

Optimization of Website Based Facility Service System at Politeknik Penerbangan Surabaya

Lady Silk Moonlight^{a,1,*}, Teguh Arifianto^{b,2}, Ahmad Bahrawi^{c,3}, Dewi Ratna Sari^{d,4}, Didi Hariyanto^{d,5}, Putri Dya Citra Nur Kumala Sari^{e,6}

^aStudy Program of Air Transport Management, Politeknik Penerbangan Surabaya, Surabaya, Indonesia

^b Department of Railway Electrical Technology, Politeknik Perkeretaapian Indonesia, Madiun, Indonesia

^cStudy Program of Air Traffic Control, Politeknik Penerbangan Surabaya, Surabaya, Indonesia

^dStudy Program of Aeronautical Communication, Politeknik Penerbangan Surabaya, Surabaya, Indonesia

^eSalesforce Asia, Viseo Warp Japan, Tokyo, Japan

¹ lady@poltekbangsby.ac.id *; ² teguh@ppi.ac.id ; ³ ahmadbahrawi@poltekbangsby.ac.id;

⁴ dewiratna@poltekbangsby.ac.id ; ⁵ didihariyanto@poltekbangsby.ac.id; ⁶ putri.dya@viseo.com

* Lady Silk Moonlight

ARTICLE INFO

Article history

Received

Revised

Accepted

Keywords

Asset rental management

Laravel 10

Payment gateway

Waterfall development

Web application

Digital technology

ABSTRACT

Technological developments, particularly in the Industry 4.0 era, accompanied by increasing technological literacy among the public, have influenced business operations, making them easier to develop and more widely known. Digital transformation innovations in facility services at the Politeknik Penerbangan Surabaya were carried out to improve administrative efficiency, information, and service speed. This study aims to develop a web-based facility service information system with the Laravel framework and online payments using the Midtrans payment gateway that can be accessed by internal and external users of the institution more easily and transparently. The development of this system uses the Waterfall Software Development Life Cycle (SDLC) method. The results of the study show that this system is able to manage facility data, transactions, availability, and transaction history in an integrated and real-time manner. The integration of Midtrans into the system not only makes transactions fast and secure, but also provides convenience and security protection for customers. The implementation of this system has been proven to increase efficiency, speed up the service process, minimize recording errors, while expanding service access for users from outside the institution easily and effectively. In addition, with the institution's digital development system, strategic decision-making has also become easier

This is an open access article under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



1. Introduction

The rapid development of information technology has revolutionized the way organizations carry out their operational activities, particularly in increasing the efficiency and speed of work processes, changes in transactions, validating information, and encouraging innovation that has triggered the emergence of facility management towards digital systems [1], [2], [3]. Digital transformation is an important factor in improving performance, productivity, innovation, and overall competitiveness because technological transformation supports efficiency and innovation in economic activities [4], [5], [6] [7]. Internet usage globally, including in Indonesia, continues to experience significant growth, accompanied by increasingly sophisticated technological developments. This situation has led to more people connecting online, accessing information and participating in the digital

economy. Now, various services that were previously accessible only offline have shifted to online services or undergone digital transformation, thereby increasing the digital experience and knowledge of internet users. Certainly, several institutions across various sectors are striving to strengthen their competition to meet the challenges of technological advancement by increasing accessibility, accelerating services, and utilizing technology for various needs, both personal and business [8], [9]

Improving digital services through digital transformation has become a crucial requirement in facility management within institutions [8]. Services and information will be increasingly accepted by the public, and companies will also benefit from digital innovation. Information transparency between divisions will improve the rental process, and revenue information will become more transparent [10]. More accurate and detailed reporting and data analysis will support better institutional planning and development in the future. Consumers always expect to be able to obtain and use rented items easily and quickly [11].

Facility rental services are still paid for offline. Because all data is manually entered into spreadsheets and books that are still susceptible to destruction, loan report recording has not been adequately digitized. Reports will also be challenging to summarize if they are required for a certain time frame. Customers also experience limited access to information. They are unable to view the politeknik penerbangan surabaya details or the things that are rented. External parties or prospective clients from outside the neighborhood are required to visit the establishment and conduct an offline inspection. Customers must thus go directly to the party in charge of the rental in order to learn the specifics, and not all of them have much free time to visit the rental place. Not only is data gathering still done by hand, but facility transactions are also paid for manually using cash or transfers to the institution's bank account, which is still susceptible to security threats including loss, fraud, mistakes, and counterfeiting [12].

The infrastructural facilities of higher education institutions are strategic assets that need ongoing upkeep and management to guarantee efficient operations and preserve the institution's image. However, proper finance for the upkeep and management of higher education facilities is frequently lacking in many developing nations [14]. Information technology integration is a strategic approach to increase the effectiveness of internal facilities management and financial management in higher education institutions [13]. It is thought that implementing a facility service system with digital technology-based asset maintenance management may boost facility management's efficacy and assist higher education institutions in raising the caliber of their offerings. Many students need temporary housing before the start of the new academic year or before the new semester, which raises the demand for dorms [15]

Meschini et al.'s research on the asset management of Italy's third-largest university is still deemed to be less digitally advanced [16].]. In order to promote technological innovation and integrate the entire process from ordering, service availability schedules, payments, and report recording a digital-based facility service information system must be developed. In order to promote technological innovation, this circumstance highlights the necessity of creating a digital-based facility service information system that can combine all aspects of the process, including ordering, service availability schedules, payments, and reporting. The Surabaya Aviation Polytechnic's housing categories, field buildings, equipment, services, and transportation are all rented out thanks to the development of this web-based facility service information system. Visitors may access each rented item's details immediately in the information system that will be established, and they can complete the transaction procedure online without physically visiting the Surabaya Aviation Polytechnic unit that manages this rental. In addition to internal parties, the general public and former students of this university are the target audience for these asset renters.

It an organization's system for managing information, including its intake, processing, and output as well as its distribution, is called an information system. The activities performed, the human data sources involved, the management structure, and the technology utilized are the four primary components of information systems from a socio-technical viewpoint [17]. Data is stored and the facility service system is supported by the database. The database influences users' acceptability and convenience of use of system services. The MySQL database is the primary language used in relational data management to address performance issues, particularly when managing intricate queries [18], [19].

A computerized system makes it easier and more accessible to gather data on facilities and equipment. Nevertheless, there isn't a system in place at politeknik penerbangan surabaya to handle the payment process and record facilities that are connected with the laravel framework-based payment gateway. The payment procedure is still done outside of the system since the majority of study focuses on the technological design of the display element, and the speed of system use must be taken into account while developing the system [20]. The php programming language, a web server, and the laravel framework were used to build the system in this study. The greatest php language framework that uses the mvc (modal view controller) approach to make the development structure more organized and efficient is laravel [21]. Blade and eloquent orm capabilities offered by laravel facilitate database management, resulting in fewer system queries [22], [23].

Accordingly, the creation of a facility service system website is intended to handle information and asset rental transactions at the politeknik penerbangan surabaya, encompassing the administration of field buildings, transportation facilities, dorms, commodities, and services. There are several things in each category, each with unique features, loan terms, and costs. Each rental item in this system will show the full description, technical details, loan terms, and rental prices per unit. In order to increase user accessibility and service effectiveness, the ordering and payment procedure is also made digital [24]. Therefore, the goal of developing this information system is to broaden the market and provide information about rentals by using digital platforms to draw in more clients and streamline the transaction process. It is intended that the facility service website would make asset management and rental easier. Customers and managers will have a better experience since they can quickly access and examine comprehensive descriptions, specifications, loan terms, and rental prices for services that are offered.

This website employs the waterfall system development life cycle (sdlc) approach to guarantee system development is organized and effective. The waterfall technique was selected because it enables the sequential and methodical execution of every development step, from requirements analysis to maintenance. This makes it possible to manage the project effectively and to carefully finish each step before going on to the next [4].

By employing payments connected with the midtrans payment gateway, which ensures the confidentiality of transaction data that cannot be altered directly from the system, this study solves the limits in payment transparency [12]. For electronic payment transactions to be completed swiftly, securely, and effectively, the payment gateway is a crucial element [25], [26]. By serving as a middleman between buyers, sellers, and financial institutions, the payment gateway guarantees that private data is secured and shielded from security risks. Offering a variety of payment and withdrawal options for different credit cards, e-wallets, qris, and popular virtual accounts, midtrans is one of the top payment gateways in 2025 [27]. Due to the comprehensiveness of its payment options, a wide range of organizations, including msme, start-ups, corporations, and huge institutions, utilize midtrans services [28]. Customers will feel more comfortable with this payment, and the organization will lessen other challenges, such as fraud.

In an attempt to promote technological innovation, digitalization of payments or finance has emerged as a key aspect in today's financial world [29], [6], [30]. It will continue to rise in the digital payment sector, reaching 16.1% and emerging as one of the key components of the system [31] digital transactions will become essential as a financial driver in the future due to the inevitable digitization of many services [5], [32]. Technological innovation is also stimulated by the growth of digital finance [7]. To guarantee the success of digitalizing public services, a suitable and user-focused strategy is needed [33].

To guarantee service efficacy, the digitization of public services necessitates an integrated and user-oriented strategy [33]. User experience and trust are directly impacted by the failure to identify important human-technology contact points, such as interface design, content delivery media, and device compatibility [34]. The innovative payment market is no longer solely restricted and is constantly generating new market entrance and growth prospects for all kinds of businesses from different sectors. The difficulty is in finding innovative ways to arrange facility services so that different individuals may use and access them, as well as innovative ways to make payments that strike a balance between accessibility and security. Even with today's growing digitization of services, cash transactions still occur 1.5 times more frequently than non-cash transactions [35]. This indicates that payments through facility service information systems used for data management and

rents are still not well studied [30]. On campus, some technology use is limited to information management, with little emphasis on innovative digital payments. Furthermore, they continue to employ manual transfers, which must be verified once again by the appropriate system administrator upon payment. Users do not have to manually input the nominal amount to be sent when using the midtrans payment gateway. A. Therefore, this may be an expectation to lower transfer mistakes in order to be more effective and efficient, to gain the confidence of customers, and to ensure the sustainability of the use of digital platforms in a variety of services. Pelanggan, dan keberlanjutan penggunaan platform digital di berbagai layanan.

Therefore, in an attempt to increase the scope of internet-based facility services, the findings of security assessments and analyses carried out in a number of earlier studies show the necessity of putting in place a technological system for recording transactions from digital payment gateways, improving data security and integrity. Politeknik penerbangan surabaya developed this method to improve the efficiency of its services. The user experience is prioritized in the system's design, making it simple to navigate the main interface. This technology may be used by target users outside of the polytechnic, such as cadets, the general public, and all facets of society.

According to the above description, the main goal of this research is to create an extremely effective information system at politeknik penerbangan surabaya that can more intelligently manage its facility assets. Additionally, it contributes to the provision of payment solutions that guarantee interaction with online platforms and improve security measures. Prioritizing customer ease and website performance, the facility rental service system, which was previously run offline, is now constructed as a website using the php programming language, the laravel framework, and the midtrans payment gateway. Through open innovation, this study supports correct data distribution and transparency

2. Method

The development process for a website-based information system, previously unavailable at the Politeknik Penerbangan Surabaya, utilized the waterfall method, with all stages determined early on. Users, or those who will use the system, only see the resulting product. The waterfall SDLC method was chosen for this information system development due to its relatively low cost, as the work stages and plans are established early on. The waterfall model is a short-term system development approach that emphasizes sequential planning. Creating a system using this approach facilitates future developers' comprehension of the project management process, particularly for new team members. Data gathering, system analysis, system design which involves creating databases, displays, and use case diagrams system development, and testing are the phases of the waterfall technique. The five phases of the waterfall approach that were employed in the development of this system are listed below. Early in the development phase, the process flow, end system outcomes, cost projections, and project completion timeline were established [3]. The process flow started with problem analysis, which revealed problems with facility data gathering at Politeknik Penerbangan Surabaya, which continued to struggle with facility management and seamless borrowing. The researcher's objective is to develop an information system to document the campus's amenities in order to facilitate data collection and make it simpler for different parties to rent and keep an eye on whether the facilities are still appropriate. In order to make the system's representation in the user interface more effective, the MVC (Model View Controller) approach was used in its development [36]. The steps of the waterfall approach are outlined in the following structure.

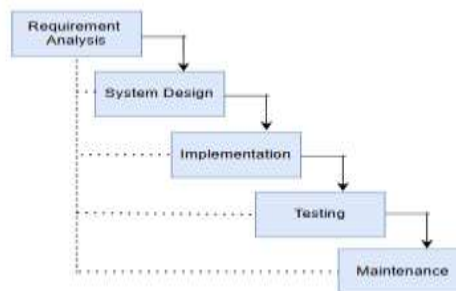


Fig. 1.Waterfall Method

2.1. Requirements Analysis

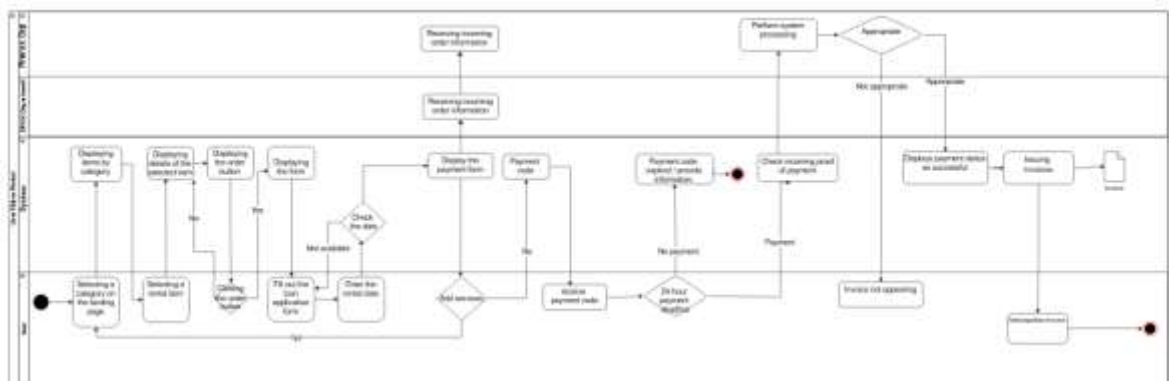
In order to obtain all the information needed for computerization, the initial step required conducting direct interviews with Politeknik Penerbangan Surabaya staff members in charge of facility services. The present system needs, which were still managed manually in the administration process, were then examined by the development team.

2.2. System Design

The facility service information system needs a functional analysis in order to satisfy the functional criteria for system development. The purpose of this functional analysis is to identify the elements that system users need and to make sure the system operates correctly in accordance with the workflow for accurate and safe data management. These specifications outline the functions that each user role may carry out as well as their place in the facility leasing system.

Hardware and software requirements are examples of non-functional requirements for system development. The goal of the software requirements is to ascertain the minimal specifications needed prior to system construction. The main code editor for this system was Visual Studio Code version 1.90, the programming language was PHP 8.1.5, the framework was Laravel 10.46, and the programming language was XAMPP version 3.30. Additionally, the goal of a hardware requirements study is to ascertain the minimal specifications needed to create the facility service information system. An i3 or AMD Ryzen 3 CPU with 4GB of RAM and 128GB of storage is the bare minimum needed, along with web browsers like Microsoft Edge, Chrome, and Safari.

By illustrating the connections between items prior to database compilation, system design aids in database design. Because DFD is well-organized and will facilitate developers' understanding of data flow, it is frequently utilized in system development. Flow objects, data, and linking objects make up the Business Process Model and Notation (BPMN), a system flowchart that depicts the system's and users' processes [37]. Because use case diagrams illustrate the system's functional requirements and user interactions, use cases serve as an additional foundation for UML design [38]. The analysis results must be visualized using BPMN, use cases, and the ERD before writing the code for an online facility service information system with a payment gateway utilizing Midtrans. Figure 3.1 shows the BPMN process for leasing a facility service. For each administrator, it processes commands and produces a variety of outcomes.

**Fig. 2.**BPMN Facility Service Information System

The use case diagram of this system is shown in Figure 2.2, which consists of four user roles that have different access rights according to their respective tasks and needs, namely: user, super admin, general and finance department admin, and finance admin. The super admin has more access rights than other access rights because he is responsible for the overall management of the system, including user management and system settings. The DPUK admin is responsible for managing the available assets and facilities, including maintaining the facilities entered into the system must be the same and always updated with the original facilities. The finance admin is responsible for managing financial transactions, payments, and financial reporting. Then the user can only register, make reservations, view all available facilities, and rent facilities.



Fig. 3. Use Case of Facility Service Information System.

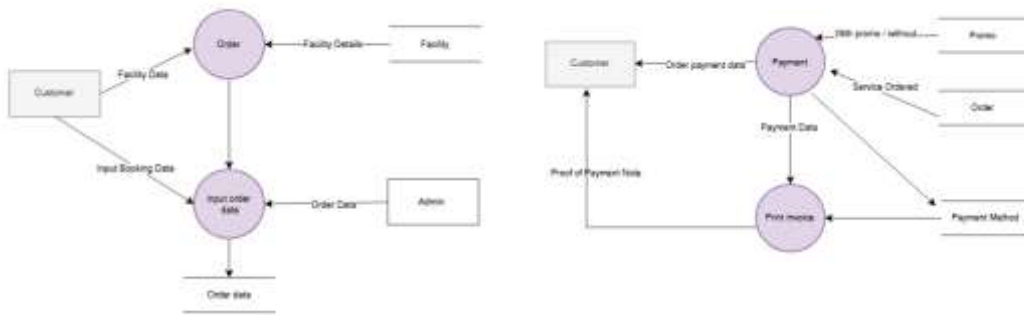


Fig. 4. DFD Level 1 the ordering and payment process by customers on the system

A dfd illustrating the data flow procedure through booking to client payment for facility rentals is shown in figures 2.4. Logged-in customers will have access to place orders and pay for their selected services. During payment, customers can enter their selected promotions before the system sends their order details to the payment gateway. The system will check whether the selected promotions are still available. Then, the order will be processed until payment is successful and the user receives an invoice as proof of the facility order

2.3. IoT and Web Service Implementation

In this study, researchers created a website information system using the sdlc waterfall analysis model, the laravel php framework, and the tailwindcss framework. The use of the mvc architectural pattern in this project resulted in a more organized code structure. Database management in laravel using the eloquent orm makes sql management more efficient because queries can be entered directly into the framework [22], [39]. He code structure is divided into three sections, making it easier for developers to develop code. Using the mvc architecture improves system performance because it includes several built-in functions or functions that can be directly implemented. This is combined with xampp, which includes apache as a web server and a mysql database.

The development of this system began with coding based on a previously created ui-ux design plan and the predetermined programming languages: tailwind css, laravel, and a mysql database managed by xampp. The previously compiled conceptual model in the erd was then converted into a

database supported by a relational database management system (dbms). Mysql is part of the dbms. Tests have shown that dbms is capable of performing crud create, read, update, and delete tasks with superior responsiveness and low error rates [19]. Therefore, this study used mysql. Laravel is the most popular framework for php system development due to its reliability, code structure, clean syntax, and easy-to-use libraries. This framework simplifies user authentication, which requires routing, views for displaying special pages, login, registration, password reset, and controllers.

With various online transaction modes and a payment gateway system, customer privacy is highly protected because customers do not need to enter identity details into the payment gateway service, making it secure[12]. Payment expiration times through midtrans vary depending on the selected payment method [40]. Payment gateway integration with the laravel website system can be easily accomplished through the api.

2.4. System Testing

The testing phase is carried out after the application is developed, by running the program and detecting the output generated by the system and ensuring that the system's responsiveness conforms to the flow and previous display design [41]. In this study, testing was conducted using the black box testing method, which focuses on functional specifications. Users and developers conducting the testing must focus on the results without needing to understand the system's internal workings. Testing using this method checks the conformity between the input provided and the output obtained on each form within the system, as well as all of its features. This testing phase plays a crucial role in helping ensure that the system operates properly and meets user requirements [42].

2.5. Data Analysis

After the system has passed the previous testing phase, the process continues with the deployment phase via hosting so that it can be accessed widely and effectively by users. The implementation of hosting allows for faster website performance because users can access the website through the institution's official domain. This also supports the institution's need for a higher level of data security [43]. This phase includes implementing the system in an operational environment and conducting further testing to ensure that the system is running optimally and is ready for user use. At this stage, assistance is provided by the system development team with managers who have access rights to this system and the system developer provides system documentation[44]. This stage aims to ensure that users are ready and understand the facility service information system being developed

3. Results and Discussion

This facility service information system is server-based, developed using the PHP programming language with the Laravel framework and the Midtrans payment gateway. Users and polytechnic administrators can access the system via smartphone, laptop, or computer from anywhere, provided the user is connected to the internet. The polytechnic, acting as an administrator, can monitor transactions, loans, and record details of all assets within the system. Furthermore, the system includes an activity log for monitoring and recording all activities within the system.

3.1 Result

Transportation, dorms, buildings and grounds, services, and equipment are the five primary areas in which the investigation found 77 functional criteria. Following that, these functional requirements were divided into the following seven business processes: 1) Rental item data management for each category; 2) Transaction and payment management; 3) Category administration; 4) Report management and transaction analysis; 5) Features for review and rating; 6) Frequently Asked Questions (FAQs) to help consumers; and 7) System authentication. Before renting, users must register and log in to provide the necessary information to enhance system security. In addition to their booking and payment histories, facility availability schedules, promotions, and bills, customers may browse every category of facilities that are offered for rent. To avoid forgeries, every transaction is kept in a different system. To further their self-expression, users can rate and evaluate rental amenities within the system. Clients are unable to see other people's booking histories.

The previously developed UI-UX design was followed during the implementation phase. Even for inexperienced users, the system's interface was created with simplicity of use in mind. The

system's home page is accessible to both users with access permissions and those who have never registered. The facility service information system's home page is seen in the screenshot that follows.

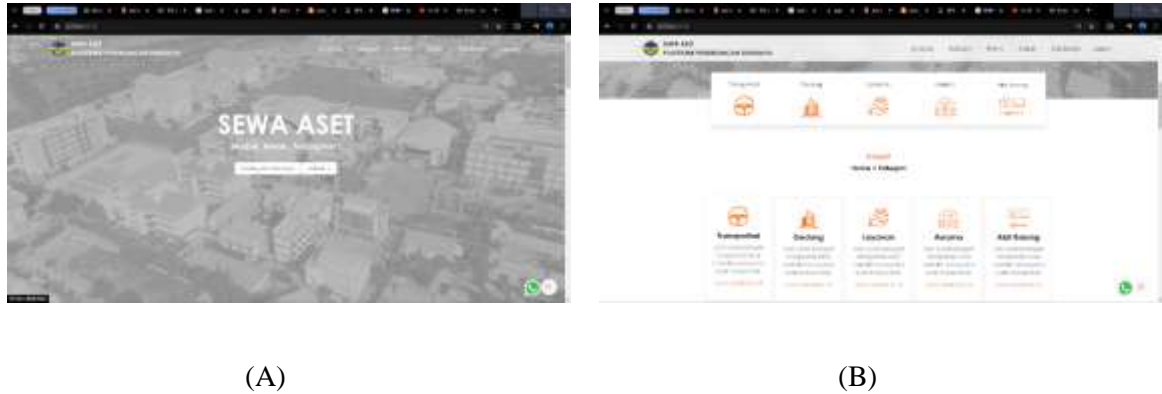


Fig. 5.Landing Page

The webpage, which includes five kinds of facility leasing options, is shown in Figure 3.4. A scrollable menu with promotional banners, facility service ratings, FAQs, and service categories is available on the main page. Through the landing page, users may also get in touch with the system administrator. The assets that are offered for rent are shown by category in the service category menu. After viewing the facility's details, customers may make a rental reservation. If a customer chooses a rental option and hasn't registered or logged in, they will be sent to the login page. Facilities that are successfully booked will be included to the booking history feature, which shows the status and payment history. This system keeps track of past payments, reservations, ratings, and promo usage.

Complete facility, report, and client data information are shown on the dashboard. To improve security by lowering the possibility of data breaches and guaranteeing the system keeps functioning properly, recorded data will be kept in the database for a full year. The Laravel framework is used to accomplish this automatically and on a scheduled basis. Furthermore, supervision may eventually be impacted by the buildup of transaction data from year to year in the absence of reliable data gathering. Users may choose specifics by day, month, and year using this system's reporting capability. Access times, user identities, and actions are all documented in activity logs. The goal of this endeavor is to identify and keep an eye on any suspected unauthorized behavior. In this system, each user role's access is restricted by authentication. Figure 3.5 below shows the admin dashboard.

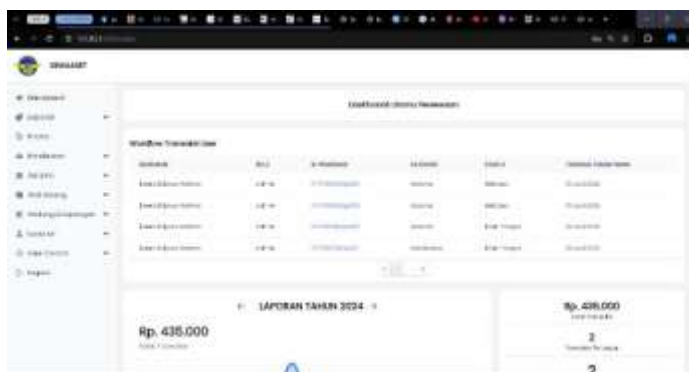


Fig. 6.Admin View Page

Perancangan sistem yang telah disesuaikan dengan kebutuhan pengguna, dilanjutkan dengan menghu The Midtrans payment gateway service is connected to the system via the Midtrans API set up in the Laravel.env file, continuing the user-focused system architecture. Adding the Midtrans API key from the midtrans.com account completes the configuration procedure. A server key and a client key make up the API key. The user's transaction data is sent to the payment gateway service using the client key once the server key is processed on the Midtrans server to facilitate direct communication during transactions. This serves as a safeguard for data. The information system transactions using Midtrans are depicted in Figure 3.3.

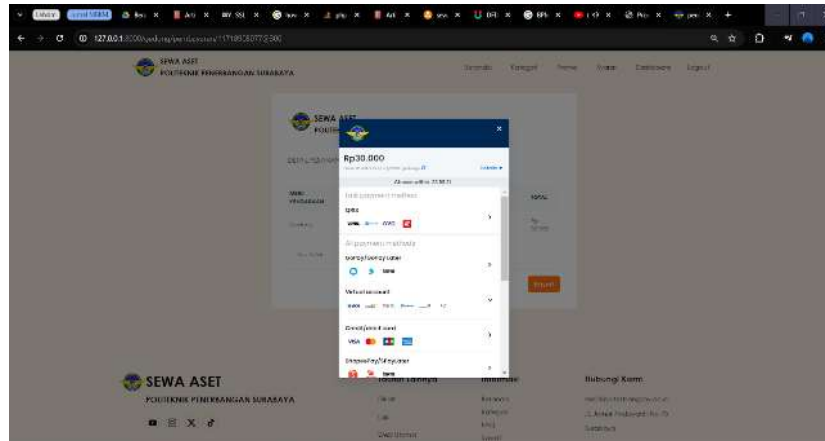


Fig. 7.Payment display page with Midtrans

The payment amount that precisely corresponds to the facility service to be hired is displayed in Figure 3.3. After that, the user can select a payment option. The system transmits transaction data, user ID, and booking details to the Midtrans server when the client has chosen the facility to be hired. The payment page is then displayed by Midtrans, as seen in Figure 3.3. Because Midtrans sent a payment notification API, the system immediately updates the payment status in real-time. The database contains transaction statuses such as pending, settlement, expired, and canceled. In Midtrans, every payment option has an own deadline. The user must restart the renting procedure if the client does not pay by the deadline. Before deploying directly to a production environment, Midtrans provides a sandbox transaction simulation. This transaction simulation is useful for ensuring the API integration configured in the .env file is correct, the payment amount, and the transaction status changes are appropriate. The finish redirect URL in Midtrans will then display the successful transaction status. If the transaction is not completed successfully, the payment page will also change. Customers who successfully place an order will receive an invoice for the facility.

Black box testing, which focuses on system functionality from registration to collecting facility rental bills, is used in the application's testing phase. In addition to the developer, the users who will oversee this system also do testing. The system operates 100% correctly, with features operating normally and system answers in line with previously established system requirements, according to the results of testing all system features to determine their compatibility to requirements. In addition to the system's applicability, users believe this information system's features and flow to be simple to comprehend. As a result, using this system going forward would enhance the efficiency of facility service administration using Politeknik Penerbangan Surabaya digital technological advancements.

3.2 Discussion

It is anticipated that the outcomes of the analysis conducted up until the system's testing phase will be utilized and updated in accordance with the institution's needs and development, enabling the parties in need of the information to receive it without physically visiting the polytechnic. Based on the findings of the earlier problem identification, facility services are established from the ground up, beginning with the storage of client order history and information. Customers can now easily view the schedule of facilities to be rented, including the date, day, and specifics of the rental time, thanks to this system's calendar feature for five categories: transportation, field buildings, services, dormitories, and equipment. Thus, this approach ensures that the facility leasing schedule is unique.

Additionally, this system has rating and promotional capabilities with time limits and restrictions that allow users to utilize each promo just once in the form of a discount or voucher. This is consistent with earlier studies that demonstrate that offering promotions improves rating rankings [45]. This research aims to enhance the user experience when using our facility services by regularly making appealing offers to clients, in addition to concentrating on system development with a framework and payment gateway. Because they witness firsthand testimonials, the review and rating features provide consumers confidence while making purchases, which may undoubtedly boost user confidence in this system. This will facilitate two-way communication between users and developers. In the future, the development team also intends to investigate testing strategies based on user opinions or input. Additionally, institutions can use user input to create changes. Users who have not rented the system are unable to submit reviews for the review and rating features because the system's security safeguards functions that have been reserved. The authentication code processing is made much simpler by using the Laravel framework, which also improves its efficiency and structure. In comparison to service systems that still rely on manual recording or are not yet digitized, the outcomes of the system's deployment and testing not only streamline the facility rental transaction process but also enhance financial transparency and data correctness.

Higher education institutions' efficiency, income liquidity, and data-driven decision making have all increased dramatically with the rise of digital technology [13][46][47]. The study's findings are consistent with other studies demonstrating that advancements in digital payment technologies have a favorable effect on consumers' views on making purchases [30]. Furthermore, a purposeful endeavor to enhance institutions' capacity to participate in the digital economy is known as digital transformation [48]. Customers and managers have more faith in online transactions since they are effective and safe, as demonstrated by this study [12], [49]. As a result, this system serves as both an operational tool and a recommendation for institutions to make data-driven decisions

4. Conclusion

The creation of a facility service information system is one of the systems that aids in data management at the Politeknik Penerbangan Surabaya, according to the research findings. In contrast to earlier data management categories for transportation, field buildings, dorms, services, and equipment, this system includes information on the effective administration of five kinds of facilities, reports, and user activity logs. Because all reports are fully computerized, facility service management is more efficient and transparent. The solution obtained by putting in place a website-based system offers substantial benefits in terms of customer satisfaction and customer trust, and the institution feels the impact of the benefits generated. The system development process is guaranteed to go well when the SDLC waterfall approach is used. High transaction security support is provided by the combination of the Laravel framework and the Midtrans payment gateway utilized in this study, making it user-friendly. Black box testing for system testing produced 100% findings that met system criteria. All things considered, this facility service information system is getting better and may help the Politeknik Penerbangan Surabaya maintain its high level of service quality in a more effective and efficient manner. Interviews with the system's target users can provide ideas for future application development so that the system can be utilized sustainably in accordance with the evolution of necessary needs.

Acknowledgments

We want to express our DPUK of Politeknik Penerbangan Surabaya for their cooperation and for providing in the data used in this research.

Funding Information

We express our deepest gratitude to Politeknik Penerbangan Surabaya and the Ministry of Higher Education, Science, and Technology for funding this research.

AUTHOR CONTRIBUTIONS STATEMENT

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Lady Silk Moonlight	✓	✓	✓	✓	✓	✓		✓	✓				✓	✓

Teguh Arifianto	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Ahmad Bahrawi	✓		✓		✓	✓	✓	✓	✓	✓		✓
Dewi Ratna Sari		✓	✓	✓	✓	✓		✓			✓	
Didi Hariyanto		✓			✓		✓	✓	✓	✓		
Putri Dya Citra Nur	✓		✓	✓			✓		✓	✓		✓
Kumala Sari												

CONFLICT OF INTEREST STATEMENT

The authors state no conflict of interest.

DATA AVAILABILITY

The data that support the findings of this study are available from the corresponding author, [initials: LSM], upon reasonable request

References

- [1] A. A. Pathak and K. Kaushik, "Driving consumer engagement for digital payment brands: Content strategy on instagram," *Journal of Retailing and Consumer Services*, vol. 79, p. 103821, 2024, doi: <https://doi.org/10.1016/j.jretconser.2024.103821>.
- [2] A. Ghazawneh, "Digital Services Development and the Dynamics of Transformation by Service Providers," in *Advances in Information Systems Development*, B. Andersson, B. Johansson, C. Barry, M. Lang, H. Linger, and C. Schneider, Eds., Cham: Springer International Publishing, 2019, pp. 97–112.
- [3] D. Ly, M. Overeem, S. Brinkkemper, and F. Dalpiaz, "The Power of Words in Agile vs. Waterfall Development: Written Communication in Hybrid Software Teams," *Journal of Systems and Software*, vol. 219, Jan. 2025, doi: [10.1016/j.jss.2024.112243](https://doi.org/10.1016/j.jss.2024.112243).
- [4] B. Dou, S. Guo, X. Chang, and Y. Wang, "Corporate digital transformation and labor structure upgrading," *International Review of Financial Analysis*, vol. 90, p. 102904, 2023, doi: <https://doi.org/10.1016/j.irfa.2023.102904>.
- [5] W. Li, B. Lv, and H. Sun, "Impact of executive team heterogeneity on enterprise digital technology innovation: The moderating effect based on digital finance," *Financ Res Lett*, vol. 89, p. 109276, 2026, doi: <https://doi.org/10.1016/j.frl.2025.109276>.
- [6] C. Ancillai, A. Sabatini, M. Gatti, and A. Perna, "Digital technology and business model innovation: A systematic literature review and future research agenda," *Technol Forecast Soc Change*, vol. 188, p. 122307, 2023, doi: <https://doi.org/10.1016/j.techfore.2022.122307>.
- [7] W. Li, B. Lv, and H. Sun, "Impact of executive team heterogeneity on enterprise digital technology innovation: The moderating effect based on digital finance," *Financ Res Lett*, vol. 89, p. 109276, 2026, doi: <https://doi.org/10.1016/j.frl.2025.109276>.
- [8] X. Fang and M. Liu, "How does the digital transformation drive digital technology innovation of enterprises? Evidence from enterprise's digital patents," *Technol Forecast Soc Change*, vol. 204, p. 123428, 2024, doi: <https://doi.org/10.1016/j.techfore.2024.123428>.
- [9] Y. Liu, J. Dong, L. Mei, and R. Shen, "Digital innovation and performance of manufacturing firms: An affordance perspective," *Technovation*, vol. 119, p. 102458, 2023, doi: <https://doi.org/10.1016/j.technovation.2022.102458>.
- [10] T. Wiegelmann and R. Glauerdt, "Practice Briefing: Mergers and Acquisitions in real estate asset management (Part 1) – strategic motivations, valuation and transaction

- structuring,” *Journal of Property Investment & Finance*, vol. 43, no. 4, pp. 454–468, 2025, doi: <https://doi.org/10.1108/JPIF-02-2025-0033>.
- [11] M.-T. Chen and Y. Tsai, “A Decentralized Car Rental Transaction Management System Using Blockchain and IPFS,” *Int J Semant Web Inf Syst*, vol. 21, no. 1, 2025, doi: <https://doi.org/10.4018/IJSWIS.367282>.
- [12] M. A. A. R. Kutubi, K. M. R. Alam, and Y. Morimoto, “A simplified scheme for secure offline electronic payment systems,” *High-Confidence Computing*, vol. 1, no. 2, Dec. 2021, doi: 10.1016/j.hcc.2021.100031.
- [13] F. N. Madu, V. A. Onodugo, and E. E. Isichei, “Electronic payment system and financial sustainability of tertiary institutions in Nigeria,” *African Journal of Economic and Management Studies*, vol. 13, no. 4, pp. 683–696, 2022, doi: <https://doi.org/10.1108/AJEMS-11-2021-0475>.
- [14] A. Ebekozien, C. Aigbavboa, M. Hafez, M. S. Samsurijan, and A. E. Oke, “Appraising sustainable and resilient physical infrastructure facilities in higher education institutions: the role of smart maintenance management,” *Facilities*, vol. 43, no. 13, pp. 1094–1113, 2025, doi: <https://doi.org/10.1108/F-12-2024-0173>.
- [15] O. Yilmaz, O. Talavera, and J. Y. Jia, “Rental Market Liquidity, Seasonality, and Distance to Universities,” *Int J Econ Bus*, vol. 29, no. 2, pp. 223–239, May 2022, doi: 10.1080/13571516.2022.2033078.
- [16] S. Meschini *et al.*, “Toward cognitive digital twins using a BIM-GIS asset management system for a diffused university,” *Front Built Environ*, vol. 8, Dec. 2022, doi: 10.3389/fbuil.2022.959475.
- [17] F. M. Mulaydinov, “Integrated Information Systems In Industrial Enterprises And Business Activities,” *Journal of Computer Science Engineering and Information Technology Research (JCSEITR)*, vol. 13, no. 1, pp. 33–44, Jun. 2023, Accessed: Dec. 15, 2025. [Online]. Available: <https://scholar.kokanduni.uz/index.php/rb/article/view/5>
- [18] A. Aminuddin, M. Z. Saringat, S. A. Mostofa, A. Mustapha, and M. H. Hassan, “A Case Study on B-Tree Database Indexing Technique,” *Journal of Soft Computing and Data Mining*, vol. 1, no. 1, pp. 27–35, Jun. 2020, doi: 10.30880/jscdm.2020.01.01.004.
- [19] P. Yin and J. Cheng, “A MySQL-Based Software System of Urban Land Planning Database of Shanghai in China,” *CMES - Computer Modeling in Engineering and Sciences*, vol. 135, no. 3, pp. 2387–2405, 2022, doi: <https://doi.org/10.32604/cmes.2023.023666>.
- [20] H. A. Rafiu, O. S. Adesina, and K. S. Adekeye, “Modelling the response rate of Apache web server using extreme value theory,” *Sci Afr*, vol. 23, p. e02086, 2024, doi: <https://doi.org/10.1016/j.sciaf.2024.e02086>.
- [21] M. Amini *et al.*, “MAHAMGOSTAR.COM AS A CASE STUDY FOR ADOPTION OF LARAVEL FRAMEWORK AS THE BEST PROGRAMMING TOOLS FOR PHP BASED WEB DEVELOPMENT FOR SMALL AND MEDIUM ENTERPRISES,” 2020. [Online]. Available: <https://www.mahamgostar.com/>
- [22] P. A. Guna Permana and E. Triandini, “Performance with Eloquent and Query Builder in Crowdfunding System with Laravel Framework,” *International Journal of Education and Management Engineering*, vol. 11, no. 3, pp. 31–39, Jun. 2021, doi: 10.5815/ijeme.2021.03.04.

- [23] J. Suchanowski and M. Plechawska-Wójcik, "Performance analysis of web applications created in the Spring and Laravel frameworks Analiza wydajnościowa aplikacji internetowych utworzonych w szkieletach Spring i Laravel," 2023.
- [24] H. Wang and F. Liu, "Digital finance and enterprise innovation efficiency: Evidence from China," *Financ Res Lett*, vol. 59, p. 104709, 2024, doi: <https://doi.org/10.1016/j.frl.2023.104709>.
- [25] R. A. Siahaan and R. A. Sianturi, "Analisis Perbandingan Payment Gateway untuk Sistem Pembayaran Berbasis Aplikasi dengan Comparative Study," *Jurnal Teknologi Informasi dan Ilmu Komputer*, vol. 11, no. 2, pp. 291–296, Apr. 2024, doi: [10.25126/jtiik.20241127680](https://doi.org/10.25126/jtiik.20241127680).
- [26] M. A. Hassan, Z. Shukur, and M. K. Hasan, "An efficient secure electronic payment system for e-commerce," *Computers*, vol. 9, no. 3, pp. 1–13, Sep. 2020, doi: [10.3390/computers9030066](https://doi.org/10.3390/computers9030066).
- [27] F. Reynaldo Pratama, N. Santoso, and L. Fanani, "Pengembangan Aplikasi E-Commerce Menggunakan Payment Gateway Midtrans," 2020. [Online]. Available: <http://j-ptiik.ub.ac.id>
- [28] Midtrans, "Midtrans," <https://midtrans.com/about-us>.
- [29] R. A. Kasri, B. S. Indrastomo, N. D. Hendranastiti, and M. B. Prasetyo, "Digital payment and banking stability in emerging economy with dual banking system," *Heliyon*, vol. 8, no. 11, Nov. 2022, doi: [10.1016/j.heliyon.2022.e11198](https://doi.org/10.1016/j.heliyon.2022.e11198).
- [30] X. Shao, K. Xi, and Z. Chen, "Science and Technology Financial Policies and Enterprise Digital Technology Innovation," *Financ Res Lett*, vol. 83, p. 107646, 2025, doi: <https://doi.org/10.1016/j.frl.2025.107646>.
- [31] I. C. Panetta, S. Leo, and A. Delle Foglie, "The development of digital payments – Past, present, and future – From the literature," *Res Int Bus Finance*, vol. 64, p. 101855, 2023, doi: <https://doi.org/10.1016/j.ribaf.2022.101855>.
- [32] F. Alamsyah, I. Usman, and Y. D. Lestari, "The influence of infrastructure quality on usage smart mobile applications and digital payments," *Sustainable Futures*, vol. 10, p. 100983, 2025, doi: <https://doi.org/10.1016/j.sftr.2025.100983>.
- [33] A. Moghayedi, "Inclusive digitalized urban public facilities for sustainable cities: A comparative user-centered evaluation of benefits and challenges," *Sustain Cities Soc*, vol. 131, Sep. 2025, doi: [10.1016/j.scs.2025.106766](https://doi.org/10.1016/j.scs.2025.106766).
- [34] C. Costa Silva, M. Galster, and F. Gilson, "A qualitative analysis of themes in instant messaging communication of software developers," *Journal of Systems and Software*, vol. 192, Oct. 2022, doi: [10.1016/j.jss.2022.111397](https://doi.org/10.1016/j.jss.2022.111397).
- [35] H. Hilale and A. Chakor, "Acceptance of electronic payment systems: A critical review forward a parsimonious model including vertical and horizontal cultural orientations," *Telematics and Informatics Reports*, vol. 14, Jun. 2024, doi: [10.1016/j.teler.2024.100139](https://doi.org/10.1016/j.teler.2024.100139).
- [36] A. Sunardi and Suharjito, "MVC architecture: A comparative study between laravel framework and slim framework in freelancer project monitoring system web based," in *Procedia Computer Science*, Elsevier B.V., 2019, pp. 134–141. doi: [10.1016/j.procs.2019.08.150](https://doi.org/10.1016/j.procs.2019.08.150).

- [37] S. Agostinelli, F. De Luzi, F. M. Maggi, A. Marrella, and A. Volpi, "Design patterns for GDPR-aware process modeling in BPMN," *Inf Syst*, vol. 137, p. 102646, 2026, doi: <https://doi.org/10.1016/j.is.2025.102646>.
- [38] X. Liu, Y. Liu, Y. Zhuang, and W. Hou, "UCD-LLM: A use case diagram requirement modeling multi-agent framework with large language model," *Inf Softw Technol*, vol. 190, p. 107955, 2026, doi: <https://doi.org/10.1016/j.infsof.2025.107955>.
- [39] Z. Subecz, "Web-development with Laravel framework," *Gradus*, vol. 8, no. 1, pp. 211–218, 2021, doi: 10.47833/2021.1.csc.006.
- [40] Midtrans, "Default Expiry Time for Each Payment Method," <https://docs.midtrans.com/docs/waktu-kedaluwarsa-default-untuk-setiap-metode-pembayaran>.
- [41] A. Cabana, C. Charrier, and A. Louis, "Mono and multi-modal biometric systems assessment by a common black box testing framework," *Future Generation Computer Systems*, vol. 101, pp. 293–303, 2019, doi: <https://doi.org/10.1016/j.future.2019.04.053>.
- [42] P. Long and J. Zhao, "Equivalence, identity, and unitarity checking in black-box testing of quantum programs," *Journal of Systems and Software*, vol. 211, p. 112000, 2024, doi: <https://doi.org/10.1016/j.jss.2024.112000>.
- [43] S. Khare and A. Badholia, "Analysis of Cloud and Self-Web-Hosting Services Based on Security Parameters," *International Journal of Information System Modeling and Design*, vol. 13, no. 6, 2022, doi: <https://doi.org/10.4018/IJISMD.297629>.
- [44] F. Al Ghifari, D. E. Ratnawati, and I. Arwani, "Pengembangan Sistem Informasi Pelayanan Pasien berbasis Web (Studi Kasus: Balai Pemasangan Gigi Setia Kawan)," 2022. [Online]. Available: <http://j-ptiik.ub.ac.id>
- [45] J. Wu, H. Zhao, and H. (Allan) Chen, "Coupons or Free Shipping? Effects of Price Promotion Strategies on Online Review Ratings," *Information Systems Research*, vol. 32, no. 2, pp. 633–652, Feb. 2021, doi: 10.1287/isre.2020.0987.
- [46] Z. Liu and C. Zhou, "Digital technology upgrading in manufacturing, digital finance, and revenue liquidity," *International Review of Financial Analysis*, p. 104857, 2025, doi: <https://doi.org/10.1016/j.irfa.2025.104857>.
- [47] E. Hartini *et al.*, "Development of an asset management information system for reliability assessment of SSCs in Indonesia's Isotope Production Reactor (RPI)," *J Radiat Res Appl Sci*, vol. 18, no. 4, p. 101950, 2025, doi: <https://doi.org/10.1016/j.jrras.2025.101950>.
- [48] H. Gao, R. Lv, X. Wu, Y. Zhang, and C. Guo, "Releasing the technological backlog: The role of digital transformation," *Journal of Engineering and Technology Management*, vol. 79, p. 101935, 2026, doi: <https://doi.org/10.1016/j.jengtecman.2025.101935>.
- [49] V. K. Gedi, S. Abbas, and A. Ahmad, "Do digital payments enhance online food ordering? A study of zoomers and millennials in an emerging economy," *British Food Journal*, vol. 127, no. 12, pp. 4546–4565, 2025, doi: <https://doi.org/10.1108/BFJ-02-2025-0159>.