

FEATURE AND SERVICE QUALITY IMPROVEMENT OF JENIUS DIGITAL BANK USING TEXT MINING METHOD

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ABSTRACT: Industry 4.0 changes various sectors of human life, including the revolution of the banking industry called Banking 4.0. This change gave birth to a new industry, the digital banking industry. This industry has many problems, including low bank account ownership, competition, and hampered business development due to COVID. This study tries to reveal public sentiment, public opinion, and service quality in the Google Play review of the Jenius application. Public sentiment and service quality analysis are performed using a classification algorithm. Public opinion is done by using topic modeling using the LDA algorithm. There are 71.2% positive and 25.6% negative sentiments in reviews for Jenius. The positive sentiment that is most often discussed is the ease of using the application. Negative sentiments mostly talk about slow apps, problems logging in to apps, and verification issues. In the analysis of service quality, positive sentiment is found in the dimensions of tangible, responsiveness, and efficiency. Meanwhile, negative sentiment is found in the dimensions of reliability, assurance, and empathy. Topics that have the highest negative sentiments are login, video call verification, and device issues. In contrast, topics with the highest positive sentiments are topics about transactions, customer satisfaction, and savings.

KEYWORDS –Digital Banking, Topic Modelling, Jenius, Sentiment Analysis

I. INTRODUCTION

The fourth industrial revolution brought many changes in people's daily lives and significantly impacted society. COVID-19 encourages accelerating the digital transformation of the entire industry, especially in the financial sector. The consequences of the situation accelerate internet user growth in Indonesia to 73.7%. This condition accelerates Banking 4.0, where users can access banking services anywhere, anytime, and on any device [1].

Digital banking is a product of Banking 4.0. In Indonesia, seven digital banks have already been recognized by the Financial Services Authority (OJK). The seven banks are Jenius, Wokee, Digibank, TMRW, Jago, MotionBanking, and Aladin Bank. The digital banking industry has many problems, including low bank account ownership, competition, and hampered business development due to COVID. One of the reasons people use a digital bank is service quality and the feature they have. Service quality can be a crucial factor that can differentiate and improve organizational performance [2].

Service quality can be seen by looking at online reviews. However, the online reviews that are generated are too large. An estimated 1.7 MB of data is generated each second from one person, amounting to 2.5 quintillion bytes of data generated by humans daily. To maintain its existence in the digital industry and maintain customer loyalty, Bank Jenius utilizes customer reviews to improve the features and quality of its services.

II. LITERATURE REVIEW

1.1. Digital Banking Industry

A Digital bank is a bank with a digital-only concept. A Digital bank can be a branch or a separate company. The concept of a digital-only bank emerged after the crisis in 2007-2009 [3]. The terms neobanks and digital banking are synonyms and can be used interchangeably. In Indonesia, the term referred to by the regulator is the digital bank. The financial services authority (OJK) defines a digital bank as an Indonesian Legal Entity Bank (BHI) that provides and carries out business activities primarily through electronic channels without a physical office other than the head office or can use limited physical offices [4].

1.2. Service Quality

Service quality is the overall evaluation of a given service company based on a comparison of that company's performance to the general customer expectations for companies in that industry [5]. The SERVQUAL model is a prominent, suitable, and commonly accepted paradigm for measuring service quality in

the service business compared to other service dimensions models [6]. The Service quality chosen in this research is as follows:

1. **Tangibility**
Tangibility refers to existing facilities, equipment, representatives, and specialized instruments. Service providers employ tangibles to give the finest services and inform clients about their equipment, personnel, and other facilities. On the other hand, it is difficult to quantify the intangible aspects of banking services.
2. **Reliability**
Reliability refers to the capacity to successfully and unquestionably fulfill promises. Reliability means that an organization delivers on its promises, such as promises about service provision, pricing, delivery, and problem-solving [7]. There is a certain effect of service quality on customer satisfaction.
3. **Responsiveness**
Responsiveness refers to the professional co-intention op's and enthusiasm to assist customers, as well as its ability to provide prompt services.
4. **Assurance**
Assurance refers to the workers' knowledge, humility, and ability to instill trust and sincerity in others. Assurance ensures service providers can develop trust and confidence in banking services without fear of rudeness or recrimination [1].
5. **Empathy**
Empathy refers to accommodating the client's care and consideration [1]. From a consumer's perspective, mobile banking service can only be considered efficient if the system is simple to use, appropriately structured, and requires minimum information input by the customers [8].
6. **Privacy**
Privacy can be defined as the degree to which the mobile banking service is safe and protects customers' banking information from intrusion [8].

1.3. Text Mining

Text mining is a method for looking at patterns in textual data sources to extract knowledge and information from massive amounts of data. Text mining is used to help analyze how documents are connected based on the words that best describe their contents to gather valuable information [9].

1.4. Sentiment Analytics

Sentiment analysis is a computational analysis of reviews, sentiments, opinions, evaluations, attitudes, subjective views, and feelings represented in the text. Sentiment analysis is also known as opinion mining, sentiment classification, subjectivity analysis, and valuation extraction [10].

1.5. Topic Modelling

Topic modeling is a machine learning method with an unsupervised learning type that can be used to identify hidden topics and ideas [11]. One of the algorithms used is Latent Dirichlet Allocation (LDA). LDA identifies the document collection's topics and the frequency of their occurrence [12]. LDA calculates a joint probability distribution by randomly selecting each variable based on the values of the other variables. LDA is used for extracting topics from a text that enable efficient processing, especially for large amounts of data.

III. RESEARCH METHOD

The method used in this study is text mining, namely sentiment analysis, topic modeling, and multiclass classification. The tools used in this research are RapidMiner version 9.10.008, with an additional Python function for text mining steps not included in RapidMiner.

The data was gathered from the Google Play Store. The gathering used the google-play-scraper library based on the python programming language. The data is external data that is open to the public. The data ranged from January 1, 2022, to July 24, 2022. The data collected is 105,655. There are eight attributes in the data, from review to app id. The data was filtered to only include Bahasa Indonesia and from the Indonesia region. The data was then labeled with one and two stars as negative sentiment, three-star as neutral, and four-star and five stars as positive. Service quality data labels have used a bag of words from Table 1.

Table 1. Bag of words related to the research.

Variable	Definition	Words
Reliability	The reliability of the digital banking service refers to the likelihood that banks would work as intended and deliver the same service via mobile phone as they	komitmen (commitment), detail (detail), dokumen (document), harapan (expectation), kebijakan (policy), janji (promise), transparan (transparent).

	did through physical locations (Sharma and Malviya, 2011).	
Assurance	Knowledge, politeness, and employee ability to build trust and confidence (Parasuraman et al., 1985)	Komitmen (commitment), jelas (explain), informasi (information), pengetahuan (knowledge), sopan/ramah (polite), alasan (reason), wajar (reasonable), menanggapi/tanggap (respond)
Tangible	Equipment, physical facilities	ATM, internet, online, profesional (professional), situs (site), website, application
Empathy	Individual attention and care that a company gives to its customers (Parasuraman et al., 1985)	Kooperatif (cooperative), karyawan (employee), pengalaman (experience), manager, perwakilan (representative), bertanggung jawab (responsible), staf (staff), kepegawaian (staffing)
Responsiveness	The willingness of employees to aid customers and provide service quickly (Parasuraman et al., 1985)	panggilan (call), panggilan balik (callback), berkomunikasi (communicate), komunikasi (communication), konfirmasi (confirmation), kontak (contact), tertunda (delayed), cepat (fast), ikuti (follow), tindak lanjut (follow up), intim (intimate), menit (minute), telepon (phone), panggilan telepon (phone call), nomor telepon (phone number), tunda (postpone), proaktif (proactive), proses (process), pemrosesan (processing), meminta (prompt), permintaan (query), antrian (queue), respon (response), responsive (responsive.), kecepatan (speed), waktu (time), tunggu (wait)
Efficiency	The banking service is simple to use, structured properly, and requires minimum information to be input by the customers (Sharma and Malviya, 2011)	Simpel (simple), mudah (easy), cepat (cepat), efisien (efficient)
Privacy	The degree to which the mobile banking service is safe and protects customers' banking information from intrusion (Sharma and Malviya, 2011)	Aman (safety), Hack, data

Then the data goes through several processes before it can be processed using topic modeling and classification algorithms. The processes are case folding, text cleaning, tokenization, filtering, stop words, stemming, lemmatization, and normalization.

For the sentiment analysis, the algorithm with the highest accuracy is deep learning with 87.13% accuracy, followed by k-NN with 76.72% accuracy and Naive Bayes with 58.38% accuracy. Meanwhile, in the multiclass classification, the algorithm with the highest accuracy is k-NN with 48.26%, followed by deep learning with an accuracy of 43.38% and Naive Bayes at 15.23%.

IV. RESULT AND DISCUSSION

The first analysis is the analysis of which comments get the most thumbs up. The comments with the most thumbs up are comments about praising the good application but having heavy loading. The second comment mentions the long and difficult process of logging into the application. The third comment compliments the app's ease of use and simple UI/UX. The complete analysis can be seen in table xx.

The second analysis is the analysis of the star rating. In the negative sentiment of one or two stars, the words that appear the most are application, login, and Jenius. It can be interpreted that the user has difficulty logging into the application. Word cloud can be seen in Fig 1. On neutral sentiment, the same thing can still be seen. Word cloud for negative sentiment can be seen in Fig 2. As for the four-star positive sentiment, the three most frequent words were *aplikasi* (app), Jenius, and *bagus* (good). But the problem of slowness is still visible

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here. Slow performance, heavy applications, and logged-out sessions are still visible here. For online reviews with five stars, the word with the most frequency is *aplikasi* (application), *mudah* (easy), and *Jenius*. In a five-star review, The application is perceived as good by users and is very helpful for saving, topping up, making transactions, and paying bills. The word cloud for positive sentiment is in Fig 3.



Fig 1. Word cloud of positive sentiment



Fig 2 World cloud of neutral sentiment



Figure 3 World cloud of negative sentiment

The third analysis is service quality analysis. Most of the data are in the efficiency dimension, with a total data of 50% or 3177 of the labeled data. The second most data is 958 data with a percentage of 15%. The third largest data has the same amount of data as the second data, which is 932 data with a percentage of 15%. The responsiveness dimension has as much as 819 data, or 13% of the total. The assurance dimension has 300 data or 5 percent. The data of the empathy dimension have 47 data. Lastly, the least amount of data obtained is from the reliability dimension, with 43 data. The distribution of the data can be seen in Fig 4.

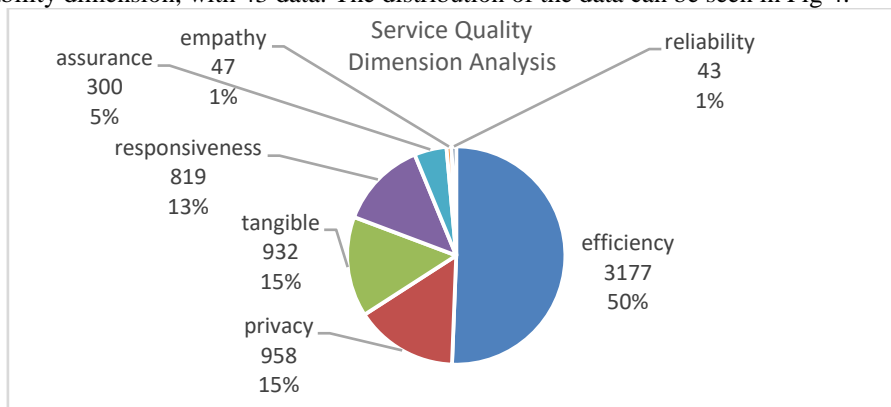


Fig 4. Distribution of service quality dimension analysis

There are three negative dimensions: assurance, empathy, and reliability. In contrast, the dimensions of service quality that have the majority of positive sentiments are efficiency, privacy, responsiveness, and tangible. Of all dimensions, none has a majority of neutral sentiments. The total percentage can be seen in Fig 5, and the net sentiment can be seen in table 2.

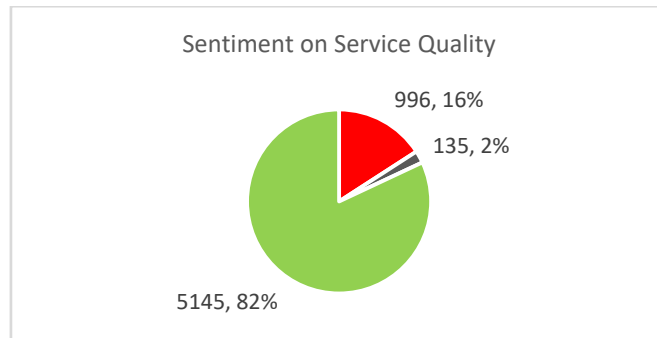


Fig 5. Distribution of service quality dimension analysis

Table 2 Net Sentiment of the Service Quality Dimension

Row Labels	negative	neutral	positive	Grand Total	Net Sentiment
Assurance	235	13	52	300	-183
Empathy	29	5	13	47	-16
Reliability	27	5	11	43	-16
Responsiveness	276	45	498	819	222
Privacy	286	35	637	958	351
Tangible	75	6	851	932	776
Efficiency	68	26	3083	3177	3015

The fourth analysis is topic modeling analysis. The number of topics determined in this analysis amounted to 15. The number was chosen due to the lowest perplexity value [13]. The net sentiment of the topic modeling analysis can be seen in Table 3. From the table, three topics have the most negative sentiment: log in, video call verification, and device problem.

Table 3 Topic Model Sentiment

Topic	Negative	Neutral	Positive	Net	Grand Total
Topic_3 (Log in)	920	88	146	-774	1154
Topic_10 (Video Call Verification)	374	40	73	-301	487
Topic_1 (Device Problem)	300	23	49	-251	372
Topic_14 (Promo)	214	14	62	-152	290
Topic_6 (App performance)	219	58	118	-101	395
Topic_13 (Transfer Fee)	178	15	121	-57	314
Topic_4 (Data Privacy)	163	38	141	-22	342
Topic_0 (Loan Credit)	70	11	89	19	170
Topic_12 (Payment History)	22	6	165	143	193
Topic_11 (Jenius Usefulness)	32	12	361	329	405
Topic_7 (Consumer Experience)	40	5	611	571	656
Topic_8 (Payment)	8		859	851	867
Topic_2 (Saving)	20	6	1140	1120	1166
Topic_5 (Consumer Satisfaction)	51	17	1323	1272	1391
Topic_9 (Transaction)	67	15	2156	2089	2238

Topic 3 is interpreted as a topic about logins. Sentiment on this topic has positive sentiment in as many as 149 documents, negative sentiment in as many as 920 documents, and neutral sentiment in as many as 88 documents. This topic talks about the difficulty of logging into the application. This topic also talks about application sessions that run out too quickly.

Topic 10 is interpreted as a topic about application performance. Sentiment on this topic has positive sentiment in as many as 73 documents, negative sentiment in as many as 374 documents, and neutral sentiment in as many as 40 documents. This topic talks about video call verification which is difficult to do. Verification is done to validate the registration made by the user.

Topic 1, or the topic about device problems, talks about the hassle of replacing and unlinking devices. Sentiment on this topic has positive sentiment in as many as 49 documents, negative sentiment in as many as 300 documents, and neutral sentiment in as many as 23 documents. The majority of sentiment is negative sentiment. The word related to topics 3, 10, and 1 can be seen in table 4.

Table 4 Sentiment of a negative topic

topicId	word	weight	topicId	word	weight	topicId	word	weight
3.0	login	709.0	10.0	call	211.0	1.0	ribet	132.0
3.0	masuk	417.0	10.0	video	172.0	1.0	device	117.0
3.0	sesi	395.0	10.0	verifikasi	120.0	1.0	unlink	99.0
3.0	akun	192.0	10.0	buka	103.0	1.0	ganti	96.0
3.0	susah	146.0	10.0	akun	96.0	1.0	login	90.0
3.0	tolong	145.0	10.0	daftar	94.0	1.0	layan	75.0
3.0	otomatis	143.0	10.0	aktivasi	91.0	1.0	pulsa	69.0
3.0	kode	137.0	10.0	data	85.0	1.0	bank	63.0
3.0	habis	133.0	10.0	gagal	82.0	1.0	susah	62.0
3.0	email	127.0	10.0	susah	82.0	1.0	email	59.0

Four analyses have been carried out: content analysis with the highest thumb up, word cloud and word frequency analysis on star rating, topic modeling analysis, and service quality analysis. The summary of negative sentiment analysis is shown in table 5, and the summary of positive sentiment is in table 6.

Table 5 Summary of the Negative Sentiment Analysis

No	Comment with thumbs up	Sentiment analysis	Service Quality Analysis	Topic Modelling
1	Slow Application	One star: Entering Apps Problem Slow application	Reliability: Data Verification is not reliable	Topic 3 (Login)
2	Entering Apps Problem	Two star: Entering Apps Problem	Assurance: Assistance offered by the CS team and the staff on duty during video calls verification has not been able to meet user expectations	Topic 10 (Video Call Verification)
3	Credit Problem	Three star: Entering Apps Problem (including login problems, pin input difficulties, and logging in difficulty) Slow application	Empathy: Users are uncomfortable with the behavior of employees who force download the app.	Topic 1 (Device Problem)
4	App Freezing	Four star: Slow application Entering Apps Problem (Sessions problem)		Topic 14 (Promo)
5	Verification and Activation Problem			Topic 6 (App performance)
6	Verification and Activation Problem			Topic 13 (Transfer Fee)
7	Data Safety			Topic 4 (Data Privacy)

Table 6 Summary of the Positive Sentiment Analysis

No	Comment with thumbs up	Sentiment analysis	Service Quality Analysis	Topic Modelling
1	-Easy to use the app -Ease in transactions and payments	Five star: Ease of Use of The Application	Tangible: The app is easy to use	Topic_9 (Transaction)
2	-Ease of activation -Ease of saving funds	Four Star: Ease of Use of The Application	Responsiveness: Quick response from the bank	Topic_5 (Consumer Satisfaction)
3	-Ease of Activation -Ease of Transaction		Efficiency: Easy and efficient application in transactions such as top-up, saving, and paying	Topic_2 (Saving)
4			Privacy: savings are safe and easy to use	Topic_8 (Payment)
5				Topic_7 (Consumer Experience)
6				Topic_11 (Jenius Usefulness)
7				Topic_12 (Payment History)
8				Topic_0 (Loan Credit)

Four problems were chosen to resolve: login, video call verification, device problems, and application performance. The problem was chosen because, besides having the lowest net score, it also has the largest share of chats with negative sentiments.

V. CONCLUSION

Jenius can respond to problems that arise by offering solutions. The main problems prioritized to be resolved are problems getting into the application, slow applications, verification problems, and device problems. The problem of logging into the application has a solution to improve user experience and improve server performance. Slow application issues can be addressed by improving server performance and UI/UX. Verification issues can be solved by implementing validation using AI. The last problem is a device problem. The problem can be solved by adding a connected device to the account.

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