



Digitalization of website-based service facility inspection for the Mechanical, Electrical, and Plumbing unit at KCIC Tegalluar Station, Bandung Regency

Jolio Aditya Pradana¹, Nyimas Arnita Aprilia², Femmy Sofie Schouten³

¹ Diploma III Study Program of Railway Transportation Management, Indonesian Land Transportation Polytechnic – STTD

^{2,3} Supervisor, Indonesian Land Transportation Polytechnic – STTD

Correspondence: jolioaditya18@gmail.com

Article Info

Article history:

Received

Jul 12th, 2026

Revised

Aug 15th, 2026

Accepted

Aug 20th, 2026

ABSTRACT

Service facility inspections at KCIC Tegalluar Station are still conducted manually using paper-based checklist forms, resulting in unintegrated inspection data and inefficient reporting and monitoring of facility conditions. This study aims to examine the existing inspection process, identify the constraints of the manual system, and design and implement a web-based Facility Management Information System (SIMFAS) as a digitalization solution for service facility inspection. The research employed a descriptive quantitative and qualitative approach, with user-needs analysis using a Likert scale and system evaluation using the PIECES (Performance, Information, Economics, Control, Efficiency, Service) method. Primary data were obtained through observation, interviews, and questionnaires involving 16 respondents, while system testing was conducted by 3 respondents across 13 test scenarios. The results showed that all user-needs indicators obtained an average score of 4.56, categorized as Strongly Agree, and Black Box Testing showed all system functions operated with a 100% success rate. The implementation of SIMFAS improved inspection recording efficiency by 66.67%, accelerated damage reporting by 94.44%, and reduced historical data retrieval time by 80%. SIMFAS is therefore an effective and efficient solution for supporting the management of railway service facility inspection.

Keyword:

Digitalization, facility inspection, SIMFAS, railway transportation, website.



© 2026 The Authors. Published by CV PITAPA KARYA GEMILANG. This is an open access article under the CC BY license (<https://creativecommons.org/licenses/by/4.0/>)

INTRODUCTION

Railway transport is a strategic public transportation mode supporting community mobility and a country's economic development, offering advantages such as large transport capacity, punctuality, energy efficiency, and a contribution to reducing congestion and carbon emissions (Lestiyono, 2025). The presence of high-speed rail services through Kereta Cepat Indonesia China (KCIC) is part of the modernization of the national railway system that prioritizes speed, efficiency, and digitally based service, thereby requiring stations to maintain service facilities that meet high standards of safety, comfort, and convenience for users. Railways are a rail-based mass transportation system organized to support community mobility, equitable development, and improved public transport services (Law of the Republic of Indonesia Number 23 of 2007 concerning Railways), while station service facilities serve as the main point of interaction between the operator and users, so that well-maintained, clean, safe, and fully functioning facilities are a key indicator of railway service quality (Jatiwaluyo, 2022).

High-speed railway stations must be equipped with adequate facilities to ensure smooth operations and service to users, as regulated under Minister of Transportation Regulation Number PM 7 of 2022 concerning the Operation of High-Speed Railways. One effort to maintain the condition of these facilities is inspection, namely a systematic examination of the condition of an object to ensure compliance with standards, function, and safety level, which also serves as the basis for decision-

making on repair or maintenance actions (Sunaryo & Agustina, 2020). Observations at KCIC Tegalluar Station, Bandung, showed that the recording of service facility inspections is still carried out using paper-based checklist forms with separate documentation, so that data is not centrally integrated, making it difficult to trace damage history and monitor further maintenance, which ultimately has the potential to slow down the evaluation and handling of facility damage.

A website-based system allows officers to record inspection results in real time, complete with automatic photo documentation and timestamps, so that data can be stored centrally, facilitating the monitoring of facility conditions, damage evaluation, and the determination of maintenance priorities (Prastyo & Irawan, 2024). Digitalization plays an important role in supporting the operation and supervision of station service facilities because it simplifies the monitoring of facility conditions, the search for damage history, the preparation of inspection reports, and the determination of maintenance priorities in a more systematic manner (Triani & Schouten, 2023), while also supporting the transparency and accountability of facility management because every inspection activity is systematically recorded and traceable.

Research on service facilities and inspection digitalization has been widely conducted. Yuwantiningrum and Nurdianwaty (2025) found that service and facilities have a positive and significant effect on train ticket purchasing decisions. Sari Cahyaningrum et al. (2025) analyzed the completeness of Type B terminal facilities and found that the facilities did not yet fully meet the standards, so further development is required. Prastyo and Irawan (2024) designed an integrated inspection and checklist application using the Rapid Application Development (RAD) method, which was proven to improve inspection efficiency and accuracy, while Setiadhi et al. (2024) studied the digitalization of website-based equipment checking at an airport and found improved efficiency and a reduced error rate in recording. These studies strengthen the foundation of this research, while the novelty of this research lies in the application of website-based digitalization of service facility inspection accompanied by automatic photo documentation and timestamps, as well as system evaluation using the PIECES (Performance, Information, Economics, Control, Efficiency, Service) method, applied to KCIC Tegalluar Station, Bandung Regency, which has not previously been studied.

Based on these conditions, this study aims to examine the existing condition of the service facility inspection process at KCIC Tegalluar Station, identify the constraints faced when the inspection process still uses manual checklist forms with data that is not centrally integrated, and design and implement a website-based Facility Management Information System (SIMFAS) so that it can support the effectiveness of maintenance prioritization and the efficiency of service facility management. Theoretically, this research is expected to enrich the body of knowledge in railway transportation management, particularly in the management and digitalization of station service facility inspection, while practically, the results of this research are expected to serve as a consideration for PT Kereta Cepat Indonesia China (KCIC), particularly the Passenger Services Facility (PSF) unit, in implementing a website-based service facility inspection system to support the effectiveness of facility monitoring and maintenance at the station.

RESEARCH METHODS

This study used a descriptive quantitative and qualitative approach. The descriptive quantitative approach was used to measure the level of user needs for SIMFAS features and the effectiveness of system implementation, while the qualitative approach was used to describe the existing conditions and problems of the manual inspection system. The research was conducted at PT Kereta Cepat Indonesia China (KCIC), specifically at Tegalluar Station, Bandung Regency, West Java Province, during the Field Work Practice and internship period from November 24, 2025, to March 1, 2026, while data processing and report preparation were carried out until June 2026.

The user-needs analysis was carried out by distributing questionnaires to 16 respondents consisting of 1 Passenger Services Facility (PSF) person in charge, 1 Mechanical, Electrical, and Plumbing (MEP) leader, and 14 MEP technicians, who were selected because they are directly involved in inspection, damage reporting, and service facility maintenance activities, while system testing was conducted by 3 respondents consisting of 1 admin, 1 leader/PIC, and 1 technician, with a total of 13 test scenarios, each

tested 3 times to ensure the consistency of system functions. Secondary data were obtained from the daily inspection checklist schedule, the inspection operational flow, the daily inspection standard operating procedure (SOP), journals, and documents from the Passenger Services Facility Bureau, while primary data were obtained through field observation, interviews, questionnaires related to system requirements identification, and direct website trials.

The user-needs analysis was carried out using descriptive quantitative analysis with a five-point Likert scale to determine the level of user needs for the features to be implemented in SIMFAS (Sumilih et al., 2025). The mean value was calculated using the formula $\bar{x} = (\Sigma x) / n$, where $\bar{x}$ is the mean value, Σx is the total score of all respondents, and n is the number of respondents. The mean value was then interpreted using class intervals on the five-point Likert scale with an interval range of 0.80 (Alkharusi, 2022), namely the categories Strongly Disagree for the range 1.00–1.80, Disagree for 1.81–2.60, Neutral for 2.61–3.40, Agree for 3.41–4.20, and Strongly Agree for 4.21–5.00.

The effectiveness of the website was tested using a comparative descriptive method, namely comparing the indicators of inspection recording time, the speed of damage-finding reports, the availability of inspection historical data, the level of documentation accuracy, and the ease of monitoring by the PIC between the manual system and SIMFAS. The efficiency value was calculated using the formula $\text{Efficiency} = ((T_m - T_s) / T_m) \times 100\%$, where T_m is the processing time in the manual system and T_s is the processing time in SIMFAS. In addition, system evaluation was carried out using the PIECES (Performance, Information, Economics, Control, Efficiency, Service) method, while the website design used the Rapid Application Development (RAD) approach, which includes a use case diagram, activity diagram, and entity relationship diagram (ERD).

RESULTS AND DISCUSSION

The service facility inspection process at KCIC Tegalluar Station is still carried out manually using paper-based checklist forms. Officers directly inspect facilities such as toilets, waiting rooms, lifts, escalators, HVAC systems, information boards, fire extinguishers (APAR), and other accessibility facilities, after which the inspection results are recorded on the checklist form while documentation is carried out separately using a mobile phone. Based on the Minimum Service Standard (SPM) monitoring results during the 2025 Christmas and 2026 New Year travel period, most service facilities already met the standards set out in PM Number 7 of 2022; however, the documentation of inspection results has not been stored in an integrated database system, and the reporting of facility disruptions and the monitoring of damage history are still carried out manually, so that they cannot yet be performed in real time. These conditions give rise to several problems, as presented in Table 1, namely double data input between the manual checklist and separate documentation, which risks data inconsistency; the search for historical data, which takes around 20–30 minutes; delays in reporting inspection results of around 30–60 minutes; documentation that has not been integrated, making facility condition monitoring less effective; maintenance follow-up monitoring that is not yet real time; and the risk of losing or damaging inspection data.

Table 1 Problems in the Manual Service Facility Inspection System

No	Problem	Operational Impact
1	Double data input between manual checklist and separate documentation	Administrative process is less efficient and risks data inconsistency
2	Historical data search takes a long time	Damage history search takes approximately 20–30 minutes
3	Delay in reporting inspection results	Reporting process is delayed by approximately 30–60 minutes
4	Inspection documentation is not yet integrated	Facility condition monitoring becomes less effective
5	Maintenance follow-up monitoring is not yet real time	Potential delay in facility repair process

No	Problem	Operational Impact
6	Risk of losing or damaging inspection data	Inspection data may be lost or difficult to trace

Source: processed from research data, 2026

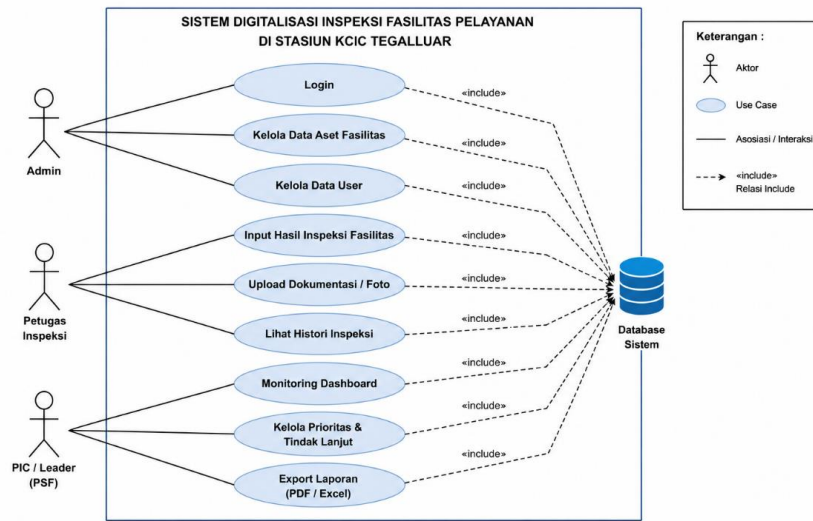
The results of the user-needs questionnaire on SIMFAS design, distributed to 16 respondents, are presented in Table 2. All indicators obtained a mean score between 4.25 and 4.75, with an overall mean of 4.56, which falls into the Strongly Agree category. The highest score was obtained for the need for centralized data storage, while the lowest score was obtained for the need to export reports in Microsoft Excel format, although it still fell into the Strongly Agree category. These results indicate that users have a very high level of need for the development of SIMFAS as a digital service facility inspection system.

Table 2 Mean User Needs for SIMFAS Design

No	Needs Indicator	Mean	Interpretation
1	The manual inspection process takes a considerable amount of time	4.50	Strongly Agree
2	A digital system is needed to replace the manual form	4.63	Strongly Agree
3	Inspection data needs to be stored in a centralized database	4.75	Strongly Agree
4	Photo documentation of damage is required	4.31	Strongly Agree
5	The system needs to provide inspection history	4.69	Strongly Agree
6	A real-time monitoring dashboard is required	4.69	Strongly Agree
7	The system needs role-based (multi-role) access rights	4.56	Strongly Agree
8	Reports need to be exportable to PDF format	4.63	Strongly Agree
9	Reports need to be exportable to Microsoft Excel format	4.25	Strongly Agree
	Overall Mean	4.56	Strongly Agree

Source: processed from research data, 2026

Based on the results of the needs analysis, a system called SIMFAS (Facility Management Information System) was designed, developed using the PHP programming language, a MySQL database, and a Bootstrap interface so that it can be accessed via computers or mobile phones. The system design used the Rapid Application Development (RAD) approach, which includes a use case diagram, activity diagram, and entity relationship diagram (ERD) to describe the relationships between users, process flows, and the system's data structure. The system involves three types of users, namely Admin, who manages facility asset data and system users; the Inspection Officer, who inputs inspection results and uploads damage documentation; and the PIC/PSF Leader, who monitors the dashboard, manages maintenance follow-up, and exports reports, as illustrated by the use case diagram in Picture 1.

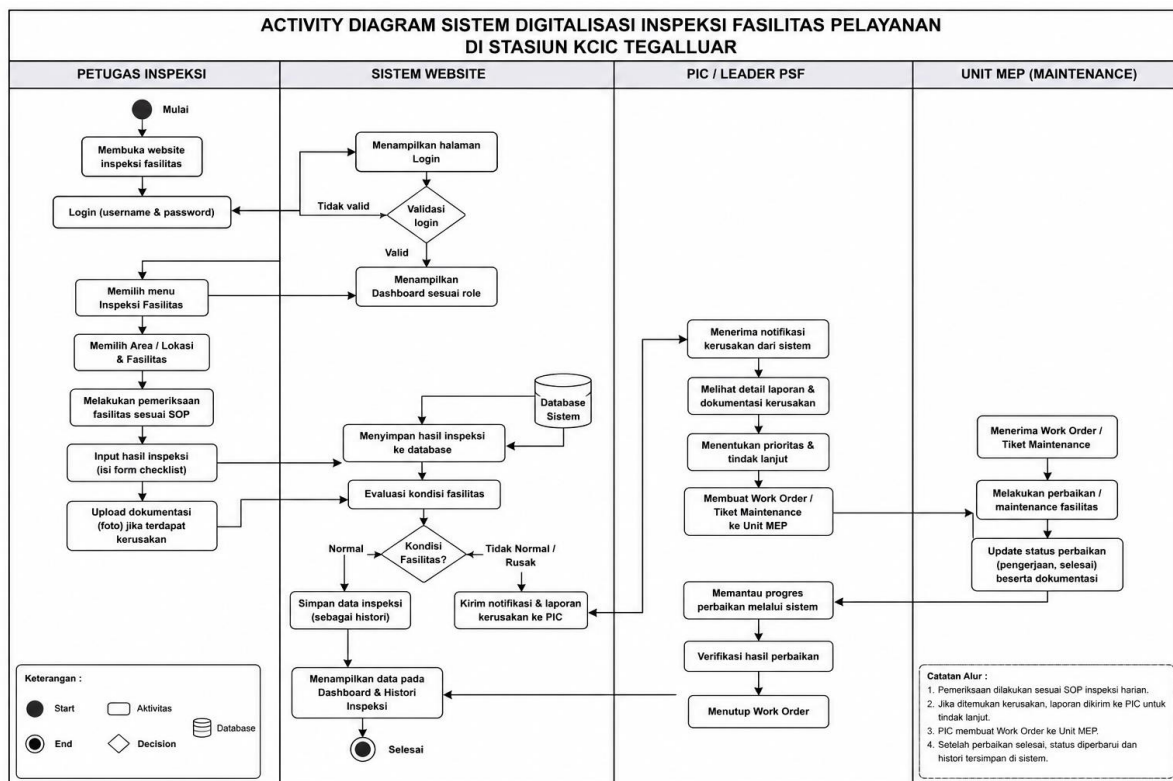


Gambar V.1 Use Case Diagram Sistem
Sumber: Hasil Analisis, 2026

Picture 1 Use Case Diagram of the Service Facility Inspection Digitalization System

Source: Author, 2026

The flow of user activities and system responses is illustrated through the activity diagram in Picture 2, starting from the login process, carrying out the inspection, inputting the inspection results, and monitoring and following up on maintenance.

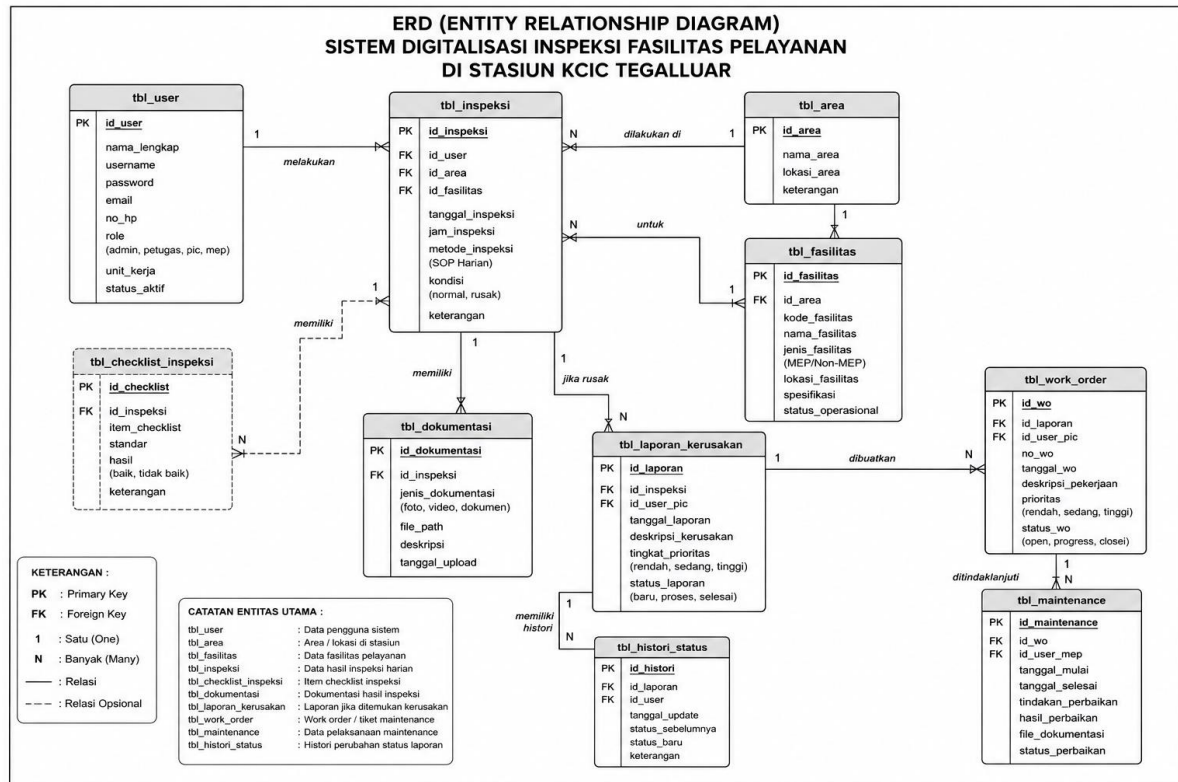


Picture 2 Activity Diagram of the Service Facility Inspection Digitalization System

Source: Author, 2026

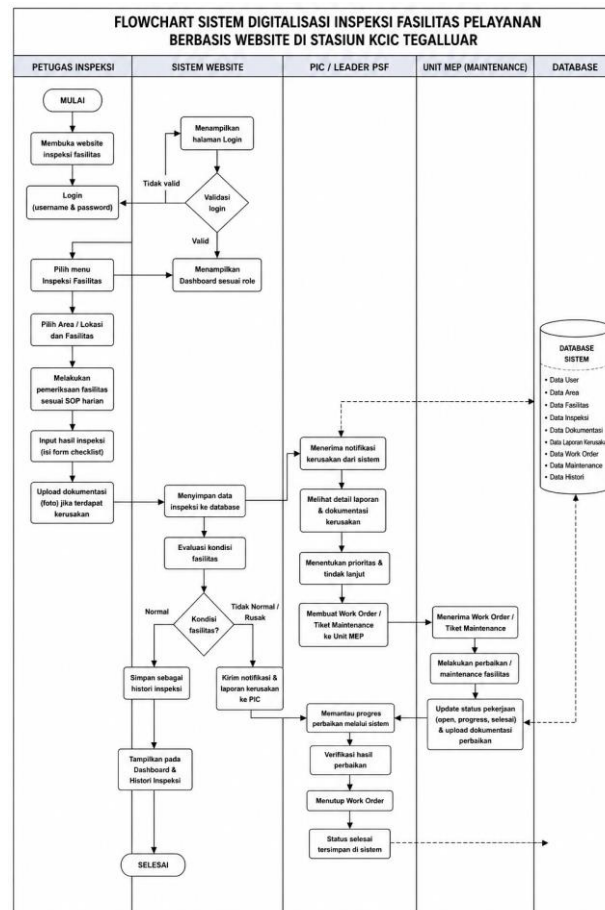
The system's database structure was designed using an Entity Relationship Diagram (ERD) to describe the relationships between user data, facility data, inspection results, damage documentation,

and maintenance data, as presented in Picture 3, while the overall system process flow, from user login to maintenance follow-up, is illustrated through the system flowchart in Picture 4.



Picture 3 Entity Relationship Diagram (ERD) of SIMFAS

Source: Author, 2026



Picture 4 Flowchart of the Service Facility Inspection Digitalization System

Source: Author, 2026

The SIMFAS interface consists of a login page as presented in Picture 5, a monitoring dashboard and inspection form in Picture 6, and a facility inspection history table in Picture 7. In addition to displaying history on the dashboard, SIMFAS also provides a feature for exporting inspection reports to PDF format, as presented in Picture 8, thereby facilitating administrative and reporting needs.

Picture 5 Login Page of the SIMFAS System

Source: Author, 2026

Riwayat Inspeksi Fasilitas										
Export PDF Export Excel										
-- Filter Status -- -- Filter Fasilitas -- Filter										
No	Petugas	Area	Tanggal	Waktu	Fasilitas	Status	Prioritas	Catatan	Foto	GPS
1	Aditya	AC Toilet Lt.3	2026-06-21	11:47:00	HVAC	Abnormal Kritis	Tinggi			Lihat Lokasi Hapus
2	Jolio Aditya	Lobby 1	2026-05-18	10:54:00	Eskalator dan Elevator	Normal/OK	Rendah			Lihat Lokasi Hapus

Picture 6 Monitoring Dashboard and Inspection Form on SIMFAS

Source: Author, 2026

Master Fasilitas		
Tambah Fasilitas		
No	Nama Fasilitas	Aksi
1	APAR	Edit Hapus
2	Elektrikal	Edit Hapus
3	Bangunan	Edit Hapus
4	Eskalator dan Elevator	Edit Hapus
5	Plumbing	Edit Hapus
6	HVAC	Edit Hapus

Picture 7 Facility Inspection History Table on SIMFAS

Source: Author, 2026

LAPORAN INSPEKSI FASILITAS PELAYANAN	
STASIUN KCIC TEGALLUAR	
Tanggal Cetak : 23-06-2026 07:03	
Inspeksi #1	
Petugas	Aditya
Area	AC Toilet Lt.3
Fasilitas	HVAC
Status	Abnormal Kritis
Prioritas	Tinggi
Tanggal	2026-06-21 11:47:58
Catatan	
Foto Temuan	

Picture 8 PDF Export Results of Historical Inspection Data

Source: Author, 2026

SIMFAS testing was carried out using the Black Box Testing method to determine the suitability of the system's functions with user needs. Testing was carried out by 3 respondents with the roles of Admin, Leader/PIC, and Technician, covering 13 test scenarios including the login process, facility master data management, inspection data input, photo documentation upload, dashboard monitoring, inspection history management, report export to PDF and Microsoft Excel formats, and the logout process. Of the 39 trials conducted, all scenarios were successfully executed without failure, resulting in a system success rate of 100%.

A comparison of the effectiveness of the manual system and SIMFAS is presented in Table 3. The comparison results show that the implementation of SIMFAS improved the efficiency of inspection result recording by 66.67%, accelerated damage-finding reporting by 94.44%, and accelerated historical data retrieval by 80%. Thus, SIMFAS not only functions according to user needs but has also been

proven to significantly improve the effectiveness and efficiency of the service facility inspection process.

Table 3 Comparison of the Effectiveness of the Manual System and SIMFAS

No	Test Variable	Manual System	SIMFAS	Improvement
1	Inspection result recording time	5–10 minutes	2–3 minutes	66.67%
2	Speed of damage-finding reports	30–60 minutes	2–3 minutes	94.44%
3	Availability of historical inspection data	20–30 minutes	< 5 minutes	80.00%
4	Level of documentation accuracy	Separate photos without timestamps	Integrated photos with automatic timestamps	More accurate
5	Ease of monitoring by the PIC	Through manual reports	Real-time monitoring dashboard	More effective

Source: processed from research data, 2026

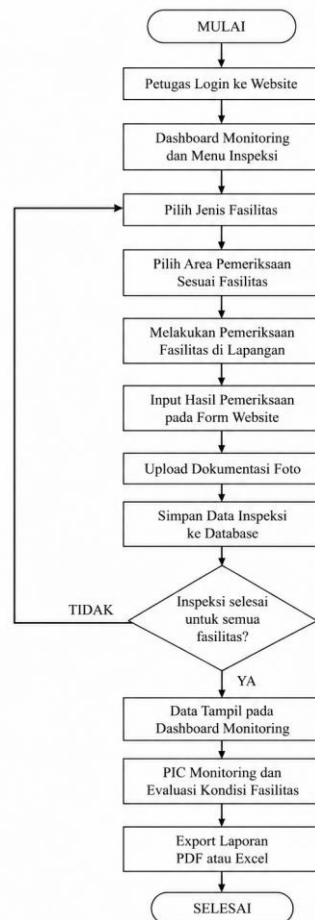
The improvement provided by SIMFAS compared to the manual system was evaluated using the PIECES method, as presented in Table 4. Based on the results of this analysis, SIMFAS was able to improve the effectiveness of the inspection process compared to the manual system in all aspects, namely performance, information provision, operational cost efficiency, data control, reporting efficiency, and the quality of facility service at KCIC Tegalluar Station, Bandung Regency.

Table 4 PIECES Analysis of SIMFAS Implementation

Aspect	Manual System	SIMFAS
Performance	Inspection and reporting are carried out manually, requiring a relatively long time	Inspection input, photo upload, and data storage are performed in real time
Information	Inspection information is not yet integrated, and damage history is difficult to find	Information is stored on the monitoring dashboard and centralized database
Economics	The use of paper checklists and manual documentation increases operational costs	The entire inspection process is carried out digitally
Control	The risk of data loss is quite high due to manual documentation	Data is stored in a MySQL database equipped with photo uploads and inspection history
Efficiency	Officers carry out recaps and reports manually	The system provides automatic PDF and Excel export
Service	Facility monitoring is not yet optimal, so maintenance follow-up has the potential to be delayed	The monitoring dashboard helps to monitor facilities in real time

Source: processed from research data, 2026

The standard operating procedure (SOP) for using SIMFAS begins with officers logging into the system, selecting the type of facility and inspection area, inspecting the facility on site, inputting the inspection results along with photo documentation, until the data is automatically stored in the database. Once all facilities have been inspected, the data will appear on the monitoring dashboard and can be monitored by the PIC/Admin, and can also be exported in PDF or Excel format, as presented in Picture 9.



Picture 9 Flowchart of the SOP for Using the Inspection Website (SIMFAS)

Source: Author, 2026

CONCLUSION

The existing condition of the service facility inspection process at KCIC Tegalluar Station is still carried out manually using paper-based checklist forms with separate documentation, giving rise to problems such as double data input, delayed reporting, unintegrated documentation, the risk of data loss, and maintenance follow-up monitoring that is not yet real time. Based on these problems, SIMFAS (Facility Management Information System), a website-based system that integrates inspection recording, timestamped photo documentation, monitoring dashboards, inspection history, and report export into a single centralized system, was developed. The implementation of SIMFAS has been proven to improve the effectiveness and efficiency of service facility management, with a system testing success rate of 100%, a 66.67% improvement in inspection result recording efficiency, a 94.44% acceleration in damage reporting, and an 80% acceleration in historical data retrieval. Therefore, PT KCIC, particularly the Passenger Services Facility (PSF) unit, is advised to gradually implement a website-based service facility inspection system to replace the manual checklist system, and to further develop the system by adding features such as automatic facility damage notifications, a maintenance priority dashboard, biometric authentication, Quick Response (QR) Code and Internet of Things (IoT) integration, as well as risk mitigation mechanisms such as server backup and periodic database backup to anticipate server disruptions, power outages, and blank spot conditions in the station area.

REFERENCES

- Aisyah, T., Safira, A., Azizah, R., Damayanti, K., & Fatkhuri. (2025). Analisis pengaruh kebijakan penggunaan e-money dan tiket digital Go-Jek terhadap transparansi sistem pembayaran KAI [The influence of e-money policy and Go-Jek digital ticketing on the transparency of the KAI payment system]. *Jurnal ISO: Jurnal Ilmu Sosial, Politik dan Humaniora*, 5(1), 20. <https://doi.org/10.53697/iso.v5i1.2524>
- Alkharusi, H. (2022). A descriptive analysis and interpretation of data from Likert scales in educational and psychological research. *Journal of Research in Education*, 12(2), 13–16.
- Dhila Franzely, D. P., Sopian, A., & Ratnasari, D. (2021). Penerapan metode PIECES pada perancangan sistem informasi penjualan berbasis web PT Vallery [Application of the PIECES method in designing a web-based sales information system for PT Vallery]. *Jurnal Sistem Informasi*, 1(2), 7–11.
- Jatiwaluyo, N. (2022). Analisis fasilitas layanan terhadap kepuasan pengguna Stasiun Kereta Api Kebumen [Analysis of service facilities on user satisfaction at Kebumen Railway Station]. *TEKSLING: Jurnal Teknik Sipil dan Lingkungan*, 1(2), 71–86.
- Laudon, K. C., & Laudon, J. P. (2020). *Management information systems: Managing the digital firm* (16th ed.). Pearson.
- Lestiyono, S. (2025). Efisiensi penggunaan transportasi publik berbasis rel (literature review) [The efficiency of rail-based public transportation use: A literature review]. *LANCAH: Jurnal Inovasi dan Tren*, 3(1), 124–130. <https://doi.org/10.35870/ljt.v3i1.3752>
- Prastyo, D., & Irawan, D. (2024). Rancang bangun aplikasi inspeksi dan checklist terintegrasi menggunakan metode Rapid Application Development (RAD) [Design and development of an integrated inspection and checklist application using the Rapid Application Development (RAD) method]. *bit-Tech*, 7(1), 162–173. <https://doi.org/10.32877/bt.v7i1.1603>
- Republic of Indonesia. (2007). *Law Number 23 of 2007 concerning Railways*. State Gazette of the Republic of Indonesia of 2007 Number 65.
- Republic of Indonesia. (2022). *Minister of Transportation Regulation Number PM 7 of 2022 concerning the Operation of High-Speed Railways*. Ministry of Transportation of the Republic of Indonesia.
- Sari Cahyaningrum, E., Istijanto, S., & Soemarwanto, D. (2025). Analisis kelengkapan fasilitas Terminal Tipe B Landungsari berdasarkan standar regulasi di Indonesia [Analysis of facility completeness at Landungsari Type B Terminal based on Indonesian regulatory standards]. *Jurnal Lingkungan Karya Arsitektur*, 4(1), 9–20. <https://doi.org/10.37477/lkr.v4i1.714>
- Setiadi, R. J., Saputra, S. T., & Sonhaji, I. (2024). Analisis digitalisasi pengecekan peralatan pendukung (station routine) pada kendaraan foam tender berbasis website di Bandara Internasional Soekarno-Hatta [Analysis of the digitalization of website-based support equipment checking (station routine) for foam tender vehicles at Soekarno-Hatta International Airport]. *Jurnal Teknik dan Manajemen Bandar Udara*, 13(3), 1–10.
- Sumilih, D. A., Tamsah, H., Ajie, A. P., Enny, M., Nurhidayah, Y., & Lestari, W. D. (2025). *Metodologi penelitian kuantitatif dan kualitatif dalam ilmu sosial* [Quantitative and qualitative research methodology in social science]. Penerbit Nas Media Pustaka.
- Sunaryo, & Agustina, W. W. (2020). Rancangan prosedur inspeksi harian fasilitas perlengkapan jalan tol Unit Traffic Control PT Jasa Marga Cabang Surabaya-Gempol [Design of a daily inspection procedure for toll road equipment facilities at the Traffic Control Unit of PT Jasa Marga Surabaya-Gempol Branch]. *Jurnal Teknologi Transportasi dan Logistik*, 1(2), 75–80.

- Suryani, E. D. N. P., & Fatahilah, N. (2025). Optimasi pemeriksaan alat pemadam api ringan (APAR) berbasis digital dengan i-Reporter [Optimization of digital-based fire extinguisher inspection using i-Reporter]. *Proceedings of the Indonesian Conference on Occupational Safety, Health, and Environment (INCOSHET)*, 2(1), 35–50.
- Triani, R. A., & Schouten, F. S. (2023). Analysis of the application of online ticket booking. *Jurnal Perkeretaapian Indonesia*, 7(1), 132–138.
- Yuwantiningrum, S. E., & Nurdawanty, S. P. (2025). Pengaruh pelayanan dan fasilitas terhadap kepuasan pengunjung [The influence of service and facilities on visitor satisfaction]. *Jurnal Ilmiah Pariwisata Kesatuan*, 5(1), 551–559. <https://doi.org/10.37641/jipkes.v5i1.2751>