Sentiment Analysis of Cryptocurrency Trading Platform Service Quality on Playstore Data: A Case of Indodax

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Abstract

Indodax is one of the cryptocurrency trading platforms in Indonesia that has the highest sentiment for the quality they provide, good quality on a platform is an important factor in obtaining user satisfaction and will have an impact on the long-term success of a company. The importance of user satisfaction on cryptocurrency online trading platforms is a significant factor in increasing user loyalty in today's competition. This research was conducted to analyze the quality of existing cryptocurrency trading platform services so that they can be input for cryptocurrency trading service providers to improve the quality of their services, this information can also be considered by prospective platform users in choosing a trading platform that has the best quality of service to minimize losses that may be caused by the platform. In this study, sentiment analysis was used for indodax play store platform users and then processed using the lexicon classification method to produce sentiment analysis for each significant factor of service quality. From the results of the classification carried out in this study, the results of the analysis show that most users are satisfied and give positive sentiments related to security, namely 87.63%, positive sentiments related to the interface design 88.46%, positive sentiments related to service & convenience by 83%, but some users also gave a slightly positive sentiment related to administrative costs, namely 39%, and their negative sentiment was mostly related to the error & failure system, which received more than 80% sentiment. While the recall value is 38.07%, the precision is 56.69% and the f1-score is 45.55%. The results of this study can be concluded that there are still many important points that must be improved in quality by the indodax platform service providers so that they can be more attractive and used by everyone.

Keywords: *service quality; trading online cryptocurrency; indodax, google play store data; sentiment analysis; lexicon classification method; lexicon based*

1. Introduction

In meeting survival, the community will carry out economic transactions, in which these activities will use traditional and digital currencies. However, as technology develops, digital or electronic currencies are considered to provide benefits not offered by traditional currencies, known as cryptocurrencies [1]. Cryptocurrency is digital or electronic money in cyberspace and does not have a concrete form of objects. Cryptocurrency can allegedly become a helpful investment tool in the future and can improve sending money across borders [2].

The popularity of cryptocurrency among the public is increasing all the time [3]. Based on a report from one of the world's leading research institutions, Taylor Nelson Sofres (TNS) released data that 63% of Indonesians already know what cryptocurrency is [4]. In addition, survey results from daily social cryptocurrencies state that 50% of the total Indonesian respondents already have cryptocurrency, and 40% have used cryptocurrency as a transaction [5]. As of 2019, Bitocto also recorded an 80% increase in crypto transaction volume in Indonesia [6]. Therefore, it can be concluded that the Indonesian people are familiar with cryptocurrencies and have attracted interest of Indonesian people to use them as an investment and buying and selling. tool as well as a tool to store and transfer funds quickly and safely [4], [5].

Reporting from several major news media such as Detik.com, and consumer media to CNBC Indonesia stated that there are several aspects of the problem that are very unfortunate to occur on the cryptocurrency trading service provider platform related to the lack of loyalty provided by service providers to their users such as a lack of good service in serving the problems that are being faced by users, there is often an error system

on the platform which is very detrimental and the user has high tax fees given by the platform to users in making deposits to withdrawing user money [2]. This resulted in many users who decided to stop using Indodax as their platform for buying and selling cryptocurrency [7] - [9].

The quality of service on a platform will have a direct impact on the satisfaction of the platform's users. The superiority of service quality is measured by the company's performance in meeting user expectations [6], [10]. When a service quality in an organization is fulfilled, it will significantly affect the trust and loyalty of platform users of the organization [11]. In addition, evaluating user satisfaction with the services provided by a platform is essential for stakeholders in an organization [12]. There is a discrepancy between the quality of service provider platforms in Indonesia today and the expectations desired by users for cryptocurrency trading service provider applications, so this is a gap problem that must be overcome by service providers to gain loyalty from the user and increase the user's comfort in using the application. The most common approach is to provide a questionnaire that involves several questions related to user interface design, platform timeliness, security, and user service [13] - [15].

However, the weakness when using questionnaires in data collection is the emergence of bias from the answers given by respondents [16], so that data collection needs to be analyzed on factual data such as data on social media or data from application reviews to determine the level of satisfaction of users with the cryptocurrency platform. Previous research on cryptocurrency was conducting a sentiment analysis on Twitter towards bitcoin and cryptocurrency based on the Python Text Blob library which resulted in 3433 reviews, consisting of 41.3% positive tweets, 44.9% neutral, and 13.7% negative. Another research is to conduct sentiment analysis on Twitter towards cryptocurrencies based on the Python Text-Blob library using a machine learning algorithm, namely Naïve Bayes, which produces 1032 reviews, consisting of 61.24% tweets are positive, 28.68% being neutral, 10, 07% being negative [17], [18]. In addition, with the Naïve Bayes algorithm, the accuracy value is 71.98%, precision is 83.04%, recall is 60.88%, and F1-Score is 65.07% [17]. Both of these studies only focus on the general use of cryptocurrency on Twitter, and there is no research that focuses on sentiment analysis of the quality of service provided on cryptocurrency trading services provider platforms, so an in-depth understanding of service quality on cryptocurrency platforms is still needed, This is a gap that the writer will solve in this research.

The purpose of this study is to evaluate the satisfaction of users of cryptocurrency platform services by

considering the sentiment analysis provided by users using the Lexicon Classification Method. Which is the user satisfaction referred to in this study, namely the results of reviews in the form of comment text concern data related to values that describe a form of their satisfaction in using the platform, such as issue reviews that offend related to the user service platform, user interface design on the platform, real-time from application and security and privacy. The results obtained are expected to be considered by the cryptocurrency trading platform service provider in developing applications so that the public can accept them because this is one of the determining parts of user satisfaction in using the service. As a case study, the Indodax cryptocurrency platform was chosen. The selection of Indodax in this study is based on the fact that Indodax is the first and largest cryptocurrency exchange in Indonesia, established in 2013 [3], [4]. Indodax has won three ISO certificates or international standards to strengthen its commitment to implementing information security, including ISO/EIC 27001:2013, ISO/EIC 9001:2015, and ISO/EIC 27017:2015 [5]. Another consideration is that Indodax also has many reviews from users on the play store, totaling 46,991 reviews, which is more than the reviews on Twitter which amounted to 2804 reviews, and on Appstore, which amounted to 200 reviews.

The results of this study are also expected to show that user satisfaction is very influential in reducing users' intentions to switch to other platforms. This study, of course, is beneficial in the problem of sales and profit growth in a company [12].

2. Research Methods

In this study, a lexicon-based method will be used to classify existing review data, where the data is obtained through scraping review data on the cryptocurrency trading service provider platform on the google play store using the python programming language to get sentiment results from the service quality provided by the user. After obtaining review data on the google play store, cleaning the data is done first before the review data is implemented using the lexicon method. And to measure the level of accuracy of the method used in this study will use several measurement matrices namely recall, precision, and F1 -Score.

2.1 Quality Cryptocurrency Trading Service

Cryptocurrency is a digital currency that can be traded online through platform services to offer solutions to everyone so that they can process economic transactions freely and safely [2]. This is because cryptocurrencies are transferred and tracked using blockchain technology. The use of cryptocurrencies can speed up the remittance process and be flexible, which will drive scientific progress and offer a stable

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alternative to fiat currencies, keeping companies and individuals accountable and giving users complete control over their assets. This makes users expect the best quality to be provided by the trading service provider form to its user's [2]. Service quality is an effort to fulfill customer needs and desires and the accuracy of delivery to balance customer expectations; this can be known by comparing consumers' perceptions of the services they receive with the services they expect against the service attributes of a company. If the service received or perceived is as expected, then the service quality is perceived to be good and satisfactory, and vice versa; if the service received is lower than expected, the service quality is perceived to be poor [19]. Furthermore, service quality is also part of the quality of interaction, information, and internet-based services, which aim to strengthen the relationship between service users and organizations to increase their trust in the platform provided by the organization [1].

Figure 1. Indodax Application Display

Based on the review data that we have obtained regarding the Indodax platform (Figure 1), there are several positive or negative sentiment factors from users that greatly influence the service, namely [5], [13], [20] : User Interface Design (The user interface design will include how comfortable and satisfied the user is with the user interface on a platform. This can be seen from how easy it is for users to understand and understand images, text, and layouts on the Indodax platform [6], [14], [21]); Realtime (The inability of the platform to provide real-time price information will significantly impact user losses, namely disrupting the user experience in the essence of trading and making users uncomfortable with the service); Security and privacy (Personal security includes the personal data of users registered on the Indodax platform, or the existing transaction processes must be adequately managed and securely to gain user trust in the platform); and User

service (User service refers to how well service on the platform helps and is responsible for handling user complaints. The existence of good communication services will provide comfort for users and contribute to the assessment of user satisfaction).

2.2 Sentiment Analysis

Sentiment analysis is a process of automatically understanding, extracting, and processing opinions from textual data to obtain positive and negative sentiment information in an opinion sentence. The magnitude of the influence and benefits of sentiment analysis causes research and applications based on sentiment analysis to develop rapidly [22]. Even in America, about 20-30 companies focus on sentiment analysis services. Therefore, corrections and improvements must be made based on several existing objects to maintain and increase user satisfaction in using services on an application system [22].

Based on the annotation and text data that have been obtained from Play store reviews of the indodax platform, there are 2 types of sentiments that are often made by users, including :

Positive sentiment, namely giving a 4 -5 star rating with review comments containing positive words about the indodax platform such as opinions about security, services provided, the process of withdrawing funds, and other benefits derived from using the platform. For example, "indodax exchange teraman, proses wd dan depo cepat." ("Indodax is the safest exchange, fast wd, and depo process").

Negative sentiment, namely giving a 1 – 3 star rating with review comments containing negative words about several points of the policies provided and the quality of service available on the indodax platform. For example, "Penarikannya mahal, 1/4 dari biaya penarikan." (Withdraw is expensive, 1/4 of the withdrawal fee").

Table 1. Sentiment Data of Indodax's User

Username	User Image	Content	Score
Eng	https://play-lh.googleusercontent.com/a/AATXAJwS1zcqQgwtxqwlfvFYffXe5BvqcLEWG3RBhaUf=mo	Good	5
Hermina Bali	https://play-lh.googleusercontent.com/a/AATXAJxYYy6Qr-cuvbkgYKgv9oAesRiKdh_cd9FKVGJB=mo	Penarikan nya agak mahal ¼ dari penarikan.	3
Abdulah Sunarto	https://play-lh.googleusercontent.com/a-	Good	5

Username	User Image	Content	Score
Haiky D	/AOh14GhNjbQUb5KQUF9wNj-ChE5mC00ZhdGl9iO9LwMNcg https://play-lh.googleusercontent.com/a-/AOh14Gi0R4ziAKKnYcTUGzy4dm22MgniIObs0uO0GxGQfA	et di hapus komen gua	1
doddy Pegora	https://play-lh.googleusercontent.com/a-/AOh14Gj3tR7LFtoLXYquKB5UcUEr6DeZo0TII__CH9O1kA	Bagus	5
Raden Bayu Halilintar	https://play-lh.googleusercontent.com/a-/AOh14Gh9wrKtLe2bhm8987LtAM01SGuSBEQxtli1csMvJw	Idx exchange teraman, proses wd dan depo cepat.	5
Dewi AHIZ	https://play-lh.googleusercontent.com/a-/AOh14Gj-hyP-FDhq4Mhf7rOW1QwbEQfbUSCc52jFlW-6	ok	5
Budi Eljava	https://play-lh.googleusercontent.com/a/AATXAJzlU4kBo-gp_XpapQMexO8f4Rqh1i98CuOU9uyx=mo	Yap, baru nyoba	5
Muhammad Khayan	https://play-lh.googleusercontent.com/a/AATXAJz9WL_TYoSEQpLbKwoIzP9Bfh30gTz8JNTFA8eA=mo	Proses widraw yang mantap	5
sum anto	https://play-lh.googleusercontent.com/a-/AOh14GjHu4OXvoq251aSkxOZlyr5lW4SRNqkkorsAu6OkQ	Baik	5
Okto Berlin	https://play-lh.googleusercontent.com/a/AATXAJxA6d0onMs9Uy4g7IMg0-dDuuNUdbnI4cCohmBs=mo	Good job	5
N i C e	https://play-lh.googleusercontent.com/a-/AOh14Gjl21ZotANZyHRmE-amc2WBefE8E	terpercaya	5

Username	User Image	Content	Score
ANGGA PURBOYO	QIPfnmUuruHrA https://play-lh.googleusercontent.com/a-/AOh14GgvmgfOHfmrfwuuFDAZVwbscF2EIAFj3zWv7mCNaQ	Go to the moon 🤩 😊 😊 🚀 🚀 🚀 🛸	5
Novianti Sembiring	https://play-lh.googleusercontent.com/a-/AOh14GggO1GhNQVB7wpT7bkaoPM34hKeDlixJ6-JpmePpQ	Keren 🧧 🧧 🧧 🧧 👏 👏 👏 👍 👍 👍 👍 💵 💵 💵 👑 👑 👑 👑 💎 💎 💎 💎 💎	5
Nurafni Novianti	https://play-lh.googleusercontent.com/a/AATXAJzo-iuXdbv3FwwWcjIW7O07_5ROwgFaGzEWxGzj=mo	Mantappp aplikasinya rekomendasi yang terdaftar di OJK , bukan kaleng kaleng	5
Adryan Ismail	https://play-lh.googleusercontent.com/a-/AOh14GjWpgBinXpJbKkHY-3n5B5PwJcJOtZhPS1uLolHHw	Mudah2an kedepan nya ada banyak feature baru termasuk paid to click dan shortlink hehe	5

As can be seen in table 1 which has obtained data is the result of crawling on the google play store data review, the results of the sentiments of Indodax users are displayed and uploaded in the play store review section. One example of positive sentiment is that there are comments such as "baik" (well), "bagus" (good), and "terpercaya" (trusted). Sentiment analysis can also be referred to as opinion mining, which involves a system to collect and examine opinions about products uploaded on blogs, comments, reviews, or tweets [23].

While examples of negative sentiments are comments such as "my Indodax account can't be opened" and "so disappointed why it happened like this, I'm confused".

The workings of sentiment analysis could be divided into three steps: classification, evaluation, and data visualization [24].

Classification, the classification scheme is the stage in accurately grouping comments or reviews on the Play store to assist in understanding social media behavior and its potential impact. The benefit of this scheme is that it allows researchers and practitioners to identify and classify the types of comments for analysis [25].

Evaluation, the evaluation scheme is the stage in conducting a dataset review with pre-processing, which includes case folding (converting all letters to all lowercase letters), tokenizer (dividing sentences into words), elimination of stop words (removing words that

often appear but have no meaning) and lemmatization (changing words into essential words), then classification and evaluation [26].

Data Visualization, this stage uses charts such as graphs, histograms, or matrices according to individual or company needs. In addition to charts, it can also be a world cloud or interactive map, depending on the result of the sentiment analysis, because it can vary widely [26].

There are three methods in sentiment analysis, namely [26]: Machine learning (a method that is considered increasingly popular because it can be considered representative, includes SVM, Neural networks, Decision Trees, and Naïve Bayes methods); Lexicon is a classification method that uses different words that are assessed with a polarity score to find out user responses about a topic. The approach with dictionaries and corpus is included in this method; and Mixed (Hybrid) is a method that is a combination of two existing methods.

Of the various classification techniques, the Lexicon classification method is used to classify in this study [26].

2.3 Lexicon Classification Method

The lexicon approach in sentiment analysis is also called the dictionary approach [27]. The sentiment classification process is to assign a value to each word in an opinion based on a dictionary or corpus which is equipped with both positive and negative weights for each word taken from a collection of words that are often used to express positive or negative sentiments, which are expected to produce solutions in improving performance desired [25], [28]. This method works by making a dictionary of opinion words first.

The words contained in the dictionary are used to identify whether a sentence contains an opinion or not. In this method, each review in the dataset will be analyzed individually, and the reviews that contain words in the opinion dictionary will be labeled as opinion tweets. The opinion dictionary used in this study was obtained from previous research. The word dictionary is a translation from senti-wordnet which has been modified and adapted to the characteristics of users in Indonesian [25], [26].

The use of sentiment analysis with the lexicon approach can produce good performance in various review opinion areas [29], has a higher level of accuracy in review sentiment classification compared to other methods [30], and can be applied to sentiment analysis at the document and sentence levels [29].

2.4 Recall, Precision & F1-Score

To measure the level of accuracy of a used method, two essential measurements can be used, namely, recall (sensitivity) and precision (accuracy) [28], [29]. The recall is a measurement to determine how much positive data (comments) is correctly predicted by the classification method for all positive data contained in the dataset [28]. Equation (1) is used to measure the recall value [28], [29].

$$Recall\ (R) = \frac{Amount\ of\ Relevant\ Data\ Retrieved\ (a)}{Amount\ of\ Relevant\ Data\ in\ Dataset\ (a+c)} \tag{1}$$

Precision is a measurement to determine how much positive data prediction is made correctly [28]. Equation (2) is used to measure the precision value [28], [29].

$$Precision\ (P) = \frac{Amount\ of\ Relevant\ collected\ Data\ (a)}{Amount\ of\ Fetched\ Data\ in\ Search\ (a+b)} \tag{2}$$

F1-Score is a measurement that combines precision and recall measurements. It is generally described as the harmonic average of the two. The harmonic average in question is another way to calculate the average value, which is generally considered more suitable for ratio calculations (such as precision and recall) than the standard average calculation [28]. Equation (3) is used to measure the F1-Score value [28].

$$F1 - Score = 2 * \frac{Precision * Recall}{Precision + Recall} \tag{3}$$

The recall, precision, and F1-Score values have a value scale from 0 to 1 and a percentage scale from 0% to 100%. Based on this value scale, if the resulting value is more excellent or closer to the value of 1 or 100%, then the effectiveness of recall, precision, and F1-Score is getting better. If the effectiveness of the recall, precision, and F1-Score values are improving, then the model used will be considered more effective in this study [28]. The recall and precision matrices are described in Table 2 [29], [30]:

Table 2. Recall and Precision Matrix

Data	Relevant	Irrelevant	Total
Found	a (*hits*)	b (*noise*)	a+b
Not Found	c (*misses*)	d (*rejected*)	c+d
Total	a+c	b+d	a+b+c+d

a (hits) = relevant document

b (noise) = irrelevant document

c (misses) = relevant document not found

d (reject) = irrelevant documents not found

2.5 Data Collection

The raw Data Collection on reviews on Play store by the scraping method was done with Python programming language. There are results from the data

collection in the form of comments collected based on available reviews of 46,991 data.

2.6 Data Cleansing

Data cleansing or data cleansing has the goal of separating and deleting raw data that contains unnecessary syntax and characters. This is done to minimize the possibility of errors and speed up the classification process as shown in Figure 2.
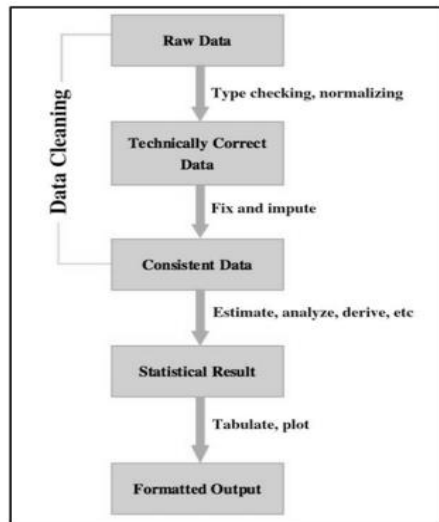

Figure 2. Cleansing Process

This study does some basic text processing techniques to clear data. Some of the preprocessing procedures that have been carried out include lower casing, removing punctuation, removing extra space, removing stop words, removing unwanted data columns, and stemming.

Case folding, aims to make all text lowercase such as "Rekomendasi yang terdaftar di OJK, bukan kaleng kaleng" changed to "rekomendasi yang terdaftar di ojk, bukan kaleng kaleng".

Removing punctuation aims to delete all non alphabet characters. For instance, "Mâha?l" changed to "Mahal". Removing extra space we will remove or strip leading and duplicate spaces. Removing unnecessary column data such as data for comment time, data for comment replies from the application admin to focus more on only the data that is needed.

Removing stop words is process in a sentence if it contains words that often come out and are considered unimportant such as time and conjunction. We use the Sastrawi library for removing stop words such as "bisa, maka, atau, dan" (can, then, or, and). For example "kita bisa pakai transaksi kartu atm" changed to "kita pakai transaksi kartu atm".

Stemming, the stage of stemming is the stage of finding the root word of each word filtering results. We used

Snowball Stemmer from Sastrawi library for indonesian. for example "OJK memberikan izin" changed to "OJK beri izin".

2.7 Implementation of Lexicon Classification Method

This classification method is solved by grouping each sentiment analysis on the quality factors of a platform's services. The data collected is a collection of words related to service quality. Then, the Lexicon classification method selection is based on the Lexicon method, which is one of the practical dictionary-based approaches [31], [32].

The steps for performing classification analysis using the Lexicon method are [33] - [35]: Data in sentences or words collected relates to the appropriate service quality; Each word is grouped by categorizing positive and negative words based on the "Sentiment-lexicon" dictionary [36]; The frequency of words that have been classified and grouped will be calculated and then analyzed according to the factors most related to user satisfaction; and The results of the calculations will be used to determine what factors affect user satisfaction.

2.8 Calculations Using Recall, Precision and F1-Score

After classifying with the Lexicon method, the next step is to calculate how accurate the Lexicon classification method in this study uses a recall and precision measurements and F1-Score measurements to see how good the value generated from recall and precision is.

3. Results and Discussions

In this section, we present the results of research related to sentiment analysis on the quality of services that have been provided by indodax based on reviews on the google play store. Where we will review the existing review data based on the lexicon dictionary and we will observe the statistical description of the existing data set by considering the relevance of each keyword from service quality and take sample data to test the accuracy of the method used.

3.1 Service Quality Dictionary

Dictionaries are keywords that are correlated with related service quality and appear the most in reviews. The technique of this method is to make a list of opinion words that are commonly used by users to indicate that the sentence they want is an opinion sentence. The advantage of the lexicon method is that data in the form of words from a sentence will be compared directly with the opinion dictionary contained in the lexicon. As we can see in table 3, there is a dictionary that explains in detail important points on issues related to service quality, such as "service & convenience", "security", "interface", and "system error & failed". A detailed explanation of the dictionary can be seen in Table 3.

In table 3, several data dictionaries and their numbers are explained for each service quality. where this data dictionary is obtained from the results of crawling data statements or feedback in the form of the words that are often expressed by users on google play store reviews for the indodax platform. Based on the main point of the existing service quality dictionary, for example data review "Authentifikasi ketika login sangat berguna untuk keamanan akun". The word "berguna" in the example review data is grouped into a library of security issues because the existing text data tends to represent security related issues. As for example of other word problems that are often commented by users, namely "wd", for example the review sentence is "wd terlalu tinggi dibandingkan platform lain", with the existing text data the word "wd" is grouped into part of the administration fee problem because the problem always discussed by users regarding fees related to costs.

Table 3. Indodax Application Service Quality Library

Service Quality	Library
Service & Comfort	Nonstop (4), layanan 24 jam (333), sepanjang masa (17), ramah (100), setiap saat (18), cs (458), tanggapan (62), bantuan (154), *fast* respon (59), tingkatkan (468), sangat mudah (556), puas (303), buruk (401), nyaman (587), memuaskan (280), sangat baik (206), kemudahan (88), kelebihan (34), *simple* (526), maju (520), tertarik (38), *maintenance* (704).
Security	Aman (2279), pribadi (66), terkunci (24), relevan (6), terpercaya (551), yakin (136), berguna (91), sangat mudah (556), sangat baik (206), sistem (392), tingkatkan (468), kendala (334).
Interface	Tampilan (389), dilihat (24), mudah digunakan (283), dipahami (389), praktis (94), sederhana (49), mudah dioperasikan (8), tata letak (1), *user interface* (35), desain (9).
System error & failure	*Error* (1357), eror (1147), nge-*lag* (76), nge-*hang* (4), *down* (839), *server down* (101), *loading* lama (9), *pump* (762), *bug* (176), gagal (286).
Administration fee	Biaya (1145), mahal (1092), *withdraw* (518), *fee* (1440), harga (1170), wd (1059), penarikan (958).

For reviews related to "service & convenience", the data dictionary that appears the most is "convenient" with 587 reviews, while the data dictionary that appears the least is "nonstop" with 4 reviews. For "safety", the data dictionary that appears the most is "safe" with 2279 reviews, while the one that appears the least is "relevant" with 6 reviews. For "interface", the data dictionary that appears the most is "looks" and "understood" with 389 reviews, while the least appearing is "layout" with 1 review. For "system error & failure", the data dictionary that appears the most is

"error" with 1357 reviews, while the least appearing is "hang" with 4 reviews.

3.2 Crawling Data Result

This study use a dictionary of service quality and the python programming language in scraping data on Play store reviews. The data scraping process resulted in 46.991 reviews from users of the Indodax application on the Play store as shown in Table 4.

In Table 5, the positive and negative reviews are grouped. Based on this grouping, there were 16,153 reviews, or 34.37% of the total reviews for 1–3-star ratings as negative reviews, where the 3star ratings contained in the existing review dataset contain negative sentiment, and 30,838 reviews, or 65.63% of the total reviews for 4–5-star ratings as positive reviews.

Table 4. Number of Reviews Based on Scoring Rate

Rating	Number of Reviews
1 Star	12.322
2 Star	1.662
3 Star	2.169
4 Star	2.793
5 Star	28.045

Table 5. Number of Reviews Based on Positive-Negative

Rating	Number of Reviews
1-3 Star	16.153
4-5 Star	30.838

Table 6. Number of Reviews Based on Service Quality

Service Quality	Number of Reviews
Service & Comfort	5.916
Security	5.109
Interface	1.281
System error & failure	4.757
Administration fee	7382
Other	22546

In Table 6, a grouping is carried out based on keywords that match the service quality dictionary. Based on this grouping, the most reviews related to service quality problems were regarding "administration fees", with 7,382 reviews or 00% of the total reviews. The second most reviews were about "service & convenience", with 5,916 reviews or 12.59% of the total reviews. The following most reviews were about "security" with 5,109 reviews or 10.87% of the total reviews, and the following most review was about "system errors & failure" with 4,757 reviews or 10.12% of the total reviews and "interface" with 1,281 reviews or 2.27% of the total reviews. For other assessments, 22,546 reviews were obtained, or 47.98% of the total reviews related to user satisfaction or not with the service quality of the Indodax application. This review does not contain keyword elements in the service quality dictionary, such as "service & convenience", "security", "interface", and "system error & failure". Thus, it

cannot fully represent the application service quality assessment.

Figure 3 describes the review data for the Indodax application. The graph shows the number of reviews that match the service quality dictionary, namely "service & convenience", "security", "interface", "system error & failure", and "Others".
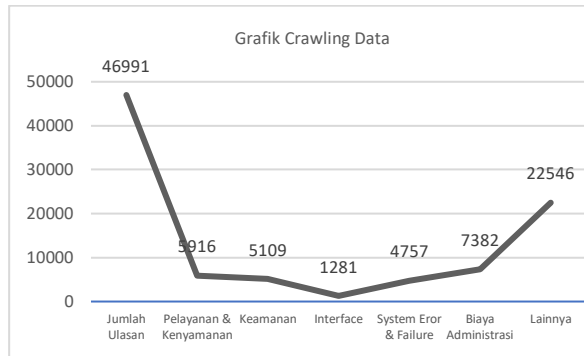

Figure 3. Data Crawling Graphic

3.3 User Satisfaction Sentiment Analysis

This study uses a dictionary of service quality and the python programming language to scrape data on Play store reviews. The data scraping process resulted in 46.991 reviews from users of the Indodax application on the Play store.

Table 7. Positive and Negative Review Amounts

Service Quality	Positive	Negative
Service & Comfort	4.926	990
Security	4.775	334
Interface	1.281	0
System error & failure	0	4.757
Administration fee	2878	4504
Other	19809	2737

In Table 7, data is grouped based on positive, negative, and sentiment from 46,991 scraped review data regarding service quality on the Indodax platform. Based on these groupings, we get a number of positive and negative reviews from each service quality dictionary.

For "service & convenience", from 5,916 reviews, positive sentiment was obtained with 4,926 reviews, or 83%, and negative sentiment with 990 reviews, or 17%. This shows that service and convenience are most positively responded to by its users. This study shows that users of the Indodax platform pay great attention to the services and convenience provided because a good service has an impact on helping users efficiently solve problems that arise when users use the platform.

For the "safety" of 5,109 reviews, positive sentiment was obtained with 4,775 reviews or 93.46%, and negative sentiment with 334 reviews or 6.54%. The comparison shows that users are delighted with the quality of security services provided on the Indodax

platform because they have received more than 70% positive sentiment. Users believe that Indodax is a safe platform and can protect users' transaction data.

For the "interface" of 1,281 reviews, positive sentiment was obtained with 1,281 reviews or 100% and had no negative sentiment. The comparison shows that users are delighted with the interface appearance of the Indodax platform because reviews related to the interface get more than 85% or reach 100% positive sentiment. Users are happy because the display of the Indodax platform is straightforward to understand, so it is easy to use.

For "system error & failure" from 4,757 reviews, negative sentiment was obtained with 4,757 reviews or 100% and not a positive sentiment. The comparison shows that users are not satisfied with the system errors & failures that often occur on the Indodax platform. This is because reviews related to system errors & failures get more than 80% or reach 100% negative sentiment. Users feel disappointed about this problem, which significantly impacts users in the process of trading cryptocurrency.

For "administration fees" from 7,382 reviews, negative sentiment was obtained with 4504 reviews or 61%, and positive sentiment reviews as many as 2,878 reviews or 39%. A comparison of these reviews shows that users are dissatisfied with the administration fees charged by the platform to customers when making money withdrawals.

For "other" from 22,564 reviews, positive sentiment was obtained with 19,809 reviews, or 88%, and negative sentiment with 2,737 reviews, or 12%. A comparison of these reviews shows that users are satisfied with the platform for trading cryptocurrencies because they have received 70% positive sentiment.

3.4 Recall, Precision & F1-Score Calculation Analysis

At this stage, the recall value will be calculated to determine how large the proportion of the number of documents recovered by a search process in the Lexicon classification method, and the precision value to determine how large the proportion of the number of documents found and considered relevant for the needs of information seekers.

Table 8 shows how many relevant and irrelevant documents can be found and cannot be found according to the analysis carried out in Table 3, Table 6, and Table 7.

Table 8. The result of Relevant & Irrelevant Document

Document	Relevant	Irrelevant	Total
Found	13.860	10.585	24.445
Not Found	19.809	2.737	22.546
Total	33.669	13.322	46.991

Based on the results in Table 8, the recall and precision are as seen in equation (4), (5) and (6).

$$Recall\ (R) = \frac{a}{a+c} \times 100 \qquad (4)$$

$$Precision\ (P) = \frac{a}{a+b} \times 100 \qquad (5)$$

$$F1 - Score = 2 * \frac{Precision * Recall}{Precision + Recall} \qquad (6)$$

Thus, the results of the calculation analysis are as follows.

$$Recall\ (R) = \frac{a}{a+c} \times 100$$

$$Recall\ (R) = \frac{13.860}{13.860 + 22.546} \times 100$$

$$Recall\ (R) = 38,07$$

$$Precision\ (P) = \frac{a}{a+b} \times 100$$

$$Precision\ (P) = \frac{13.860}{13.860 + 10.585} \times 100$$

$$Precision\ (P) = 56,69$$

$$F1\text{-}Score = 2 * \frac{Precision * Recall}{Precision + Recall}$$

$$F1\text{-}Score = 2 * \frac{66,43 * 32,27}{66,43 + 32,27}\ x\ 100$$

$$F1\text{-}Score = 45,55$$

From the calculation, the recall value is 38.07%, the precision value is 56.69%, and the F1-Score is 45.55%. So it can be seen that the precision value is greater than the recall value, and the average value of both produces a value of 47.38% based on keywords that match the Indodax application service quality dictionary.

3.5 Discussion

Previous research on sentiment analysis on bitcoin and cryptocurrencies based on the Python Text Blob library and sentiment analysis on Twitter against cryptocurrencies based on the Python Text Blob library using the Naïve Bayes algorithm, of course, only focuses on the general use of cryptocurrencies on Twitter [17], [18]. This makes the previous research different from this research which focuses on improving the service quality of the cryptocurrency trading service provider platform. Moreover, from the results obtained, it is known that cryptocurrencies in Indonesia are proliferating and large every time [4], [5]. This makes the cryptocurrency market platforms in Indonesia have to provide their best services to compete with existing competitors and gain loyalty. Of its users [11]. Therefore, it is essential to research sentiment analysis related to the quality of this cryptocurrency trading service provider to improve the quality of user comfort so that the use of cryptocurrency in Indonesia continues to grow [11].

In improving the quality of service and building user comfort, several aspects of the method can be used to conduct an assessment analysis and get feedback regarding the quality of service from users to the cryptocurrency trading platform that has been provided. Provided by users on the Google Play store related to the service provider platform [37].

After collecting data related to reviews given by users of cryptocurrency trading services on the Google Play store, we got 46,991 review data with various kinds of comments and ratings ranging from 1 star (unsatisfactory) to 5 stars (very satisfactory).

Furthermore, in this study, we use the service quality dictionary and the lexicon classification method to identify data from several aspects of reviews that are often discussed and affect the quality of existing services to gain user loyalty to the platform, such as in the service & convenience sector, security, interface design, system error & failure, and administrative costs. The results of the data from the user reviews related to this research state that the quality of services available on an indodax cryptocurrency trading platform still has several problems that must be improved regarding the quality of its services such as in the service & convenience sector, security, administration fees, and system errors & failure, which still has the most negative sentiments, must be further improved as essential support that must be done in increasing loyalty and profits for companies providing cryptocurrency trading services [38], [11]. Regarding service & convenience aspects, the review data stated that the quality of customer service/services provided by Indodax related to problem-solving was sufficient to satisfy users, with 83% of positive sentiments stating that users were satisfied. Regarding service quality related to security, Indodax also received 93% positive sentiment stating that users were satisfied with the quality of service for their account security. Then on the service aspect, Indodax's in-interface design quality gets 100% positive sentiment, which means that users feel that the user interface provided by the service is very satisfying. However, the system error & failure service and administrative fees provided by the crypto-currency trading service provider get much positive sentiment from its users, whereas system error & failure, get 100% negative sentiment reviews, and administration fees get 61% negative sentiment. This states that there are still important aspects that the cryptocurrency trading service provider must resolve to provide the best quality service in building user loyalty.

The main emphasis that cryptocurrency trading service providers can make in providing their best quality service is by considering and overcoming problems that often occur and become complaints from existing users, such as increasing platform performance to prevent material losses by users caused by system errors & failures and costs, maximizing the minimum possible related to tax withdrawal fees so that users can feel

comfortable. The costs are minimal for discounts in making withdrawals or remittances transactions to reduce existing administrative cost problems and improve security and customer service performance in serving users so that user comfort is adequately maintained. As for the theoretical and practical implications contained in this study, namely:

Theoretical Implications: In its theoretical implications, this study seeks to analyze and evaluate the quality of services on cryptocurrency trading platforms in Indonesia. This is a differentiator from previous research that only focuses on cryptocurrencies and bitcoins [17] [18]. Moreover, based on the results of this study, it is known that the quality of services provided by Indodax currently has several problems or negative sentiments, namely related to system errors & failures and administrative costs getting a high number of negative sentiments. This must be considered to increase customer trust so that Indodax can gain its users' loyalty and compete with existing competitors.

Practical Implications : The results of this study can practically be used as consideration or recommendations to Indodax or the cryptocurrency trading service providers in Indonesia to pay attention to user needs and improve the quality of existing services [19].

Service quality is taken in this study for cryptocurrency trading, as from references, service quality significantly affects user satisfaction. Moreover, the factors obtained are service and convenience, security, interface, system error & failure, and administrative costs [17], [18].

Each service quality factor has several data dictionaries that represent words that often appear or can be said as 'keywords' in Indodax application reviews [25] [26]. This indicates that the data dictionary is getting more attention as an assessment of the satisfaction of Indodax application users. To that end, an analysis of positive and negative sentiments from user reviews was carried out to see how good the quality of service provided by Indodax to users was and whether it was said to be good enough or needed further service improvement [25], [26].

After getting the results of an analysis of the magnitude of the positive and negative sentiments of indodax application users, it appears that users are satisfied with this cryptocurrency trading platform because they have received a positive sentiment of 70% greater than the amount of negative sentiment of 30%. and in the aspect of the user interface getting more than 85% or reaching 100% positive sentiment, users also feel happy because the indodax platform is easy to understand so it's also easy to use. However, there is a concern that indodax must increase in order to minimize system errors and failure issues in order to get positive sentiment in the future. it can be concluded from the results of this analysis that the service quality of the indodax application is quite good and suitable for use in cryptocurrency trading from the point of users' view.

4. Conclusion

Based on the sentiment analysis of the largest cryptocurrency trading company in Indonesia, namely Indodax, it can be concluded that several service quality factors can affect user satisfaction, namely the aspect of service & convenience, security, interface, system error & failure. Some of these factors are the most discussed factors in the Google Playstore data review.

Cryptocurrency trading companies must improve the quality of system error & failure problems that often occur to users. Also, Indodax is expected to consider aspects of taxes / administrative fees that users consider too expensive when making transactions [39], [27]. This is because the system error & failure factor and administrative costs get a relatively high negative sentiment in the conversations that users often discuss.

In analyzing the sentiments of Indodax users, this study uses the Lexicon classification method, which obtained 65.63% positive sentiment, 34.37% negative sentiment, 38.07% recall value, 56.69% precision, and F1-Score. by 45.55%. The results obtained from the analysis related to this research are that the service quality of the Indodax application is quite good for the users of the Indodax Play store platform.

Further research suggests conducting an analysis on other media, such as Twitter data reviews and special forums for indodax members on Facebook [40]. This will ensure that the data collected is more detailed and that the results are representative of user reviews as a whole. Since this study only used 2 labels on the 5-scale rating data namely positive and negative, it is hoped that further research can add a neutral label. In other datasets, a rating of 3 could be considered a positive sentiment. Additionally, other methods that can provide high recall, precision, and F1-Score values should be used to increase the level of effectiveness of using these methods.

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