International Journal Administration, Business & Organization
Vol. 7 (1), 2026: 122-138 | E-ISSN 2721-5652
Available at https://ijabo.a3i.or.id/index.php/ijabo

User Perceptions of Digital Public Service Quality: Sentiment Analysis of the MyPertamina Application Using Stochastic Gradient Descent

Moch. Badrus Sholeh[1*]
Informatics Management Department, Faculty of Vocational Studies
Universitas Negeri Surabaya, Surabaya, Indonesia
E-mail: mochsholeh@unesa.ac.id

Faris Abdi El Hakim[2]
Informatics Management Department, Faculty of Vocational Studies
Universitas Negeri Surabaya, Surabaya, Indonesia
E-mail: farishakim@unesa.ac.id

Ahmad Abdullah Zawawi[3]
Educational Management Department, Faculty of Education
Universitas Negeri Surabaya, Surabaya, Indonesia
E-mail: ahmadzawawi@unesa.ac.id

Rabiyya Museyibzada[4]
Science, Higher, and Vocational Education Department
Ministry of Science and Education of the Republic of Azerbaijan
Republic of Azerbaijan
E-mail: rabiyya.museyibzade@edu.gov.az

ABSTRACT

Digital public service applications are increasingly used to support the distribution of subsidized services and improve administrative efficiency. However, user perceptions of system reliability, transaction processes, and data verification procedures remain critical factors influencing service acceptance. This study aims to analyze public sentiment toward the quality of a digital public service application by examining user reviews and identifying dominant service issues affecting user experience. A quantitative approach was applied using user review data collected from the Google Play Store. The textual data were processed through several stages of preprocessing and then classified into positive, neutral, and negative sentiments using the Stochastic Gradient Descent algorithm. In addition, aspect based analysis was conducted to examine issues related to system reliability, transaction processes, and data management and verification. The results show that system reliability and application stability, particularly login processes, verification mechanisms, and system updates, are the most influential factors shaping user sentiment. Transaction related issues such as payment failures and barcode scanning problems also contribute to negative perceptions, although some users acknowledge the convenience and speed of digital transactions. The study concludes that improving system stability and simplifying verification procedures are essential to enhance user satisfaction and strengthen the effectiveness of digital public service implementation.

Keywords: Sentiment Analysis; Stochastic Gradient Descent; User Reviews; Machine Learning

Received: 05 March 2026
Accepted: 08 April 2026
Available online: 29 April 2026

DOI: 10.61242/ijabo.26.729

JEL Classifications: C55, C45, H41

 *Corresponding Author: mochsholeh@unesa.ac.id

INTRODUCTION

Digital transformation in the public sector has become an integral component of managerial reform aimed at enhancing service effectiveness and efficiency through the adoption of e-government initiatives (Ananda Febryan, 2025). The use of mobile applications and digital platforms not only serves as a mechanism for bureaucratic modernization but also functions as a public discourse arena where citizens' opinions and evaluations are dynamically formed (Afyare & Orey, 2025). From a strategic management and organizational decision-making perspective, public sentiment captured through digital media plays a critical role, as it can shape policy perceptions, organizational legitimacy, and collective behavioral responses (Yang *et al.*, 2025). Accordingly, the evaluation of digital public service quality should incorporate users' moral considerations and evaluative judgments as a foundation for building sustainable policy support (Ba & Tan, 2025). By positioning digital service quality as a managerial issue, public organizations can become more adaptive in responding to citizens' expectations in an era of increasing transparency.

In this regard, the present study is primarily informed by two theoretical perspectives. First, E-Government Quality (E-GovQual) emphasizes that the quality of digital public services is reflected in dimensions such as reliability, usability, efficiency, and responsiveness (Yulian Surya Saputra *et al.*, 2025). Second, technology acceptance and public trust perspectives suggest that citizens are more likely to accept and continue using digital public services when the system is perceived as useful, accessible, and trustworthy (Afyare & Orey, 2025; Chu, 2025). These perspectives are particularly relevant in mandatory digital public service settings, where technical failure may directly affect citizen trust and policy acceptance.

As part of a national strategic initiative in the energy sector, the Indonesian government, through PT Pertamina, introduced the MyPertamina application to ensure that subsidized fuel distribution, such as Pertalite and Solar, becomes more targeted, transparent, and accountable (Putra & Menorizah, 2025). Although the application was designed to address long-standing challenges related to subsidy misuse, its nationwide implementation entails significant managerial complexity. Empirical studies indicate the presence of contradictory user responses; while the application has the potential to improve transactional efficiency, users frequently report substantial technical barriers, including complex registration procedures, server access issues, and limited accessibility for individuals with low digital literacy (Wijaya *et al.*, 2025). These challenges extend beyond technical concerns and may undermine public trust and the legitimacy of digitally mediated energy distribution policies. Consequently, public perceptions of the MyPertamina application vary considerably, and user satisfaction does not always align with expected digital service quality standards, which may ultimately influence public acceptance of national energy policies (Yulian Surya Saputra *et al.*, 2025). Such fluctuating perceptions necessitate a more in-depth evaluation to enable public service managers to identify service deficiencies and continuously enhance platform performance.

Previous studies have extensively examined sentiment analysis as a tool for assessing user perceptions across various digital sectors, including banking, education, and healthcare services (Baqach & Battou, 2024; Kholifah *et al.*, 2025; Nóra, Julianna *et al.*, 2025). In the specific context of the MyPertamina application, several studies have employed machine learning and deep learning algorithms, such as Convolutional Neural Networks (CNN) and Extreme Gradient Boosting (XGBoost), to classify user reviews based on sentiment polarity (Pardede *et al.*, 2025; Wardana *et al.*, 2025). However, much of this literature primarily emphasizes technical optimization and model accuracy

 DOI: https://doi.org/10.61242/ijabo.26.729

performance. The linkage between sentiment classification results and public service management implications remains limited, particularly for mandatory digital distribution systems such as MyPertamina. Without a clear managerial interpretation, technical findings risk remaining isolated from strategic decision-making processes.

More specifically, existing studies focus on model accuracy, but have not explicitly connected sentiment outputs with managerial decision-making in evaluating digital public service quality. This gap is important because, in mandatory digital governance systems such as MyPertamina, negative sentiment may indicate not only technical dissatisfaction but also deeper problems related to service reliability, user trust, and acceptance of digital public services.

This study addresses this gap by shifting the focus from mere text classification toward the evaluation of digital public service quality based on users' actual perceptions. The primary research gap lies in the limited number of studies that position sentiment analysis outcomes as managerial performance indicators within mandatory digital public service ecosystems. The novelty of this research resides in the application of the Stochastic Gradient Descent (SGD) algorithm as an efficient and scalable classification method. Unlike complex deep learning models that require substantial computational resources, SGD offers advantages in processing large-scale textual data through adaptive and efficient learning mechanisms, enabling robust model generalization with relatively low computational costs (Sclocchi & Wyart, 2024). By integrating public service management perspectives with SGD-based sentiment analysis, this study contributes to the strategic management literature through a scalable and managerially relevant machine learning approach.

The primary objective of this study is to analyze user perceptions of the MyPertamina application's service quality as a basis for managerial evaluation and response formulation. Specifically, this study addresses two research questions: (1) how is user sentiment toward the MyPertamina application distributed based on reviews from the Google Play Store, and (2) how does the Stochastic Gradient Descent algorithm perform in classifying these sentiments as an instrument for evaluating digital public service quality. The research methodology involves collecting user review data from the Google Play Store, conducting systematic text preprocessing, and applying sentiment classification using an optimized SGD algorithm with appropriate term-weighting techniques to ensure accurate and reliable analysis.

The findings of this study are expected to map the dominance of specific sentiment categories that reflect levels of user satisfaction and the barriers encountered by citizens in using the MyPertamina application nationwide. These insights are anticipated to provide strategic implications for public service managers in designing and managing more user-centric and inclusive digital platforms.

LITERATURE REVIEW

Digital Public Service Quality and User Perceptions

Digital public service quality from the perspective of public management and e-government is defined as the extent to which digital platforms are able to facilitate interactions between government and citizens in an efficient, transparent, and accountable manner. Unlike conventional public services that rely on face-to-face interactions, the quality of digital services is highly dependent on system reliability, usability, and the effectiveness of the features provided (Shapa *et al.*, 2025). Within the public service management framework, models such as E-GovQual emphasize that service quality should not be assessed solely based on technological availability, but also on equitable

 DOI: https://doi.org/10.61242/ijabo.26.729

access for all segments of society, including vulnerable groups such as older adults who often face challenges in adopting ICT-based services (Yakura *et al.*, 2026; Yulian Surya Saputra *et al.*, 2025). The digitalization of public services therefore requires a strategic shift in organizational management from traditional bureaucratic approaches toward more adaptive models that prioritize transactional convenience and information transparency.

User perceptions of digital services are formed through the accumulation of direct experiences that reflect not only the technical performance of an application but also broader dimensions of public trust and policy legitimacy. User perceptions are increasingly positioned as a critical managerial performance indicator, as they capture the extent to which public policies are accepted and perceived as fair by society (Handojo *et al.*, 2026). The integration of perception data derived from digital platforms with conventional survey data provides richer insights into social values and public preferences regarding a given service (Krajewski *et al.*, 2026; Chaniago *et al.,* 2025). Accordingly, sentiments expressed by users in digital interactions should not be interpreted merely as individual opinions, but rather as a form of digital legitimacy that plays a decisive role in determining the success of strategic policy implementation at the national level.

Sentiment Analysis in Service and Management Research

Sentiment analysis has evolved into a crucial analytical instrument in contemporary management research for capturing users' opinions, emotions, and attitudes embedded in unstructured textual data. As part of People Analytics and data-driven management, sentiment analysis functions as a strategic sensing mechanism that enables organizations to understand user behavior and service satisfaction in real time through the extraction of insights from user-generated content (Mohammadi & Mohammadian, 2025). In the context of risk and crisis management, the ability to monitor fluctuations in public emotions across digital platforms is essential for organizations to dynamically adjust communication strategies and mitigate the dissemination of information that may harm organizational reputation (Chu, 2025; Qhal, 2025). Accordingly, sentiment analysis is no longer viewed merely as a technical text-processing procedure but rather as a strategic management function that supports data-driven decision making.

Previous studies have demonstrated the effectiveness of sentiment analysis in evaluating services across various sectors. In the healthcare sector, sentiment analysis has been used to monitor public concerns regarding post-licensure vaccine policies and drug reimbursement decisions, where the dominance of positive sentiment has been shown to correlate strongly with public trust and policy acceptance (Javed *et al.*, 2025; Pinilla-Dominguez & Pinilla-Dominguez, 2025). In the corporate sector, this approach has been employed to analyze employees' perceptions of employee value propositions (EVP) in order to strengthen employer branding strategies and enhance human resource retention (Mohammadi & Mohammadian, 2025). Although such cross-sector applications demonstrate the flexibility and generalizability of sentiment analysis methods, the existing literature remains largely dominated by studies focusing on commercial business contexts or public services that are voluntary in nature, which exhibit behavioral dynamics distinct from those of mandatory public services.

The primary gap in previous research lies in the tendency to position sentiment analysis as a purely technical analytical tool (a technical-end approach), with limited integration into public management strategy frameworks. Studies that utilize sentiment analysis as a management intelligence instrument to evaluate strategic public services, such as fuel distribution systems, remain relatively scarce (Gopal *et al.*, 2025). Therefore, this study positions sentiment analysis as a managerial decision-support tool for

 DOI: https://doi.org/10.61242/ijabo.26.729

objectively mapping implementation challenges in public service delivery based on empirical user data, enabling service quality improvements to be grounded not in normative assumptions but in users' actual perceptions.

Machine Learning Approaches for Sentiment Classification

The evolution of sentiment classification methods has undergone a significant shift from traditional lexicon-based approaches toward the adoption of more complex artificial intelligence techniques. Early approaches that relied on sentiment lexicons often failed to capture the dynamic emotional context present in informal language (Patil *et al.*, 2025). This limitation has driven the adoption of supervised learning and deep learning methods, which offer higher accuracy and greater flexibility through training processes based on labeled datasets (Yuliyanti *et al.*, 2025). The primary advantage of machine learning approaches lies in their ability to autonomously learn linguistic patterns and adapt to continuously evolving vocabulary across social media platforms and mobile application reviews.

Various classification algorithms exhibit distinct characteristics in terms of trade-offs among accuracy, interpretability, and computational complexity. Algorithms such as Naïve Bayes and Logistic Regression are widely used due to their simplicity and time efficiency in text processing tasks (Dimalanta & Fajardo, 2025). In contrast, methods such as Support Vector Machines (SVM) and Extreme Gradient Boosting (XGBoost) often deliver superior accuracy but require greater computational resources. In the context of management and public policy research, algorithm selection should not be based solely on achieving the highest accuracy scores, but also on the interpretability of results to ensure that findings can be translated into clear and actionable policy recommendations (Faris Abdi El Hakim & M Adamu Islam Mashuri, 2025).

Within the context of large-scale, unstructured, and highly dynamic public service review data, the relevance of machine learning approaches becomes increasingly critical. The volume of user reviews, which can reach thousands per day for strategic applications, demands methods that are not only technically accurate but also managerially scalable (Patil *et al.*, 2025). Selecting appropriate algorithms enables public service managers to respond to public complaints in a timely and targeted manner. Consequently, the use of machine learning shifts from being merely a technical decision within a computational environment to a strategic managerial decision that determines organizational responsiveness in detecting public dissatisfaction and continuously improving service quality (Faris Abdi El Hakim & M Adamu Islam Mashuri, 2025).

Stochastic Gradient Descent in Text-Based Service Evaluation

Stochastic Gradient Descent (SGD) is an efficient optimization algorithm that is widely applied in large-scale text classification tasks. Conceptually, SGD updates model parameters iteratively by using a single randomly selected data sample at each step, rather than processing the entire dataset simultaneously. This characteristic makes SGD particularly suitable for high-dimensional textual data, such as sentiment analysis involving thousands of unique terms, as it enables faster convergence compared to traditional gradient descent methods (Alharbi & Khan, 2025). Within the context of digital service research, SGD supports the scalable and near real-time processing of large volumes of user-generated reviews without imposing excessive memory demands on the system.

In the evaluation of public services, SGD offers practical advantages over more complex deep learning approaches. Although deep learning models often achieve higher

 DOI: https://doi.org/10.61242/ijabo.26.729

raw accuracy, SGD provides superior computational efficiency, ease of implementation, and model stability (Gaye *et al.*, 2021). For public organizations and government agencies that frequently operate under technological and infrastructural constraints, SGD represents a more feasible and sustainable analytical solution. The algorithm enables sentiment classification to remain accurate and reliable even when deployed on standard hardware configurations, thereby ensuring that analytical insights can be generated without compromising operational feasibility (Faris Abdi El Hakim & M Adamu Islam Mashuri, 2025).

The integration of SGD as a sentiment classification tool provides a robust foundation for the objective evaluation of digital public service quality. If SGD is able to accurately classify user sentiments into positive, neutral, and negative categories, the resulting sentiment distribution can serve as a tangible performance indicator of service quality from the users' perspective (Alharbi & Khan, 2025). The model's effectiveness in capturing user satisfaction and complaints supports the theoretical assumption that SGD-based sentiment analysis enhances the accuracy of public service quality evaluation. Accordingly, text-based sentiment classification should be understood not merely as a technical procedure, but as a managerial instrument for identifying areas requiring improvement in strategic public policy implementation.

RESEARCH METHOD

Research Design

This study is systematically designed to transform unstructured text data into measurable managerial insights (Alharbi & Khan, 2025; Faris Abdi El Hakim & M Adamu Islam Mashuri, 2025; Gaye *et al.*, 2021). The research workflow is divided into several stages, which can be seen in Figure 1 below.

In this study, the selection of the Stochastic Gradient Descent (SGD) algorithm was based not only on its classification capability but also on its methodological suitability for large-scale public review data. SGD is well suited for TF-IDF-based text classification and is particularly effective in handling high-dimensional textual features with relatively efficient computational requirements. Therefore, SGD was considered appropriate for this study, which involves a large volume of user-generated reviews and

requires analytical efficiency to support managerial evaluation (Alharbi & Khan, 2025).

Figure 1. Research Design
Source: Own Compilation (2026)

1. Data Acquisition Stage: The initial step involves collecting user reviews of the MyPertamina app from the Google Play Store using web scraping techniques. The data collected includes raw review texts and star ratings as initial labels.
2. Text Preprocessing Stage: The raw data is cleaned through a series of filtering processes (such as cleansing, case folding, stopword removal, and stemming) to eliminate data "noise," leaving only meaningful words for analysis.
3. Feature Extraction Stage: The cleaned text data is converted into numerical representations using the TF-IDF (Term Frequency-Inverse Document Frequency) method. This stage is essential for enabling machine learning algorithms to process textual information.

 DOI: https://doi.org/10.61242/ijabo.26.729

4. Classification with SGD Stage: The model is trained using the Stochastic Gradient Descent (SGD) algorithm. The data is split into training data to build the model and testing data to evaluate the model's accuracy, precision, and recall.
5. Data Visualization Stage: The final stage presents the classification and evaluation results in an informative visual format, such as Word Clouds to identify the most frequently appearing words in negative sentiments, and sentiment distribution charts (positive, neutral, negative) to intuitively assess the quality of the digital service.

Data Source and Data Collection

The research data consists of user reviews of the MyPertamina app sourced from the Google Play Store between 2023 and 2025. The data was collected using web scraping techniques via the Python-based google-play-scraper library.

The extracted data attributes include review ID, user name, user profile picture, review text, star rating, number of likes on the review, review creation time, developer response, developer response time, and the app version used when the review was submitted. For analysis purposes, reviews were categorized into three sentiment groups based on their ratings: ratings 4–5 as Positive sentiment, rating 3 as Neutral, and ratings 1–2 as Negative sentiment. All raw data was stored in CSV format to be processed in the preprocessing stage (Demircan *et al.*, 2021).

Data Preprocessing and Text Cleaning

The data preprocessing stage is carried out to clean the review texts from noise or irrelevant components, thereby enhancing the efficiency of the Stochastic Gradient Descent (SGD) algorithm in recognizing sentiment patterns. The initial step involves case folding to convert all characters to lowercase, avoiding word redundancy caused by differences in capitalization. Next, a cleansing process is performed to remove numbers, punctuation marks, symbols, URLs, and other non-alphabetic characters. The text is then split into individual word units through tokenization.

The process continues with normalization to correct non-standard word spellings, abbreviations, and common typos found in public service reviews, aligning them with standard spelling conventions. To reduce data dimensionality, filtering or stopword removal is applied to eliminate common words that do not carry sentiment information (such as "and," "in," "to"). Finally, stemming is applied using the Sastrawi algorithm to convert inflected words into their root forms (Arifin *et al.*, 2025). The final output of this series of processes is a collection of clean words ready to be transformed into numerical representations.

Feature Extraction and Representation

The cleaned review data is then converted into numerical representations using the Term Frequency–Inverse Document Frequency (TF-IDF) method. This method assigns a weight to each word based on its frequency within a review and its rarity across the entire dataset (Faris Abdi El Hakim & M Adamu Islam Mashuri, 2025; Rifaldy *et al.*, 2025). Mathematically, the TF-IDF weighting is calculated using the following equation:

1. The first step is to calculate Term Frequency (TF) to determine how often a term appears in a document, using the following equation:

$$TF(t,d) = \frac{f_{t,d}}{\sum_n f_{n,d}}$$

Where:

$f_{t,d}$ = the frequency of term t in document d

 DOI: https://doi.org/10.61242/ijabo.26.729

$\sum_n f_{n,d}$ = the total number of terms in document d

2. The second step is to calculate Inverse Document Frequency (IDF) to measure the importance of a term across the entire dataset. This process reduces the impact of common words and gives higher weight to rare terms to improve analytical relevance. The IDF is calculated as:

$$IDF(t) = \log \frac{N}{n_t}$$

Where:
N = total number of documents in the corpus
n_t = number of documents containing term t

3. The final step is to determine the TF-IDF weight by multiplying TF and IDF, as shown in the equation:

$$TF - IDF(t,d) = TF(t,d) \times IDF(t)$$

The resulting weighted matrix then serves as the main input for the Stochastic Gradient Descent (SGD) algorithm to differentiate sentiment categories based on the most representative word features.

Sentiment Classification Using Stochastic Gradient Descent

After the TF-IDF weighting stage is completed, the next step is sentiment classification using the Stochastic Gradient Descent (SGD) algorithm. To ensure that the resulting model has good stability, this study applies K-Fold Cross Validation. Using this technique, the dataset is randomly divided into k equal parts, where each part takes turns serving as the testing data while the remaining parts are used as training data. This strategy is crucial for data management to avoid bias and ensure that the model can accurately classify new reviews.

The SGD model is built by optimizing several key hyperparameters, such as the maximum number of iterations, learning rate, loss function, alpha, and early stopping. As an iterative optimization algorithm, SGD works by finding the minimum point of a function through gradual adjustment of parameters. Its main advantage lies in time efficiency and process flexibility; parameter updates are performed quickly without processing the entire dataset at once, making it highly effective for managing large volumes of review data. The process begins by initializing the parameter values θ, which are then updated in each iteration using the learning rate α until the cost function $J(\theta)$ reaches its minimum, as described by the following equation:

$$\theta j = \theta j - \alpha \frac{\partial_y}{\partial_x} J(\theta)$$

During the training process, the loss function (L) is used to measure the prediction error, while a regularization component (R) is added to maintain model complexity and ensure stability. Parameter updates are performed iteratively on each training data point to minimize errors, following the pattern described in the following equation:

$$J(\theta) = \frac{1}{n} \sum_{i=1}^{n} L\big(y_i, f(x)\big) + \alpha R(W)$$

Through this approach, the model is able to provide objective sentiment classification of MyPertamina app reviews, thereby serving as a valid basis for managerial decision-making.

 DOI: https://doi.org/10.61242/ijabo.26.729

Data Visualization

The final stage of this research methodology is data visualization, using Word Clouds to present the results of text analysis in an intuitive manner. A Word Cloud is a textual data visualization technique that represents word frequency through variations in visual size; the larger a word appears, the higher its frequency in the collection of user reviews. From a managerial perspective, Word Clouds are highly effective for identifying patterns, trends, and opinion distributions within large datasets without the need to examine each review individually.

In the context of sentiment analysis for the MyPertamina app, this visualization plays a key role in mapping public perception by highlighting words that carry emotional weight, whether positive or negative. This allows management to quickly detect dominant issues or service aspects that are most frequently criticized or appreciated by users. Thus, Word Clouds function not only as a data presentation tool but also as a strategic instrument to enhance efficiency in understanding sentiment trends on digital platforms (Baqach & Battou, 2024).

RESEARCH RESULTS

The analysis of user sentiment toward the MyPertamina app is based on approximately ±11,000 reviews collected from the Google Play Store. This large volume of data enables a more representative mapping of public perception regarding the quality of digital services provided, while also reflecting the intensity of public interaction with app-based public services. In the context of public service management, sentiment distribution serves as an initial indicator to understand levels of satisfaction, dissatisfaction, and the service areas that receive the most user attention.

In this study, sentiment distribution is grouped into three main categories: positive, neutral, and negative, reflecting the evaluative tendencies in the language used by users. Positive sentiment represents service experiences perceived as satisfying or helpful; neutral sentiment captures informative or descriptive responses without strong emotional content; while negative sentiment reflects dissatisfaction, technical obstacles, or perceptions of administrative unfairness. This grouping is based on dominant language patterns and expressions in user reviews, thus representing the actual public perception of the services received.

To maintain consistency in managerial interpretation, these sentiment expressions are further associated with three aspects of digital public services: System Reliability & Technical Performance, Payment & Transaction Process, and Policy Implementation & Administrative Fairness. Table 1 presents the conceptual framework of sentiment keyword grouping used as a guide for interpreting the analysis results, without altering the automated classification mechanism described in the methodology section.

Table 1. Conceptual Grouping of Sentiment Keywords by Service Aspect

Aspect	Description	Keywords (Original Language: Indonesian)
System Reliability & Technical Performance	This aspect captures issues related to system stability, application performance, server responsiveness, and technical errors that disrupt the proper functioning of the application and affect user experience.	error, gagal, bug, sistem, aplikasi, server, loading, crash, performa, stabil, lemot, macet, nge-freeze, freeze, blank, stuck, force close, lag, tidak responsif, error terus, sering error, sering gagal, aplikasi bermasalah, tidak bisa dibuka, tidak bisa login, loading lama, berhenti sendiri, layar putih, cuma logo, muter-muter, tidak jalan, lancar, normal, berjalan baik, tidak error

 DOI: https://doi.org/10.61242/ijabo.26.729

Payment & Transaction Process	User perceptions related to payment methods, transaction success, and the accuracy of transaction records within the application.	bayar, pembayaran, transaksi, cash, tunai, non tunai, nontunai, QR, QRIS, barcode, e-wallet, dompet digital, bayarnya, bayar pakai, harus cash, harus tunai, tidak bisa non tunai, tidak bisa bayar, pembayaran gagal, transaksi gagal, QR tidak muncul, QR tidak keluar, barcode tidak muncul, barcode tidak keluar, tidak tercatat, riwayat kosong, riwayat transaksi, saldo tidak kepotong, saldo tidak berkurang, bukti tidak ada, bukti pembayaran, gagal bayar, cepat, praktis, membantu, lancar
Policy Implementation & Administrative Fairness	User opinions regarding policy enforcement, registration requirements, data verification, vehicle eligibility, barcode blocking, and perceived fairness of administrative procedures.	subsidi, verifikasi, kebijakan, aturan, data, administrasi, keadilan, diblokir, ditolak, lama, ribet, tidak jelas, sepihak, subsidi tepat sasaran, verifikasi lama, data tidak sesuai, daftar ditolak, diblokir sepihak, menyusahkan rakyat, rakyat kecil, tidak adil, kebijakan aneh, aturan menyulitkan, membantu, tepat sasaran, diterima, sesuai

Source: Own Compilation (2026)

After the conceptual framework for sentiment keyword grouping is presented in Table 1, the distribution of user perceptions toward MyPertamina's digital services is visualized in Figure 2. This visualization shows the proportion of mentions for each service aspect across all user reviews, providing an initial overview of the service areas most frequently discussed by the public. This presentation emphasizes the intensity of public attention to specific issues in app usage, without distinguishing between positive, neutral, or negative sentiment.

The distribution of these aspects reflects the primary focus of users when evaluating app-based public services, with most reviews concentrated on aspects directly related to system reliability, transaction mechanisms, and policy implementation. Therefore, this visualization serves as an initial mapping of the public attention space regarding the digital services provided.

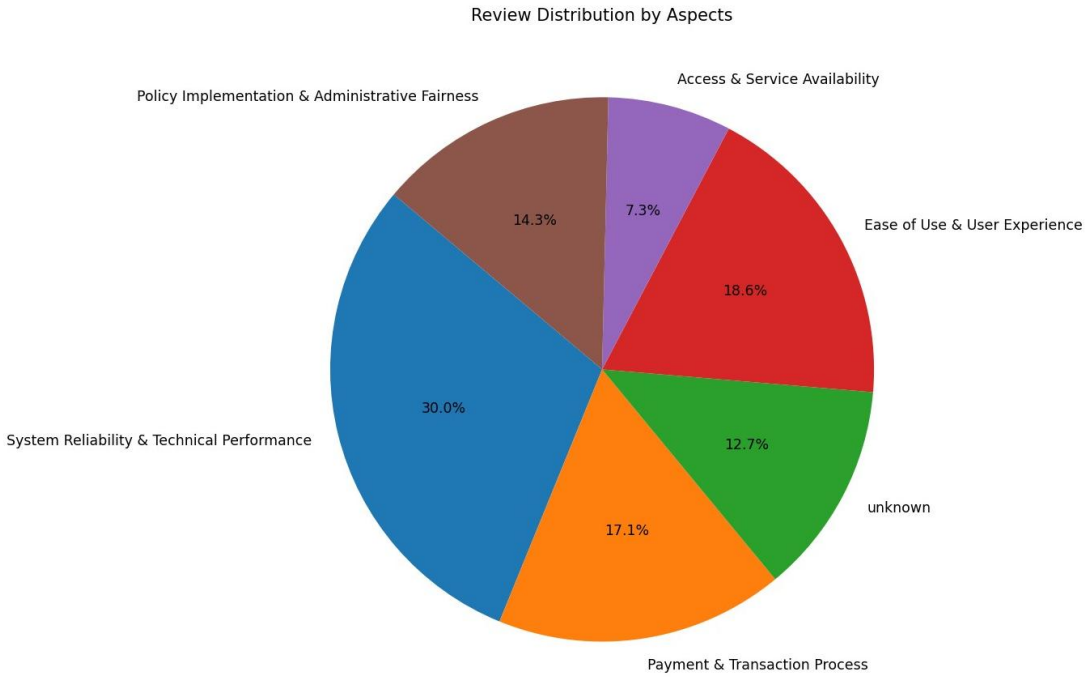

Figure 2. Distribution of User Review Aspects in the MyPertamina Application
Source: Own Compilation (2026)

 DOI: https://doi.org/10.61242/ijabo.26.729

Next, to provide a more specific view of users' evaluative tendencies, Figure 3 presents the distribution of positive, neutral, and negative sentiments across the three main aspects of digital public services examined in this study. This visualization shows the number of reviews in each sentiment category for each aspect, allowing direct comparison between aspects in terms of user satisfaction and dissatisfaction levels.

The presentation of this bar chart is not intended as a technical evaluation of the model's performance, but rather as a descriptive summary highlighting general patterns of user sentiment toward strategically important service aspects. This information serves as an initial empirical basis for understanding service areas that may generate public friction, as well as aspects that are relatively well-received by users, prior to a more in-depth discussion in the following subchapter.

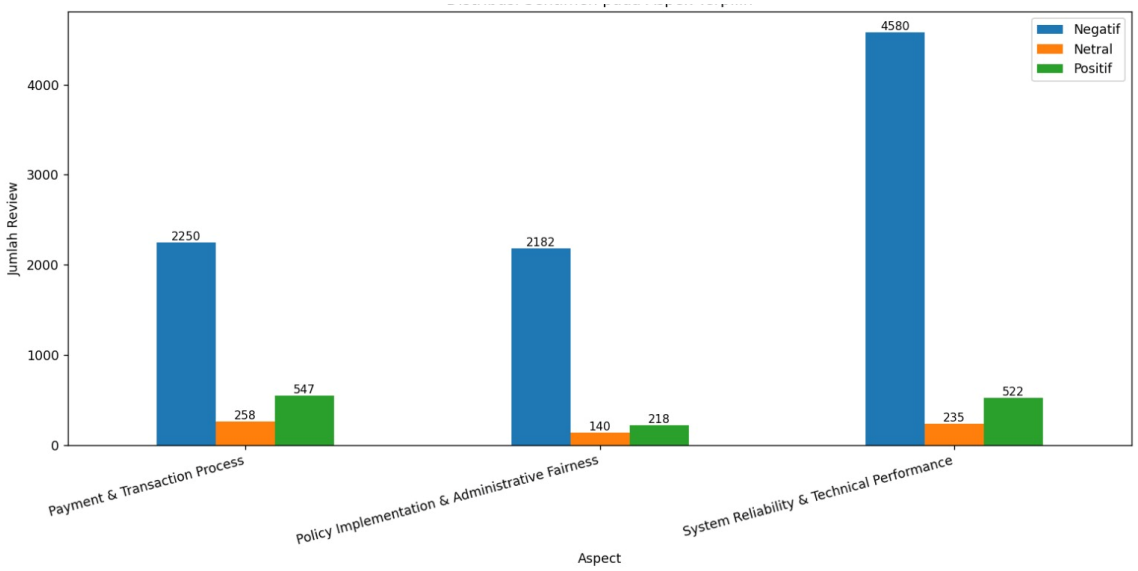

Figure 3. Sentiment Distribution Across Key Digital Public Service Aspects
Source: Own Compilation (2026)

DISCUSSION

The analysis in this section focuses on the three main aspects of digital public services that are most prominently mentioned in user reviews of the MyPertamina app: System Reliability & Technical Performance, Payment & Transaction Process, and Policy Implementation & Administrative Fairness. These three aspects represent critical areas of interaction between users and the system, which directly shape perceptions of digital service quality and the effectiveness of public policy implementation.

An aspect-based analysis approach is used to avoid excessive generalization from aggregate sentiment analysis. The distribution of positive, neutral, and negative sentiments is analyzed separately for each aspect to capture differences in problem characteristics, user experiences, and levels of satisfaction. To enrich the interpretation of results, the quantitative sentiment distribution analysis is complemented by Word Cloud visualizations, highlighting dominant language patterns and issues for each aspect, with green representing positive sentiment, blue for neutral, and red for negative. A more detailed discussion of empirical findings and managerial implications is provided in the following subsection. From a theoretical perspective, these findings are interpreted through E-GovQual and public trust perspectives, so that user sentiment is understood not

 DOI: https://doi.org/10.61242/ijabo.26.729

only as an outcome of technical interaction but also as an indicator of how digital public services are evaluated and accepted in practice.

System Reliability & Technical Performance

The System Reliability & Technical Performance aspect attracts the highest level of attention from MyPertamina app users. Based on the visualization in Figure 3, this aspect is dominated by negative sentiment, with a far greater number of reviews compared to positive and neutral sentiments. This indicates that technical issues are the primary source of user dissatisfaction when interacting with app-based public services.

Quantitatively, the sentiment distribution for this aspect shows that the majority of reviews fall into the negative category, while positive sentiment represents only a small fraction of the total data. This imbalance confirms that system reliability issues are not incidental but are experienced widely and repeatedly by users. In the context of public service management, the dominance of negative sentiment in this aspect reflects more than isolated operational problems; it indicates recurring weaknesses in the continuity and dependability of service delivery. From the perspective of E-GovQual, such findings point to failures in core service dimensions, particularly reliability and responsiveness, because users are unable to access and use the service consistently when needed.

These quantitative findings are reinforced by the Word Cloud visualization in Figure 4, which shows that user complaints are largely related to app access, login processes, main function failures, and system instability. Nonetheless, the presence of positive sentiment, albeit limited, indicates that the app is still capable of providing a good service experience when the system operates optimally. This suggests that improvements in system reliability and technical performance have the potential to significantly enhance overall user perception. More importantly, in a mandatory digital public service context such as MyPertamina, repeated failures in login access, system stability, and core functions should not be interpreted merely as technical inconvenience. Rather, they indicate a systemic failure in service reliability that may weaken user trust and reduce acceptance of the digital service itself.

Figure 4. Word Cloud Visualization of Sentiments for the System Reliability & Technical Performance Aspect
Source: Own Compilation (2026)

Payment & Transaction Process

The Payment & Transaction Process aspect is the second most dominant in MyPertamina app user reviews. Based on the distribution shown in Figure 3, negative sentiment in this aspect remains higher than positive and neutral sentiments, indicating that payment and transaction recording processes are critical points in the user experience.

 DOI: https://doi.org/10.61242/ijabo.26.729

Figure 5 presents a Word Cloud visualization for this aspect, showing the dominance of negative words such as application, barcode, failed, payment, complicated, and QR code. This pattern indicates that users' main challenges are related to transaction failures, difficulties using barcodes/QR codes, and obstacles during payment at gas stations. For neutral sentiment, words such as subsidy, gas station, payment method, and transaction reflect descriptive reviews of the service process without strong emotional evaluation. Meanwhile, positive sentiment is marked by words like easy, good, and payment, suggesting that the payment system can provide benefits when it functions properly.

Figure 5. Word Cloud Visualization of Sentiments for the Payment & Transaction Process Aspect
Source: Own Compilation (2026)

From a public service management perspective, the high negative sentiment in this aspect underscores that transaction failures are perceived not only as technical problems but also as direct disruptions to public access to subsidy services. Therefore, stability and clarity of the payment mechanism are key factors in maintaining public trust in MyPertamina's digital services. Viewed through the lens of public trust, these failures may generate perceptions of uncertainty and procedural unreliability, particularly because payment completion represents the most immediate point at which users assess whether the service functions properly. In this sense, weaknesses in the transaction process do not only reduce operational convenience, but also shape users' confidence in the predictability and dependability of digital public service delivery.

Policy Implementation & Administrative Fairness

The Policy Implementation & Administrative Fairness aspect reflects users' perceptions of the fairness of subsidy policies and the administrative processes required when using the MyPertamina app. This aspect is directly related to the implementation quality of public policy, as users evaluate not only the technical functionality of the app but also whether the implemented procedures are perceived as fair, transparent, and non-burdensome for different social groups. In mandatory digital public services, perceptions of fairness are especially important because administrative barriers may be interpreted as exclusionary rather than merely procedural.

 DOI: https://doi.org/10.61242/ijabo.26.729

Figure 6. Word Cloud Visualization of Sentiments for the Policy Implementation & Administrative Fairness Aspect
Source: Own Compilation (2026)

The Word Cloud results show that, for negative sentiment, words such as application, register, data, subsidy, verification, complicated, difficult, login, and failed appear prominently. These findings indicate that user dissatisfaction is mainly related to the complexity of the verification process, data inconsistencies, and administrative barriers that make access to subsidies difficult. For neutral sentiment, words like data, verification, subsidy, and register describe the process, indicating that some reviews are informative without strong evaluative expressions. Positive sentiment is marked by words such as data, verification, subsidy, and application, suggesting that when administrative processes run as expected, users can understand and accept the intended objectives of the policies.

From a managerial perspective, these findings emphasize that perceptions of unfairness or administrative complexity can undermine public acceptance of policies, even when the policy goals are pro-people. Therefore, improving the transparency of verification processes, clarity of subsidy criteria, and simplification of administrative procedures are key factors in strengthening public trust in digital-based public policies. From a public trust perspective, these findings suggest that administrative complexity is interpreted by users not only as procedural burden, but also as a signal that the service system may not be fully accessible or user-oriented. Thus, dissatisfaction with verification and registration procedures reflects more than operational inconvenience; it indicates that procedural design directly influences perceived fairness and acceptance of mandatory digital public services.

CONCLUSIONS

This study concludes that sentiment analysis based on user reviews can serve as an effective instrument for evaluating the quality of digital public services, such as the MyPertamina app. By leveraging approximately ±11,000 user reviews from the Google Play Store, the study was able to systematically map public perception in a data-driven manner, providing a more objective picture of societal satisfaction and dissatisfaction with government digital services. These findings highlight the strategic value of user-generated content in the context of public service management and e-government.

The analysis shows that System Reliability & Technical Performance is the aspect with the highest dominance of negative sentiment compared to other aspects. Issues related to app stability, login access, and failures in core service functions emerged as the primary sources of user dissatisfaction. This indicates that system reliability is not merely a technical issue but a determining factor in shaping the overall perception of digital public service quality. Furthermore, the Payment & Transaction Process and Policy

 DOI: https://doi.org/10.61242/ijabo.26.729

Implementation & Administrative Fairness aspects also exhibited significant proportions of negative sentiment, reflecting challenges in transaction mechanisms as well as perceptions of unfairness or administrative complexity in subsidy policy implementation.

On the other hand, positive sentiment consistently appeared when services operated smoothly, simply, and met user expectations without significant obstacles. This underscores that the success of digital public services heavily depends on a stable and reliable user experience. Conceptually, this study contributes to public management literature by demonstrating that sentiment analysis is not only a tool for text classification but can also function as an indicator of digital public service performance. Thus, the findings strengthen the argument that evaluating public service quality in the digital era should integrate user perception-based analytical approaches as part of evidence-based management and decision-making strategies.

The findings of this study carry important implications for digital public service managers, particularly in managing the MyPertamina app as a strategic national policy instrument. The dominance of negative sentiment in the System Reliability & Technical Performance aspect indicates that system reliability must be positioned as a top priority in digital public service management. From a managerial perspective, recurring technical failures such as login disruptions, system errors, or processing failures cannot be treated merely as operational issues but as service failures that directly affect public trust and policy legitimacy. Therefore, organizations should adopt a service reliability management approach emphasizing system stability, ongoing maintenance, and rapid response to technical disruptions.

The next implication relates to the Payment & Transaction Process, where negative sentiment reflects the public's low tolerance for transaction failures in digital public services. In service management, failures in payment and transaction recording can create perceptions of uncertainty and risk for users. This necessitates strengthening transaction process governance to make it more transparent, simple, and easy for the public to understand. From a policy perspective, simplifying payment mechanisms and clarifying transaction flows are key factors in improving user adoption and compliance with government-mandated digital systems.

Regarding Policy Implementation & Administrative Fairness, negative sentiment indicates a gap between policy design and user-level implementation experience. Perceptions of unfairness, complex verification processes, and administrative rejections that are not well understood by users may lead to policy delegitimization. Therefore, the policy implications emphasize the importance of administrative transparency, clear policy communication, and effective feedback mechanisms. Governments and service organizations must ensure that digital policies are not only regulatory-compliant but also fair and socially acceptable.

Strategically, this study demonstrates that machine learning-based sentiment analysis can be utilized as an early warning system for digital public service management. Continuous monitoring of user sentiment allows public organizations to identify critical issues in real-time and formulate more responsive managerial interventions. Integrating sentiment analysis into the policy evaluation and public service management cycle can therefore strengthen evidence-based policymaking and enhance the quality of digital public services sustainably. This study has several limitations that should be noted. First, the data is sourced only from Google Play Store user reviews, meaning the results reflect the perceptions of active app users and do not fully represent the broader population, particularly those with limited digital access. Second, text classification-based sentiment analysis is not fully capable of capturing complex language nuances such as sarcasm,

 DOI: https://doi.org/10.61242/ijabo.26.729

irony, or ambiguity, and the performance of the SGD algorithm still depends on the quality of preprocessing and feature representation.

Given these limitations, future research is recommended to combine sentiment analysis with qualitative methods such as interviews or surveys to obtain a more comprehensive understanding. Future studies could also explore more detailed aspect-based analysis, compare alternative classification algorithms, and extend the scope to other digital public service applications to improve generalizability and the contribution of findings.

REFERENCES

Afyare, A., & Orey, M. A. H. (2025). The Influence of Social Media on Political Discourse and Public Opinion. *Architecture Image Studies*, *6*(3), 1634–1667. https://doi.org/10.62754/ais.v6i3.506

Alharbi, Y., & Khan, S. S. (2025). Classifying Multi-Lingual Reviews Sentiment Analysis in Arabic and English Languages Using the Stochastic Gradient Descent Model. *Computers, Materials and Continua*, *83*(1), 1275–1290. https://doi.org/10.32604/cmc.2025.061490

Ananda Febryan, F. (2025). Analisis Dampak Modernisasi Digital Terhadap Efektivitas Pelayanan Kepolisian Sektor Manyar. *Paradigma POLISTAAT: Jurnal Ilmu Sosial Dan Ilmu Politik*, *8*(2), 19–30. https://doi.org/10.23969/paradigmapolistaat.v8i2.39139

Arifin, D. A. N., Pada, S., Teks, D., Indonesia, B., Pardede, J., & Darmawan, D. (2025). *Perbandingan Algoritma Stemming Porter , Sastrawi , Idris , Comparison of Stemming Algorithms Porter , Sastrawi , Idris , and Arifin Setiono on Indonesian Text Documents*. *12*(1), 69–76. https://doi.org/10.25126/jtiik.2025128860

Ba, Y., & Tan, H. (2025). Moral foundations of energy transitions in the United States: A cross-sector discourse analysis. *Energy Research and Social Science*, *125*. https://doi.org/10.1016/j.erss.2025.104090

Baqach, A., & Battou, A. (2024). A new sentiment analysis model to classify students' reviews on MOOCs. *Education and Information Technologies*, *29*(13), 16813–16840. https://doi.org/10.1007/s10639-024-12526-0

Chu, Y. (2025). Dynamic response and disposal strategies for public opinion crises driven by reinforcement learning. *Discover Artificial Intelligence*, *5*(1). https://doi.org/10.1007/s44163-025-00699-7

Chaniago, H., Hidayat, H., & Efawati, Y. (2025). Intrinsic Motivation and the Use of Artificial Intelligence (AI) in the Public Sector: Evidence from Indonesia. *Revista Brasileira de Políticas Públicas*, *15*(2). https://doi.org/10.5102/rbpp.v15i2.10066

Chaniago, H., & Efawati, Y. (2026). Individual absorptive capacity as a stepping stone for digitalization, digital transformation, and small business performance; Entrepreneurial perspectives. *Contaduría y administración*, *71*(2), 1-36.https://doi.org/10.22201/fca.24488410e.2026.5126

Demircan, M., Seller, A., Abut, F., & Akay, M. F. (2021). Developing Turkish sentiment analysis models using machine learning and e-commerce data. *International Journal of Cognitive Computing in Engineering*, *2*(July), 202–207. https://doi.org/10.1016/j.ijcce.2021.11.003

Dimalanta, V. A. R., & Fajardo, A. (2025). Optimizing Multinomial Naïve Bayes in Sentiment Analysis through Hybrid Ensemble Techniques. *ACM International Conference Proceeding Series*, *December 2024*, 131–136. https://doi.org/10.1145/3718391.3718418

Faris Abdi El Hakim, & M Adamu Islam Mashuri. (2025). Analisis Sentimen Pengguna Aplikasi Mobile JKN Menggunakan Metode Stochastic Gradient Descent (SGD). *Jurnal Komputer Teknologi Informasi Sistem Informasi (JUKTISI)*, *4*(1), 284–294. https://doi.org/10.62712/juktisi.v4i1.409

Gaye, B., Zhang, D., & Wulamu, A. (2021). Sentiment classification for employees reviews using regression vectorstochastic gradient descent classifier (RV-SGDC). *PeerJ Computer Science*, *7*, 1–27. https://doi.org/10.7717/peerj-cs.712

Gopal, S. V., Sollapur, S. B., Chaudhary, R., Thakur, R., Shree, A. S., & Ray, A. K. (2025). Decision Support Systems for Library Policy and Governance. *Indian Journal of Information Sources and Services*, *15*(3), 266–275. https://doi.org/10.51983/ijiss-2025.IJISS.15.3.30

Handojo, P., Hardjosoekarto, S., Hayadi, L. F., Luayya, L., Lestari, H. M., & Amalia, R. (2026). Public Reactions to Indonesia's KRIS Policy: A Textual Network Analysis of Digital Legitimacy. *Journal of Public Health and Pharmacy*, *6*(1), 158–170. https://doi.org/10.56338/jphp.v6i1.7401

Javed, M., Khademi, S., Hickman, J., Buttery, J., Clothier, H., & Dimaguila, G. L. (2025). VaxPulse: Monitoring of Online Public Concerns to Enhance Post-Licensure Vaccine Surveillance. *Studies in Health Technology and Informatics*, *329*, 728–732. https://doi.org/10.3233/SHTI250936

Kholifah, B., Syarif, I., & Badriyah, T. (2025). Analysis of Mental Health Disorders via Social Media Mining Using LSTM and Bi-LSTM. *Kinetik: Game Technology, Information System, Computer Network, Computing, Electronics, and Control*, *4*(3). https://doi.org/10.22219/kinetik.v10i3.2205

Krajewski, P., Weidgang, J., Lipsa, J., & Lebiedzińska, M. (2026). Integrating social media and survey data to map social landscape value in diverse municipal contexts. *Landscape and Urban Planning*, *267*(September 2025). https://doi.org/10.1016/j.landurbplan.2025.105542

Mohammadi, N., & Mohammadian, B. (2025). Employee value proposition mining: A novel approach to employer brand development based on social media data using aspect-based sentiment analysis. *Results in Engineering*, *28*(September), 107973. https://doi.org/10.1016/j.rineng.2025.107973

Nóra, Julianna, G., Artúr, V., Szilvia, B. S., & Roland, M. (2025). Investigating banks' social media content and consumer reactions with machine learning. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(2). https://doi.org/10.1016/j.joitmc.2025.100512

Pardede, A. M., Mustafid, M., & Sugito, S. (2025). Implementasi Metode Convolutional Neural Network Untuk Klasifikasi Sentimen Ulasan Pengguna Aplikasi Mypertamina. *Jurnal Gaussian*, *14*(2), 345–355. https://doi.org/10.14710/j.gauss.14.2.345-355

Patil, S. S., Suryawanshi, V. P., Patil, S. M., Girase, S. P., & Bhagat, D. A. (2025). Review of sentiment analysis in social media using big data: techniques, tools, and frameworks. *International Journal of Basic and Applied Sciences*, *14*(2), 34–48. https://doi.org/10.14419/mhv83077

Pinilla-Dominguez, P., & Pinilla-Dominguez, J. (2025). Challenges and reforms in Spain's health technology assessment system: analysis of criteria influencing medicines' reimbursement decisions between 2019 and 2022 in Spain. *European Journal of Health Economics*, *26*(9), 1569–1579. https://doi.org/10.1007/s10198-025-01790-7

Putra, J. M., & Menorizah, M. (2025). An Analysis of the Use of the MyPertamina Application in Reducing the Misuse of Government-Subsidised Pertalite (A Literature Review). *JERIT: Journal of Educational Research and Innovation Technology*, *2*(2), 62–72. https://doi.org/10.34125/jerit.v2i2.30

Qhal, E. M. A. (2025). Data-Driven Knowledge Management Frameworks for Effective Risk and Crisis Management: A Cross-Industry Approach. *Journal of Applied Data Sciences*, *6*(2), 1437–1453. https://doi.org/10.47738/jads.v6i2.780

Rifaldy, F., Sibaroni, Y., & Prasetiyowati, S. S. (2025). Effectiveness of Word2Vec and TF-IDF in Sentiment Classification on Online Investment Platforms Using Support Vector Machine. *JIPI (Jurnal Ilmiah Penelitian Dan Pembelajaran Informatika)*, *10*(2), 863–874. https://doi.org/10.29100/jipi.v10i2.6055

Sclocchi, A., & Wyart, M. (2024). On the different regimes of stochastic gradient descent. *Proceedings of the National Academy of Sciences of the United States of America*, *121*(9), 1–8. https://doi.org/10.1073/pnas.2316301121

Shapa, T., Adristi, V., Setiawan, N. Y., & Wijoyo, S. H. (2025). *Heritage Berdasarkan Analisis Sentimen Dan Root Cause Analysis (Rca)*. *9*(3). https://j-ptiik.ub.ac.id/index.php/j-ptiik/article/view/14608

Thariq, F., & Efawati, Y. (2024). The Influence of Website Quality on Buying Interest Consumer. *International Journal Administration, Business & Organization*, *5*(3), 64-74.

Wardana, D. A. B., Muflikhah, L., & Perdana, R. S. (2025). Analisis Sentimen Ulasan Pengguna Aplikasi Mypertamina Pada Google Play Store Menggunakan Metode Xgboost Dan Word2Vec Embedding. *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, *9*(8), 1–10. https://j-ptiik.ub.ac.id/index.php/j-ptiik/article/view/15247

Wijaya, H., Akbar, M. N., Irawati, F. E., & Hayati, N. (2025). Observasi Penggunaan Aplikasi Mypertamina di SPBU Cangkring Karanganyar Demak. *Jurnal Bakti Nusantara*, *3*(1), 19–29. https://doi.org/10.63763/jutira.v3i1.106

Yakura, T., Ngoc, A. M., & Shiomi, Y. (2026). Adapting to new mobility conditions: Evidence from a Japanese survey on the substitution of in-person mobility with online services for daily necessities. *Travel Behaviour and Society*, *43*(June 2025), 101221. https://doi.org/10.1016/j.tbs.2025.101221

Yang, Y., Lin, Y. W., & Cheng, L. C. (2025). Impact of real-time public sentiment on herding behavior in Taiwan's stock market: Insights across investor types and industries. *International Review of Economics and Finance*, *102*. https://doi.org/10.1016/j.iref.2025.104397

Yulian Surya Saputra, Sucitra Sahara, & Agung Permana, R. (2025). Assessing the Role of E-Govqual in Improving Public Satisfaction with the MyPertamina Application in Setiabudi District. *Nuansa Informatika*, *19*(2), 18–24. https://doi.org/10.25134/ilkom.v19i2.379

Yuliyanti, A. Y., Septiana, P. M., Sari, W. W. S. P., & Sari, T. (2025). Analyzing Public Sentiment on Indonesia's Constitutional Court Post-2024 Election Ruling: Insights from Appraisal Theory and Data Mining. *Traduction et Langues*, *24*(1), 77–103. https://doi.org/10.52919/translang.v24i01.1027