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DESIGN OF A PRELOVED MARKETPLACE WEBSITE APPLICATION FOR UNIVERSITY STUDENTS

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Abstract

The rapid development of information and communication technology has significantly influenced commercial activities, including buying and selling transactions conducted through digital platforms. Among university students, the increasing demand for affordable products has encouraged the growth of preloved or second-hand goods trading. However, existing general marketplace platforms do not specifically accommodate the needs of university students in conducting preloved transactions within campus environments, resulting in inefficiencies in product searching, limited transaction relevance, and concerns regarding security and trust. This study aims to design a website-based Preloved Marketplace application specifically intended for university students to facilitate secure, efficient, and affordable buying and selling activities for second-hand usable goods. The research employed a qualitative approach through observation, interviews, surveys, literature review, and system requirement analysis. The design process included problem identification, UI/UX design using Figma, prototype implementation, and system evaluation. The developed application provides various features, including user registration, login, product listings, product search and filtering, shopping cart, checkout, payment confirmation, live chat, sales reports, and dashboard monitoring. Black Box Testing was conducted to evaluate system functionality based on user input and output behavior. The testing results indicate that all system features operated successfully according to expected requirements, demonstrating functional consistency and usability. The developed platform is expected to support university students in selling unused but still usable products while helping other students obtain affordable necessities. Therefore, the proposed Preloved Marketplace has strong potential to improve transaction efficiency, support sustainable consumption, and encourage digital transformation within campus communities.

Keywords: preloved marketplace; website application; ui/ux design; students; e-commerce.

1. INTRODUCTION

The development of information and communication technology in the current digital era has grown very rapidly. These advancements have significantly impacted various aspects of society, including education, social life, and the economy. Technological progress has made it easier for people to access information and utilize digital services to support their daily activities [1], [2]. In addition, the development of internet-based technology and Artificial Intelligence (AI) has increased society's dependence on digital technology in various fields of life.

One of the sectors experiencing significant growth is the commercial and business sector. Nowadays, buying and selling activities are not only conducted conventionally but also through digital platforms such as online marketplaces. Marketplaces provide convenience for people to conduct transactions anytime and anywhere without having to meet directly. Various needs can be fulfilled through marketplaces, ranging from daily necessities to branded products. However, the high price of branded goods often becomes an obstacle for certain groups, especially university students. This condition has encouraged the increasing interest in preloved or second-hand usable goods. Preloved items are products that have been previously used but still maintain good quality and are suitable for reuse. Purchasing preloved items is considered a solution for obtaining quality goods at more affordable prices compared to buying new products[3], [4], [5].

The trend of using preloved items is currently growing among young people, particularly university students. In addition to the lower prices, buying and selling preloved goods also helps students reduce the accumulation of unused items, especially for those living in boarding houses or dormitories. Items such as boarding house equipment, clothing, electronics, and study necessities are often still usable but difficult to bring home due to transportation limitations and

shipping costs [3], [6], [7]. Through a preloved trading system, these items can be reused by other students who need them.

Currently, there are various marketplace platforms that can be used to sell preloved items. However, most general marketplaces do not provide a specific category focused on preloved goods within the student environment, making the process of finding such items less effective. Based on these problems, a specialized preloved marketplace platform is needed to facilitate students in conducting buying and selling transactions for second-hand usable goods easily, safely, and efficiently.

Therefore, this study aims to design a website-based preloved marketplace application specifically for university students. This application is expected to help students sell items that are no longer used but still suitable for use, while also helping other students obtain necessities at more affordable prices. With this platform, the process of buying and selling preloved goods within the student community can be carried out more effectively and efficiently.

2. RESEARCH METHODS

2.1. Data Collection

This study uses a qualitative approach through direct observation, interviews, and surveys conducted on two main groups of informants, namely preloved business actors and students of Bengkalis State Polytechnic. Data collection was carried out with the aim of obtaining relevant and accurate information to achieve the research objectives using systematic, planned, and research-appropriate methods.

2.2. Research Instruments

The hardware used in this study includes:

a. Laptop: ASUS TUF Gaming A15 FA507NU
b. Processor: AMD Ryzen 5 7535HS with Radeon Graphics (3.30 GHz)
c. RAM: 16 GB

The software used in this study includes:

a. Operating System: Windows 11
b. Code Editor: Visual Studio Code
c. Database: MySQL
d. Browser: Google Chrome
e. UI/UX Design Tool: Figma

2.3. Research Flow

The research procedure is a series of systematic steps carried out by the researcher to obtain the data and information needed in designing a website-based preloved marketplace application. These steps consist of seven stages, namely: (1) Problem Identification, (2) Literature Review, (3) Data Collection, (4) System Requirements Analysis, (5) UI/UX Design, (6) Implementation, and (7) Design Evaluation.

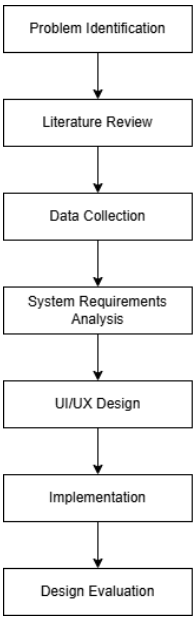

Figure 1. Research Flow Diagram

The main issue addressed in this study is the lack of a preloved marketplace platform specifically designed for campus environments and university students. General marketplaces often do not provide preloved categories that are focused on campus contexts, making the process of searching for second-hand goods less efficient and more vulnerable to irrelevant new product listings. In addition, concerns regarding transaction security, identity verification, and responsive customer support become obstacles to the adoption of new platforms among students, especially those with varying levels of digital literacy. [8], [9]. Therefore, a website-based Preloved Marketplace application design is needed that prioritizes ease of use, transaction security, relevance to the campus environment, and compliance with regulations related to privacy and consumer protection within the campus community[10].

The literature review shows that digital transformation and the growth of e-commerce have accelerated the adoption of online platforms, with trust and security serving as the main determinants of user decisions. Good UI/UX design and the integration of reliable payment mechanisms are important factors in optimizing user experience in preloved marketplaces, especially within campus environments that require personal data security and ease of transactions [8], [11]. Regulations on personal data protection, consumer rights, and cybersecurity practices establish a normative framework for building legal compliance and user trust in campus-based platforms. [9], [10]. In addition, literature on consumer behavior in preloved marketplaces highlights the role of price, convenience, platform reputation, and digital literacy as determinants of purchase intention. [11], [12]. Overall, the literature suggests a holistic approach that combines UX, security, regulatory compliance, and digital literacy to increase adoption among university students [8], [11], [13].

Data collection was focused on understanding the needs, preferences, and behavior of student users through a combination of qualitative and quantitative methods. Questionnaires were used to measure usage intention, trust, and risk perception; in-depth interviews were conducted with representatives from various departments to explore the needs for preloved categories such as boarding house equipment, clothing, and electronics; analysis of existing campus platform usage data was carried out to identify transaction patterns and areas for improvement; and case studies of other campus-based preloved platforms were used as comparisons for best practices. [8], [14]. The collected data were then analyzed quantitatively and qualitatively to produce clear functional and non-functional requirements for the system design. [9], [11].

The system requirements analysis produced functional specifications such as preloved listing management, structured campus-based categories, efficient search and filtering features, listing processes with image verification, integrated communication, as well as escrow payment mechanisms and transaction tracking. In addition, the non-functional requirements include data security (encryption and two-factor authentication), user privacy, service availability, scalability, and ease of use through a responsive interface. This analysis also incorporates compliance with personal data protection regulations, consumer rights, and relevant campus policies, ensuring that the technical architecture and UX design align with legal and ethical usage contexts. [9], [10]. The resulting system requirements document serves as the foundation for implementing the technical architecture and UX design.

The UI/UX design focuses on creating a user experience that is intuitive, secure, and relevant to the campus environment. The interface structure includes a clear information hierarchy, an easy listing flow with sufficient photo upload options, and a search flow that can be filtered based on campus categories, location, and distance. Additional features include notifications, integrated chat, ratings/reviews, and a reporting mechanism for problematic listings. Accessibility and responsiveness across various devices are key priorities to ensure inclusivity for students with different levels of digital literacy. The UI/UX prototype can be tested through usability testing involving students from different departments to obtain continuous feedback. Design Thinking or User-Centered Design (UCD) approaches can be applied through the stages of empathize, define, ideate, prototype, and test to produce a design that truly focuses on user needs [8], [10], [15].

The implementation stage includes the development of a web-based Preloved Marketplace prototype with a modular architecture that supports listing management subsystems, escrow payments, communication inboxes, and privacy policies. The technologies considered include a responsive front-end, a reliable back-end, and secure escrow payment solutions. Security is implemented through identity verification, data encryption, and privacy protocols. The implementation also includes integration with campus customer service and compliance with personal data protection regulations and consumer protection policies. Functional, performance, and security testing are carried out iteratively to ensure system stability before launch, while post-implementation evaluation uses user feedback for further design iterations [8], [9], [16].

The design evaluation is conducted to assess the extent to which the campus Preloved Marketplace achieves its objectives. The evaluation methods include usability testing (SUS or SUS-like), security evaluation through threat simulations and privacy compliance assessments, as well as post-usage user satisfaction surveys. Relevant KPIs include transaction completion time, listing conversion rate, user trust level, and satisfaction scores. The evaluation results will serve as input for design iterations and feature improvements, with a focus on increasing adoption among students as well as ensuring regulatory compliance and digital literacy [8], [9], [11], [17].

2.4. Use Case Design

Two use case diagrams were developed to illustrate system interactions. For regular users, the use cases include: account registration, system login, viewing products, searching for products, viewing product details, adding products for sale (seller role), editing and deleting products, adding items to the cart, checkout, payment confirmation, viewing order history and status, live chat with the administrator, editing user profiles, and logging out.
For administrators, the use cases include: admin login, user data management, product management, order management, financial management, viewing dashboard statistics, live chat with users, system settings management, and admin logout.

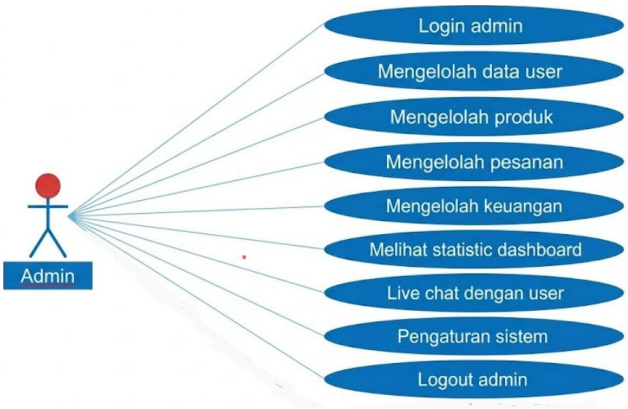

Figure 2. Use Case Diagram

2.5. Activity Diagram Design

The user activity diagram begins from the homepage and continues to the login process. After successfully logging in, users can access the dashboard and perform activities such as browsing products, viewing product details, adding items to the cart, proceeding to checkout, and confirming payments. Users can also start a live chat session with the administrator. The admin activity diagram begins from the admin login page. After successfully logging in, the administrator can access menus for managing user data, products, orders, financial reports, live chat, and system settings.

3. RESULTS AND DISCUSSION

3.1. Implementation Results

The design of the PrelovedMarket website application resulted in a comprehensive set of user interface displays that fully illustrate the system workflow from beginning to end. A total of 24 interface pages were designed, covering both regular user flows and administrator-specific flows. The application design uses a dominant pink and white color scheme to create an attractive, modern, and user-friendly appearance for university students. All pages were interactively prototyped using Figma to facilitate the visualization and system development process.

In addition, each page was designed by considering user-friendly aspects so that users can access the available features more easily and efficiently. The layout of menus, color selection, icons, and navigation was created consistently to improve user comfort while using the marketplace application.

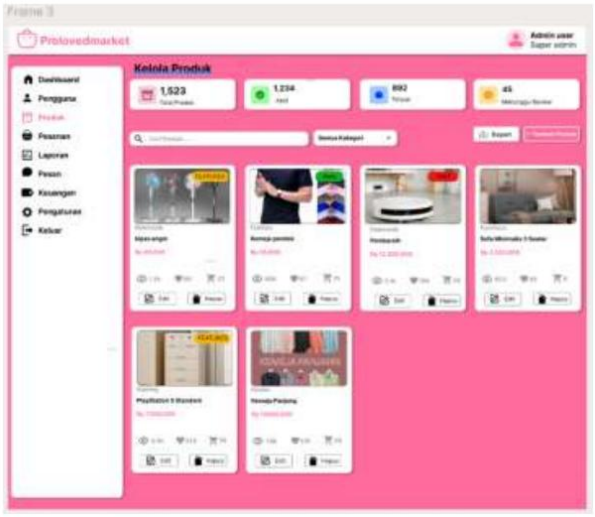

Figure 3. Product Page

The product sales page is a page used to manage product data in the marketplace application. On this page, the admin can view a list of available products along with information such as product name, price, category, and stock quantity. In addition, there are search and category filter features to make it easier for users to find specific products. This page also provides features to add, edit, and delete product data so that the product management process can be carried out more effectively and efficiently. The product page was designed with a simple yet informative interface to help the admin manage product data more easily. With the availability of complete product management features, the admin can quickly update product information and maintain accurate product availability data.

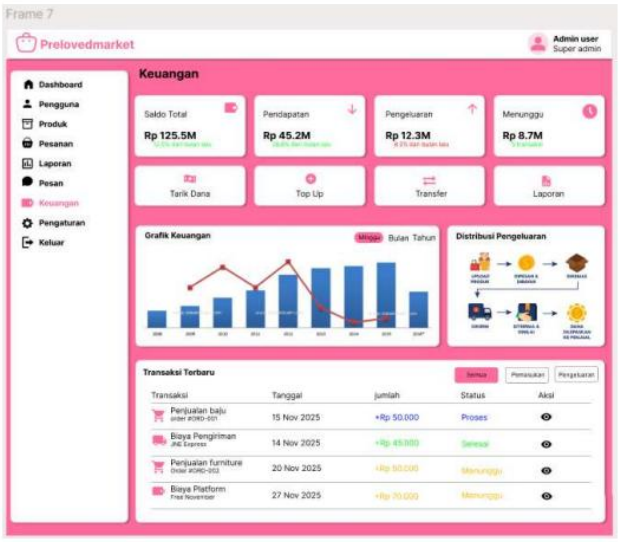

Figure 4. Report Page

The sales report page is a page used to display information related to sales data in the application. On this page, users can view a summary of total revenue, number of orders, number of customers, and the number of available products. In addition, there is a sales chart that functions to monitor sales performance based on a specific time period. This page also displays a list of best-selling products and the latest orders, making it easier for the admin to monitor and evaluate overall sales activities.

The report page was designed to assist admins in analyzing sales performance and making decisions based on the available data. With the presence of graphical visualizations and sales data summaries, the process of monitoring business development can be carried out more easily, quickly, and systematically.

3.2. System Testing

Black Box Testing was conducted to evaluate whether the features of the developed website-based Preloved Marketplace application functioned properly according to the predefined system requirements. This testing method focuses on validating system functionality by examining input and output behavior without analyzing the internal program code structure. The testing process covered the main features available for both users and administrators, including registration, login, product management, search functionality, cart management, checkout, payment confirmation, reporting, communication, and logout. The purpose of this testing was to ensure that every function in the application operates correctly, consistently, and efficiently from the user perspective.

Table 1. System Testing

No	Tested Page/Feature	Test Scenario	Input	Expected Result	Actual Result	Status
1	Registration Page	User creates a new account	Valid registration data	New account is successfully created	Registration successful	Valid
2	Login Page	User logs in with valid account	Correct username and password	User successfully enters dashboard	Login successful	Valid
3	Login Page	User logs in with invalid credentials	Incorrect username/password	Error message displayed and access denied	Error message displayed	Valid

4	Product Page	User views product list	Open product page	Product list displayed completely	Products displayed properly	Valid
5	Search Feature	User searches for products	Enter product keyword	Relevant products displayed	Search works correctly	Valid
6	Product Detail	User views product details	Click selected product	Product details displayed	Product details shown	Valid
7	Add Product	Seller uploads product for sale	Enter valid product data	Product added successfully	Product uploaded	Valid
8	Edit Product	Seller edits product data	Update product information	Product information updated	Product edited successfully	Valid
9	Delete Product	Seller deletes listed product	Click delete button	Product removed from system	Product deleted successfully	Valid
10	Add to Cart	User adds product to cart	Click add-to-cart button	Product added into shopping cart	Product successfully added	Valid
11	Checkout Page	User proceeds to checkout	Confirm selected products	Checkout page displayed	Checkout successful	Valid
12	Payment Confirmation	User confirms payment	Valid payment data	Payment confirmation processed	Payment successful	Valid
13	Order History	User checks purchase history	Open history page	Transaction history displayed	History displayed properly	Valid
14	Live Chat	User sends message to admin	Enter message	Message sent successfully	Chat functioning properly	Valid
15	Report Page	Admin views sales report	Open report page	Sales summary and chart displayed	Report displayed properly	Valid
16	Dashboard Statistics	Admin views statistics	Open dashboard	Statistical data displayed correctly	Dashboard works properly	Valid

Based on the Black Box Testing results shown in Table 1, all tested functionalities of the Preloved Marketplace website successfully operated according to system requirements. The authentication features, including registration and login, worked properly by allowing valid users to access the system while rejecting invalid login attempts through error notifications. This confirms that the authentication mechanism provides adequate access control and security for users and administrators.

The product management functionality also performed effectively. Users were able to browse products, search for specific items, view detailed information, and add products to the cart successfully. Sellers could upload, edit, and delete product listings without encountering functional issues, demonstrating that the platform adequately supports student-based preloved trading activities.

Transaction-related features such as checkout, payment confirmation, and order history also worked as expected. Users could complete purchasing processes and review transaction records properly, which contributes to a smoother and more transparent buying experience. Additionally, the integrated live chat feature enabled communication between users and administrators, improving customer support and transaction confidence.

On the administrative side, report and dashboard features functioned successfully by displaying sales summaries, product information, and transaction statistics accurately. These features can support better decision-making and marketplace monitoring. Overall, the Black Box Testing results indicate that the developed Preloved Marketplace application is functionally feasible and capable of supporting secure, efficient, and user-friendly online buying and selling activities within the university environment.

3.3. Discussion

The results of the Black Box Testing demonstrate that the developed website-based Preloved Marketplace application successfully fulfills its functional requirements and operates consistently across all tested modules. The successful implementation of registration and login features indicates that the authentication system is capable of

managing user access effectively, ensuring that only authorized users can access marketplace services. This is particularly important in a campus-based marketplace environment, where trust, account security, and identity verification play essential roles in creating safe buying and selling interactions among university students.

Furthermore, the successful operation of product browsing, searching, and management features suggests that the designed interface effectively supports usability and ease of navigation. Students can conveniently search for preloved items according to their needs, while sellers can efficiently manage product listings through add, edit, and delete functionalities. The availability of category filters and product detail pages also contributes to improving information accessibility and user convenience, which are important aspects in enhancing the overall user experience within digital marketplace systems.

The implementation of transaction-related features, including shopping cart, checkout, payment confirmation, and order history, further demonstrates the system's capability to support a structured and transparent transaction process. The successful validation of these features helps reduce the possibility of transaction errors and enhances user confidence when conducting online purchases. In addition, the integrated live chat functionality enables direct communication between users and administrators, providing a more responsive interaction process and improving problem-solving efficiency during transactions.

From the administrator perspective, the report and dashboard functionalities provide meaningful support for monitoring sales activities and marketplace performance. The availability of sales summaries, order statistics, and product monitoring features facilitates decision-making and operational management. These findings indicate that the proposed system not only improves transaction efficiency for users but also provides administrative support for maintaining marketplace performance effectively. Overall, the findings suggest that the developed Preloved Marketplace application has strong potential to support digital buying and selling activities among university students. The integration of usability-oriented design, secure transaction mechanisms, and administrative monitoring features demonstrates that the system is suitable for implementation within campus environments. In addition, the platform may contribute to promoting sustainable consumption behavior by encouraging the reuse of preloved goods while simultaneously supporting students in obtaining affordable products according to their needs.

4. CONCLUSION

This study successfully designed a website-based Preloved Marketplace application specifically intended for university students to facilitate the buying and selling of second-hand usable goods within the campus environment. The developed platform provides several essential features, including user registration and login, product listing management, product search and filtering, shopping cart, checkout process, payment confirmation, transaction history, live chat, sales reports, and dashboard monitoring. The interface design was developed with consideration for usability, responsiveness, and user convenience to support students with varying levels of digital literacy.

Based on the results of Black Box Testing, all tested functionalities operated successfully according to the predetermined system requirements. Features related to authentication, product management, searching, transaction processing, communication, and reporting performed consistently without significant functional errors. These findings indicate that the proposed system is functionally feasible and capable of supporting structured, secure, and efficient online buying and selling activities among university students. Furthermore, the developed Preloved Marketplace application contributes to increasing transaction efficiency and promoting sustainable consumption behavior by encouraging the reuse of second-hand products that are still suitable for use. The system also helps students obtain affordable necessities while reducing the accumulation of unused items, particularly for those living in boarding houses or dormitories. Therefore, the proposed platform has strong potential to support digital transformation within campus communities and improve the effectiveness of student-based economic activities. For future development, several enhancements may be considered, including payment gateway integration, recommendation systems, stronger security and identity verification mechanisms, mobile application development, and AI-based product recommendation features to further improve user experience and platform scalability.

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