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Enhancing Digital Banking Experience Through Text Mining of e-Service Reviews in Indonesia

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*Corresponding Author: 29123412@mahasiswa.itb.ac.id¹, manahan@sbm-itb.ac.id²**ABSTRAK**

Penelitian ini bertujuan untuk menilai kualitas layanan bank digital di Indonesia melalui analisis sentimen dan pemodelan topik ulasan Google Play Store, dengan fokus pada SeaBank, Bank Jago, dan Bank Neo Commerce, yaitu 3 (tiga) bank digital terkemuka di Indonesia berdasarkan total aset dan basis pengguna. Menggunakan kerangka kerja E-S-QUAL. Penelitian ini mengidentifikasi 5 (lima) dimensi utama kualitas layanan: Efisiensi, Pemenuhan, Keandalan, Responsivitas, dan Privasi. Penelitian ini menggunakan model BERT yang telah disempurnakan untuk mengklasifikasikan sentimen dan mengekstrak tema dari 277.877 ulasan. Hasil penelitian menunjukkan bahwa SeaBank memimpin dalam kinerja keseluruhan, terutama dalam efisiensi, dengan 89,4% sentimen positif, yang menunjukkan keunggulan operasional dan keterlibatan emosional yang kuat dengan pengguna. Namun, terdapat pula kesenjangan dalam responsivitas layanan pelanggan. Bank Jago berkinerja baik dalam hal efisiensi, tetapi menghadapi masalah kritis dalam hal keandalan, terutama terkait otentikasi dan pembatasan perangkat. Bank Neo Commerce menunjukkan pola sentimen yang paling terfragmentasi, dengan kelemahan sistemik dalam hal keandalan dan responsivitas. Hasil ini menawarkan wawasan praktis bagi bank digital untuk meningkatkan area layanan tertentu dan meningkatkan kepuasan pelanggan. Studi ini berkontribusi pada penelitian perbankan digital dengan menunjukkan bagaimana penambangan teks tingkat lanjut dapat mengungkap pola kualitas layanan yang bernuansa langsung dari umpan balik pengguna.

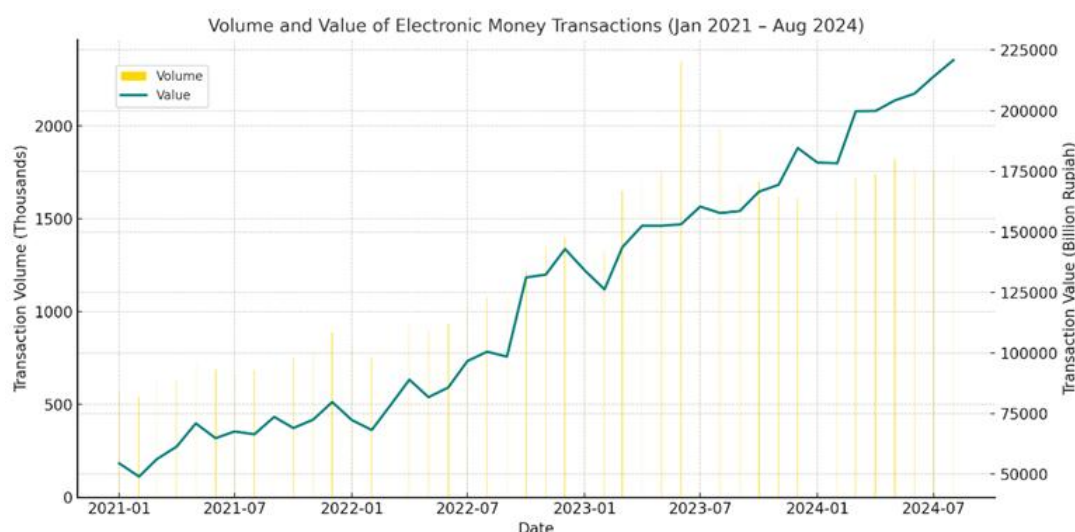
ABSTRACT

This study aims to assess the service quality of digital-only banks in Indonesia through sentiment analysis and topic modeling of Google Play Store reviews, with a focus on SeaBank, Bank Jago, and Bank Neo Commerce three of the country's leading digital banks by total assets and user base. Using the E-S-QUAL framework, this research identifies five key service quality dimensions: Efficiency, Fulfillment, Reliability, Responsiveness, and Privacy. The study employs a fine-tuned BERT model to classify sentiment and extract themes from 277,877 reviews. The findings reveal that SeaBank leads in overall performance, particularly in efficiency, with 89.4% of positive sentiment, indicating operational excellence and strong emotional engagement with users. However, gaps in customer service responsiveness were also identified. Bank Jago performs well in efficiency but faces critical issues in reliability, especially related to authentication and device restrictions. Bank Neo Commerce demonstrates the most fragmented sentiment pattern, with systemic weaknesses in reliability and responsiveness. The results offer practical insights for digital banks to improve specific service areas and enhance customer satisfaction. This study contributes to digital banking research by demonstrating how advanced text mining can reveal nuanced service quality patterns directly from user feedback.

Keywords : Digital Banking, E-S-QUAL; Sentiment Analysis; Topic Modeling; BERT; Service Quality.**INTRODUCTION**

The development of digital technology has revolutionized the financial services industry, especially banking, where digitalization is the main strategy for improving service quality and customer experience. Customer experience is now the main foundation of banking digital transformation. Today's customers expect flexibility in choosing between human or digital interaction; thus, digital banking must provide services that are not only efficient, but also ethical and trustworthy (Karaharli & Touma, 2021)

The digital financial ecosystem in Indonesia has experienced significant growth in recent years, as reflected in the increasing volume and value of electronic money transactions. From early 2021 to August 2024, the volume of electronic money transactions grew from around 500 thousand to over 2.5 million transactions per month, while the transaction value reached more than IDR 200 trillion per month by mid-2024 (Kusnandar, 2024). This rapid growth has been strongly driven by the rise of digital banks, which have played a crucial role in accelerating online transactions (Zhang et al., 2021). Consumers are increasingly turning to digital banks due to better digital experiences and lower service fees (Allchin, 2024), while factors such as security, convenience, and ease of use further influence customer preferences—positioning digital banks as dominant players in the online financial services landscape (Sultana & Faisal, 2024). As a result, digital banks are now seen as key actors in driving global digital transaction growth, offering faster, more flexible, and more affordable banking services compared to traditional banking models (Fang et al., 2021).



Source: Kusnandar (2024)

Figure 1
Volume and Value of Electronic Money Transactions in Indonesia

Asia, particularly, demonstrates the highest growth in digital banking, with over 100 digital banks recorded in 2023 more than any other region reflecting strong technology adoption and increasing demand for modern financial services (Wayman, 2023). In Indonesia, the total digital banking transaction value rose dramatically from IDR 1.5 quadrillion in January 2018 to more than IDR 5 quadrillion by April and December 2022 (Ahdiat, 2023). This acceleration has also been driven by the COVID-19 pandemic, which transformed user behavior due to social restrictions and virus concerns (Vilhena & Navas, 2023). As a result, digital banking shifted from an alternative to a necessity in modern financial life (BAI, 2020).

Nevertheless, not all digital banks are successful. Only 30% of digital banks manage to successfully undergo digital transformation (Fitsak & Neville, 2023). Further studies indicate that out of nearly 250 digital banks worldwide, only 13 have achieved profitability (Boston Consulting Group, 2021). Signicat's survey found that 63% of users abandoned the digital onboarding process due to poor user experience (Blandino, 2022). Poor customer experience in digital banks is often linked to poor service quality (Arora & Banerji, 2024), which is a critical factor since unsatisfied customers tend to stop using digital banking services (Basavaraju et al., 2024). Improving service quality directly addresses user experience and satisfaction issues (Bhuvaneswari & Maruthamuthu, 2024).

To measure service quality, the SERVQUAL model by Parasuraman et al. (1985) identifies five dimensions: tangibles, empathy, reliability, responsiveness, and assurance. Later, Parasuraman (2000) developed the E-S-QUAL model to assess electronic service quality through four dimensions: efficiency, system availability, privacy, and fulfillment (Zeithaml et al., 2000). Modifications of the E-S-QUAL model have since expanded the dimensions to reflect contemporary digital service contexts. Table 1 in this study presents a modified version of the E-S-QUAL model based on dimensions in recent

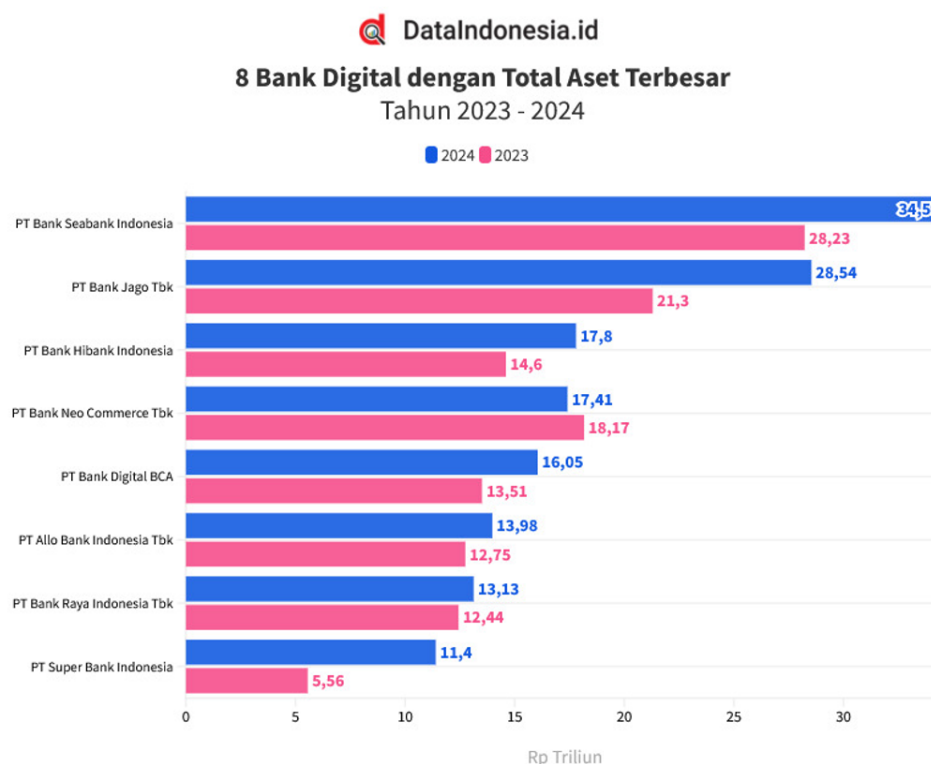
research, which include Efficiency, Reliability, Responsiveness, Fulfillment, and Privacy. These five dimensions were selected due to their high frequency of usage in prior studies.

Table 1.
Result of the modification of the E-S-QUAL dimension model

Dimension	Previous Research
Efficiency	Hasnah & Suyanto, 2020; Khan et al., 2019; Raza et al., 2020; Sasono et al., 2021; Ulum & Muchtar, 2018
Personal Needs	Raza et al., 2020
Reliability	Hasnah & Suyanto, 2020; Khan et al., 2019; Raza et al., 2020; Sasono et al., 2021; Ulum & Muchtar, 2018
Responsiveness	Hasnah & Suyanto, 2020; Khan et al., 2019; Raza et al., 2020; Sasono et al., 2021; Ulum & Muchtar, 2018
User Friendliness	Haria & Mulyandi, 2019; Raza et al., 2020
Site Organization	Haria & Mulyandi, 2019; Raza et al., 2020
System Availability	Haria & Mulyandi, 2019; Hasnah & Suyanto, 2020; Khan et al., 2019;
Fulfillment	Hasnah & Suyanto, 2020; Khan et al., 2019; Sasono et al., 2021; Ulum & Muchtar, 2018
Privacy	Haria & Mulyandi, 2019; Hasnah & Suyanto, 2020; Khan et al., 2019; Sasono et al., 2021; Ulum & Muchtar, 2018
Contact	Hasnah & Suyanto, 2020; Sasono et al., 2021; Ulum & Muchtar, 2018
Compensation	Sasono et al., 2021; Ulum & Muchtar, 2018
Assurance	Hasnah & Suyanto, 2020
Empathy	Haria & Mulyandi, 2019; Hasnah & Suyanto, 2020

Source: data processed

Today, service quality measurement can be enhanced through the use of text mining techniques (Vencovský, 2020), which enable identification and extraction of E-S-QUAL dimensions from online reviews (Mejia et al., 2021). Online reviews serve as indicators of customer sentiment and help detect dissatisfaction through sentiment analysis (Lu et al., 2023; Park et al., 2015). Textual feedback from digital footprints such as app reviews can highlight specific service shortcomings (Vencovský, 2020).



Source: DataIndonesia.id (2024)

Figure 2
Total Assets of Digital Banks in Indonesia (2024)

Digital banks in Indonesia are currently dominated by SeaBank, Bank Jago, and Hibank based on total assets. In 2023, SeaBank held IDR 34.59 trillion (up 22.53% from 2023), Bank Jago held IDR 28.54 trillion (up 33.98%), Hibank held IDR 17.80 trillion (up 21.92%), and Bank Neo Commerce (BNC) held IDR 17.41 trillion (down 4.18%) (DataIndonesia, 2023). Although Hibank ranks third in total assets, it primarily targets the MSME segment. Therefore, this study includes BNC ranked fourth as a more suitable representative of digital-only banks serving the general market.

Service quality management in today's digital banks is not merely a supporting element but serves as a strategic and critical factor in maintaining and enhancing competitiveness in the banking industry (Arora & Banerji, 2024). In order to meet the expectations of increasingly digital-savvy users, continuous technological innovation is essential to support the delivery of high-quality services (Ayinaddis et al., 2023). Across all industries, service quality functions as a key differentiator in business competition and remains a central metric in evaluating a company's overall performance including in the digital banking sector (Parasuraman et al., 1988).

According to Figure 2, SeaBank, Bank Neo Commerce and Bank Jago are the top digital only banks with the largest total assets in Indonesia in 2024, thus representing institutions with high operational scale and digital penetration. (Rahman, 2023). These banks have different ratings according to Google Playstore which is presented in Table 2.

Table 2
Result of the modification of the E-S-QUAL dimension model

Bank	Total Reviews	Rating
SeaBank	1.768.107	4.9
Bank Neo Commerce	277.545	3.4
Bank Jago	186.922	4.5

Source: Google Playstore Indonesia (2025)

Reviews or feedback provided by users on Google Playstore are urgent and important. Companies that do not respond and fix problems expressed through reviews risk losing customer trust and losing their loyal customers (Yin & Peng, 2020). Responses to negative reviews are critical, as companies that fail to respond properly will continue to lose users. Responding to reviews allows companies to identify issues more quickly and fix them, thereby reducing the negative impact that can diminish their digital reputation (Anziano, 2023). Furthermore, conducting a review analysis can identify service issues that need to be improved, such as response speed and network quality, which were previously undetected through traditional methods (Sinha et al., 2020). Text mining analysis can be used to identify dimensions of service quality that need improvement, and find issues that were previously undetected through traditional surveys (Chalupa et al., 2021), including in the digital banking industry, because it can identify problems with transaction speed and customer service quality which will ultimately be used to improve the quality of banking services (Mittal & Agrawal, 2022).

Based on the issues identified through user reviews and service quality concerns, this research aims to enhance customer experience by applying text mining analysis to Google Playstore reviews of SeaBank, Bank Neo Commerce, and Bank Jago, which are recognized as the top digital banks in Indonesia. By utilizing this approach, the study seeks to identify key dimensions of service quality that require improvement, providing actionable insights for digital banking services to address customer pain points. Ultimately, this analysis will contribute to the strategic enhancement of service quality, fostering greater customer trust and satisfaction in the competitive digital banking landscape

Literature Review

E-Service Quality

Service quality defined as the difference between customer expectations and the actual service received, as proposed by Parasuraman et al. (1988). This concept is measured through the SERVQUAL model, which includes five dimensions: tangibles, empathy, reliability, responsiveness, and assurance. These dimensions represent various aspects of customer perception, such as physical appearance, attention to customer needs, consistency, promptness, and the ability to instill trust. To address the growing relevance of technology and e-commerce, Zeithaml et al. (2000) expanded the SERVQUAL model to better suit digital services. Yandi (2019) adds that service quality reflects a product or service's

ability to meet both implicit and explicit customer needs. In the digital banking context, service quality is a key factor influencing institutional performance (Mwiya et al., 2022) and plays a vital role in enhancing user satisfaction, digital experience, and customer engagement (Chaffey, 2021).

In the digital era, service quality through electronic platforms is essential to meeting customer expectations. Electronic service quality (e-SQ) emphasizes how well digital services deliver smooth, user-friendly, and secure experiences. It includes factors such as ease of use, responsiveness, reliability, personalization, and security, all of which contribute to customer satisfaction and loyalty (Zeithaml et al., 2000). Zeithaml et al (2000) formalized e-SQ through the E-S-QUAL model, which includes four main dimensions: efficiency, system availability, privacy, and fulfillment. These dimensions help assess the quality of digital services, particularly in sectors like online banking where user experience and reliability are critical (Teofilus & Trisya, 2016).

The E-S-QUAL model used in this research is based on the modified framework in Table 1, which includes five essential dimensions for evaluating digital service quality: Efficiency, Reliability, Responsiveness, Fulfillment, and Privacy (Zeithaml et al., 2000).

1. Efficiency is the ability of a digital platform to help users complete transactions quickly and easily. It plays a key role in enhancing user satisfaction and loyalty (Raza et al., 2020), and efficient systems are often seen as more innovative and customer-oriented (Loonam & O'Loughlin, 2008). According to Zeithaml et al. (2000), this dimension is indicated by ease of use, minimal information input, and a well-structured interface.
2. Reliability is defined as the service provider's ability to consistently and accurately fulfill promised services (Parasuraman et al., 1985). In digital banking, reliability ensures system stability and user data security (Raza et al., 2020; Sakhaei et al., 2014). Zeithaml et al. (2000) identify three indicators of reliability: system uptime, service accuracy, and availability of features or products.
3. Responsiveness reflects how quickly and effectively a service provider responds to user needs. It involves a willingness to assist users and resolve problems promptly (Parasuraman et al., 1985; Raza et al., 2020), which strengthens satisfaction and loyalty (Suleiman et al., 2012). Zeithaml et al. (2000) measure this dimension through prompt confirmations, accessible support, and fast service processing.
4. Fulfillment refers to the accuracy and reliability in delivering promised services, including the availability and timely execution of features (Parasuraman et al., 1985). It indicates how well the service meets expectations in digital environments (Hasnah & Suyanto, 2020). According to Zeithaml et al. (2000), fulfillment is assessed through the accuracy of service promises, feature availability, and timely delivery.
5. Privacy concerns the protection of users' personal and transactional data from unauthorized access or misuse (Khan et al., 2019). Strong privacy practices foster trust and satisfaction (Nathan, 2014), and are critical in digital banking (Aboobucker & Bao, 2018). Zeithaml et al. (2000) identify indicators such as secure systems, careful data collection, and assurance that personal information is not shared.

Customer Satisfaction

Every online user seeks a positive experience when using an application, with the ultimate goal of achieving satisfaction from the service (Phillips, 2021). Customer satisfaction is defined as the pleasure or fulfillment felt when expectations are met or exceeded by a product or service's actual performance (Oliver, 1980). Kotler and Armstrong (2012) explain that satisfaction results from comparing perceived performance with expectations: underperformance leads to dissatisfaction, alignment leads to satisfaction, and exceeding expectations leads to delight. Dissatisfied customers are less likely to repurchase and may switch to alternatives. In digital banking, customer satisfaction reflects how well the services meet user expectations (Li & Suomi, 2009). One effective approach to measuring this is through digital footprints. Dey et al. (2023) utilized digital footprints to understand user perceptions of banking apps, identifying key factors influencing satisfaction and offering insights to improve service quality.

Text Mining

Text mining is a variation of data mining focused on identifying patterns in large text datasets, primarily for classification and information extraction (Munthe et al., 2022). The process typically

involves stages such as tokenization, filtering, stemming, labeling, and analysis. It enables companies to classify texts by topic, sentiment, or specific goals, improving efficiency and accuracy in data processing (Ginting & Panjaitan, 2023). As a tool, text mining is essential for managing large volumes of textual data and extracting relevant insights (Agung, 2024).

This method can uncover improvement areas and issues not easily detected through traditional surveys (Chalupa et al., 2021). It allows faster analysis of online reviews, offering competitive insights without the delays or biases of questionnaires (Amadio & Procaccino, 2016). Digital footprints, such as Google Play reviews, can be analyzed to evaluate factors like app impact (Brauer et al., 2016) or to assess service quality, as seen in studies involving Telkomsel's digital services (Aprillia et al., 2024). In digital banking, text mining offers a scalable and timely approach to evaluating service quality, especially in identifying critical aspects like user experience and customer support (Leem & Eum, 2021).

Sentiment Analysis

Sentiment analysis is a technique used to interpret subjective texts by identifying the expressed sentiment, typically categorized as positive, negative, or neutral (Mejova, 2009; Medhat et al., 2014). This method helps determine not only the polarity of opinion but also its target, such as products, services, or specific features. It is widely applied to assess opinions, emotions, and attitudes within text data (Irawan et al., 2019). Beyond its general use, sentiment analysis is especially useful for analyzing online reviews, including those from app stores and social media platforms (Rambocas & Pacheco, 2018).

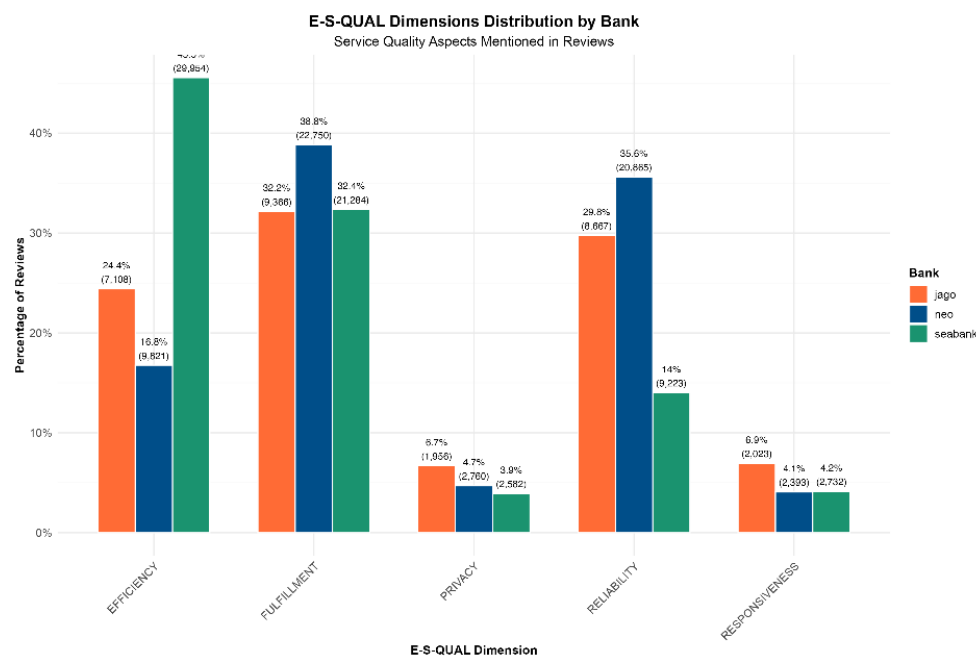
METHOD

Research is a process of inquiry that transforms the unknown into the known through testing or validating a phenomenon. This study adopts a quantitative approach using the BERT model to analyze user reviews from the Google Play Store for three digital-only banks in Indonesia: Bank Jago, SeaBank, and Bank Neo Commerce. The goal is to evaluate sentiment and user perceptions of service quality. According to Sekaran & Bougie (2016), quantitative research is rooted in positivism, involving statistical analysis of data from a defined sample. As a descriptive study, this research does not manipulate variables but aims to comprehensively understand the phenomenon. Data was collected through crawling user reviews, with minimal researcher intervention. The unit of analysis is individual user feedback, and a case study strategy was employed to gain in-depth insight into real-world service quality issues in a natural digital setting.

The research framework begins by identifying the business problem, followed by formulating research questions and objectives to guide the study. The scope and limitations are then established to define the boundaries of analysis. A detailed literature review consolidates prior research and theoretical foundations, including electronic service quality (e-SQ), the E-S-QUAL model, and customer satisfaction. Analytical concepts such as data mining, text mining, text classification, and sentiment analysis provide methodological support. Previous studies from the past decade enrich the research with empirical evidence. The research design details data collection and analysis methods, with findings used to inform practical business solutions. The study concludes with insights that contribute to both academic understanding and improvements in digital banking service quality.

This study utilizes secondary data as the basis for its analysis. Secondary data, as defined by Hardani et al. (2020), refers to information previously collected from indirect sources or third parties, such as documents, reports, or digital archives. Its use offers advantages including time and cost efficiency, along with access to broader datasets. Sekaran (2016) adds that secondary data enables researchers to extract insights without conducting primary data collection. In this study, data crawling is used to collect user-generated online reviews from the Google Play Store, which represents public, qualitative feedback on digital banking services and provide valuable insights into customer perception and satisfaction. Online reviews serve not only as authentic input but also help identify areas for service improvement. Mangold & Faulds (2009) highlight that such reviews are part of the broader social media ecosystem, influencing both brand reputation and business decisions.

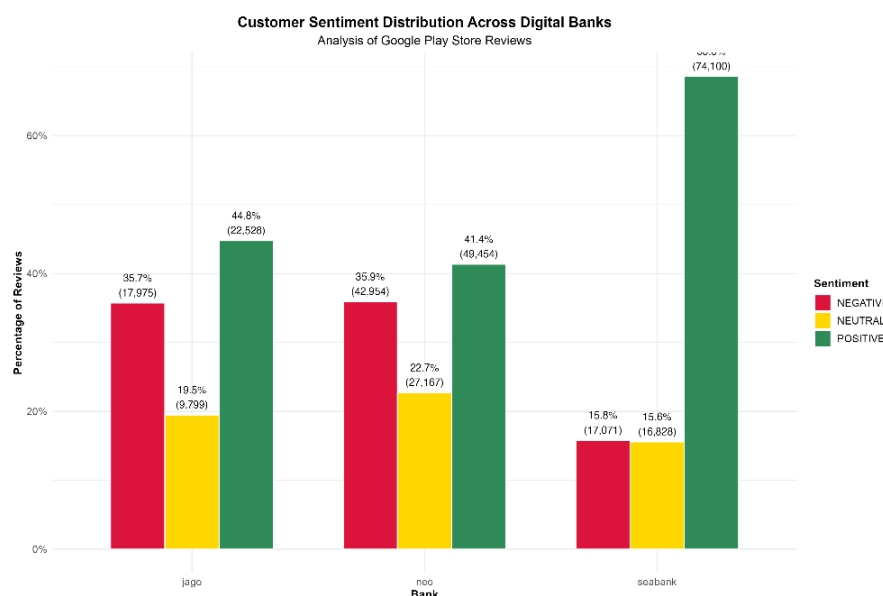
RESULT



Source: data processed

Figure 3
E-S-QUAL Dimensions Distribution by Bank

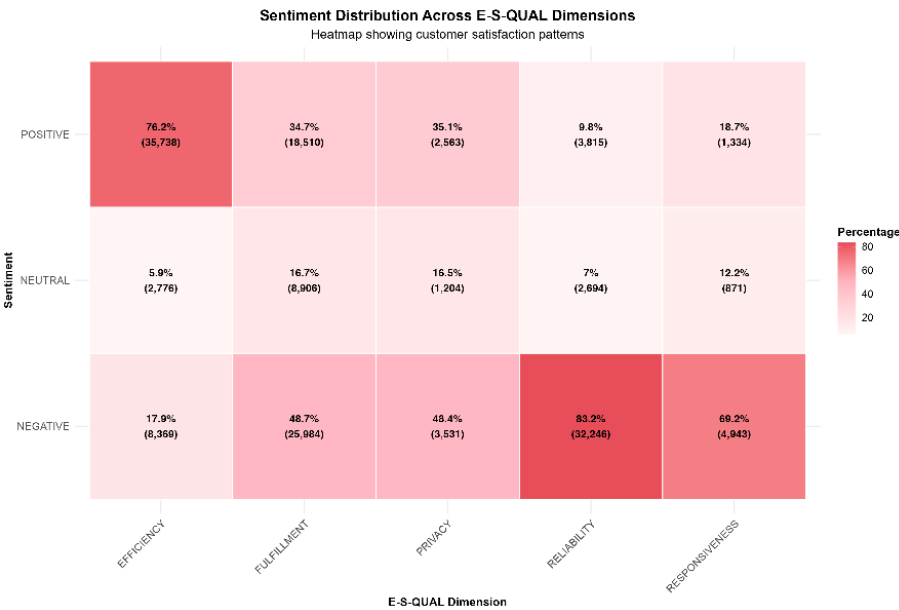
SeaBank demonstrates a clear efficiency-focused strategy, with 45.5% of service quality mentions relating to efficiency dimensions (29,954 reviews), followed by fulfillment at 32.4% (21,284 reviews). This concentration suggests SeaBank's strategic emphasis on operational excellence and streamlined service delivery. Bank Neo Commerce exhibits a more balanced but problematic distribution, with fulfillment concerns dominating at 38.8% (22,750 reviews) and reliability issues constituting 35.6% (20,865 reviews). Bank Jago shows the most distributed pattern across dimensions: fulfillment (32.2%, 9,366 reviews), reliability (29.8%, 8,667 reviews), and efficiency (24.4%, 7,108 reviews).



Source: data processed

Figure 4
Sentiment Distribution Across Digital Banks

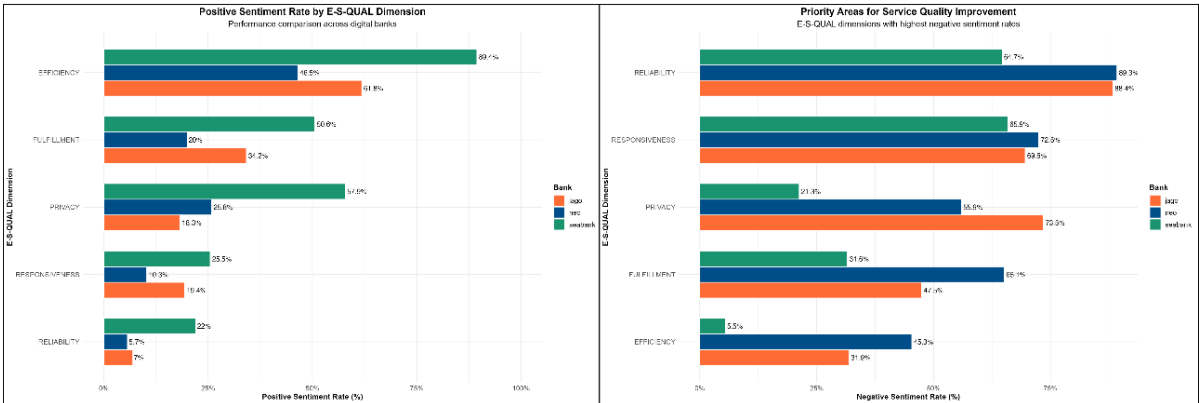
The sentiment distribution illustrated in Figure 4, shows significant differences in customer satisfaction levels among the three digital banks. SeaBank shows a superior performance, with 68.6% of its reviews expressing positive sentiments (equivalent to 74,100 reviews), thereby noticeably surpassing its competitors. In comparison, Bank Jago recorded 44.8% positive sentiment (22,528 reviews), while Neo Commerce Bank reported 41.4% (49,454 reviews). This gap in performance is further emphasized by the proportion of negative sentiment, with SeaBank recording only 15.8%, significantly lower than both Bank Jago (35.7%) and Bank Neo Commerce (35.9%). This finding underscores SeaBank's stronger position in delivering customer satisfaction in the digital banking landscape.



Source: data processed

Figure 5
Sentiment Distribution Across E-S-QUAL Dimensions

Figure 5 illustrates customer sentiment distribution across E-S-QUAL dimensions, revealing that Efficiency consistently receives the highest positive sentiment, indicating strong user satisfaction with fast and seamless service. Conversely, Reliability emerges as the most problematic dimension, with the highest proportion of negative sentiment, suggesting widespread issues related to system stability and service dependability. As the analysis involves the three largest digital-only banks in Indonesia, these findings are considered to be reflective of broader service quality patterns across the digital banking industry.



Source: data processed

Figure 6
Sentiment Analysis Results by E-S-QUAL Dimension

The findings in Figures 6 reveal that Efficiency consistently receives the highest levels of positive sentiment across all three banks, while Reliability emerges as the most critical pain point, indicated by the highest negative sentiment rates. This pattern suggests that operational speed and ease of use are key drivers of customer satisfaction, whereas system stability and dependability remain major sources of frustration. To further explore what users specifically appreciate and complain about within these dimensions, a topic modeling analysis was conducted on both positive and negative reviews to uncover the underlying themes



Source: data processed

Figure 7
Seabank topic modeling for efficiency Dimensions

The topic modeling of 22,572 positive reviews under the Efficiency dimension generated 139 topics, revealing strong and diverse patterns of user satisfaction. The dominant theme (20.2%) reflects expressions of gratitude and emotional satisfaction with the SeaBank brand, marked by keywords such as “terimakasih,” “seabank,” “sukses,” and “menggunakan.” This indicates a level of emotional attachment that goes beyond functional service use. Secondary themes include appreciation for zero-cost transactions (3.9%), ease of application use (3.0%), and fast, free transfer services (2.8%). Another notable topic (1.7%) highlights SeaBank’s ecosystem integration with Shopee, reinforcing its value proposition. This pattern suggests that SeaBank excels not only in operational delivery but also in building meaningful emotional connections with its users

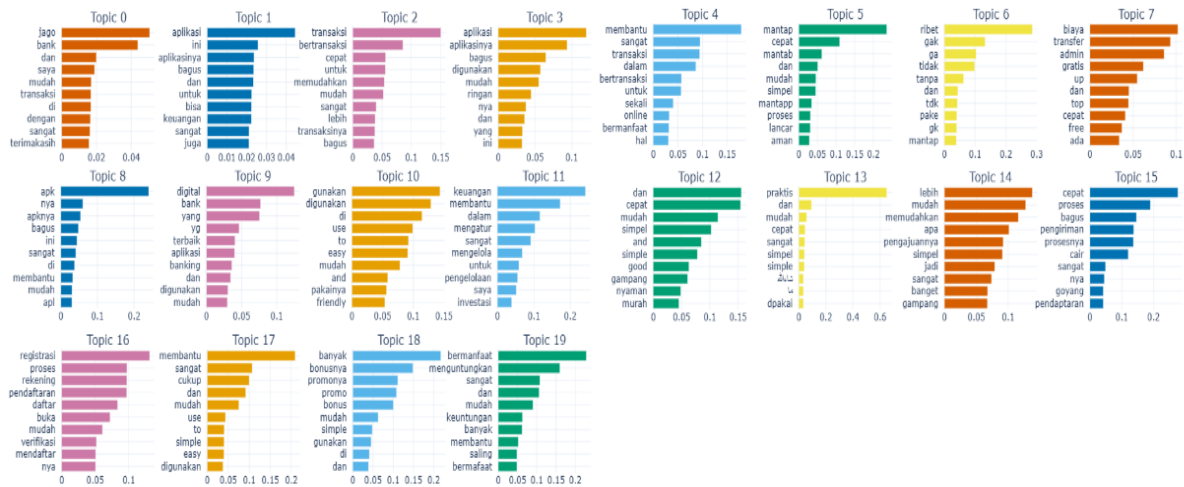


Source: data processed

Figure 8
Seabank topic modeling for Responsiveness Dimensions

For SeaBank, negative sentiment is primarily linked to the Responsiveness dimension, with 1,797 reviews grouped into just two main topics. The majority (68.3%) centers around customer service shortcomings, with users frequently expressing frustration using phrases like “cs, di, saya, bisa, ada, nya, tidak.” The remaining 31.7% relate to broader support concerns, including difficulties in account

resolution, using terms like “saya, seabank, di, cs, bisa, dan, akun.” While SeaBank leads in efficiency, this pattern suggests a clear service gap in handling customer inquiries and issues, highlighting the need to strengthen its support infrastructure



Source: data processed

Figure 9
Bank Jago topic modeling for efficiency Dimensions

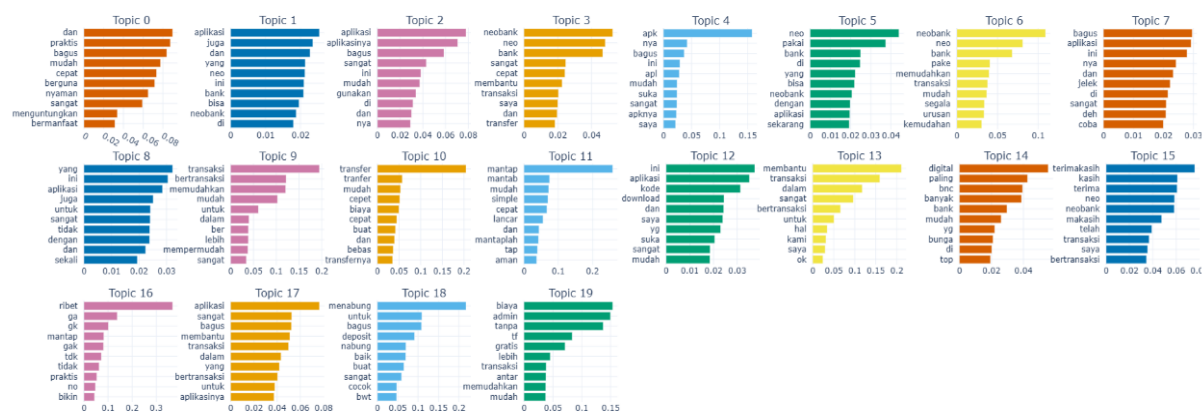
From 4,170 positive reviews, 27 topics were extracted, with the primary theme (23.4%) centered on user satisfaction with basic banking functions, particularly ease of transactions and service access. This is illustrated by frequent use of keywords such as “mudah,” “transaksi,” “bank,” and “jago.” The supporting topics include application quality appreciation (7.3%), transaction speed (5.9%), and interface usability (3.9%). While less varied than SeaBank, the positive sentiment toward Bank Jago is highly concentrated, indicating a strength in delivering essential services reliably and efficiently.



Source: data processed

Figure 10
Bank Jago topic modeling for Reliability Dimensions

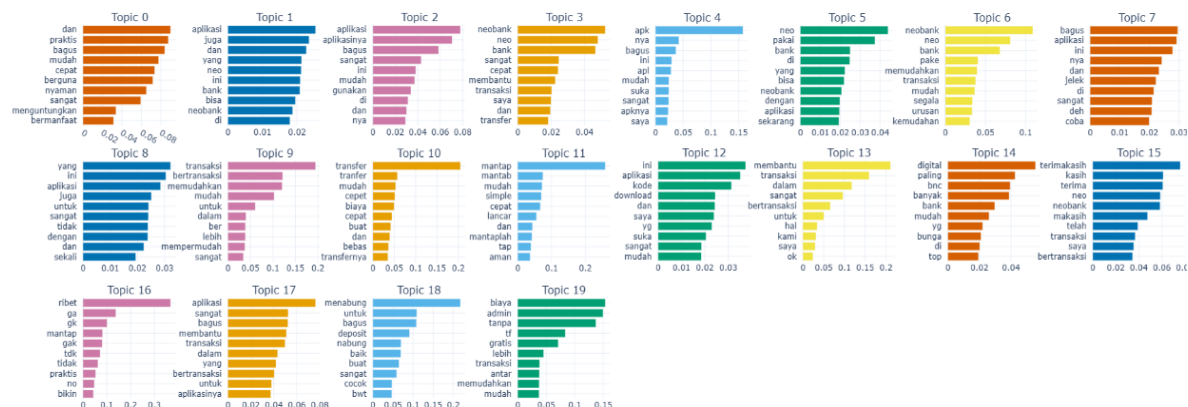
Topic modeling on 7,585 negative reviews under the Reliability dimension reveals that 99.5% of complaints are concentrated on authentication failures. Most reviews mention issues such as “saya, bisa, di, tidak, jago, login, ini”, indicating serious problems with the login process and access restrictions. This strongly points to systemic weaknesses in Bank Jago’s authentication infrastructure. Additionally, a small portion of reviews (0.5%) discuss device compatibility issues, particularly involving rooting detection, with phrases like “root, di, hp, saya, rooting, tidak, bisa.” These findings suggest that the current security mechanisms may be too restrictive, unintentionally excluding legitimate users and creating a barrier to service access.



Source: data processed

Figure 11
Bank Neo Commerce topic modeling for efficiency Dimensions

With 4,351 positive reviews forming 32 topics, the largest single theme covers only 5.8% of all reviews, indicating that positive sentiment toward BNC is fragmented and lacks a dominant focal point. Commonly occurring keywords such as “praktis,” “bagus,” “mudah,” and “nyaman” appear across multiple general topics without a clear unifying concept. Unlike SeaBank and Jago, BNC does not yet hold a clearly distinguished value proposition in the eyes of its users. This highlights an opportunity to strengthen its service positioning and establish a more defined value narrative around efficiency and user experience



Source: data processed

Figure 12
Bank Neo Commerce topic modeling for Reliability Dimensions

Bank Neo Commerce recorded 18,406 negative reviews in the Reliability dimension, with complaints distributed across 70 topics—indicating multifaceted and systemic issues. The most frequent problem (11.3%) concerns facial verification errors, represented by keywords such as “wajah, verifikasi, gagal, muka, terus, login, susah.” Additional issues include KYC mismatches (4.5%) with phrases like “ktp, sesuai, nama, rekening, daftar, data, foto”, network issues (3.5%) like “jaringan, bermasalah, koneksi, bagus, lancar, padahal, sinyal”, and transactional failures (2.9%) expressed as “saldo, ke, transfer, bank, neo, masuk, uang.” The wide spread of these complaints reflects a lack of reliability across multiple stages of the user journey, signaling an urgent need for cross-functional service improvement.

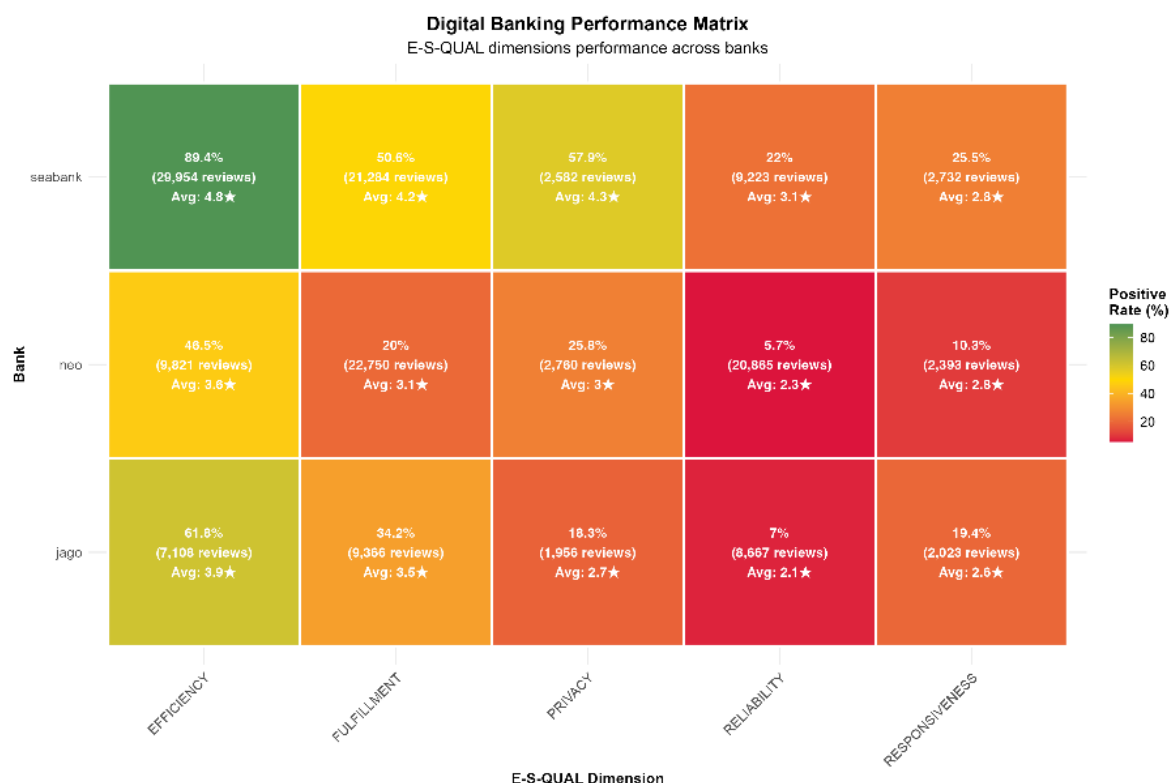


Figure 13
Digital Banking Performance Matrix

Source: data processed

The performance matrix analysis, as shown in Figure 13, reveals dramatic variations in positive sentiment rates across E-S-QUAL dimensions. The efficiency dimension demonstrates the most significant performance gap, with SeaBank achieving 89.4% positive sentiment compared to Bank Jago's 61.8% and Bank Neo Commerce's 46.5%. This 43 percentage point advantage for SeaBank in efficiency performance represents a substantial competitive moat in digital banking operations. Conversely, the reliability dimension presents universal challenges across all three institutions, as illustrated in Figure 13 (Positive Sentiment Rate by E-S-QUAL Dimension). SeaBank, despite its overall market leadership, achieves only 22% positive sentiment in reliability, while Bank Jago records a concerning 7% and Bank Neo Commerce manages just 5.7%. These figures indicate systemic industry-wide challenges in service reliability that require immediate attention from all institutions.

CONCLUSION

The study concluded that SeaBank stood out as the best-performing bank, with the highest level of positive sentiment (68.6%) and outstanding performance in the Efficiency dimension (89.4% positive sentiment). This success was driven not only by functional aspects such as fee-free transactions and fast service, but also by emotional engagement, as reflected in gratitude-themed reviews. However, SeaBank's Responsiveness dimension revealed gaps in customer support, particularly regarding service response times. Therefore, SeaBank is recommended to strengthen its customer service infrastructure to complement its operational excellence. Bank Jago demonstrated solid performance in Efficiency, particularly in basic banking functions, but experienced a significant decline in Reliability, with 88.4% of reviews expressing negative sentiment. Most issues centered on login failures and overly stringent security protocols (e.g., rooting detection). To address this, Bank Jago should prioritize overhauling its authentication infrastructure and implementing a more flexible yet secure login system, while also increasing data protection transparency on the Privacy dimension. Neo-Commerce Bank demonstrated the most fragmented and inconsistent performance. While some users appreciated its convenience, the bank recorded high negative sentiment on Reliability (89.3%) and Responsiveness. Issues such as facial verification failures, network instability, and incomplete transactions reflect systemic service

weaknesses. BNC is strongly advised to conduct a comprehensive review of its technical architecture, particularly focusing on onboarding processes, KYC documentation, and transaction handling. Furthermore, BNC should invest in building a clear and differentiated user experience strategy to strengthen its market position.

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