Sawala

Jurnal Administrasi Negara

ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

POLICY EVALUATION OF FACE RECOGNITION TECHNOLOGY FOR RAILWAY PASSENGERS AT SURABAYA GUBENG STASION

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Abstract

This study evaluates the policy implementation of the face recognition system at Surabaya Gubeng Station as a digital innovation in public service by PT Kereta Api Indonesia (Persero). Using a qualitative approach and the policy evaluation model by William N. Dunn, the study assesses six key indicators: effectiveness, efficiency, adequacy, responsiveness, accuracy, and equity. The findings indicate that the system is effective in accelerating the boarding process, reducing queues, and improving passenger convenience. Efficiency is achieved through reduced staff workload and automated identity verification. However, several challenges remain, including technical disruptions, data input errors, and low digital literacy among users. Personal data protection is also a concern as most users are not fully aware of how their biometric data is managed. Therefore an adaptive governance strategy is needed, involving infrastructure improvement, staff training, public education, and greater transparency in data policy. With these measures, the face recognition system can serve not only as a tool for technical efficiency but also as a form of inclusive and sustainable public service transformation.

Keywords: *face recognition, policy evaluation, public service, efficiency, digitalization*

Article history:
Submission: 27 August 2025
Revised: 05 Nov 2025
Accepted: 06 Dec 2025
Published: 26 Dec 2025

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Sawala

Jurnal Administrasi Negara

ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

INTRODUCTION

Improving the efficiency of public services has become a strategic response to the rapid advancement of digital technology. PT Kereta Api Indonesia (Persero) has adopted facial recognition technology in the boarding process at several major railway stations, including Surabaya Gubeng Station. This system utilizes cameras to recognize and authenticate passengers' identities and integrates this data with the electronic ticketing system (Sari & Hartono, 2023). The primary goal is to accelerate the boarding process through contactless verification, eliminating the need to present physical tickets, e-tickets, or ID cards. At Surabaya Gubeng Station, this initiative was also introduced to address the issue of long queues and passenger congestion at manual ticket boarding gates. The application of facial recognition technology is expected to improve service efficiency and streamline passenger flow. However, during the initial phase of implementation, several challenges have emerged. One of the main concerns is the disparity in access between passengers who are already registered in the facial recognition system and those who are not, potentially leading to unequal service experiences among users.

Regular passengers are allowed to board only two hours prior to departure, whereas users of the face recognition system may enter the boarding area up to three hours in advance (Putri & Prunama, 2024). However, technical issues such as facial detection failures frequently lead to queues and delays. In addition, the collection of biometric data without clear and transparent explanations has raised concerns regarding personal data protection (Fadhilla & Putra, 2024). The lack of public education and outreach has resulted in limited passenger understanding of the system, leading to resistance particularly expressed through social media platforms. Studies indicate that when the system operates optimally, user trust and satisfaction increase significantly (Yuniasti et al., 2025). Therefore, a comprehensive evaluation of this policy is needed, not only in terms of its technical performance but also in relation to user rights protection and equitable access.

The implementation of facial recognition technology in the public transportation sector, including by PT Kereta Api Indonesia (Persero), has demonstrated varying levels of efficiency across different regions. Yogyakarta Station reported efficiency rates of up to 100%, while Solo Balapan Station achieved only 80%, indicating disparities in operational readiness and supporting infrastructure (Iswanto et al., 2025). System reliability and the availability of supporting facilities also play a significant role in influencing user satisfaction (Ependi et al., 2024). In response to the issue of passenger congestion at manual ticket boarding gates, PT Kereta Api Indonesia has implemented facial recognition technology at several major stations, including Surabaya Gubeng Station, as part of its efforts to enhance service efficiency for railway passengers.

As a solution to technical challenges, PT Kereta Api Indonesia (KAI) has integrated the boarding system with the national civil registry database (Dukcapil) to ensure the

Sawala
Jurnal Administrasi Negara
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ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

validity of biometric data. In terms of data protection, KAI has implemented an ISO 27001-based information security management system and offers users the option to delete their personal data within a maximum period of one year via the official mobile application. To promote service accessibility, manual boarding options are available for elderly passengers and individuals with disabilities. Public education efforts are continuously being strengthened through direct outreach and the provision of user-friendly information to reduce hesitation in using the system. Despite these technical initiatives, the policy's implementation continues to raise concerns regarding on-the-ground effectiveness, infrastructure readiness, and user perceptions of the security and convenience of digital services.

This study aims to conduct a comprehensive evaluation of the face recognition policy at Surabaya Gubeng Station, with a focus on the implementation process, challenges encountered, and user perceptions regarding the system's effectiveness and reliability. The research is expected to provide strategic insights for policy improvement and the advancement of public transportation service innovations in the future. A theoretical gap is identified in the limited integration of studies that simultaneously examine the relationship between the effectiveness of face recognition policies and the issues of equitable access and personal data protection within the context of public transportation services in Indonesia. Most previous studies have primarily focused on the technical dimensions and system efficiency, without fully integrating these aspects with social acceptance factors and data protection regulations.

Previous studies have not explicitly addressed how demographic context, infrastructure readiness, and user characteristics in specific regions influence the successful implementation of such technology. Consequently, there remains a significant gap in the theoretical literature linking the efficiency of digital technology with sociocultural dimensions, regulatory frameworks, and inclusive public service policies. Some researchers argue that facial recognition represents a progressive form of digital transformation, as it can expedite the boarding process in just one second and significantly reduce passenger queues (Widyastiwi et al., 2024). However, the success of this system is highly dependent on the existence of robust personal data protection regulations and the clarity of user information governance.

Several studies highlight the importance of integrating KAI's system with the national civil registry (Dukcapil) and aligning standard operating procedures (SOPs) with Law No. 27 of 2022 on Personal Data Protection (Fadhilla & Putra, 2024). The lack of public outreach, transparency, and public engagement has also contributed to low levels of public acceptance (Putri & Prunama, 2024). Uneven infrastructure distribution suggests the absence of a continuous evaluation system to ensure a reliable and comprehensive digital transformation (Sari & Hartono, 2023). Therefore, a thorough policy evaluation remains essential—not only to ensure technical efficiency but also to guarantee the protection of users' rights.

The novelty of this study lies in its specific focus on evaluating the face recognition

Sawala
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ISSN: 2598-4039 (Online)
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10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

policy at Surabaya Gubeng Station—an area that has received limited attention in previous research. The researcher employs a public policy evaluation approach based on William N. Dunn's model, which comprises six key indicators: effectiveness, efficiency, adequacy, equity, responsiveness, and accuracy. This approach allows for a comprehensive analysis that differs from prior studies, which have primarily concentrated on technical aspects. Furthermore, this research integrates considerations of personal data protection, accessibility for vulnerable groups, and user experience within a unified evaluative framework. As such, the study contributes to the development of more inclusive public policies that are adaptive to the challenges of digital transformation and relevant for improving the quality of transportation services in Indonesia in a sustainable manner.

Implementation of Face Recognition Technology in Public Transportation Services

The adoption of face recognition technology by PT Kereta Api Indonesia (Persero) at several stations, including Surabaya Gubeng Station, is part of a broader digital transformation aimed at enhancing the efficiency of public services. This technology enables a contactless boarding process through facial biometric identity verification. While it has proven effective in accelerating the boarding flow, challenges remain in terms of infrastructure readiness and system instability, which hinder service effectiveness. In practice, passengers who are not registered in the face recognition system are subject to restricted access times, leading to disparities in service delivery (Sari & Hartono, 2023).

A comparison of the effectiveness of face recognition implementation across stations also reveals varying outcomes. Previous research notes that Yogyakarta Station successfully achieved full efficiency (100%), while Solo Balapan Station reached only 80% (Iswanto et al., 2025). This indicates that operational readiness and infrastructure support play a critical role in the success of the policy. However, there remains a lack of studies that specifically and longitudinally evaluate the effectiveness of the system at Surabaya Gubeng Station—particularly in terms of measuring system performance and its impact on user satisfaction and trust.

In addition, public responses to this policy remain mixed. Social media analysis reveals that the majority of public reactions are negative, particularly concerning the lack of outreach and education regarding how the technology works and its potential benefits (Putri & Prunama, 2024). This suggests that the success of technology implementation depends not only on the sophistication of the system but also on the effectiveness of inclusive policy communication strategies. The limited involvement of the public in the implementation process may lead to resistance and distrust toward digital policies that are intended to enhance user convenience.

Personal Data Protection Issues and Research Gaps

The implementation of face recognition technology inherently involves the collection of biometric data, such as facial images and National Identity Numbers (NIK), which are classified as sensitive personal data. To these days, concerns persist regarding

Sawala
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ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

the security and management of such data. Transparency and the integration of the system with the national population database (Dukcapil) are essential to ensure that authentication mechanisms operate securely and align with the principles of personal data protection, as stipulated in Law No. 27 of 2022 (Fadhilla & Putra, 2024). In the absence of clear regulations and oversight, the risk of data misuse remains high, potentially undermining public trust.

Global literature has also highlighted the issue of bias in facial recognition systems, noting that variables such as facial structure, the use of head coverings (e.g., hijab), or lighting conditions can affect system accuracy (Terhorst et al., 2022). This concern is particularly relevant in the Indonesian context, which is characterized by high demographic diversity. To these days, no local studies have systematically examined whether KAI's facial recognition system exhibits discriminatory tendencies or bias toward specific groups. This research gap is critical to address, as it has direct implications for equity of access in public service delivery.

Overall, there remains a significant theoretical gap in face recognition policy research, particularly in linking technical effectiveness with equitable access and data protection in a comprehensive manner. Previous studies have generally focused on system efficiency without integrating the social, regulatory, and psychological dimensions of user experience. The lack of region-based evaluations that account for differences in infrastructure readiness and user perceptions has resulted in a body of literature that is not yet robust enough to support the development of fair and sustainable policy frameworks. Therefore, a comprehensive evaluation of the face recognition policy at Surabaya Gubeng Station is urgently needed

METHODE

This study employs a qualitative approach using a descriptive-evaluative design to provide an in-depth account of the policy implementation process of face recognition technology by PT Kereta Api Indonesia (Persero) at Surabaya Gubeng Station. This approach is well-suited for evaluating policies based on the experiences and perceptions of policy actors and service users, as well as for assessing implementation dimensions within social and institutional contexts (Nuraida et al., 2019). The evaluation model applied in this study is based on William N. Dunn's (2003) public policy evaluation framework, which includes six key dimensions: effectiveness, efficiency, adequacy, equity, responsiveness, and accuracy (Kurniawan et al., 2024).

The focus of this study is directed toward analyzing the implementation process of the face recognition policy, identifying both technical and non-technical obstacles, as well as examining user perceptions and levels of satisfaction with the system. The research also highlights the importance of equitable access, personal data protection, and infrastructure readiness as critical factors in the successful implementation of technology within public service delivery (Kurniawan et al., 2024).

Data collection was carried out using a triangulation method, which included in-

Sawala

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10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

depth interviews, direct observation, and document analysis. Interviews were conducted with key informants such as station staff, PT KAI management, and railway passengers. Field observations were conducted to understand the boarding process and users' interactions with the system. Meanwhile, the documents reviewed included standard operating procedures (SOPs), corporate policies, internal reports, and relevant academic literature.

The types of data used in this study include primary data obtained through interviews and observations, as well as secondary data derived from official documents and scholarly references. The data analysis employed a content analysis approach, consisting of data reduction, data presentation, and conclusion drawing. All data were analyzed based on the six policy evaluation indicators proposed by Dunn (2003), in order to produce a comprehensive evaluation of the effectiveness and impact of the face recognition policy implementation in digital-based public transportation services.

RESULT

Implementation of Face Recognition Technology Policy at Surabaya Gubeng Station

The researcher conducted interviews with PT KAI staff to explore the implementation of the face recognition technology policy at Surabaya Gubeng Station. This technology has been in use since February 2023 and was introduced to passengers through digital media, station announcements, and direct assistance from staff. While the system supports the identity verification process, its implementation continues to face both technical and non-technical challenges. Technical issues include lighting conditions and network connectivity, while non-technical obstacles involve limited user understanding and difficulties in reading data from national identity cards (KTP).

Table 1.
Implementation of Face Recognition Technology Policy at Surabaya Gubeng Station

Questtions	Staff"s Answers
When has the face recognition system been implemented at Surabaya Gubeng Station?	The face recognition system began to be implemented at Surabaya Gubeng Station in early February 2023.
How was the socialization process carried out for passengers prior to the implementation?	Socialization was carried out through digital media (Instagram, the KAI website, and others), announcements at the station, as well as direct assistance from on-site staff.
What technical and non-technical challenges were encountered during the implementation of this system?	Technical issues included mismatches in lighting conditions for the camera and network disruptions. Non-technical challenges involved limited user understanding of the new system and difficulties in reading ID cards (KTP) during initial registration.

Source: Data processed by the researcher (2025)

Sawala

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10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

The analysis of Table 1 indicates that the implementation of the face recognition system at Surabaya Gubeng Station since February 2023 reflects PT KAI's commitment to enhancing service efficiency and security. The socialization efforts—conducted through various media such as Instagram, the official KAI website, station announcements, and direct assistance from staff—demonstrate a comprehensive approach to introducing this technology to the public. These efforts are essential, as changes in service systems require user adaptation, particularly in the context of digitizing passenger identity verification processes.

In practice, however, the system has faced several challenges. Technically, the main issues stem from inadequate lighting conditions that are incompatible with camera standards, as well as network disruptions that hinder real-time facial identification. On the non-technical side, limited passenger understanding of the new procedures and difficulties during the initial registration—especially when national ID cards (KTP) are not properly recognized by the system—pose additional obstacles. These challenges underscore that the success of technological implementation is not solely dependent on hardware and software, but also on the readiness of supporting infrastructure and the level of digital literacy among the public.

Effectiveness of Face Recognition Technology Implementation at Surabaya Gubeng Station

The researcher conducted interviews with PT KAI staff to examine the effectiveness of face recognition technology in the boarding process at Surabaya Gubeng Station. The interview results indicate that the system significantly accelerates queuing time, reducing it from three minutes to less than one minute per passenger. In addition to time efficiency, the system also demonstrates a high level of accuracy in facial recognition, achieving a 95% success rate under normal conditions.

Table 2.
Effectiveness of Face Recognition Technology Implementation at Surabaya Gubeng Station

Questtions	Staff"s Answers
Has the face recognition system successfully accelerated the boarding process? Could you explain the indicators?	Yes, the queue time has decreased significantly, from an average of 3 minutes per passenger to less than 1 minute. Passengers also no longer need to present their individual identity documents during boarding.
How successful is the system in accurately recognizing passengers' faces?	The system has an accuracy rate of 95% under normal conditions. So, when passengers already have a valid ticket, the system automatically allows them to proceed directly with face recognition for boarding.

Source: Data processed by the researcher (2025)

The analysis of Table 2 highlights the boarding process at Surabaya Gubeng Station.

Sawala

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10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

Queue times were significantly reduced—from an average of 3 minutes to less than 1 minute per passenger. This reflects a substantial improvement in service speed while also helping to reduce congestion in the ticket inspection area. Moreover, the convenience provided to passengers, who no longer need to manually present identification cards, indicates that the system effectively supports the automation of public services.

Efficiency of Face Recognition Technology Implementation at Surabaya Gubeng Station

The researcher conducted interviews with PT KAI staff to explore how the implementation of face recognition technology has positively impacted operational efficiency, particularly in reducing the workload of boarding staff. Previously, four officers were required, but now only two are needed to serve the manual lane, as much of the process has been automated. Although some facial verification errors were reported, the majority were attributed to data input mistakes made by passengers rather than system failures.

Table 3.
Efficiency of Face Recognition Technology Implementation at Surabaya Gubeng Station

Questtions	Staff"s Answers
Does the use of this technology reduce the workload of staff or does it actually increase it?	In general, it reduces the workload in the manual boarding process. Before the implementation of face recognition, the number of boarding staff at Surabaya Gubeng Station was four. However, after the system was introduced, the number of manual boarding staff was reduced to only two.
How often do errors occur in the facial verification process?	As for the frequency of errors, it is not that common. Most errors occur on the passenger's side—for example, entering the wrong identification number on the ticket. If the identity on the ticket does not match the actual data, the system cannot verify the face. In addition, errors in departure dates can also be a factor causing the facial verification to fail in detecting the passenger.

Source: Data processed by the researcher (2025)

Analysis of Table 3 shows that the implementation of the face recognition system at Surabaya Gubeng Station has clearly reduced the workload of staff during the boarding process. Prior to the system's implementation, four staff members were required to manually serve passengers. After the adoption of the technology, this number was reduced to only two. This indicates that automation through technology not only enhances service efficiency but also optimizes the use of human resources.

Sawala
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ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

The reduction in the number of personnel without compromising the smoothness of the boarding process suggests that the system contributes to operational efficiency. Face recognition technology takes over the task of identity verification quickly and accurately, allowing the remaining staff to focus on passenger assistance or handling special cases. In addition to supporting cost and labor efficiency, this also creates opportunities for redeploying staff to more strategic roles in public service. From the perspective of modern public administration, this approach aligns with the evolution from New Public Management (NPM) to Digital Public Administration. While NPM supports digital transformation in Indonesian governance, it must be accompanied by stronger institutional integration to fully realize service efficiency and responsiveness (EGAWATI, 2022).

Face recognition technology also reflects the principles of Public Sector Transformation, where public technologies drive innovation, speed, and service quality by reinforcing the strategic role of personnel through administrative function redistribution and a focus on service value (Nurfadilah & Haliah, 2024). According to William N. Dunn's public policy analysis framework, efficiency is one of the key indicators of policy success. Efficiency is not merely about cost or labor savings but also about optimizing functional distribution and improving policy outcomes. The transformation of staff roles—from manual verification to more strategic service functions—demonstrates high output achievement without compromising the quality of the boarding process. This process also exemplifies adaptive governance in policy implementation, where technology enables public organizations to adjust their structures and roles, allowing for more flexible and user-responsive policy execution.

Adequacy and Responsiveness of Face Recognition Technology Implementation at Surabaya Gubeng Station

The researcher conducted interviews with PT KAI staff to explore the adequacy and responsiveness of the face recognition technology implementation. In general, basic infrastructure—such as cameras, network systems, and boarding gates—was reported to be available and functional, although improvements in technical quality are still needed. In the event of system disruptions, staff demonstrated a prompt response by redirecting the process to manual lanes and recording incidents for reporting purposes. All staff members had also received internal training, including operational system simulations, as part of their preparedness to manage the new technology.

Table 4.
Adequacy and Responsiveness of Face Recognition Technology Implementation at Surabaya Gubeng Station

Sawala
Jurnal Administrasi Negara
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ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

Questtions	Staff"s Answers
Are the available facilities and infrastructure currently adequate?	The basic infrastructure is already in place, such as cameras and the network system, and the requirement has been met with the installation of four gates. However, improvements are still needed in terms of camera quality and internet connection stability.
How do staff respond when the system experiences disruptions?	Staff will immediately switch to manual verification and record the disruption incident to be reported to the central technical team.
Did the staff receive special training to operate this system?	Yes, all personnel assigned to the boarding gate have received internal training and simulations on the use of the face recognition system.

Source: Data processed by the researcher (2025)

Analysis of Table 4 reveals that the availability of basic infrastructure—such as cameras, network systems, and four boarding gates—indicates that the foundation for the face recognition system at Surabaya Gubeng Station is sufficiently adequate for initial operations. However, over time, there remains a need to improve camera quality and ensure internet connection stability to enable more accurate and consistent facial verification processes. Weaknesses in these technical aspects can directly affect the system's performance, particularly during peak passenger volumes or network disruptions. Therefore, a continuous improvement strategy for supporting infrastructure is essential.

From an operational perspective, the readiness of staff to redirect the process to manual verification during system disruptions, along with the documentation of incidents for technical evaluation, demonstrates the presence of effective risk mitigation procedures. The provision of internal training and simulation exercises for all personnel further indicates that human resource capacity is considered a critical component in supporting the successful implementation of this system. The combination of ongoing infrastructure improvements and the preparedness of staff in handling disruptions constitutes a key factor in ensuring the continuity and reliability of the face recognition service in practice.

Protection of Personal Data in the Implementation of Face Recognition Technology at Surabaya Gubeng Station

The researcher conducted interviews with PT KAI staff to explore the procedures for collecting biometric data, which involve user consent and identity verification, with data stored on encrypted internal servers. To ensure information security, the company has implemented ISO 27001 information security management standards and provides passengers with the right to delete their personal data at any time. In addition, the face

Sawala
Jurnal Administrasi Negara
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ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

recognition system is optional, as users are still offered the alternative of using the manual boarding lane.

Table 5.
Protection of Personal Data in the Implementation of Face Recognition Technology at Surabaya Gubeng Station

Questtions	Staff"s Answers
What are the procedures for collecting and storing passengers' biometric data?	The procedure only requires passengers to present their identification card and provide consent. The data is stored on PT KAI's internal servers, which are encrypted.
How does PT KAI ensure the security and privacy of passengers' facial data and National Identification Numbers (NIK)?	PT KAI has implemented an ISO 27001-certified privacy and information security management system. Passengers also have the right to request the deletion of their personal data at any time after registering for face recognition.
Are passengers given the option not to use this system?	Yes, passengers may still choose to board manually by presenting a physical ticket and their ID card at the boarding gate.

Source: Data processed by the researcher (2025)

Analysis of Table 5 shows that the personal data protection aspect demonstrates PT Kereta Api Indonesia (Persero) has implemented fundamental mechanisms to ensure the security of passengers' biometric information. The data collection process is conducted based on the passenger's consent and includes verification of original identity documents. All data is stored on internal servers equipped with encryption systems as a safeguard against potential privacy violations. The implementation of an information security management system aligned with ISO 27001 standards indicates that the company has made efforts to align its data governance with international best practices. Passengers are also granted the right to request the deletion of their biometric data at any time after registration, reflecting a commitment to respecting individuals' rights over their personal data.

Although face recognition is a digitally based system, PT Kereta Api Indonesia (Persero) continues to provide manual boarding services for passengers who choose not to use biometric technology. This policy reflects a commitment to the principles of inclusivity and equitable access, taking into account the diversity of preferences and varying levels of technological literacy within society. The availability of an alternative lane also demonstrates the company's responsiveness to public concerns regarding data privacy. Overall, this policy indicates that data protection is understood not merely as a technical obligation but as an institutional responsibility to ensure the security and rights of users within a digital public service system.

Sawala

Jurnal Administrasi Negara

ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

Equity and Accessibility in the Implementation of Face Recognition Technology at Surabaya Gubeng Station

The researcher conducted interviews with PT KAI staff to explore how the face recognition system was designed with attention to accessibility for vulnerable groups, such as the elderly and persons with disabilities, through special assistance and the provision of a manual boarding option. Passengers using the face recognition system are granted faster access without the need to present a physical ticket, provided that their data and departure schedule are valid. Although there is a difference in access time between digital and manual users, services are provided equally and without discrimination.

Table 6.
Equity and Accessibility in the Implementation of Face Recognition Technology at Surabaya Gubeng Station

Questtions	Staff"s Answers
How does the system accommodate vulnerable groups such as the elderly or persons with disabilities?	Special assistance is provided by station staff for vulnerable groups, and an alternative boarding lane remains available for those who experience difficulties using the technology.
Is there a difference in access between face recognition users and regular passengers?	Face recognition users are given access to a dedicated fast lane and are not required to present tickets or identification, as long as their departure time and ticket information are valid—they can proceed directly to boarding. Meanwhile, passengers using the manual boarding process are still served at the manual gate and must present both their ticket and identification. There is no discrimination in service delivery, although there is a difference in boarding time: face recognition users may enter up to three hours before departure, while manual boarding is only available starting two hours prior.

Source: Data processed by the researcher (2025)

Analysis of Table 6 indicates that, based on information provided by station staff, the face recognition policy at Surabaya Gubeng Station has accommodated the principles of equity and accessibility, particularly for vulnerable groups such as the elderly and persons with disabilities. PT Kereta Api Indonesia (Persero) provides direct assistance from staff and maintains a manual boarding lane as an alternative for passengers who encounter difficulties using the digital system. This measure reflects an effort to ensure that digital transformation in public services remains inclusive and accessible to all segments of society, without excluding certain groups due to technical limitations or digital literacy gaps. There is a difference in boarding access time between the face recognition lane and the manual boarding lane, whereby face recognition users

Sawala
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10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

are permitted to enter the boarding area one hour earlier than those using the manual process. Although this distinction does not constitute formal discrimination, it has the potential to create disparities in service experience. Therefore, policy evaluation should consider equity not only in terms of infrastructure and service options, but also in the provision of balanced access rights. The principle of fairness in public service delivery requires equal treatment for all users, including in terms of convenience and access time to the available services.

Users of the Face Recognition System at Surabaya Gubeng Station

User Perceptions and Experiences with the Face Recognition System at Surabaya Gubeng Station

Interviews conducted by the researcher with users of the face recognition system at Surabaya Gubeng Station revealed that the primary reasons for utilizing the system were its convenience and efficiency in the boarding process. Most respondents stated that their experience using the system was smooth and fast, although some encountered technical issues such as failed facial verification due to incorrect data input. Overall, users felt that the system was comfortable and easy to use in supporting their travel.

Table 1.
User Perceptions and Experiences with the Face Recognition System at Surabaya Gubeng Station

Questtions	Passenger Responses
What motivated you to use the face recognition system during the ticket boarding process?	The main reason for using face recognition is its practicality and efficiency—it eliminates the need to present identification during boarding. Users are also drawn to the system because the process is faster compared to manual boarding, which requires queuing and showing ID.
How was your experience with the boarding process using this system?	Most users stated that the process ran smoothly and did not take much time. However, some did experience issues such as unverified facial recognition, often due to mismatches between the identification number entered and the data on the ticket.
Do you find the system comfortable and easy to use?	Yes, the majority of users reported that the system is reasonably comfortable and easy to use.

Source: Data processed by the researcher (2025)

Analysis of Table 1 indicates that the implementation of the face recognition system at Surabaya Gubeng Station is perceived to provide convenience and efficiency for the majority of users. The primary reason for adopting this system is its practicality, as it eliminates the need for complicated procedures such as presenting identification during boarding. The speed of facial verification is a key attraction compared to the manual method, which requires queuing and identity checks. User responses show that most

Sawala
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10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

passengers found the process to be smooth, fast, and comfortable, suggesting that the technology has been generally well received by service users.

Several technical issues were identified in the implementation of the face recognition system, such as unverified facial data and incorrect identity input that did not match the ticket information. These problems indicate that, although the system offers a more efficient experience, its success largely depends on the accuracy of user data and the quality of the technology. To ensure long-term user satisfaction, it is essential to educate users on the importance of accurate data entry and to improve the system's ability to accommodate variations in users' facial features. In this way, the overall user experience can be continuously enhanced alongside the utilization of this technology.

Security and Privacy of Face Recognition System Users at Surabaya Gubeng Station

Interviews conducted by the researcher with users of the face recognition system revealed that most of them do not fully understand how their biometric data is managed by PT KAI. Nevertheless, the majority reported feeling secure due to their trust in the credibility of PT KAI as a state-owned enterprise. However, some users still expressed concerns regarding the potential misuse or hacking of their personal data.

Table 2.
Security and Privacy of Face Recognition System Users at Surabaya Gubeng Station

Questtions	Passenger Responses
Are you aware of how your facial data is managed by PT KAI?	In general, users are not fully aware of the detailed procedures regarding how PT KAI manages facial data. However, they tend to trust the company with their personal data.
Do you feel secure when submitting your biometric data, such as your ID card, facial photo, or fingerprint?	Most users feel secure, relying on the credibility of PT KAI as a state-owned enterprise. Nonetheless, some expressed concerns about the potential misuse or hacking of their data.

Source: Data processed by the researcher (2025)

Analysis of Table 2 indicates that the majority of face recognition system users at Surabaya Gubeng Station exhibit a relatively high level of trust in PT Kereta Api Indonesia (Persero) regarding the management of their personal data, despite generally lacking detailed knowledge about how their facial data is processed and stored. This trust is largely based on the public image and credibility of PT Kereta Api Indonesia (Persero) as a state-owned enterprise (BUMN), which is perceived as being responsible and equipped with reliable data security systems. This sense of security plays a crucial role in fostering user acceptance of biometric-based technologies.

A small portion of users still express concerns regarding the potential misuse or leakage of their data, particularly in light of increasingly complex cyber threats. This indicates a gap between public trust and their understanding of data protection practices. The absence of transparency or user education concerning biometric data

Sawala
Jurnal Administrasi Negara
ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

management may lead to long-term doubts if left unaddressed. Therefore, to maintain and strengthen public trust, PT Kereta Api Indonesia (Persero) must actively disseminate its data protection policies and ensure that the system in place adheres to principles of digital security and privacy.

User Satisfaction with the Face Recognition System at Surabaya Gubeng Station

Interviews conducted by the researchers revealed that users expressed satisfaction with the accelerated boarding process enabled by the face recognition system, particularly during peak departure hours. The elimination of the need to present physical tickets and identity documents manually was perceived as highly convenient. Although there were some issues, such as facial obstructions from masks or suboptimal lighting conditions, these problems were generally resolved with assistance from station staff or through repeated verification.

Table 3.
User Satisfaction with the Face Recognition System at Surabaya Gubeng Station

Questtions	Passenger Responses
In your opinion, does this system accelerate the boarding process?	Yes, the system is considered to accelerate the boarding process, particularly because it eliminates the need to present physical tickets and identification manually. This has been especially beneficial during peak departure hours.
Have you ever experienced errors during the facial recognition process?	Some users have experienced issues when their faces were covered by masks or under poor lighting conditions. However, these errors were generally resolved with assistance from staff or by repeating the facial verification process.

Source: Data processed by the researcher (2025)

Analysis of Table 3, the implementation of the face recognition system is considered successful in accelerating the passenger boarding process, especially during peak departure hours. Users reported significant benefits from no longer needing to present physical tickets and identification manually, which made the process more efficient and helped reduce queues. This indicates that the system supports operational efficiency and enhances the user experience, particularly when passenger volume is high.

Although considered successful, several technical issues were still identified, such as passengers' faces being covered by masks or suboptimal lighting conditions, which caused the system to fail in accurately recognizing faces. These issues were generally resolved with assistance from station staff or by repeating the verification process. This reflects that the success of technology implementation does not rely solely on the sophistication of the system, but also on the readiness of human resources and the presence of responsive supporting procedures to address technical disruptions promptly.

Sawala

Jurnal Administrasi Negara

ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

DISCUSSION

Implementation of Face Recognition Technology Policy at Surabaya Gubeng Station

Policy Implementation

The analysis reveals that the implementation of the face recognition system at Surabaya Gubeng Station faces two main types of challenges: technical and non-technical. Technical challenges include lighting issues and network connectivity problems that affect the system's accuracy and speed in recognizing passengers' faces. Meanwhile, non-technical challenges involve users' limited understanding of the new system and difficulties during registration, particularly when ID cards (KTP) are not properly scanned by the system.

These findings are particularly relevant when analyzed through the lens of the Technology Acceptance Model (TAM) developed by (Gefen & Straub, 2000). In TAM, technology adoption is influenced by two primary factors: perceived usefulness and perceived ease of use. Technical issues such as network disruptions and inadequate lighting may lower user trust, as the system is perceived as inefficient or inaccurate. Meanwhile, non-technical issues such as limited user understanding and difficulties during registration affect the perceived ease of use. Within the framework of public administration theory, particularly the New Public Management (NPM) approach, technological innovations like face recognition are part of the modernization of public services, emphasizing efficiency, effectiveness, and user satisfaction. However, the successful adoption of technological innovations in the public sector requires public participation and user understanding, to avoid resistance or digital divide (Thompson & Riccucci, 1998). The technical and non-technical challenges identified in this study indicate the presence of an administrative capacity gap, where the pace of technological advancement exceeds the readiness of institutional infrastructure and public digital literacy.

From a public policy analysis perspective—particularly the evaluative approach proposed by William N. Dunn—the effectiveness and efficiency of technological policies must be assessed not solely based on technical achievements, but also in terms of responsiveness and equity, namely how well the policy responds to user needs and ensures fair access (Djuwita, 2018). Therefore, for the system to be widely and sustainably accepted, policy learning and adaptive governance are essential. These involve developing dynamic policies that can be adjusted based on user feedback and field realities. Strategies that can be implemented include improving the technical quality of the face recognition system, enhancing supporting infrastructure, and providing ongoing public education so that users feel comfortable, understand the system's mechanisms, and feel protected in terms of the use of their biometric data.

Effectiveness

The analysis found that the implementation of the face recognition system has significantly improved the efficiency of the passenger boarding process. Queue times were reduced from an average of three minutes to less than one minute per person. The

Sawala
Jurnal Administrasi Negara
ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

system also reduces the need for manual boarding verification, as passengers are no longer required to present identification, provided they already hold a valid ticket. Furthermore, the system demonstrated high performance, with a 95% accuracy rate under normal conditions, indicating the reliability of the technology in detecting and matching facial identities.

These findings can be analyzed through the Innovation Diffusion Theory, particularly in the dimensions of relative advantage and compatibility (Carey, 2017). The relative advantage is reflected in the accelerated queue times and the convenience of not having to present physical identification, while compatibility is evident in the system's integration with the pre-existing digital ticket purchasing process. From a public administration perspective, this aligns with the New Public Service and Digital Era Governance approaches, which emphasize technology-based public services to create value and respond to community needs (Denhardt & Denhardt, 2000; Dunleavy et al., 2006). According to the Efficiency–Effectiveness Model, the improvements in time efficiency and the system's 95% accuracy rate demonstrate success in enhancing service quality. However, under William N. Dunn's evaluation framework, policy success must also consider responsiveness and equity of access. Therefore, the success of the face recognition system should not be measured solely by its technological sophistication, but by its ability to generate equitable public value.

Efficiency

The analysis reveals that the implementation of the face recognition system at Surabaya Gubeng Station has successfully reduced the workload associated with manual boarding processes. The number of boarding staff, which was initially four, could be reduced to two without disrupting operational flow. This indicates that the system has effectively taken over a significant portion of the identity verification tasks previously carried out manually by staff, thereby improving the efficiency of workforce utilization.

The finding that face recognition enhances operational efficiency at Surabaya Gubeng Station can be explained through the Business Process Reengineering (BPR) approach introduced by (Dimitrova, 2024). The digitization of the boarding process through face recognition represents a transformation from a manual system into an automated process that accelerates service delivery while reducing labor requirements. This phenomenon aligns with the Labor Substitution Theory, where human labor is replaced by technology. Automated technology takes over routine tasks previously handled by staff, allowing personnel to be reassigned to more strategic roles such as assisting vulnerable groups or addressing other service-related issues. Thus, efficiency is achieved not only in terms of workload reduction but also through the optimization of human resources. From the perspective of modern public administration, the principle of digital governance underlies the use of technology to improve public service delivery.

This type of transformation requires institutional readiness and the enhancement of

Sawala
Jurnal Administrasi Negara
ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

human resource capacity to ensure adaptability and inclusiveness, as emphasized (Dimitrova, 2024; Dzulkifli et al., 2023). From the perspective of public policy analysis, efficiency is one of the six key evaluation criteria proposed by William N. Dunn. The success of a policy is not solely measured by its technical efficiency, but also by its ability to ensure equitable access, responsiveness to technical disruptions, and the protection of user data. Therefore, the implementation of this technology can only be considered fully successful when operational efficiency is complemented by service accessibility, data transparency, and responsiveness to the needs of all users.

Adequacy and Responsiveness

The analysis above indicates that the implementation of the face recognition system at Surabaya Gubeng Station was designed with an inclusive and adaptive approach. Special assistance is provided for vulnerable groups, along with an alternative lane for passengers who encounter difficulties using the technology, ensuring that no discrimination occurs in service delivery. Passengers using the face recognition system benefit from a fast-track lane without the need to present physical tickets or identification, and they are granted access to the boarding area up to three hours before departure—compared to two hours for manual boarding. This difference is intended to serve as an incentive for adopting the technology, without depriving conventional service users of their rights.

Findings regarding the differentiated treatment within the face recognition boarding system at Surabaya Gubeng Station can be analyzed using Equity Theory, which emphasizes fairness based on users' needs and capacities (Inuwa, 2017). Although there are separate lanes, services remain fair and inclusive for all passengers. This aligns with the principle of social equity in modern public administration, which places justice as a central pillar of public service delivery (Widianto & Zunaidi, 2024). This approach is also consistent with several dimensions of the SERVQUAL model, such as responsiveness, empathy, and reliability, as demonstrated by the staff's readiness to assist vulnerable passengers and maintain consistent service. From a public policy perspective, this reflects the application of William N. Dunn's evaluation criteria, particularly responsiveness and equity, which assess policy success not only through efficiency but also through equitable access and adaptability to social needs.

Personal Data Protection

The analysis reveals that the basic infrastructure for the face recognition system at Surabaya Gubeng Station is already in place, including cameras, network connectivity, and four boarding gates. However, improvements are still needed in camera quality and internet stability to ensure optimal system performance. Another key finding is the existence of a disruption-handling procedure, which involves switching to manual verification and recording incidents for reporting to the central technical team. Additionally, all staff members have received internal training and participated in simulations, indicating that the human resources are well-prepared to operate the system and respond to technical disruptions in the field.

Sawala
Jurnal Administrasi Negara
ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

Findings related to the face recognition system at Surabaya Gubeng Station can be analyzed using the Socio-Technical Systems Theory, which emphasizes that the success of a technology depends on the synergy between technical aspects (hardware/software) and social components (human resources, training, and work procedures). Infrastructure readiness must be complemented by adaptive operational capacity to ensure system effectiveness (Appelbaum, 1997). Moreover, Contingency Management Theory explains that organizations must adjust their processes and structures based on changing environmental conditions. In the context of technical disruptions, it is essential to prepare emergency procedures and provide staff training as a form of operational adaptation (Pacheco-Cubillos et al., 2024). From a public administration perspective, this approach reflects the principles of digital governance, which emphasize the integration of technology and organizational preparedness to respond to changes inclusively and sustainably (Ciancarini et al., 2024). In terms of public policy analysis, William N. Dunn's evaluation framework suggests that beyond efficiency, public policy must also fulfill the criteria of responsiveness and appropriateness, especially in emergency situations or when serving vulnerable groups.

Equity and Accessibility

This finding can be analyzed through the lens of justice theory in public service, as emphasized in the New Public Service paradigm, which positions citizens as holders of rights to fair services—not merely as customers. In technology-based services, including the face recognition system, service design must ensure equal access for all segments of society, including individuals with limited digital literacy or those who prefer to use manual service routes. The availability of assistance and alternative boarding lines indeed reflects inclusiveness, but the difference in access times between face recognition users and those using the manual line may create disparities that require further attention.

From the perspective of public policy evaluation as proposed by William N. Dunn, the equity indicator is a crucial component in assessing the distribution of benefits within a policy. Although the implementation of the system is considered effective and responsive in accelerating service processes for certain users, the disparity in boarding access times indicates that service equity has not been fully achieved in the policy's implementation. The success of digital public service transformation does not rely solely on technological effectiveness but also on the government's ability to uphold social inclusion, ensure equal access, and foster cross-sector collaboration to prevent inequalities among specific groups (Arifin et al., 2025). Therefore, digital transformation policies such as face recognition should be oriented not only as tools for technical efficiency but also as instruments for equitable and sustainable public service delivery.

Users of the Face Recognition System at Surabaya Gubeng Station

Perception and Experience

The analysis reveals that the primary reasons users choose the face recognition system are its practicality, efficiency, and ability to accelerate the boarding process

Sawala
Jurnal Administrasi Negara
ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

without the need to manually present identification. Most users reported that the process ran smoothly, comfortably, and did not take much time. However, some users experienced technical issues, such as unverified facial recognition and errors in entering identification numbers that did not match the ticket data, which hindered the boarding process.

The finding that the face recognition system accelerates the boarding process and enhances passenger convenience can be analyzed using the Technology Acceptance Model Davis, 1989 as applied in the study by (Gefen & Straub, 2000). Perceived usefulness and ease of use are reflected in user experiences, where the process is regarded as fast and smooth, although technical issues such as facial verification errors highlight the importance of system quality (Ilieva et al., 2024). In the context of public administration, TAM is relevant for understanding the adoption of digital technologies, where user trust has been shown to influence the intention to use electronic services, in line with the principles of digital governance (Warsono et al., 2023). Referring to William N. Dunn's public policy evaluation theory, the success of this system should be assessed not only based on efficiency but also on responsiveness and equity. Therefore, technical improvements and user education are essential to ensure broad and inclusive acceptance of the technology.

Security and Privacy

The analysis indicates that most users of the face recognition system at Surabaya Gubeng Station trust PT Kereta Api Indonesia (Persero) in managing their personal data, although they generally lack a detailed understanding of how their facial data is processed and stored. This trust is largely based on the public image of PT Kereta Api Indonesia (Persero) as a credible state-owned enterprise (BUMN). However, a small number of users have expressed concerns about the potential misuse or leakage of their data, revealing a gap in public understanding regarding biometric data protection.

This finding can be analyzed using the Trust-Based Acceptance Model, in which trust in PT Kereta Api Indonesia (Persero) serves as a primary factor in the acceptance of the face recognition system, even though users may not fully understand the technical aspects (Melorose et al., 2015). Additionally, the Privacy Calculus Theory explains that users are willing to trade some degree of privacy for service convenience, as long as there are no serious violations (Fathni et al., 2023). From a public administration perspective, the success of digital services depends on transparency and assurances of data protection to maintain public trust (Jopang et al., 2024). This aligns with William N. Dunn's policy evaluation theory, which emphasizes the importance of responsiveness and equity in assessing policies. Without clear communication and guaranteed data security, public trust may decline and hinder the adoption of technological innovations.

Service Satisfaction

Findings from the analysis indicate that the face recognition system has generally succeeded in accelerating the boarding process, particularly during peak hours, as users

Sawala
Jurnal Administrasi Negara
ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

no longer need to manually present their tickets and identification. This has enhanced both the efficiency and convenience of the departure process. However, some technical issues were still encountered by users, such as faces being obscured by masks or poor lighting conditions, which led to verification failures. These issues were typically resolved with assistance from staff or through repeated verification attempts, demonstrating the presence of a sufficiently responsive support system on the ground. The policy of implementing the face recognition system at Surabaya Gubeng Station aims to improve the efficiency of the train passenger boarding process. This system enables users to verify their identity automatically without needing to present a physical ticket or ID card, which has proven to accelerate the process, particularly during peak departure hours. Based on the evaluation results, the system is considered effective in achieving its objective, as it significantly reduces queuing time and streamlines the passenger entry process.

In its implementation, this policy also presents technical challenges such as faces being covered by masks or poor lighting conditions, which lead to verification failures. The presence of staff assistance and the option for re-verification indicate that the policy demonstrates a good level of responsiveness to user needs and on-the-ground conditions. According to William Dunn's policy evaluation theory, this policy can be categorized as functionally successful, as it fulfills two key indicators: effectiveness in achieving its objectives and responsiveness to implementation barriers.

CONCLUSION

The implementation of the face recognition system by PT Kereta Api Indonesia (Persero) at Surabaya Gubeng Station represents a public service innovation aimed at enhancing the efficiency of the passenger boarding process through automated, contactless identity verification. Based on the evaluation using William N. Dunn's public policy evaluation model, the system has proven effective in accelerating the boarding process, reducing queues, and improving passenger comfort, particularly during peak hours. The system's high accuracy rate and the reduced workload for staff indicate a significant achievement in operational efficiency.

In its implementation, this policy still faces several challenges, both technical—such as lighting disruptions and connectivity issues—and non-technical, including the public's limited understanding of the new system. These obstacles indicate that the success of a technology is not solely determined by the sophistication of the system, but also by institutional readiness, users' digital literacy, and the organization's responsiveness to field dynamics. The issue of personal data protection also remains a significant concern, as most users do not fully understand how their biometric data is managed.

This evaluation shows that the face recognition system has functionally succeeded in meeting the indicators of effectiveness, efficiency, responsiveness, and accessibility. To ensure the sustainability of the policy, an adaptive governance strategy is needed—one that emphasizes policy learning, infrastructure quality improvement, public

Sawala

Jurnal Administrasi Negara

ISSN: 2598-4039 (Online)
ISSN: 2302-2221 (Print)

10.30656/sawala.v13i2.zwyzcb43 to this article
Page 199-221
Volume 13 Number 2 (December) 2025

education, and transparency in data management. In this way, the policy not only enhances the efficiency of public services but also supports inclusive, secure, and sustainable digital governance in Indonesia's transportation sector.

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Page 199-221
Volume 13 Number 2 (December) 2025

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