONS AND RECOMMENDATIONS

The results of our research found dimensions that are considered positive by users based on their experience using the BTN Mobile application. These dimensions include being able to carry out various kinds of transactions and lots of features; the application is mobile, easy to use, fast access, complete and can make transfers in an easier way. This shows that BTN has succeeded in

providing excellent quality online services to its consumers through the use of the BTN Mobile application.

To increase positive user sentiment towards the BTN Mobile application, the first step that can be taken is to make improvements in dimensions such as making information updates faster, the application compatible with all devices, one-time passwords sent in real-time, and account mutation data that has not yet been implemented. details. This dimension received a neutral response from consumers, so slight improvements to the BTN Mobile application based on this dimension will increase positive sentiment among consumers. Improvements in dimensions that receive negative sentiment from consumers are also necessary to improve the quality of online services through BTN Mobile.

ADVANCED RESEARCH

Each study has limitations; thus, you can describe it here and briefly provide suggestions for further research.

REFERENCES

- Abd-Elrahman, El-Borsaly, A., & Hassan, S. (2020). The Impact of Service Quality on Organizational Performance in the Mobile Telecommunications Sector in Egypt. *Proceedings on Engineering Sciences*, 2(1), 93-104. <https://doi.org/10.24874/PES02.01.010>
- Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., Lal, B., & Williams, M. D. (2015). Consumer adoption of Internet banking in Jordan: Examining the role of hedonic motivation, habit, self-efficacy and trust. *Journal of Financial Services Marketing*, 20(2), 145-157. <https://doi.org/10.1057/fsm.2015.5>
- Arhas, S. H., Suprianto, S., Darwis, M., Saleh, S., Jamaluddin, J., & Nasrullah, M. (2022). Service Quality and Customer Loyalty at Grapari. *KnE Social Sciences*, 2022, 734-740. <https://doi.org/10.18502/kss.v7i5.10590>
- Aris, V., Maupa, H., Djaya, Y., & Nursyamsi, I. (2016). Analysis of User Behavior and Satisfaction for the Use of Academic Information System on Universities in Makassar Analysis of User Behavior and Satisfaction. *Scientific Research Journal (SCIRJ)*, ISSN 2201-2796, IV(Xi), 1-12.
- Asali, A. G. (2021). Social Media Analysis for Investigating Consumer Sentiment on Mobile Banking. *Journal of International Conference Proceedings*, 4(2), 241-253. <https://doi.org/10.32535/jicp.v4i2.1247>
- Assegaf, S. (2016). The Effect of Service Quality to Customer of Loyalty Using Self-Service Technology: Internet Banking. *The Asian Journal of Technology Management*, 9(1), 21-36. <https://doi.org/10.18502/kss.v3i26.5413>
- Basuki, R., Tarigan, Z. J. H., Siagian, H., Limanta, L. S., Setiawan, D., & Mochtar, J. (2022). The effects of perceived ease of use, usefulness, enjoyment and

- intention to use online platforms on behavioral intention in online movie watching during the pandemic era. *International Journal of Data and Network Science*, 6(1), 253–262. <https://doi.org/10.5267/J.IJDNS.2021.9.003>
- Bharti M. (2016). Journal of Internet Banking and Commerce Impact of Dimensions of Mobile Banking on User Satisfaction. *Journal of Internet Banking and Commerce*, 21(1), 1–22. <http://www.icommercecetral.com>
- Chen, C., Huang, W., Ma, Y., Tang, Y., & Zang, Y. (2022). Analysis of the Richness of Functions of Mobile Banking Services and Users' Satisfaction. *Proceedings of the 2021 3rd International Conference on Economic Management and Cultural Industry (ICEMCI 2021)*, 203(Icemci), 2611–2617. <https://doi.org/10.2991/assehr.k.211209.425>
- Cleveland, C. E. (2016). A Study on How Mobile Banking Has Affected the Banking Industry: Has Mobile Banking Improved Bank Performance? *Finance and Financial Management Commons*, 1–47. https://egrove.olemiss.edu/hon_thesis/228
- Daniyan-bagudu, H., Jan, S., Khan, M., & Roslan, A. (2017). The Effect of Mobile Banking on the Performance of Commercial Banks in Nigeria. *International Research Journal of Management, IT & Social Sciences*, 4(2), 74–80. <https://doi.org/10.21744/irjmis.v4i2.392>
- Ha, J., Kambe, M., & Pe, J. (2011). Data Mining: Concepts and Techniques. In *Data Mining: Concepts and Techniques*. <https://doi.org/10.1016/C2009-0-61819-5>
- Halvadia, N. B., Halvadia, S., & Sarva Vishwavidyalaya, K. (2022). Using Text Mining to Identify Key Dimensions of Service Quality for the Indian Public Sector Banks' Mobile Banking Apps. *Research Square*. <https://doi.org/10.21203/rs.3.rs-1536236/v1>
- Jain, P., & Agarwal, G. (2019). Factors affecting mobile banking adoption: An empirical study in gwalior region. *International Journal of Digital Accounting Research*, 19(June), 79–101. https://doi.org/10.4192/1577-8517-v19_4
- Kabara, K., & Aris, V. (2023). The Successful Implementation of a Financial Information System at Hasanuddin University: Development of the Financial Information System Technology Adoption Model (FISTAM). *Journal of Research in Business and Management*, 11(7), 11–18.
- Khan, G. F. (2015). Seven Layers of Social Media Analytics: Mining Business Insight from Social Media Text, Actions, Networks, Hyperlinks, Apps, Search Engine, and Location Data. In *CreateSpace Independent Publishing Platform* (Vol. 1). <http://7layersanalytics.com/>

- Kompas. (2023). *BTN Luncurkan BTN Mobile, Satukan Teknologi dan Ekosistem Perumahan*.
<https://www.kompas.com/homey/read/2023/02/12/194254176/btn-luncurkan-btn-mobile-satukan-teknologi-dan-ekosistem-perumahan?page=all>
- Kotler, P., Keller, K. L., Ang, S. H., Tan, C. T., & Leong, S. M. T. A.-T. T.-. (2018). *Marketing management : an Asian perspective* (Seventh ed). Pearson Harlow, United Kingdom. <https://doi.org/LK> -
<https://worldcat.org/title/1023552002>
- Meghna Saikia. (2022). USE OF MOBILE BANKING-A STUDY OF CONSUMER'S PERCEPTION ANALYSIS 1 Meghna Saikia. *Journal of Positive School Psychology*, 2022(2), 5746-5754. <http://journalppw.com>
- Mustika, Ardila, Y., Manuhutu, A., Ahmad, N., Hasbi, I., Guntoro, Manuhutu, M. A., Ridwan, M., Hozairi, Wardhani, A. K., Alim, S., Romli, I., Religia, Y., Octafian, D. T., Sufandi, U. U., & Ernawati, I. (2021). *Data Mining dan Aplikasinya*. Widina.
- Nanda, P., & Kumar, V. (2021). Social Media Analytics: Tools, Techniques and Present Day Practices. *International Journal of Services Operations and Informatics*, 11(4), 1. <https://doi.org/10.1504/ijsoi.2021.10039351>
- Parera, N. O., & Susanti, E. (2021). Customer Loyalty Based on Mobile Banking Usability Article Info Abstract. *International Journal of Digital Entrepreneurship and Business (IDEB)*, 2(1), 39. <https://ejournal.jic.ac.id/ideb/>
- Peng, M. Y. P., & Yan, X. (2022). Exploring the Influence of Determinants on Behavior Intention to Use of Multiple Media Kiosks Through Technology Readiness and Acceptance Model. *Frontiers in Psychology*, 13(March), 1-11. <https://doi.org/10.3389/fpsyg.2022.852394>
- Piercy, N. (2014). Online service quality: Content and process of analysis. *Journal of Marketing Management*, 30(7-8), 747-785. <https://doi.org/10.1080/0267257X.2013.839571>
- Raza, S. A., Shah, N., & Ali, M. (2019). Acceptance of mobile banking in Islamic banks: evidence from modified UTAUT model. *Journal of Islamic Marketing*, 10(1), 357-376. <https://doi.org/10.1108/JIMA-04-2017-0038>
- Sundari, S., Perdana Windarto, A., Purba, Y. P., & Artikel, G. (2022). Penerapan Data Mining Klasifikasi Terhadap Kepuasan Pelanggan Toko Bombay Textile Application of Data Mining Classification to Store Customer

Satisfaction Bombay Textiles. *JOMLAI: Journal of Machine Learning and Artificial Intelligence*, 1(4), 2828-9099.
<https://doi.org/10.55123/jomlai.v1i4.1672>

WeAreSocial. (2023). *Digital 2023 Indonesia: The Essential Guide to The Last Connected Behaviours*. <https://datareportal.com/reports/digital-2023-indonesia>