

# Design of a Web-Based Mountain Equipment Rental Information System: A Case Study of Semeton Pendaki

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**ABSTRACT:** This study presents the design of a web-based information system for mountain equipment rental at Semeton Pendaki, a local outdoor gear rental business located in Narmada. The current manual rental process has led to various inefficiencies, including limited customer access to equipment availability and slow transaction management. To address these issues, a web-based platform was developed using the System Development Life Cycle (SDLC) with the Waterfall model. The system was implemented using PHP with Laravel framework, VueJS for frontend development, and MySQL for database management. Data collection techniques included observation, interviews with stakeholders, and literature review. The system features include real-time catalog access, online booking, transaction tracking, inventory management, and administrative reporting. System testing was conducted using the black-box method to ensure that each function worked according to specifications. The results indicate that the developed system improves the efficiency and transparency of the rental process. Customers can access the catalog and place orders without visiting the rental location, while administrators benefit from structured transaction records and automated reporting. This system not only enhances user experience but also supports operational competitiveness in an increasingly digital market. The study suggests future enhancements such as integration of online payments, mobile responsiveness, and user data security.

**Keyword:** Information System, Web-based System, SDLC, Laravel, MySQL

## I. INTRODUCTION

The increasing popularity of mountaineering and outdoor recreational activities has led to the growth of supporting industries, including gear rental services. These services play a vital role in ensuring climbers have access to proper safety and utility equipment without the high cost of ownership. However, despite the growth in demand, many rental businesses, especially those in rural or semi-urban areas, still operate manually. This results in inefficiencies such as outdated inventory tracking, unclear rental policies, lack of real-time booking capabilities, and overall reduced customer satisfaction.

Semeton Pendaki, a rental business based in Narmada, is a representative example of this challenge. Since its establishment in 2015, it has served local climbers through in-person rentals and informal communication channels such as WhatsApp. This approach, while sufficient in earlier years, has become less competitive in the face of rising customer expectations and the emergence of similar businesses with better technological integration. Without automation and centralized data management, the business struggles with delayed transactions, miscommunication about stock availability, and error-prone reporting.

Digital transformation through a well-structured web-based information system is therefore critical. The integration of information systems in small and medium-sized enterprises (SMEs) has shown significant positive impacts on operational performance, customer engagement, and decision-making processes [1], [2]. A properly implemented web-based rental system not only facilitates online reservations and payments but also enables streamlined inventory control, real-time updates, and automated reporting, contributing to better resource management [3].

This research focuses on the design and development of a web-based information system tailored to the operational needs of Semeton Pendaki. The system is built using the System Development Life Cycle (SDLC) with the Waterfall model, employing PHP (Laravel) and MySQL to ensure structured backend management and responsive web functionality. The goal is to enhance service accessibility, reduce operational latency, and increase business competitiveness in a digitized rental market.

## II. RELATED WORK

The implementation of web-based information systems in rental businesses has become an increasingly popular subject of study, particularly within the outdoor and tourism equipment sectors. Prior research consistently supports the effectiveness of such systems in overcoming limitations posed by manual operations.

Cahyono and Suprianto [1] conducted a study on InOutdoorsRental in Sidoarjo, developing a web-based rental system that replaced conventional methods of documentation and communication. Their system featured a real-time catalog, user account management, and administrative dashboards. Tested through black-box methods, the application demonstrated improved transaction accuracy, better data organization, and higher customer usability.

Budiana et al. [3] extended this model by integrating booking systems for mountaineering trips alongside equipment rental in their system for Warbah Adventure. They utilized the Waterfall model and incorporated database-driven functionalities that enabled users to select dates, equipment categories, and view availability. Their system served not only logistical functions but also marketing and operational reporting, highlighting the value of system multipurposeness.

Putri et al. [4] took a different approach by using WordPress and WooCommerce plugins to build an equipment rental system for Outdoorkris. Though limited in flexibility compared to custom-built solutions, their study proved that open-source platforms could still deliver scalable and functional systems. Their findings emphasized the importance of visual catalog interfaces, payment gateway integration, and user education for platform adoption.

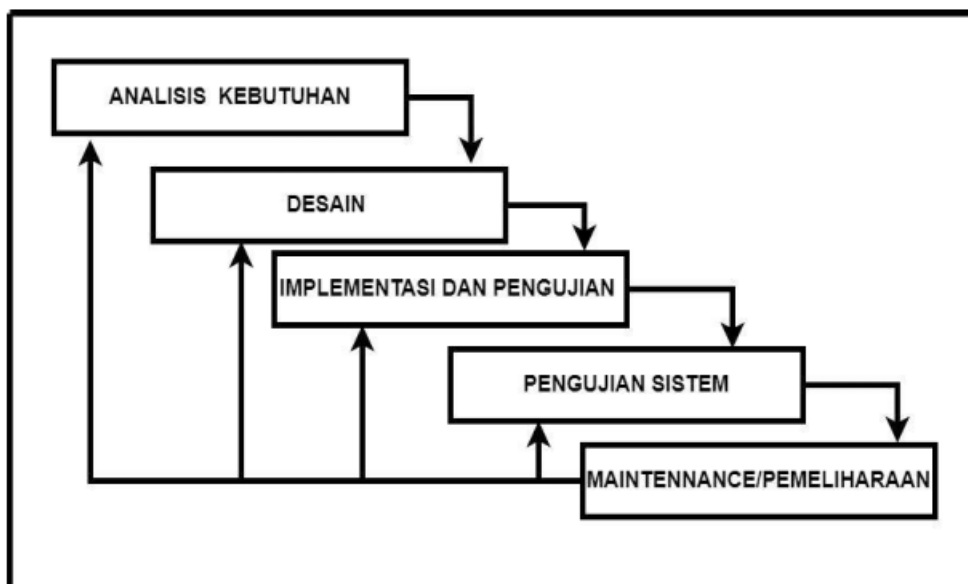
Wahyuningsih and Muslihudin [5] addressed a case where a rental service, Napak Tilas Adventure, still relied entirely on paper-based documentation. Their solution involved the design of a customized system with built-in reporting tools, user authentication, and dynamic equipment availability. The results demonstrated significant improvements in daily operations, reducing miscommunication and human error.

Ardilah and Rosid [2] additionally proposed integrating WhatsApp API with web-based systems to enhance real-time notification, a critical feature in small businesses lacking complex infrastructure. Their system allowed automatic reminder alerts and refund status tracking, improving customer retention and administrative responsiveness.

Although these studies collectively establish the effectiveness of web-based systems, they often lack contextual adaptation to the unique challenges of mountain equipment rental, such as diverse item conditions, seasonal demand variability, and the importance of visual item representation. This paper addresses such gaps by combining structured system architecture with tailored business logic, aimed at bridging functionality with local business realities..

### III. METHOD

This study adopted a System Development Life Cycle (SDLC) approach using the Waterfall model, which provides a structured and sequential framework suitable for well-defined project requirements. The methodology includes five primary phases: system analysis, system design, implementation, testing, and documentation. Each stage must be completed before progressing to the next, ensuring thorough validation and review of each process [1].



**Figure 1.** System Development Life Cycle (SDLC)

#### A. Data Collection Methods

To capture operational needs and user expectations at Semeton Pendaki, the study employed several qualitative data collection techniques:



Figure 2. A. Data Collection Methods

- **Observation:** Direct observation of rental operations was conducted to identify workflow inefficiencies, common customer inquiries, and stock management procedures.
- **Interviews:** Semi-structured interviews with business owners and staff were conducted to collect insights on system requirements, interface preferences, and pain points in the current manual process.
- **Document Review:** Business records, rental forms, and transaction logs were examined to understand the structure and categories of equipment rentals.
- **Literature Review:** Existing studies on similar systems were analyzed to benchmark best practices and technical architectures.

## B. System Development Procedure

The system was developed based on the following Waterfall stages:

### 1. System Analysis

The system requirements were defined through use-case modeling, functional decomposition, and data requirement specifications. Entity Relationship Diagrams (ERD) were used to map data structures and relationships. Requirements included real-time catalog browsing, customer login, order tracking, and admin-side inventory control.

### 2. System Design

This phase involved the creation of:

- **Use Case Diagrams** to model user interactions
- **Activity Diagrams** to outline rental workflows
- **Flowcharts** to visualize key processes such as equipment reservation and return
- **User Interface Prototypes** to plan layout, responsiveness, and ease of navigation

The interface was designed to be minimal, mobile-friendly, and intuitive for both administrators and customers.

### 3. Implementation

The system was built using:

- **Frontend:** HTML5, CSS3, VueJS
- **Backend:** PHP with Laravel Framework
- **Database:** MySQL

The development environment utilized **XAMPP** for local testing and **phpMyAdmin** for database interaction.

#### 4. Testing

Functional testing was conducted using **Black Box Testing** to verify that all system functions met expected outcomes without evaluating internal code logic. Each module—login, reservation, catalog browsing, transaction logging, and reporting—was tested independently and in combination.

#### 5. Documentation and Deployment

Final documentation includes user manuals for both administrators and customers, system architecture diagrams, and code repositories. The system was deployed on a local server for demonstration and testing, with future scalability to online hosting planned.

### C. Equipment and Tools

Data Split	Training Accuracy
Laptop	Development and testing
Visual Studio Code / Sublime Text	Code editor
XAMPP	Local server and database testing
MySQL	Database management
Laravel	Backend framework
VueJS	Frontend interface framework

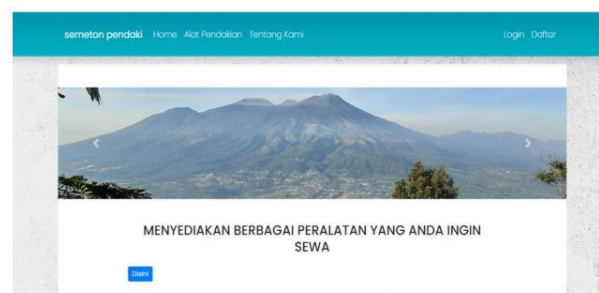
## IV. RESULT AND DISCUSSION

### A. System Implementation

The developed system is composed of several functional modules designed to improve the rental experience for both administrators and customers. Each module is visualized through corresponding interface screenshots and is discussed below.

#### 1) Homepage and Rental Catalog

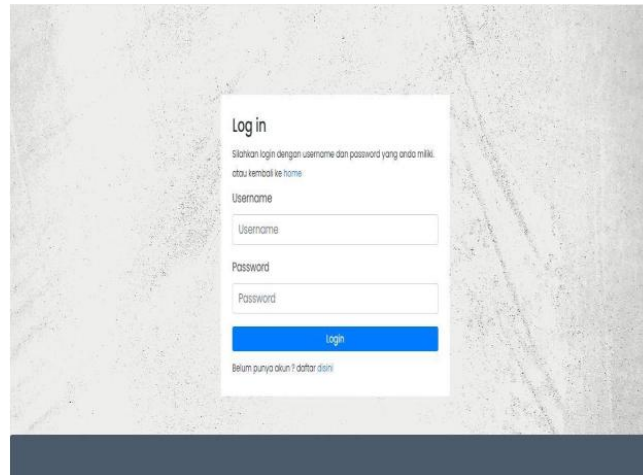
The homepage provides users with a catalog of available mountain equipment such as tents, jackets, and backpacks. Each item is accompanied by an image, rental price, and brief description. Users can filter results by category or perform keyword searches to quickly locate needed equipment. This design enhances customer accessibility and browsing efficiency. As illustrated in Figure 3, the interface presents a clean layout with search functionality and categorized items.



**Figure 3.** Homepage displaying available rental items with price and category filter

## 2) Login Interface

The system supports role-based login for administrators and customers. The login page requests valid credentials and redirects users to their respective dashboards upon successful authentication. As shown in Figure 4, the login interface is minimalistic and role-aware, preventing unauthorized access to administrative functions.



**Figure 4.** Login interface for admin and customer roles

## 3) Admin Dashboard

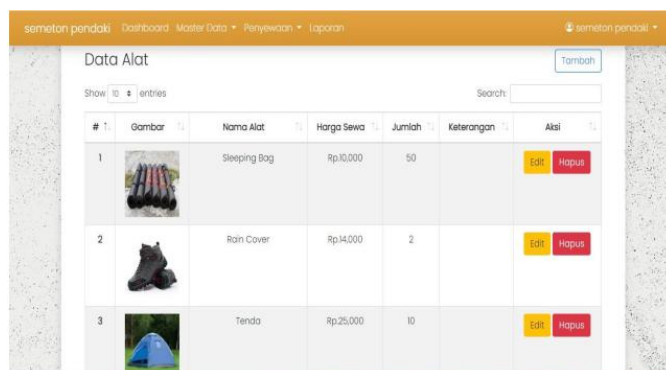
Once logged in, the administrator is presented with a dashboard summarizing critical metrics such as rental activity, item availability, and financial logs. Figure 5 depicts the dashboard, which includes direct navigation to modules for inventory, reports, and user management.






**Figure 5.** Admin dashboard with quick access to inventory, transactions, and reports

## 4) Equipment Management Module

Administrators can manage inventory by adding, editing, or removing items from the catalog. This ensures up-to-date availability and accurate listings for customers. Figure 6 demonstrates the admin view of the item list, with control buttons for editing or deleting entries.

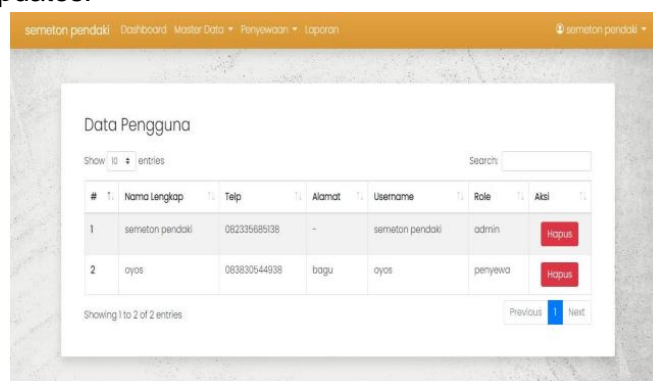


#	Gambar	Nama Alat	Harga Sewa	Jumlah	Keterangan	Aksi
1		Sleeping Bag	Rp.10,000	50		<a href="#">Edit</a> <a href="#">Hapus</a>
2		Rain Cover	Rp.14,000	2		<a href="#">Edit</a> <a href="#">Hapus</a>
3		Tenda	Rp.25,000	10		<a href="#">Edit</a> <a href="#">Hapus</a>

**Figure 6.** Admin dashboard with quick access to inventory, transactions, and reports

## 5) User Management

This module allows administrators to view user profiles, track their activity, and revoke access if necessary. In Figure 7, user information is displayed in a structured format that facilitates monitoring and data updates.

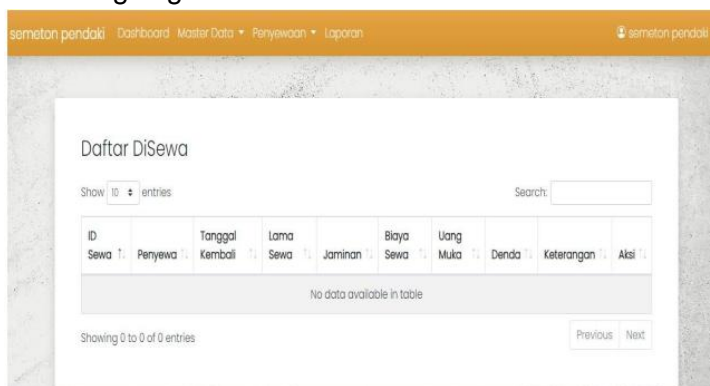


#	Nama Lengkap	Telp	Alamat	Username	Role	Aksi
1	semeton pendaki	0823568938	-	semeton pendaki	admin	<a href="#">Hapus</a>
2	oyos	083830544938	bagu	oyos	penyewa	<a href="#">Hapus</a>

**Figure 7.** User data management module for admin

## 6) Active Rentals Tracking

This module displays items currently rented out, along with borrower information and return status. It supports scheduling, overdue tracking, and penalty calculation. As shown in Figure 8, the system presents a tabular view of ongoing rentals and durations.



ID Sewa	Penyewa	Tanggal Kembali	Lama Sewa	Jaminan	Biaya Sewa	Uang Muka	Denda	Keterangan	Aksi
No data available in table									

**Figure 8.** List of currently rented items with status indicators



## 7) Edit Equipment Form

This feature allows admins to update item descriptions, prices, and quantities. Figure 9 illustrates the edit form layout with input fields for each attribute, streamlining updates without altering the database manually.



**Figure 9.** Edit form for updating item data

## 8) Add New Equipment

Admins can register new equipment by inputting details such as name, rental price, stock, image, and description. Figure 10 displays the input form designed to standardize data entry and prevent missing fields.



**Figure 10.** Equipment input form for new rental items

## 9) Transaction History Log

This module provides access to all completed rental transactions, filterable by date, customer name, or equipment type. As illustrated in Figure 11, the table provides detailed tracking for business auditing and user history.



ID	Bayar	Tgl Transaksi	Penyewa	Uang Muka	Jumlah Uang	Total Bayar	Kembalian	Aksi
11		2024-08-24 23:42:20	oyos	Rp.100,000	Rp.100,000	Rp.0	Rp.100,000	<a href="#">Detail</a>

**Figure 11.** Table displaying full rental transaction history

## 10) Financial Reports

This feature summarizes total earnings, rental frequency, and late return incidents, helping decision-makers evaluate business performance. Figure 12 shows a summarized financial report in tabular format with export capabilities.

#	Tgl Transaksi	Penyewa	Nama Alat	Harga Sewa	Jumlah	Lama Sewa	Sub Total
11	2024-08-24 23:42:20	oyos	Tenda	Rp.25,000	2	2 Hari	Rp.100,000
Total :							Rp.100,000

**Figure 12.** Monthly rental report view with income and return rate charts

## 11) Customer Rental List

Customers can view a list of currently rented items, including rental duration and scheduled return date. Figure 13 presents this list as part of the customer dashboard, enhancing transparency.

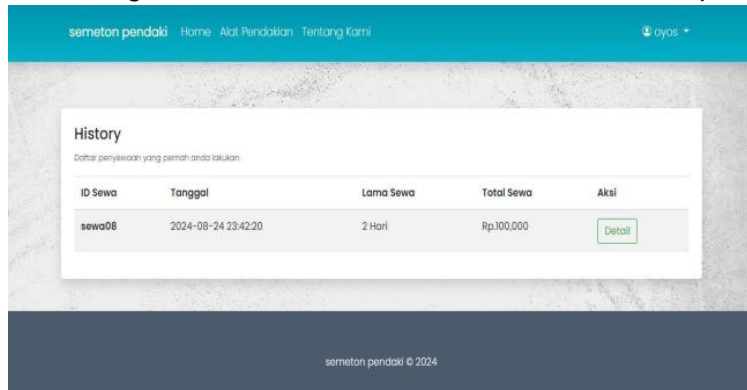
Gambar	Nama Alat	Harga Sewa	Jumlah Sewa	Keterangan	Sub Total	Aksi
tidak ada alat yang dipilih!						

\* Anda harus datang ke tempat kami untuk mengambil alat, pada tanggal menyewa yang anda tentukan.  
 \* Alat yang disewa harus dikembalikan setelah mencapai lama pemakaian, pada jam seperti waktu pengambilan alat, jika tidak akan ada denda yang terhutang.  
 \* Denda akan dihitung perjam sebesar total \* 43568%, dimana ketika sampai 24 seperti menyewa 1 hari.

**Figure 13.** Customer-side view of active rental list

## 12) Customer Rental History

Customers may view all previously rented items, including status, rental periods, and payment confirmation. As shown in Figure 14, the interface includes filters for time period and rental type.

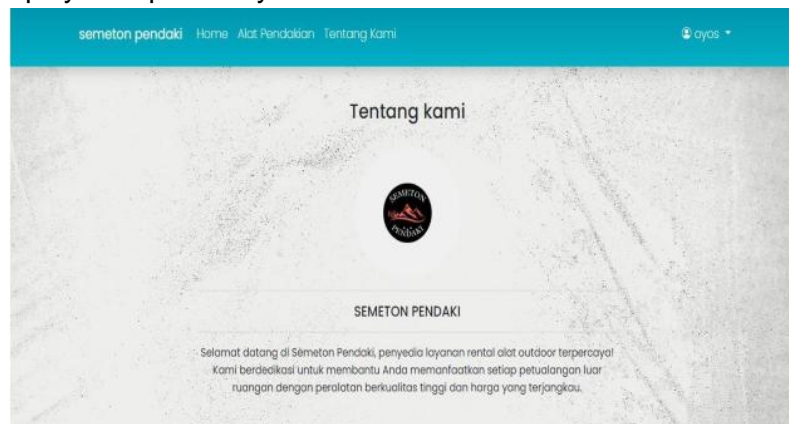


ID Sewa	Tanggal	Lama Sewa	Total Sewa	Aksi
sewa08	2024-08-24 23:42:20	2 Hari	Rp.100.000	<a href="#">Detail</a>

**Figure 14.** Customer rental history table with past transaction details

## 13) About Us Page

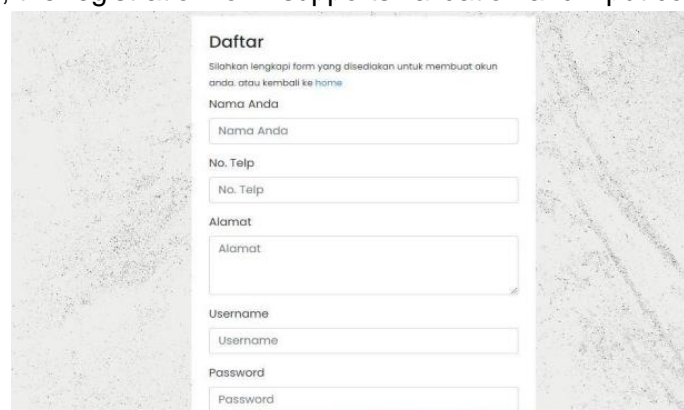
This static page introduces Semeton Pendaki's background, mission, and values to build brand trust. Figure 15 displays the profile layout with clear sections for business introduction.



**Figure 16.** Informational “About Us” page

## 14) Customer Registration Page

New customers register through this page by providing basic identity and contact details. As seen in Figure 17, the registration form supports validation and input confirmation.



**Figure 17.** Informational “About Us” page

## **B. Black Box Testing Results**

Each functional component was tested using black-box testing to confirm that the system operates as expected under normal input-output conditions. The results are shown in Table 2.

**Table 2.** Black-Box Testing Results

No	Feature Tested	Input	Expected Output	Result
1	Admin Login	Username & password	Admin dashboard access	Passed
2	Add Equipment	Name, stock, price	Item appears in catalog	Passed
3	Edit Equipment	Updated attributes	Catalog reflects new information	Passed
4	Rental History Tracking	Customer ID	Transaction log displayed	Passed
5	Payment Confirmation	Transaction details	Status updates to "Paid"	Passed

All tests passed without exceptions or functional defects. The system was confirmed to be stable, accurate, and ready for deployment in a controlled environment..

## **C. Discussion and Impact**

The implementation of this system significantly improved Semeton Pendaki's operational efficiency and customer experience. Key impacts include:

- **Improved Accuracy:** The transition from manual logs to structured databases reduced data loss and misrecorded transactions.
- **Customer Convenience:** Online rental booking allows customers to view and reserve items remotely, improving service accessibility.
- **Centralized Management:** Admins can monitor inventory, manage users, and generate reports from a single control panel.
- **Scalability:** The system design allows for future integration of payment gateways, SMS/email reminders, and mobile app compatibility.

By digitizing a previously manual workflow, the system aligns Semeton Pendaki with modern consumer expectations and creates room for business growth in a competitive outdoor tourism market.

## **V. CONCLUSION**

This research has demonstrated the successful design and implementation of a web-based information system tailored to the operational needs of Semeton Pendaki, a mountain equipment rental service. Utilizing the System Development Life Cycle (SDLC) with the Waterfall model, the system effectively resolves key challenges associated with the manual rental process—namely, limited access to item availability, time-consuming transactions, and the risk of human error in recordkeeping. The system integrates essential functionalities such as real-time catalog viewing, user authentication, transaction management, and financial reporting within a single, centralized platform. Black-box testing validated the system's performance and stability, confirming that each

module functioned as expected. Users, both administrative and customer-facing, benefited from improved access to information and streamlined workflows. This digital transformation not only enhances operational efficiency but also aligns the business with evolving consumer expectations in an increasingly digital market environment. Moreover, the architecture of the system was designed to support future enhancements, including the integration of online payment systems, mobile responsiveness, multilingual interfaces, and automated notification features. These improvements could further extend the system's utility, scalability, and competitiveness. In conclusion, the developed system represents a significant advancement for Semeton Pendaki, offering a viable model for other small and medium-sized rental businesses seeking to modernize their operations. By bridging the gap between manual processes and digital infrastructure, the system contributes meaningfully to the broader discourse on ICT adoption in traditional service industries..

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