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Web-Based Inventory Booking System to Empower Community Services in Ngawen, Indonesia

Nugroho Agung Prabowo[a*], Irsatu Nurhayadin[b], Arif Setyo Wicaksono[c], Zuan Afrisaul Haq[d], Mukhtar Hanafi[e], Bambang Pujiarto[f], R. Arri Widyanto[g],

[a,b,c,d,e,f,g]*Universitas Muhammadelang, Jl. Mayjend Bambang Soegeng KM.5, Magelang, Jawa Tengah*

* *naprabowo@unimma.ac.id*

Abstract

This study describes the development and implementation of a web-based online borrowing and booking system for inventory items in the Dusun Ngawen community, Muntilan, Magelang. The system was designed using an Object-Oriented Programming (OOP) approach to ensure a modular, flexible, and efficient structure for future scalability. The research began with user requirement analysis involving residents and inventory managers, followed by OOP-based architectural design, code implementation using encapsulation, inheritance, and polymorphism principles, and functionality testing before online deployment. The resulting system enables residents to view available inventory, submit borrowing requests, and track borrowing status in real-time through a responsive web interface. The system also features an admin dashboard with integrated data management for user registration, item availability, and borrowing transactions. Results show that the system effectively overcomes communication barriers in traditional inventory borrowing processes, ensures transparency of item availability, and streamlines monitoring and confirmation processes. This innovation not only improves service efficiency within the RT environment but also provides a reference framework for similar community-based system developments. However, optimal utilization requires socialization and training for residents and managers. Overall, the implementation demonstrates that web-based technology with OOP design can significantly advance inventory management practices in local residential communities.

Keywords: web-based system; online booking; inventory management; Object-Oriented Programming; community services

1. Introduction

In the ever-growing digital era, the use of information technology has brought significant changes in various areas of life, including inventory management. The implementation of online borrowing and booking systems for managing inventory items has become increasingly relevant, especially in the neighborhood (RT) environment. This transformation supports efficiency, transparency, and affordability in the process of borrowing and returning inventory items (Marpaung & Limbong, 2022; Rochmawati & Saputra, 2016).

The Ngawen Hamlet neighborhood in Muntilan, Magelang, also felt the impact of this change. Effective and efficient inventory management is key to maintaining sustainable facilities and providing optimal services to residents (Suswara & Kurniawan, 2022). However, conventional methods of borrowing inventory items often face challenges such as barriers in communication, unclear availability of items, overlapping bookings, unrecorded borrowing transactions, and difficulties in monitoring the status of borrowings in real-time. These issues can result in reduced service quality and resident satisfaction and even lead to disputes due to the absence of centralized digital data (Jamil et al., 2015; Rahmah, 2015).Such problems indicate an urgent need to implement a technological solution that can automate data recording, facilitate communication between residents and managers, and minimize administrative errors in the inventory borrowing process (Sarimole et al., 2022).

Moreover, the importance of adopting technology in inventory management is mainly reflected in the increasing public demand for fast, easy, and reliable online access (Faizah, 2019; Rahman & Dewantara, 2017). Based on DataReportal (2020), internet users in Indonesia reach more than 175 million people, indicating a large potential for the use of online systems in community services. Therefore, the development of a web-based online booking system becomes a strategic solution to address these challenges by providing a transparent platform for

viewing inventory availability and submitting borrowing requests anytime and anywhere. Residents can independently check the availability of items, submit booking requests, and monitor approval status in real-time, thereby reducing the need for face-to-face confirmations and repeated phone calls. For inventory managers, this system integrates automated data recording and notification features, enabling them to manage items more efficiently and minimize the risk of data loss or human error (Rumetna, 2018).

This study discusses the development and implementation of a web-based online booking system for inventory items in the Rukun Tangga community in Ngawen Hamlet, Muntilan, Magelang. The system was designed using an Object-Oriented Programming (OOP) approach to ensure a modular, flexible, and efficient structure for future scalability. OOP allows the separation of different functions into well-configured components, reduces code duplication, and facilitates future system expansion and maintenance (Escobar-Castillejos et al., 2020; Primandaria & Sholiq, 2015).

In this context, this study aims to provide a solution to the problems faced by the community and offer guidance for the development of similar systems elsewhere by utilizing the potential of the latest technology in optimizing inventory management in neighborhood environments.

2. Litarature Review

2.1. Web-Based Inventory Management Systems

The development of web-based inventory management systems has become an important trend in improving operational efficiency and service quality in various organizational contexts. Rochmawati & Saputra (2016) developed an inventory information system for borrowing and returning laboratory items, which succeeded in improving the accuracy and speed of transaction recording. Similarly, Suswara & Kurniawan (2022) designed an inventory management system for school facilities, highlighting that digital systems can minimize data loss and overlapping bookings that often occur in manual processes.

In the context of this study, the implementation of a web-based inventory management system in Ngawen Hamlet is expected to overcome the limitations of manual recording that still dominate neighborhood inventory management practices (Handoko et al., 2015). By referring to previous studies in educational institutions and offices, this research adapts system features such as real-time data display, user access management, and online approval processes to suit the social environment and technical capabilities of the local community.

2.2. Online Booking Systems in Community Services

The implementation of online booking systems has also been proven effective in community service contexts. Sarimole et al. (2022) developed a web-based inventory system in a neighborhood community in Jakarta, enabling residents to access item availability and submit borrowing requests online, thus reducing communication barriers and increasing transparency. Rahman & Dewantara (2017) emphasized that user acceptance of online systems is influenced by perceived ease of use and perceived usefulness, indicating the importance of intuitive interfaces and real-time information features in increasing user satisfaction.

Furthermore, online booking systems are not only beneficial in formal institutional environments but also highly relevant for daily communal activities, such as borrowing shared items in neighborhoods. The current study builds upon these findings by developing a booking system specifically designed to accommodate community needs, social structures, and communication habits in Ngawen Hamlet, thereby increasing system adoption and supporting local digital transformation initiatives (Christianto & Susanto, 2025).

2.3. Application of Object-Oriented Programming (OOP) in System Development

The use of Object-Oriented Programming (OOP) is essential in developing scalable and maintainable systems. Escobar-Castillejos et al. (2020) stated that OOP facilitates modular design, allowing components to be reused and easily expanded for future system upgrades. Primandaria & Sholiq (2015) added that OOP principles such as encapsulation, inheritance, and polymorphism simplify complex coding structures, reduce redundancy, and improve system performance, making them suitable for developing inventory management and online booking systems.

In this study, the OOP approach was chosen to ensure that the inventory booking system can be efficiently developed and maintained while allowing future enhancements such as integration with mobile apps or notification APIs (Asghar et al., 2022). By utilizing OOP, system functionalities such as borrowing transactions, item data management, and user authentication are developed as independent yet interconnected modules, making the system more flexible and easier to adapt to evolving community needs (Wu et al., 2020).

2.4. Research Gap

Although many studies have discussed inventory management systems in educational and organizational environments, research on the development of web-based online booking systems specifically for neighborhood (RT) inventory management is still limited. The Ngawen Hamlet community in Muntilan, Magelang, has unique characteristics, where inventory management still relies on manual recording and verbal confirmations. This study thus fills the research gap by developing a web-based online inventory booking system with an OOP approach in a neighborhood context, providing a practical solution to improve transparency, efficiency, and accountability in local community services (Demestichas & Daskalakis, 2020; Hoosain et al., 2020).

Addressing this research gap is important because neighborhood-level innovations often receive less attention despite their direct impact on daily community welfare. Therefore, this study is expected to serve as a reference model for other RTs or rural communities aiming to digitize their inventory management processes with low-cost, scalable, and user-friendly web-based systems that can be replicated with minimal resources and technical training (Haseeb et al., 2019).

3. Method

This study applied a Research and Development (R&D) approach with a prototyping development model, aiming to produce a web-based online inventory booking system that meets user needs effectively and efficiently. The R&D approach was chosen to ensure that the resulting system is not only theoretically feasible but also practically applicable in the community context (Sugiyono, 2019).

3.1. Requirement Analysis

The first stage was user requirements analysis, carried out through interviews and observations involving RT residents as users and inventory managers as administrators. This stage identified functional needs such as viewing item availability, submitting borrowing requests, and monitoring borrowing status, as well as non-functional needs such as system security and ease of use (Baxter, 2006).

3.2. System Design

The second stage was system design, using the Object-Oriented Programming (OOP) approach to produce a modular, flexible, and scalable architecture. The design included case diagrams, class diagrams, and database schema modeling to define system functionality and data relationships clearly (Escobar-Castillejos et al., 2020).

3.3. Prototype Development

The third stage was prototype development, where the coding process applied OOP principles including encapsulation, inheritance, and polymorphism using PHP and MySQL frameworks to build system components efficiently (Primandaria & Sholiq, 2015).

3.4. Testing

The fourth stage was system testing, conducted using black box testing to validate whether each function met the requirements and operated without errors (Baxter, 2006). Testing scenarios included input validation for borrowing forms, notification features, and admin dashboard functionality to ensure the system ran as intended.

3.5. Implementation and Evaluation

The final stage was implementation and evaluation, where the prototype was deployed on the hosting server and tested in real user environments within the Ngawen Hamlet RT community. Feedback was collected through interviews with residents and managers to evaluate system usability, efficiency, and impact on service quality, which is an essential stage in the prototyping model to refine and finalize the system before wider deployment (Sugiyono, 2017).

4. Result

Through the presentation that has been explained in the background, it is known that the problems that occur in the process of borrowing inventory goods at the RT in Ngawen hamlet. We have two goals for the website we created and provide results as shown below:
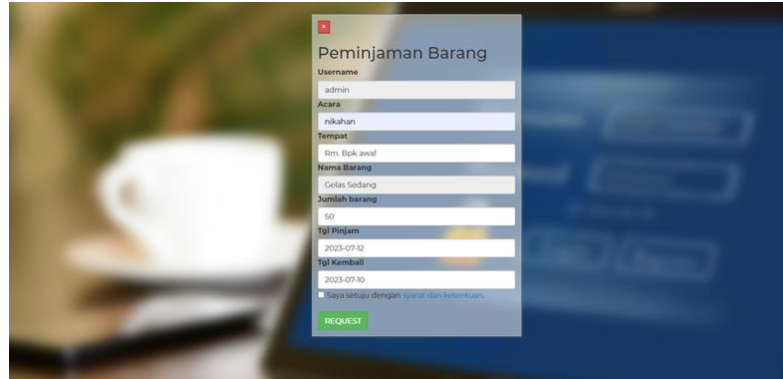
a. Input of borrowing goods

Figure 1. Borrowing process page

In Figure 1. The form contains the form used to borrow goods, in the form contains the Username, Event, Place, Name of the item, Number of goods, Date of borrowing, Date of return and a loan approval checklist containing terms and conditions. Every user who wants to borrow goods is helped by this web-based application because the user only needs to press the existing button to enter the borrowing data, then it can be helped so that it is more efficient, but for events and venues must be typed themselves because they are uncertain. Users are helped because if they want to borrow an amount more than what has been registered and when entering the borrowed date or return incorrectly, the transaction process cannot be carried out so that the user can immediately replace the data entered.
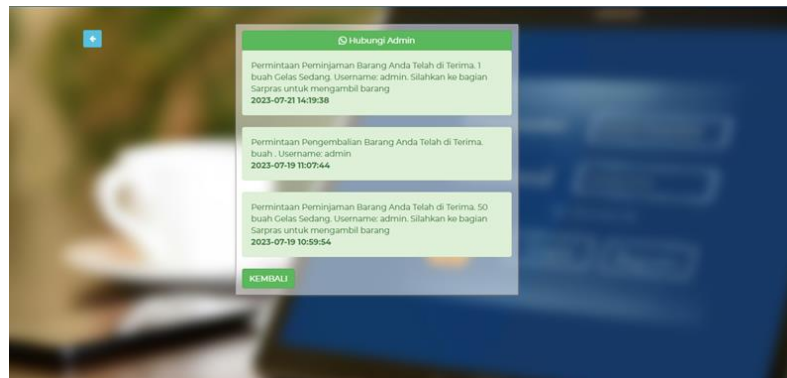
b. Notification page

Figure 2. Notification Page

In Figure 2. Namely, the Notification menu contains a notification of approval or rejection in the borrowing process, there is also a contact admin button to contact the admin via Whatsapp. Every User who has made a loan input can find out the borrowing status of the borrowed item only from that page. Users are helped because if the borrowed item has not received confirmation, they can make a confirmation request via WhatsApp by clicking the whatsapp button at the top of the notification so that the borrowing process is immediately followed up.
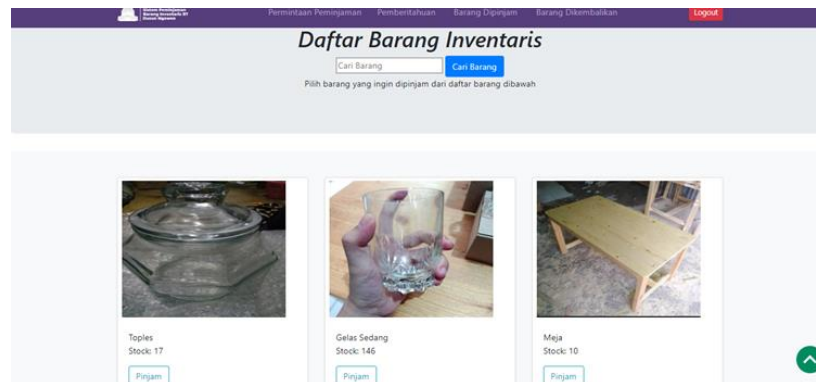
c.   User main page

Figure 3. User home page

From Figure 3. There is a list of Baramg that can be seen directly the number of stocks, the search column to search for goods also has a main User menu including Loan Requests, Notifications, Borrowed Goods, Returned Goods as well as the Logout button to exit the Login session. On display in the system, the goods provided by the equipment section are directly listed. If there is a User who wants to borrow, it is helped by the page because it can find out the number of items available and find items to be borrowed through the existing search even without logging in first.
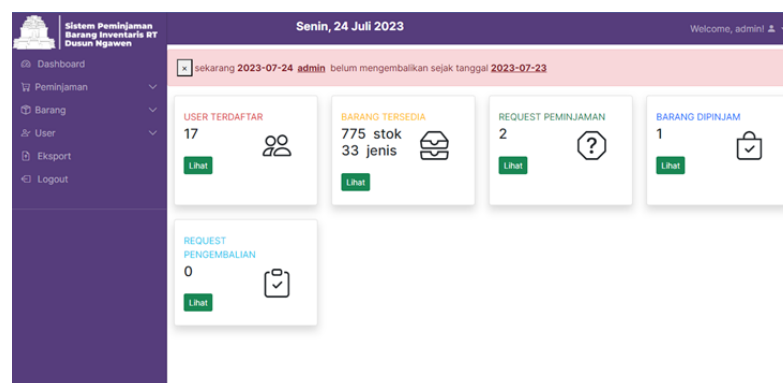
d.   Admin Dashboard Page

Figure 4. Admin Dashboard Page

On the Admin Dashboard page, there is a sidebar menu containing the Dashboard, Loans, Goods, User, Export and Logout menus. In addition, there is also a notification with a menu shortcut in which there is data to make it easier for Admins to monitor the condition of the borrowing process. All data has been seen so that the admin or equipment section officer can easily monitor the registered users, available goods, transaction processes, and the return process of goods also if there are borrowers who are late in returning it can be seen because it will display a notification, so that when there is a change in data or the need to confirm the loan or return there is no need to search for data one by one.

5. Discussion

The results of this study demonstrate that the web-based online inventory booking system developed using an Object-Oriented Programming (OOP) approach effectively addressed the problems identified in the manual borrowing process in Ngawen Hamlet. Previously, residents experienced difficulties checking the availability of items and submitting borrowing requests, leading to overlapping bookings and communication barriers. The implementation of the system has successfully eliminated these problems by providing a real-time inventory display and an online borrowing request feature accessible via a user-friendly web interface.

Furthermore, the admin dashboard provided in this system has facilitated inventory managers in monitoring borrowing transactions, approving or rejecting requests, and updating item data efficiently. The integrated notification feature enables direct communication between users and managers, reducing response time and enhancing service transparency. These findings align with previous research by Rochmawati & Saputra (2016) and Suswara & Kurniawan (2022), which emphasize that digitizing inventory management increases accuracy, efficiency, and user satisfaction in both educational and community environments.

The use of an OOP approach has proven effective in this development. The modular system design enabled functionalities such as borrowing transactions, user management, and item data management to be developed as independent yet interconnected modules. This structure simplifies future system maintenance and upgrades, as stated by Escobar-Castillejos et al. (2020). Additionally, by applying encapsulation, inheritance, and polymorphism, the system code became more organized and flexible, supporting the scalability of the system to adapt to potential future needs, such as integration with mobile apps or automated reminder notifications.

From the perspective of community service and digital transformation, this system has created a significant impact by supporting the acceleration of digital literacy and e-governance practices at the RT (neighborhood) level. The ability of residents to independently access, request, and track the status of borrowed items not only improves operational efficiency but also increases accountability and public trust towards inventory managers. This result confirms Rahman & Dewantara's (2017) finding that perceived usefulness and ease of use are key factors influencing user acceptance of new online systems.

However, despite the positive outcomes, several challenges remain for optimal utilization of this system. Training and socialization for residents and inventory managers are needed to ensure all features are used effectively, as some elderly users may face difficulties in using web-based interfaces. In future research, usability testing with a larger and more diverse sample is recommended to improve user interface design and accessibility. Nevertheless, overall, this study contributes practical implications as a reference model for other communities aiming to develop similar web-based inventory management systems to support digital transformation in community services.

6. Conclusion

This study illustrates the success of the application of the Object-Oriented Programming (OOP) approach in developing a web-based online booking system for inventory goods for the RT environment in Ngawen Hamlet, Muntilan, Magelang. The results show that the use of OOP can create a system structure that is modular, efficient, and easy to manage. This system provides easy access for residents to order and borrow inventory items, as well as facilitate managers in tracking status in real-time.

In the digital era, the adoption of information technology such as online borrowing and booking provides relevant solutions in overcoming communication barriers and improving the efficiency of inventory management. With the concept of OOP, this system can accommodate the development and change of user needs in the future. However, the launch of this system needs to be followed by training for residents and managers to ensure optimal utilization. Overall, this research makes a significant contribution to advancing inventory management in the context of the RT environment using modern technology.

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