Application, Information System and Software Development Journal
Appissode Journal
Vol. 3, No. 4, December 2025, Page 8-12
E-ISSN: 3032-5625, P-ISSN: 3032-5269

Design and Development of a Web-Based Tenant Management System at Mutiara SIS Al-Jufri Airport

Ferry Ardiansah Sulistyo[1], Didi Hariyanto[2], Linda Winisari[3]
Politeknik Penerbangan Surabaya, Indonesia

Corresponding Author: Ferry Ardiansah Sulistyo
Air Transportation Management Departement
Politeknik Penerbangan Surabaya, Indonesia
Email: ferryardiansah@email.com

Article History

Received August 1, 2025
Accepted August 22, 2025
Published December 2025

Keywords

Tenant Management, Web-Based System, PIECES Analysis, Digital Transformation, Airport Service

Abstract

Mutiara SIS Al-Jufri Airport hosts a number of tenants providing various services to airport users. However, its manual management system leads to inefficiencies, risks of data loss, and limited access to information. This research aims to design and develop a web-based tenant management system to streamline the rental and complaint processes. The prototype method was employed through five stages: communication, planning, modeling, construction, and system delivery. The system utilizes Google Sites as the primary website, supported by Clappia and Google Spreadsheet for forms and data storage. The results show that the system enhances operational efficiency, transparency, and service quality. Effectiveness evaluation using the PIECES framework confirms performance improvement. Furthermore, the system supports paperless operations and aligns with eco-airport concepts.

1 INTRODUCTION

Mutiara SIS Al-Jufri Airport is a strategic transportation hub in Central Sulawesi, Indonesia. It accommodates various tenant services including restaurants, retail, and financial services to enhance passenger experience. Despite this, tenant operations are still managed manually through physical forms and direct communication. This traditional method poses several problems such as data loss, delayed processing, and lack of efficiency. Digital transformation in public service, especially in the aviation sector, offers opportunities to improve service quality and operational effectiveness. Implementing a digital system can simplify business processes, promote transparency, and increase responsiveness. This research aims to develop a tenant management system using a web-based approach to support rental applications, contract documentation, and complaint handling at the airport. Information systems analysis and design is a structured process of studying organizational needs and translating them into a system specification that can meet user requirements and improve performance [1].

Tenant management at Mutiara SIS Al-Jufri Airport is still conducted manually through physical documents and direct communication. This approach leads to inefficiencies, data loss risks, and slow service. Digital transformation is needed to improve operational efficiency, data access, and transparency. The success of an information system is influenced by the alignment between user needs, system functionality, and the technology infrastructure that supports it [2]. Web-based applications allow users to access information and services anytime and anywhere, increasing flexibility and operational reach [3]. System modeling is an essential step to ensure that workflows, data relationships, and system interfaces meet the needs of all stakeholders [4]. To design and develop a website-based system that supports efficient, structured, and accessible tenant rental and complaint processes.

The benefits of this research are:

- Practical: Makes it easier for tenants to access and submit digital forms.
- Managerial: Assists airport management in monitoring data and workflows.
- Environmental: Supports eco-airport practices by reducing paper usage.

An information system is defined as a combination of technology, people, and procedures that transform data into useful information. Tenant management is described as a process that includes rental, contract management, and complaint handling, facilitating the relationship between tenants and management. This study utilizes Google Sites as a fast and user-friendly platform for website creation, Clappia for creating real-time integrated digital forms, and Google Spreadsheet for online data storage and processing.

Furthermore, this research applies the prototyping method to develop the system iteratively by involving user feedback in each stage. The system evaluation uses the PIECES analysis framework, which consists of six assessment aspects: Performance, Information, Economy, Control, Efficiency, and Service. This comprehensive approach ensures that the developed system can be assessed in terms of performance, information quality, cost, control, efficiency, and service delivery.

2 METHOD

Data was collected using three main techniques. First, direct observation of the tenant management process, from rental application to complaint handling, to map existing workflows. Second, interviews with tenant management staff to understand their needs, challenges, and priorities for system development. Third, a literature review of books, journals, and online sources related to information systems, tenant management, Google Sites, Clappia, Google Spreadsheet, and the PIECES analysis method.

2.3 Data Collection Techniques

To ensure the system was tailored to the actual needs of the airport's tenant management division, three data collection techniques were used:

- Observation – Direct observation of tenant registration, contract renewal, and complaint handling workflows to identify inefficiencies and bottlenecks in the existing manual process [8].
- Interviews – Structured interviews with the airport's commercial division officers to gather detailed functional and non-functional requirements, including user access needs, reporting formats, and integration preferences.
- Literature Review – Review of related academic works, books, and online resources on information systems, airport commercial management, Google Sites development, Clappia form customization, and the PIECES framework for system evaluation [9].

2.4 System Development Stages

The development followed five key stages:

1. Communication – Conducted requirement analysis with stakeholders to define essential modules such as tenant registration, rental rate information, contract documentation, complaint submission, and reporting features.
2. Quick Plan – Selected Google Sites as the primary website platform for ease of deployment and accessibility, Clappia for dynamic form creation, and Google Spreadsheet for centralized data storage and analysis.
3. Quick Design – Created use case diagrams, entity relationship diagrams, and interface mockups that reflected the functional requirements and workflow logic of tenant management.
4. Construction – Developed and integrated system components, ensuring that data submitted via forms was automatically recorded in Google Spreadsheet, enabling real-time monitoring and reporting [10].
5. Development – Tested the system with actual airport management staff, then evaluated performance using the PIECES framework (Performance, Information, Economy, Control, Efficiency, Service) to measure operational improvements [11].

3 RESULTS

3.1 System Development Result

1. Communication Result

The initial stage of development began with identifying system requirements through discussions and interviews with the tenant management division at Mutiara SIS Al-Jufri Airport. The findings revealed that the previously used manual system had several weaknesses, such as lengthy rental application processing times, a high risk of document loss, and difficulties in

tracking tenant complaint statuses. The management expressed the need for a web-based system that is integrated, user-friendly, accessible across devices, and equipped with features that support efficient and effective tenant management [12]. The researcher conducted a preliminary analysis through observation during the first On the Job Training (OJT) at the Terminal, Sanitation, and Hygiene Unit of Mutiara SIS Al-Jufri Airport in January 2025, and found that:

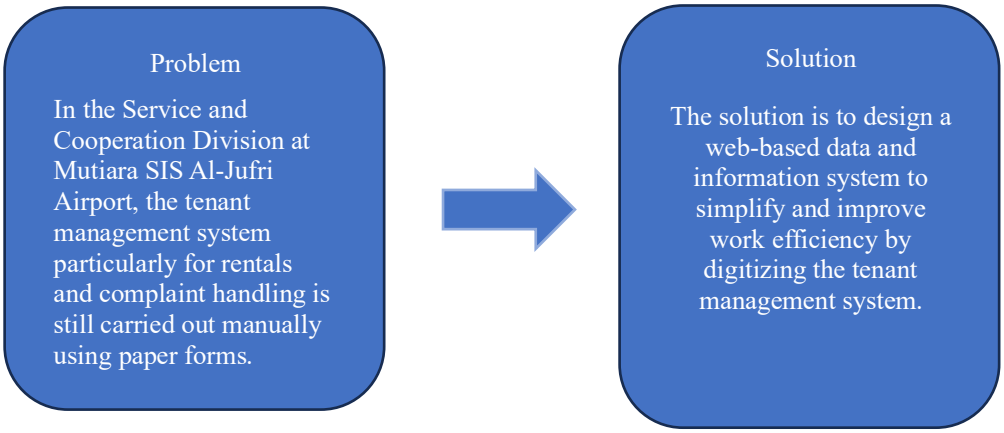

Figure 1 Analysis of Problem and Solution

2. Quick Plan Result

Based on the communication stage findings, the planning stage was conducted to determine the technical specifications, platforms to be used, and main features to be developed. Google Sites was selected as the main platform for website creation due to its ease of integration, Clappia was chosen for creating interactive forms, and Google Spreadsheet for cloud-based data storage and management. The planned features included a rental rates menu, tenant rental procedures, tenant rental form, tenant billing menu, complaint handling menu, and tenant complaint form.

3. Quick Modelling Desain Result

At this stage, the system design was created in the form of a use case diagram, entity relationship diagram, and user interface mockups. The modeling aimed to ensure that the system workflow, data relationships, and interface design met user requirements. The design emphasized simplicity and informativeness, with a focus on easy navigation and compatibility across devices such as desktops, tablets, and smartphones.

4. Construction Result

a. Data Management System Design

The creation of a data management system in the form of a digital form was carried out using the online platform Clappia. The process began by accessing https://www.clappia.com/ via a web browser and creating an account to start building the required form. A workplace subdomain was then created and named “manajementenant” in accordance with the project, which focuses on developing a web-based tenant management system [13]. The form design process started from the dashboard by organizing sections based on needs, with each section having its own advanced settings and specific functions. Various drag-and-drop blocks were added, including text fields, drop-down menus, date and time selectors, barcode scanners, and options for uploading photos and files. Once completed, the form was integrated with Google Spreadsheet and Google Drive to store and manage the collected data.

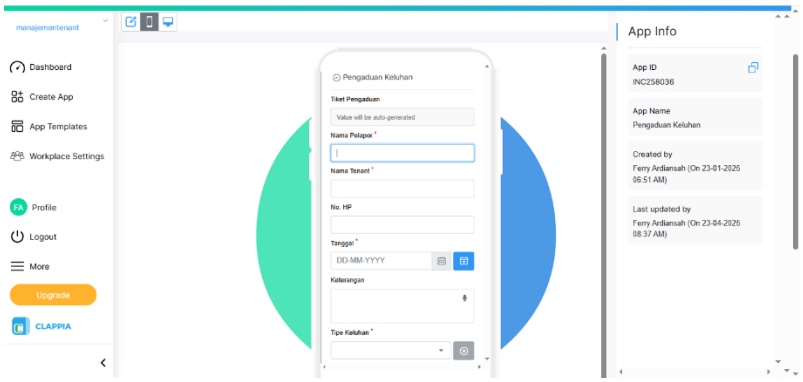

Figure 2 Digital Form Interface

The construction stage began with the creation of digital forms using Clappia, which were directly linked to Google Spreadsheet to ensure that all tenant-submitted data was automatically stored in the cloud. The website was built using Google

Sites, following the menu structure designed in the planning stage. After successful platform integration, a series of preparatory steps were undertaken before implementing the system in an operational environment:

1. Functionality Testing: Ensuring that all system features operated according to the design, such as displaying correct rental rates, automatically processing rental and complaint forms, and accurately showing tenant billing information.
2. Data Validation: Conducting simulations to verify the accuracy of data storage and retrieval, ensuring that platform integration worked seamlessly without data loss.
3. User Interface Enhancement: Refinements were made based on feedback from trial users, including layout improvements, higher contrast color schemes, and font size adjustments to enhance user-friendliness.
4. User Manual Preparation: Developing a step-by-step illustrated guide for using each menu and feature, enabling both tenants and administrators to easily understand the rental process, bill checking, and complaint reporting procedures.
5. Development

With these preparations, the system was ensured to be in optimal condition before its full launch. This pre-implementation phase also served as the foundation for conducting limited trial evaluations, involving respondents from both tenants and management [14]. The evaluation was carried out through questionnaires assessing usability, system response speed, data accuracy, and feature completeness. The questionnaire results were then analyzed to measure user satisfaction levels and to identify areas for improvement before the system's official implementation.

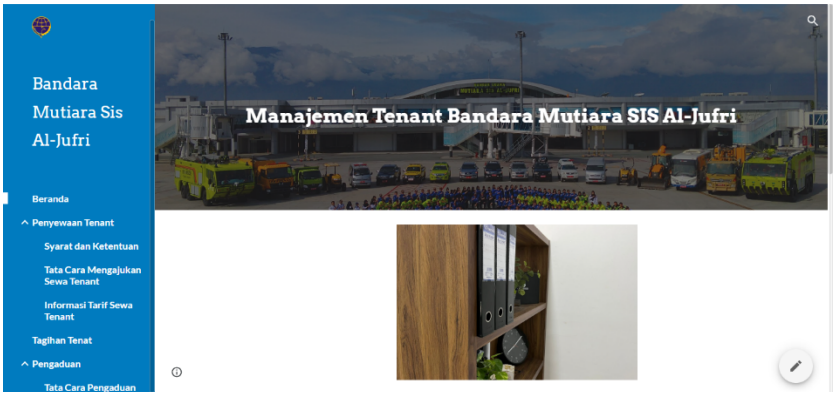

Figure 3 Website Management Tenant Interface

The website consists of eight (8) pages, namely:
a. Home – Contains information about the tenant rental and complaint submission pages.
b. Tenant Rental – Provides information on tenant categories available at the airport, an "Apply for Rental" button linking to the digital rental form, and emergency contact details for the management.
c. Terms and Conditions – Contains general requirements for renting a tenant space, tenant regulations, payment information, and important notices from the management.
d. Tenant Rental Procedures – Explains the step-by-step process for applying to rent a tenant space.
e. Tenant Rental Rates Information – Provides details on tenant location, type, and rental prices.
f. Tenant Billing – Displays billing information, tenant availability, and rental periods.
g. Complaints – Includes complaint processing time, an "Submit Complaint" button to file a complaint, an FAQ section, and emergency contact information for the management.
h. Complaint Procedures – Explains the step-by-step process for submitting a tenant complaint.

3.2 PIECES Analysis Result

The system evaluation was conducted using the PIECES framework to compare the previously used manual system with the newly developed web-based system:

- Performance: The new system significantly reduces the processing time for rental applications and complaint handling.
- Information: Data is better structured, securely stored in the cloud, and accessible at any time.
- Economy: Paper usage is significantly reduced, lowering operational costs.
- Control: Digital storage minimizes the risk of document loss and simplifies data retrieval.
- Efficiency: Integration between platforms speeds up data entry, processing, and presentation.
- Service: Tenants can submit rental applications and complaints online without the need for physical visits.

The results indicate that the web-based system provides substantial improvements across all aspects compared to the manual approach [15].

CONCLUSION

This study successfully designed and developed a web-based tenant management system at Mutiara SIS Al-Jufri Airport, integrating the processes of tenant rental, billing management, and complaint handling into a single digital platform. The utilization of Google Sites, Clappia, and Google Spreadsheet has improved work efficiency, reduced the risk of data loss, and enhanced information transparency. The trial results indicated that the system could be operated effectively by both management and tenants, featuring user-friendly functions that meet operational needs.

For further development, the system can be enhanced with an automatic notification feature related to billing or rental periods via email or short messages, as well as improved data security through encryption. Regular training sessions for users are also recommended to maximize system utilization, along with integration into the broader airport system to support centralized tenant management.

REFERENCES

[1] H. Al Fatta, Analisis dan Perancangan Sistem Informasi. Yogyakarta, Indonesia: Andi Offset, 2007.

[2] S. Anggraeni, Sistem Informasi Manajemen. Yogyakarta, Indonesia: CV. Budi Utama, 2017.

[3] Y. Bekti, Dasar-dasar Website. Yogyakarta, Indonesia: Graha Ilmu, 2015.

[4] J. Duckett, JavaScript and JQuery: Interactive Front-End Web Development. Indianapolis, IN, USA: Wiley, 2014.

[5] D. Flanagan, JavaScript: The Definitive Guide, 7th ed. Sebastopol, CA, USA: O'Reilly Media, 2020.

[6] R. Hidayat, "Penggunaan sistem digital untuk layanan publik di bandara," Jurnal Transportasi, vol. 13, no. 1, pp. 55–63, 2021.

[7] J. Hutahaean, Konsep Sistem Informasi. Yogyakarta, Indonesia: Deepublish, 2016.

[8] K. C. Laudon and J. P. Laudon, Management Information Systems, 16th ed. Harlow, England: Pearson, 2020.

[9] N. Maulidia, "Analisis PIECES dalam evaluasi sistem informasi," Jurnal Sistem Informasi Bisnis, vol. 5, no. 2, pp. 42–50, 2020.

[10] R. S. Pressman, Software Engineering: A Practitioner's Approach, 9th ed. New York, NY, USA: McGraw-Hill, 2021.

[11] I. Oktaviani and D. Sumarlinda, "Pengukuran efektivitas sistem informasi dengan PIECES," Jurnal Ilmu Komputer dan Sistem Informasi, vol. 9, no. 4, pp. 333–340, 2021.

[12] T. Purnomo, "Digitalisasi bandara ramah lingkungan," Majalah Transportasi Udara, Feb. 2024.

[13] Sugiyono, Metode Penelitian Pendidikan. Bandung, Indonesia: Alfabeta, 2019.

[14] E. Turban, Information Technology for Management. Hoboken, NJ, USA: Wiley, 2021.

[15] L. S. Moonlight, et al., "Prototyping for airport service system design," Journal of Aviation Technology, vol. 7, no. 2, pp. 88–95, 2023.