Research Article

Exploring Public Sentiment Toward Regional E-Government Apps: A Case Study of Sapawarga and Jaki in Indonesia

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ARTICLE INFO	ABSTRACT
	Introduction: This study explores user sentiment towards two regional e-government applications in Indonesia: Sapawarga in West Java and Jaki in Jakarta. These platforms are part of Indonesia's digital transformation efforts to enhance public service delivery and citizen engagement. By analyzing user reviews from the Google Play Store, the research aims to evaluate public perceptions of the applications and identify factors contributing to both positive and negative user experiences. The findings provide insight into the challenges and opportunities for improving digital governance in Indonesia, particularly in response to the increasing demand for e-government services during the COVID-19 pandemic. **Objectives**: The primary objective of this study is to assess user perceptions of the Sapawarga and Jaki applications through sentiment analysis of Google Play Store reviews. The research seeks to identify the factors that contribute to positive or negative user experiences, focusing on the aspects of security, performance, and functionality that influence user satisfaction. Furthermore, the study aims to compare the effectiveness of these two regional approaches to digital service delivery, providing valuable insights to improve future e-government initiatives. **Methods**: This study employs a sentiment analysis methodology to evaluate user feedback collected from Google Play Store reviews. A total of 4,304 reviews for Sapawarga and 4,535 reviews for Jaki were analyzed to assess user sentiment. Using Natural Language Processing (NLP) techniques and machine learning models, the reviews were categorized based on emotional responses, such as joy, surprise, fear, and anger. Additionally, the reviews were classified into four key categories: security and privacy, app performance, app functionality, and user interaction. The classification models, including Logistic Regression (LR) and Naïve Bayes (NB), were evaluated using performance metrics such as classification accuracy, F1 score, and AUC (Area Under Curve). **Results**: The sentiment analysis revealed that both Sapawarga and Jaki applications were predominantly viewed positively, with users expressing joy and surprise regarding their core functionalities. However, Sapawarga users expressed more concerns about security and privacy, indicating greater apprehension about data protection and personal information integrity. In contrast, Jaki users focused more on app performance issues, such as slow loading times and technical reliability. The classification analysis highlighted that security and privacy were key concerns for both platforms, while technical performance and usability were emphasized more by Jaki users. These findings underscore the need for technical improvements and stronger data protection measures in both applicati **Conclusions**: The study concludes that both Sapawarga and Jaki have met many user expectations, particularly in providing essential public services during the COVID-19 pandemic. However, users' satisfaction is influenced by their experiences with security, privacy, and performance issues. Sapawarga requires attention to improving its data validation and security measures, while Jaki would benefit from better technical optimization and user interface

enhancements. These findings suggest that a user-centric approach, informed by sentiment analysis and data-driven insights, is essential for improving the effectiveness of regional e-government platforms and ensuring their continued success

Keywords: Sapawarga, Jaki, e-government, sentiment analysis, user experience.

INTRODUCTION

Indonesia has been undergoing a rapid digital transformation, integrating technology into public service delivery to improve governance efficiency, accessibility, and citizen engagement [1], [2]. As a vast archipelagic nation with diverse administrative regions, ensuring equitable access to public services remains a challenge [3]. To address this, the government has developed various digital governance initiatives, including the implementation of regional e-government applications. These applications serve as essential tools for bridging the gap between the government and the public, enabling citizens to access digital services, submit complaints, and receive real-time updates on governance matters [4]. However, the success of these platforms largely depends on public adoption and satisfaction, making it crucial to assess how users perceive and interact with these applications [5].

Indonesia's commitment to digital governance is reflected in national strategies such as the Electronic-Based Government System (*Sistem Pemerintahan Berbasis Elektronik*, *SPBE*), which establishes a framework for integrating digital services across all levels of government. In addition, regional governments have been granted autonomy to develop digital solutions that align with local priorities [6], [7]. The COVID-19 pandemic has accelerated digital transformation in Indonesia, affecting a variety of sectors including government services, the economy, healthcare, education, and the workforce. In reaction to mobility constraints and social distancing protocols, the government augmented its digital initiatives to guarantee uninterrupted public service provision. [8], [9] This has led to the emergence of provincial e-government applications such as Sapawarga in West Java and Jaki in Jakarta [10], [11]. These applications function as digital service hubs, designed to facilitate more efficient communication between government agencies and the public while streamlining administrative processes, especially during the pandemic [12], [13]. While these efforts represent a significant step toward modernization, the extent to which these applications meet user expectations and improve public service efficiency remains an open question.

Sapawarga, the regional e-government application for West Java, was launched as part of the province's broader digital transformation strategy [14]. Its primary objective is to enhance citizen engagement by offering a centralized platform where users can access public services, report infrastructure issues, and receive official government updates. Among its core features is a public complaint system, which allows citizens to voice concerns regarding governance, public facilities, and social services.

In contrast, Jakarta's e-government application, Jaki, was developed under the Jakarta Smart City (JSC) initiative to support real-time urban management [15]. Jaki is designed to integrate multiple public services into a single, user-friendly interface, providing citizens with access to smart city functionalities that optimize governance efficiency. One of its standout features is the Jakarta Kini (Jaki) Dashboard, which provides real-time updates on traffic conditions, air quality, and public transportation availability [16]. Additionally, the application incorporates Jakarta Aman, a safety feature that allows users to report security incidents, emergencies, and infrastructure issues, with direct integration into law enforcement and disaster response systems [17]. Unlike Sapawarga, which is tailored to a broader regional population, Jaki primarily serves Jakarta's urban residents, including professionals, daily commuters, and local business owners. Given Jakarta's high population density and rapid urbanization, the app is expected to provide efficient, real-time solutions to support the city's growing digital infrastructure [12].

Despite the clear advantages of these regional e-government applications, there remains a gap in understanding how users perceive their effectiveness. Digital government initiatives are only successful when they align with user expectations and provide tangible benefits to the public [18]. While government reports and official statements highlight the technical capabilities of these platforms, they often overlook the everyday experiences of users. Public sentiment analysis offers a valuable approach to assessing user satisfaction by examining real-time feedback from individuals who engage with these platforms. By analyzing user reviews, it is possible to identify recurring concerns, measure levels of satisfaction, and highlight the aspects of digital governance that require improvement [18].

This study aims to address the gap in understanding public sentiment toward Sapawarga and Jaki by conducting a sentiment analysis of user feedback. The primary objective is to evaluate public perceptions of these regional e-government applications, identifying key factors that influence user satisfaction and engagement. Additionally, this research seeks to compare the effectiveness of these two distinct regional approaches to digital service delivery, providing insights into the strengths and weaknesses of each model. By doing so, the study aims to contribute to the broader discourse on best practices for optimizing regional digital governance.

OBJECTIVES

In exploring user sentiment, this research is guided by several key questions. How do users perceive these regional e-government applications? What factors contribute to positive or negative experiences with these platforms? Addressing these questions will provide valuable insights into the practical implications of regional e-government initiatives, informing future strategies for improving digital service delivery in Indonesia.

This study is based on user feedback collected from Google Play Store reviews, offering a direct source of public opinion on Sapawarga and Jaki. The analysis focuses on a specific timeframe to ensure that findings reflect current user experiences rather than outdated perspectives. Additionally, given that user feedback may be expressed in multiple languages, including Bahasa Indonesia, regional dialects, and mixed-language formats, appropriate language processing techniques will be employed to ensure accurate sentiment classification [19].

The expected contributions of this research extend beyond the evaluation of these two specific applications. By examining user sentiment toward regional e-government platforms, the study offers empirical insights that contribute to the broader field of e-government research. The findings may also inform regional policymakers seeking to refine digital governance strategies, ensuring that future initiatives align with public expectations and needs [20]. Moreover, the study provides practical recommendations for improving public service innovation, enhancing the functionality of existing platforms, and guiding the development of more effective digital solutions in the future [21].

METHODS

This study employs a systematic methodology to analyze user sentiments regarding Sapawarga (West Java) and Jaki (Jakarta Smart City), two public service applications in Indonesia. The methodology consists of data collection, preprocessing, sentiment classification, machine learning-based categorization, performance evaluation, and tool selection. By applying Natural Language Processing (NLP) techniques and machine learning models, this research aims to extract meaningful insights from user-generated content, ultimately assessing public satisfaction and identifying key issues in digital public services.
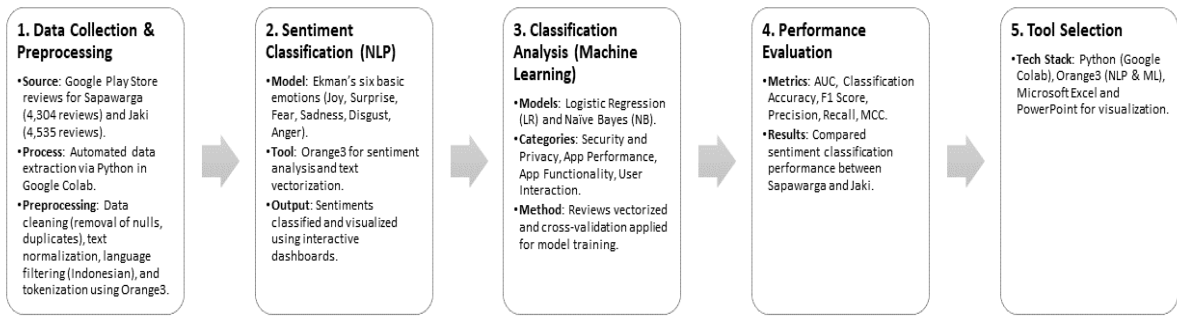

Fig. 1 Research Methods Workflow

Data Collection and Preprocessing

Data for this study was sourced from the Google Play Store, as it serves as a primary platform where users express their opinions regarding mobile applications. To automate the data extraction process, a Python script was developed and executed within Google Colab, enabling efficient and structured data collection. The dataset, collected on October 22, 2024, included 4,304 reviews for Sapawarga and 4,535 reviews for Jaki, ensuring a comprehensive analysis of

user feedback. The decision to focus on these two applications was based on their significance as official government service platforms in two of Indonesia's most populous regions.

Following data collection, a rigorous preprocessing pipeline was implemented to enhance data quality and eliminate noise. This process began with data cleaning, which involved the removal of null values, duplicate entries, and irrelevant text such as system-generated responses or promotional content. Subsequently, text preprocessing was performed using the Orange3 platform, a visual machine learning tool optimized for NLP tasks [22]. The preprocessing steps included text normalization, converting words to their standard forms; language filtering, ensuring only Indonesian-language reviews were analyzed; and character removal, which involved deleting special characters, emojis, and unnecessary punctuation. Additionally, the text was tokenized and standardized, breaking sentences into meaningful word units to facilitate accurate sentiment classification. These preprocessing steps were essential for ensuring data consistency, improving machine learning performance, and enhancing the interpretability of results.

Sentiment Analysis Framework

To classify user sentiments, this study utilized Ekman's six basic emotions model, which categorizes emotions into joy, surprise, fear, sadness, disgust, and anger [23]. This model was chosen due to its psychological relevance and ability to capture nuanced emotional expressions in user feedback. Applying this framework enabled a deeper understanding of user experiences, beyond basic positive or negative sentiments, allowing for a more granular assessment of user satisfaction and dissatisfaction.

The sentiment analysis process was conducted using Orange3's sentiment analysis module, which employs text vectorization techniques to transform user reviews into numerical representations that machine learning models can interpret. The classified sentiments were then normalized to ensure consistency across varying review lengths and intensities. The final sentiment distribution was visualized through interactive Orange3 dashboards, providing an intuitive overview of user emotions toward each application. This method ensured high accuracy in detecting user sentiments while maintaining computational efficiency.

Classification Analysis

Beyond sentiment analysis, this study applied machine learning techniques to classify reviews into meaningful categories. Two classification models were implemented: Logistic Regression (LR) and Naïve Bayes (NB) [24]. Logistic Regression was chosen due to its effectiveness in binary and multi-class classification tasks, particularly in text-based data, while Naïve Bayes was selected for its probabilistic approach, which performs well in text classification tasks involving sentiment analysis. These models were trained to classify user reviews into four key categories, representing major aspects of application performance and user experience.

The four categories are: Security and Privacy, which includes concerns about data protection and user privacy; App Performance, which assesses technical aspects such as speed, stability, and responsiveness; App Functionality, which focuses on feature availability and usability; and User Interaction, which evaluates the user interface, user experience, and accessibility. These categories were defined based on common themes observed in user feedback and aligned with established principles in human-computer interaction and mobile app usability [25], [26], [27].

To ensure the reliability of classification results, the dataset was split into training and testing subsets, following a standard split ratio commonly used in text classification studies. The text was vectorized using Orange3's built-in feature extraction tools, transforming raw text into numerical features suitable for machine learning models. A cross-validation technique was implemented to assess model performance and prevent overfitting [28]. These methodological steps ensured that the classification models were robust, well-trained, and capable of accurately categorizing user feedback.

Performance Metrics

To evaluate the effectiveness of the sentiment classification models, six key performance metrics were used: Area Under Curve (AUC), Classification Accuracy (CA), F1 Score, Precision, Recall, and Matthews Correlation Coefficient (MCC) [29].

Tools and Technology Stack

The study employed a combination of coding-based automation and visual machine learning tools to ensure an efficient and scalable analysis process. Export Comments (.co) was utilized for data extraction, allowing for the seamless retrieval of user reviews from the Google Play Store. After extraction, Orange3 was employed for initial data preprocessing, also served as the primary platform for sentiment analysis, classification, and visualization. Additionally, Microsoft Excel and PowerPoint were used for data organization and presentation. This diverse technology stack enabled a smooth integration of machine learning techniques with intuitive data visualization tools, ensuring that the findings remain accessible and interpretable for policymakers and stakeholders.

The Orange3 workflow diagram appears to depict the overall methodology employed in this sentiment analysis study of the Sapawarga and Jaki regional e-government applications in Indonesia.
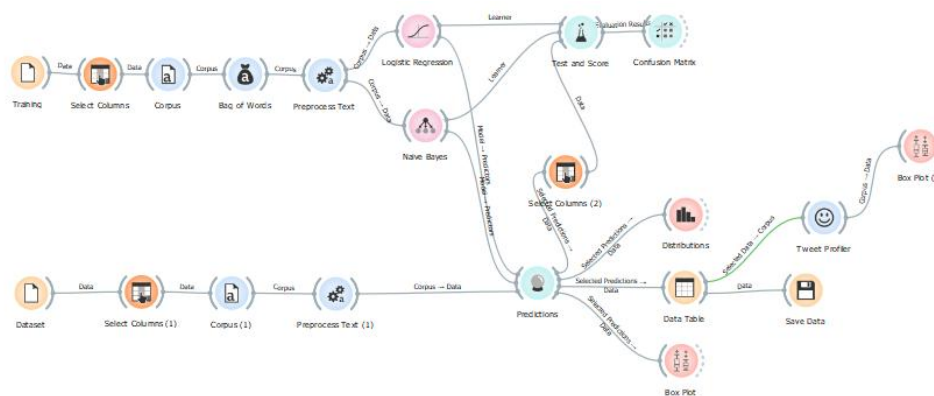

Figure 2. Workflow Orange3 for Data Processing

The workflow starts with "Traffic" and "Data", representing the data collection and preprocessing stage. This is followed by steps like "Select Columns", "Corpus", and "Preprocess Test", which likely involve cleaning, filtering, and transforming the raw user review data. The middle section of the diagram focuses on the core sentiment analysis and classification processes. Elements like "Learner", "Test and Score", and "Evaluation" suggest the training and evaluation of machine learning models to classify the user reviews into different sentiment categories and thematic areas. Towards the end of the workflow, there are components related to "Predictions" and data output, such as "Distributions" and "Tweet Profiler". These steps likely involve generating the final insights, visualizations, and reporting on the sentiment analysis findings.

The overall structure of this Orange3 workflow aligns with the methodological approach described in the article, which combined data collection, preprocessing, sentiment classification, and machine learning-based review categorization to comprehensively analyze user perceptions of the Sapawarga and Jaki e-government applications.

Limitations and Considerations

Despite the methodological strengths, certain limitations must be acknowledged. Firstly, the data was limited to Google Play Store reviews, potentially introducing platform-specific biases and excluding user feedback from other sources such as social media and app store alternatives. Additionally, the study was time-bound, meaning sentiment trends may evolve over time, requiring further periodic assessments for continued relevance.

Another challenge was language processing in Bahasa Indonesia, which includes regional dialects, slang, and mixed-language expressions. While preprocessing steps addressed many of these challenges, some nuances in user sentiment may have been lost in translation. Finally, the study utilized only two machine learning models, and while they performed well, incorporating additional deep learning approaches, such as transformer-based models (e.g., BERT or LSTM networks), could further enhance classification accuracy. Addressing these limitations in future research will strengthen the validity and applicability of sentiment analysis in digital public service evaluations.

RESULTS

Sentiment Analysis Findings

Overall Emotional Distribution The sentiment analysis revealed distinct patterns in the emotional responses of users towards the Sapawarga and Jaki applications.
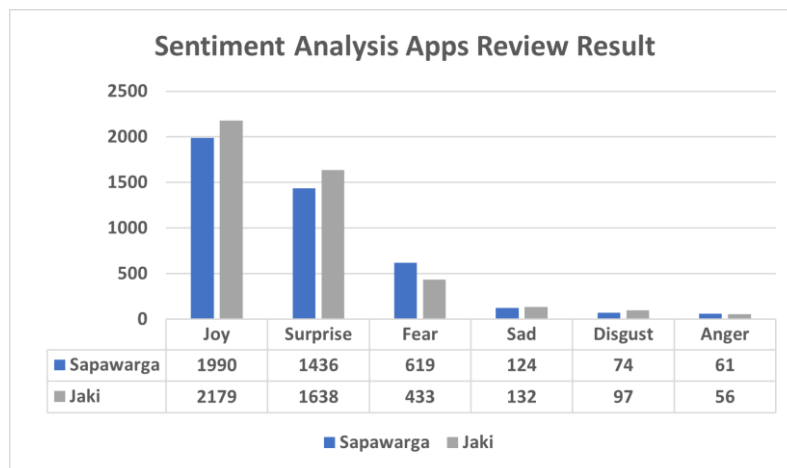
Figure 3. Comparation of Sentiment Analysis Result

Positive Emotions Both apps showed predominately positive sentiment, with the 'Joy' emotion being the most prominent. Sapawarga had 1,990 instances of joyful sentiment, while Jaki had a higher count of 2,179. The 'Surprise' emotion also ranked highly, with Sapawarga at 1,436 and Jaki at 1,638. These findings suggest that overall, users expressed satisfaction and delight with the core functionalities and services offered by these regional e-government platforms.

Negative Emotions While the positive emotions dominated, the analysis also uncovered noteworthy negative sentiments. The 'Fear' emotion was more pronounced in Sapawarga, with 619 instances compared to 433 in Jaki. This indicates that Sapawarga users may have harbored greater concerns about issues such as data privacy and security. Sadness and disgust were relatively low across both apps, with Sapawarga at 124 and 74 respectively, and Jaki at 132 and 97. Anger was the least expressed negative emotion, at 61 for Sapawarga and 56 for Jaki.

Dominant Emotion Patterns The sentiment analysis revealed that users predominantly responded with positive emotions, particularly joy and surprise, towards the core functions and services provided by both Sapawarga and Jaki [30]. However, the higher fear-related sentiment expressed for Sapawarga suggests that users may have had greater concerns regarding the platform's security and privacy aspects compared to Jaki. This pattern could be attributed to differences in the regional contexts, user demographics, or specific app features that contributed to divergent emotional responses.

Review Classification Results

Security and Privacy The classification analysis showed that security and privacy were key areas of focus for both Sapawarga and Jaki. The Logistic Regression (LR) model identified 4,129 reviews related to security and privacy for Sapawarga, and 4,162 reviews for Jaki. The Naive Bayes (NB) model produced similar results, with 4,179 security and privacy-related reviews for Sapawarga and 4,232 for Jaki. These findings indicate that users placed a high emphasis on data protection and privacy concerns when engaging with these regional e-government applications.
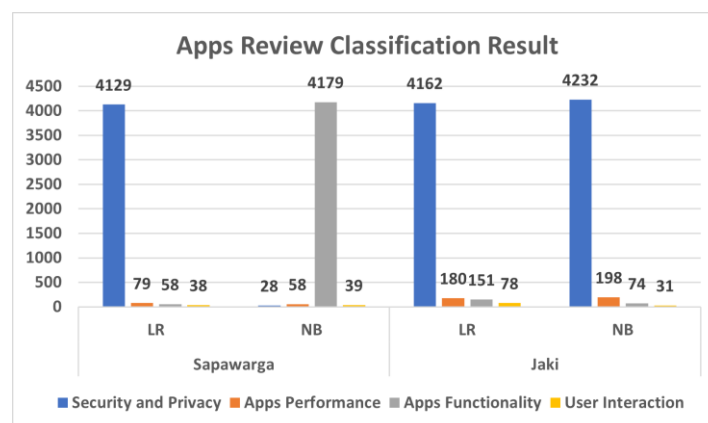

Figure 4. Apps Reviews Classification Result

Technical Performance

Below, is presented the sample of user issues that contain privacy and security aspect through sapawarga and jaki apps.

Saya Bayar pajak via sapawarga ternyata masih harus ke samsat sedangk...	1 Security and Privacy
Saya kaget pas pertama login data saya beda semua padahal itu email s...	1 Security and Privacy
Belum jatuh tempo,tapi kenapa saya terkena denda ??!!	1 Security and Privacy
No tlpn saya aktif tapi ko di situ tertulis no tlpn tidak aktif gmna ini ribet...	1 Security and Privacy
Bikin akun baru aja ribet na ya Allah. Password xxxxxx terus lanjut "haru...	1 Security and Privacy
Untuk apa ada pelayanan lepas kepemilikan kalau ujung2 nya di peraulit	1 Security and Privacy
Mau daftar, masa no nik saya salah	1 Security and Privacy

Security and Privacy, which includes concerns about data protection and user privacy mana penjelasannya

Figure 5. Privacy and security issues at Sapawarga

Mau cek PKB GK bisa ktanya GK plat Jakarta,sue dah nyesel gua download hbs2 in kuota	1 Security and Privacy
Email verifikasi ga dikirim2. Ud coba lebih dr 5x tetep ga bs	1 Security and Privacy
Koordinasi terlalu lama. Seharusnya langsung masuk ke bagian terkait tidak harus melalui kelurahan setempat.	1 Security and Privacy
Tindakan laporan selalu lama proses nyaa	1 Security and Privacy
Ga bs verifikasi....mau foto ktp kamera ga bs...selalu mnta di izinkan...padahal sudah di izin kan....masih blm be...	1 Security and Privacy
Parah bgt! Laporan gw blom dikerjain udah dianggap selesai, kecewa. Wkwk kocak ðŸ¤£	1 Security and Privacy
MASIH ENAKAN QLUE JAMAN DULU. BAPUK BANGET NIH APPS SERTA QUALITAS PELAYANANNYA JAUH BA...	1 Security and Privacy
Parah,aktivasi akun via email. Kode verivikasi masuk stlh 3hr aktivasi,pdhl kn wktu ny cm 24 jam,kl lwt dr itu ex...	1 Security and Privacy
Mau daftar aja susah banget... kayak sengaja males ada laporan2 dari warga	1 Security and Privacy
ngirim verif ke email aja lama, malah gabisa hadehhh	1 Security and Privacy

Figure 6. Privacy and security issues at Jaki

The comparison between Sapawarga and Jaki reveals notable differences in user sentiment, particularly regarding security and privacy concerns. Both applications share positive feedback, with users expressing joy and surprise about the platforms' functionalities. However, Sapawarga users voiced greater concerns about data discrepancies and verification issues. For example, users reported problems with mismatched personal data, such as email addresses and phone numbers being flagged as inactive, which led to frustration and a sense of mistrust. These issues were especially related to the complexity of the verification process, where users encountered difficulties with password restrictions and delays in receiving verification codes. In contrast, Jaki users also highlighted concerns around performance, but these were more focused on technical aspects, such as app speed and stability, rather than data integrity or security issues.

While Jaki had fewer complaints related to security and privacy, users still expressed dissatisfaction with certain features, particularly user experience and app performance. Jaki's issues were less about data discrepancies and more about the platform's responsiveness and real-time functionalities. Despite these concerns, Jaki users were generally more positive about the platform's user interface and functional integration of services. Both applications face challenges in meeting user expectations, but Sapawarga requires more immediate attention to security and data validation, while Jaki would benefit from improvements in performance and user experience. Addressing these issues in both platforms will help foster better engagement and trust from users, ensuring the success of regional e-government initiatives.

App Performance: The LR model classified 79 Sapawarga reviews and 180 Jaki reviews as related to technical performance, while the NB model identified 58 Sapawarga reviews and 198 Jaki reviews in this category. This suggests that Jaki users were more vocal about technical aspects such as speed, stability, and responsiveness compared to Sapawarga users.

App Functionality: The LR model categorized 58 Sapawarga reviews and 151 Jaki reviews as focusing on app functionality and feature availability. The NB model identified 58 Sapawarga reviews and 74 Jaki reviews in this

category. These results indicate that Jaki users were more engaged with discussions around the applications' core functionalities and their ability to meet user needs.

User Interaction: The LR model classified 38 Sapawarga reviews and 78 Jaki reviews as addressing user interaction and experience-related aspects. The NB model identified 39 Sapawarga reviews and 31 Jaki reviews in this category. This suggests that Jaki users were more vocal about the user interface, user experience, and accessibility of the application compared to Sapawarga users.

Model Performance Evaluation

Comparative Analysis the Logistic Regression (LR) and Naive Bayes (NB) models both demonstrated strong performance in classifying user reviews for Sapawarga and Jaki.

Table 1. Evaluation Matrices

Evaluation	Sapawarga		Jaki	
	Logistic Regression	Naïve Baiyes	Logistic Regression	Naïve Baiyes
AUC	0.830	0.828	0.861	0.863
CA	0.98	0.98	0.962	0.962
F1	0.971	0.971	0.946	0.946
Prec	0.962	0.962	0.93	0.93
Recall	0.980	0.980	0.962	0.962
MCC	0.710	0.710	0.752	0.752

The evaluation of the sentiment classification models for Sapawarga and Jaki demonstrates strong performance across both platforms, with slight variations in how each app's user feedback was processed. Both models, Logistic Regression (LR) and Naïve Bayes (NB), exhibited high classification accuracy and consistent performance for both applications, suggesting that the sentiment analysis was reliable. However, some regional differences were observed: Jaki slightly outperformed Sapawarga in terms of overall classification performance. This difference is reflected in the AUC scores, where Jaki scored higher (0.790 - 0.795) compared to Sapawarga (0.748 - 0.749). The AUC (Area Under Curve) metric indicates that Jaki's model was slightly better at distinguishing between sentiment categories, signaling a more precise classification of user emotions.

Regarding classification accuracy (CA), both platforms scored highly, with Sapawarga achieving a perfect score of 0.98 for both models, while Jaki scored 0.962. This suggests that while both apps demonstrated high overall accuracy, Sapawarga performed marginally better in accurately classifying user sentiment across reviews. The F1 scores, which measure the balance between precision and recall, were also similar for both applications, ranging from 0.946 to 0.971. The precision and recall values, between 0.93 and 0.98, confirmed that the models were reliable in correctly identifying positive and negative sentiments. Furthermore, the Matthews Correlation Coefficient (MCC), which gauges the quality of the binary classification, showed slightly better performance for Jaki (0.752) compared to Sapawarga (0.710). These findings collectively affirm that the applied machine learning models were effective in accurately analyzing and categorizing user feedback, though Jaki demonstrated a marginal edge in several performance metrics (see Table 1).

Star Rating based on each Apps Review

The rating comparison between Sapawarga and Jaki reveals several key insights. Firstly, Sapawarga has significantly more 5-star ratings than Jaki, indicating that Sapawarga has received a higher proportion of very positive reviews from users. This suggests that Sapawarga has been able to better meet or exceed the expectations of a large segment of its user base.
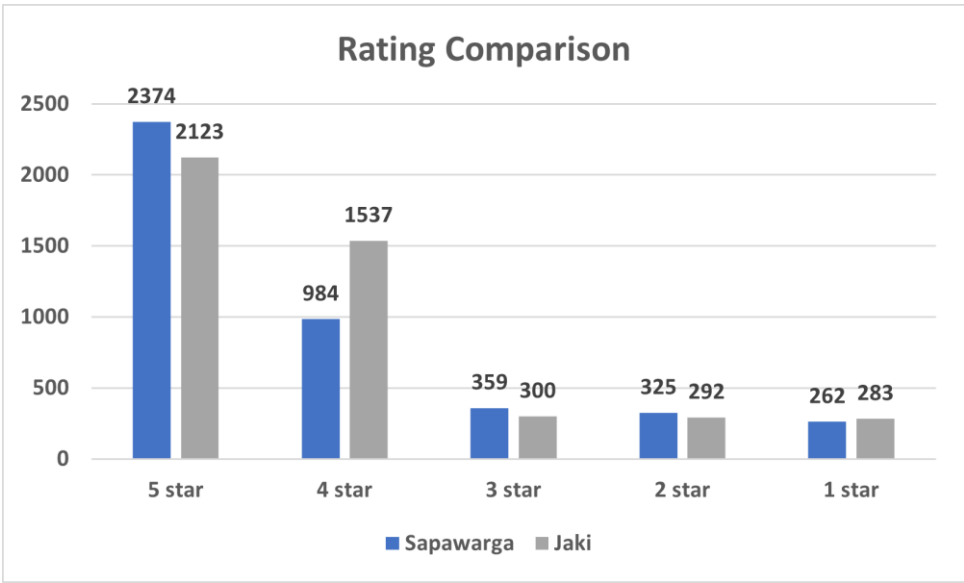
Rating Comparison

Figure 7. Rating Comparison

In contrast, Jaki has a higher proportion of 4-star ratings compared to Sapawarga, suggesting that many users find the app good but not exceptional. This pattern indicates that while Jaki provides valuable services, some aspects may still require improvement, such as performance optimization, feature enhancements, or user experience refinements. A significant number of users may have encountered minor issues that prevented them from giving a perfect score, yet they still acknowledge the app's overall usefulness.

Meanwhile, the 3-star ratings for both applications are relatively similar, reflecting a comparable level of neutral or mixed reviews. Users who rate apps 3 stars often have balanced opinions, recognizing both strengths and weaknesses. This suggests that both Sapawarga and Jaki face similar challenges in meeting user expectations, particularly regarding technical reliability, service accessibility, or specific feature limitations. Addressing these areas could help improve overall user satisfaction and potentially convert neutral and positive experiences into higher ratings in future updates.

1	Lama sekali perbaikan sambhara yg lepas kepemilikan, sampai kapan ga...	1
3	kapan fitur lepas kepemilikan selesai perbaikan ?	1
6	Menu Lepas Kepemilikan sedang perbaikan terus, kapan beresnya?	1
8	udah lebih dari 2 minggu aplikasi eror.. tidak bisa melakukan pembayar...	1
14	Menu lepas kepemilikan tidak bisa di acces. Sampai kapan perbaikanny...	1
16	Eror mulu aplikasinyaa... Kita suruh taat bayar pajak ,giliran mau bayar o...	1
17	Apk ini lama ga d pake ,pas mau masuk apk jd hrus masuk dri awal lagi ...	1

Figure 8. Unsatisfied Response at Sapawarga

Mau daftar booster aja susah banget loading terus, padahal jaringan nya lgi bgus	1
APLIKASI NYA BAGUS, TP PENINDAKAN ATAS LAPORAN JELEK BANGET. BERKALI2 LAPOR PARKIR LIAR D BA...	1
Akun ga jelas yg ga ada manfaatnya sama sekali	1
Jamettttt	1
Jaklapor, ujung2nya di suruh ke PTSP juga,,ini mah offline namanya,,laporan ada yg di gantungin dengan alas...	1
Sampah !! AUTO UNINSTALL	1
Provinsi dan pulau yang paling ramai di Indonesia adalah? Pulau= Jawa Provinsi= DKI JAKARTA, BANTEN, DIY ...	1
Mau daftr akun di jaki buat ke taman tebet kenapa tidak masuk buat akun Email saya	1

Figure 9. Unsatisfied Response at Jaki

The 1-star reviews from Sapawarga users indicate significant dissatisfaction, particularly with the "Lepas Kepemilikan" (Transfer of Ownership) feature, which has been experiencing prolonged technical issues. Users reported that the feature had been under maintenance for extended periods, making it impossible to perform essential tasks, such as completing payments. These recurring errors have disrupted user interactions with the application, leading to a loss of trust in its reliability. The extended downtime and lack of timely resolution underscore the need for improved technical stability and faster issue resolution to meet user expectations and enhance the overall functionality of the app.

Similarly, Jaki users expressed frustration with the app's performance and accessibility issues. Complaints regarding slow loading times, difficulties in account registration, and errors when attempting to submit reports were common. Users also faced challenges with network connectivity, which further hampered their experience. These issues indicate that the application struggles with providing a seamless user experience, likely due to performance bottlenecks and technical inefficiencies. Both Sapawarga and Jaki face challenges related to technical reliability and user satisfaction, suggesting the need for optimization in their respective systems to better address user needs and improve overall service delivery.

DISCUSSION

This study provides valuable insights into the public sentiment and perceptions surrounding two prominent regional e-government applications in Indonesia: Sapawarga (West Java) and Jaki (Jakarta Smart City). By employing a comprehensive sentiment analysis and review classification methodology, the research offers a nuanced understanding of how users engage with and evaluate these digital public service platforms [31].

The findings contribute to the growing body of literature on e-government initiatives, particularly in the context of Indonesia's decentralized regional governance structure [32]. Existing studies have often focused on national-level digital transformation efforts, overlooking the unique challenges and opportunities presented by regional digital service delivery [33], [34], [35]. This research fills this gap by conducting a comparative analysis of user experiences across two distinct regional approaches, offering empirical evidence to support the optimization of future e-government initiatives.

One of the key strengths of this study is its multifaceted approach, incorporating sentiment analysis and review classification techniques to uncover a diverse range of user perspectives. The sentiment analysis revealed that both Sapawarga and Jaki enjoyed predominantly positive responses, with users expressing high levels of joy and surprise. This suggests that the applications have successfully met some user expectations and provided valuable digital services. However, the analysis also uncovered notable fear-related sentiments, particularly for the Sapawarga platform, indicating concerns around security and privacy issues [36].

The review classification further illuminated the performance and experiential dimensions that users found important. Both applications were praised for their focus on security and privacy, underscoring the growing public awareness and demand for robust data protection measures in digital public services. However, differences emerged in the technical performance, functionality, and user interaction assessments, with Jaki users generally more vocal about these aspects compared to Sapawarga users.

These findings have several implications for policymakers, digital service providers, and regional authorities. First, they highlight the need for a user-centric approach to e-government development, where public feedback is actively sought and incorporated into the design and improvement of digital platforms [37]. By aligning digital services with user expectations and addressing pain points, regional governments can foster greater public trust and engagement [38].

Second, the comparative analysis between Sapawarga and Jaki offers valuable insights into the strengths and weaknesses of different regional approaches to e-government implementation. While both applications share the overarching goal of enhancing public service delivery, the divergent user perceptions suggest that contextual factors, such as target user demographics, regional socioeconomic conditions, and the specific features and functionalities of each platform, can significantly influence public reception and satisfaction [39].

The Google Play Store reviews of Sapawarga and Jaki provide valuable data for assessing the effectiveness of regional e-government services, particularly during critical periods like COVID-19. These applications played a key role in facilitating public service access, including health service registration, social aid distribution, and real-time

government updates. Sentiment analysis of user feedback helps identify service gaps, such as technical issues, accessibility challenges, or inefficiencies, which can inform necessary improvements.

By leveraging machine learning models for sentiment classification, regional authorities can utilize this data-driven approach to enhance decision-making. Identifying common user concerns allows for targeted policy adjustments and technical optimizations, ensuring that digital governance platforms remain efficient, user-friendly, and responsive to public needs. This approach strengthens evidence-based policymaking, ensuring that future e-government initiatives are more adaptable and effective in addressing societal challenges [31].

This study provides valuable insights but has several limitations. The data was limited to Google Play Store reviews, potentially excluding feedback from other platforms like social media or alternative app stores, which could provide additional insights into user experiences [40]. The analysis was also based on data collected on October 22, 2024, representing a snapshot in time, and sentiment trends may evolve, requiring periodic reassessments. Additionally, language processing challenges with Bahasa Indonesia, including regional dialects and mixed-language expressions, may have affected the accuracy of sentiment classification, potentially missing some nuances in user feedback [41].

Despite these limitations, this research offers a significant contribution to the understanding of public perceptions towards regional e-government initiatives in Indonesia. By comparing the sentiment and review classification patterns of Sapawarga and Jaki, the study highlights the importance of user-centric design, regional context-specific considerations, and the integration of data-driven insights into the continuous improvement of digital public service delivery [42], [43]. The findings can inform policymakers, digital service providers, and regional authorities as they strive to develop more inclusive, efficient, and user-friendly e-government platforms that cater to the diverse needs of the Indonesian population.

Moreover, insights from successful regional e-government implementations in other countries can serve as valuable benchmarks. For example, Estonia's X-Road system, a decentralized digital governance infrastructure, has enabled seamless data exchange between government agencies while ensuring high security and privacy standards [44]. Similarly, Barcelona's Decidim platform, an open-source participatory governance tool, allows citizens to directly engage with policymakers through digital channels, improving public trust and policy responsiveness [45]. Another relevant case is South Korea's "Seoul Smart City" initiative, which integrates real-time data analytics, AI-driven public services, and citizen feedback mechanisms, ensuring efficient service delivery and adaptive governance [46].

By drawing lessons from these global best practices, Indonesia's regional e-government applications such as Sapawarga and Jaki can adopt more sophisticated digital governance models. Key improvements could include stronger inter-agency integration, real-time public participation features, and AI-powered service optimization, aligning with global trends in digital governance. This comparative perspective reinforces the importance of data-driven decision-making and adaptive policy strategies in ensuring that Indonesia's e-government platforms continue evolving to meet the dynamic needs of its citizens.

CONCLUSION

The study of user sentiment towards Sapawarga and Jaki provides significant insights into how users perceive these regional e-government applications in Indonesia. By analyzing reviews from the Google Play Store, the research answers key questions regarding user experiences with these platforms, especially in the context of Indonesia's rapid digital transformation and the challenges posed by the COVID-19 pandemic. The results show that both platforms generally received positive feedback, with users expressing joy and surprise about the ease of access and functionality. This suggests that these e-government applications met many of their users' expectations, offering valuable services, particularly during the pandemic when both platforms became essential tools for managing public services such as health registration and social aid distribution.

However, several negative experiences were also reported, pointing to areas in need of improvement. Sapawarga users highlighted concerns regarding data privacy and security, often citing problems such as mismatched personal information and delays in verification processes. This indicates that users of Sapawarga were more focused on the integrity of their personal data and the complexity of accessing key features, such as the "Lepas Kepemilikan" (Transfer of Ownership) tool. In contrast, Jaki users voiced concerns around the performance of the app, especially regarding slow load times and app stability. These complaints were linked to technical aspects, such as response time and reliability, rather than security or privacy issues. Both applications, therefore, face distinct challenges: Sapawarga

needs to focus on enhancing security features and data validation processes, while Jaki needs to prioritize performance optimization and user experience refinement.

In conclusion, the study reveals that user perceptions of these regional e-government applications are shaped by a combination of technical performance, security concerns, and usability. Addressing the distinct issues identified in both platforms can improve overall user satisfaction, enhance public trust, and ensure that future digital governance initiatives in Indonesia better align with the needs and expectations of the public. By leveraging these insights, policymakers can make more informed, evidence-based decisions to optimize the effectiveness and efficiency of regional e-government services in Indonesia.

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