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IMPLEMENTATION OF CONSTRUCTION EQUIPMENT LOAN SYSTEM APPLICATION USING METHOD USER CENTERED DESIGN (UCD)

Muhammad Donni Lesmana Siahaan[1], Iskandar[2], Muhammad Davy Anggara Saragih[3]
Universitas Pembangunan Panca Budi, Medan
e-mail: donilesmana@dosen.pancabudi.ac.id

Abstract: *Borrowing construction equipment is an important need in the construction industry to support the smooth running of construction projects. However, the process of borrowing equipment is often not well organized, causing delays and inefficiencies. This study aims to implement a construction equipment borrowing system application using the User Centered Design (UCD) method to improve user experience in the tool borrowing process. The UCD method was chosen because it focuses on user needs and preferences, which can ensure that the application is designed according to the wishes of the end user. The development of this application is carried out through several stages, namely user needs analysis, interface design, user testing, and system evaluation. The results of this study are expected to produce an application that is not only functional, but also easy to use and in accordance with user needs in borrowing construction equipment. This application is expected to increase efficiency in the tool borrowing process, reduce errors, and provide a better user experience.*

Keywords: *Construction equipment lending system, User Centered Design (UCD), user experience, efficiency.*

Abstrak: Peminjaman peralatan konstruksi merupakan kebutuhan penting dalam industri konstruksi untuk menunjang kelancaran proyek konstruksi. Namun, proses peminjaman peralatan seringkali tidak terorganisir dengan baik sehingga menyebabkan penundaan dan inefisiensi. Penelitian ini bertujuan untuk mengimplementasikan aplikasi sistem peminjaman alat konstruksi dengan metode User Centered Design (UCD) untuk meningkatkan pengalaman pengguna dalam proses peminjaman alat. Metode UCD dipilih karena berfokus pada kebutuhan dan preferensi pengguna, yang dapat memastikan bahwa aplikasi dirancang sesuai dengan keinginan pengguna akhir. Pengembangan aplikasi ini dilakukan melalui beberapa tahapan yaitu analisis kebutuhan pengguna, perancangan antarmuka, pengujian pengguna, dan evaluasi sistem. Hasil penelitian ini diharapkan menghasilkan suatu aplikasi yang tidak hanya fungsional, namun juga mudah digunakan dan sesuai dengan kebutuhan pengguna dalam peminjaman peralatan konstruksi. Aplikasi ini diharapkan dapat meningkatkan efisiensi dalam proses peminjaman alat, mengurangi kesalahan, dan memberikan pengalaman pengguna yang lebih baik.

Kata kunci: Sistem peminjaman peralatan konstruksi, User Centered Design (UCD), pengalaman pengguna, efisiensi.

INTRODUCTION

In the construction industry, the use of construction tools and equipment plays a very important role in supporting the smooth and efficient implementation of the project. The availability of tools on time and in good condition can affect the success and productivity of a construction project. However, the process of borrowing construction tools is often faced with various obstacles, such as lack of information regarding the availability of tools, complicated borrowing

procedures, and minimal transparency in managing borrowing. (Izhari & Dhany, 2023)(Hendrawan, Perwitasari, & Ritonga, 2023)(Syahputra Novelan & Putra, 2020)

Currently, many construction companies still use manual methods or less integrated systems in managing tool loans, which have the potential to cause problems such as project delays, lost tools, and increased operational costs. Therefore, a system is needed that can automate the construction tool loan process so that it is more efficient, transparent, and easily accessible to users. (Rizal & Fachri, 2023)(Rizal et al., 2022) (Septian Hardinata et al., 2022)(Supiyandi et al., 2022)(Bangun Sistem et al., 2019)
The User Centered Design (UCD) method is the right approach to overcome this problem because it focuses on the needs and comfort of users in application development. UCD ensures that the system developed is designed according to the wishes and expectations of users so that it can improve the overall user experience. By utilizing UCD, it is hoped that this construction equipment lending system application will not only be able to meet operational needs but also increase user satisfaction. (Hendrawan, Perwitasari, & Arifin, 2023)(Tasril, 2018)(Hasan Putra & Syahputra Novelan, n.d.)

This study aims to design and develop a web-based construction equipment lending system application with a UCD approach, so that it can provide an effective solution in overcoming problems that are often faced by users in the tool lending process. The implementation of this application is expected to be able to provide a real contribution in increasing efficiency and productivity in the construction sector. (Fachri, 2018)(Informatika & Hasan, n.d.)(dan Pembuatan Aplikasi Manajemen Peminjaman Kendaraan Berbasis Web Dengan et al., n.d.)

METHOD

The research methodology for designing a drug data processing information system at a health center can involve several steps including planning, development, implementation, and evaluation. Here are some research methodologies that you can consider. (Rahmat et al., 2019)

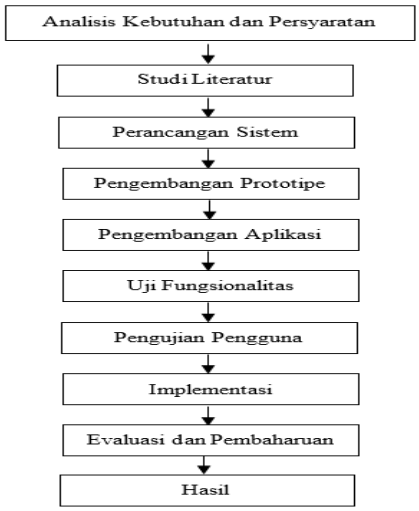

Figure 1. Research Stages

Based on Figure 3.1, the following is an explanation of each process in the research stages, including:

1. Needs and Requirements Analysis
   Identify application needs and requirements by communicating with principals and potential users. Determine key features, data security, and desired user scale.(Penjualan Online Berbasis Website et al., 2019)
2. Literature Study
   Conduct a literature study to understand the current trends in drug data processing applications in health centers and relevant technologies, such as websites. And the challenges they face in adopting digital technology. (Fauzi Siregar & Sari, 2018)
3. System Design
   Create an application system design, including application architecture, user interface, and integration with Firebase Realtime Database and Cloud Computer. Determine how

data will be stored, managed, and accessed.

4. Prototype Development
   Build a prototype of your app to test your concept and get feedback from potential users. Make sure the prototype includes the key features you have identified.
5. Application Development
   Implement applications based on tested prototypes. Integrate database systems for data storage and Cloud Computer to improve scale and performance.
6. Functionality Test
   Perform functional testing to ensure that all application features are working properly. Identify and fix any bugs or technical issues that may arise.
7. User Testing
   Perform functional testing to ensure that all application features are working properly. Identify and fix any bugs or technical issues that may arise.
8. Implementation
   After passing the test and testing, implement and launch the application publicly. Ensure adequate technical support is available.
9. Evaluation and Update
   Conduct a post-launch evaluation to identify potential improvements or enhancements. Get feedback from users and make updates as needed.
10. Results
    Pada penerapan ini akan dijelaskan tentang sistem Rancangan Aplikasi pencarian rumah sakit diwilayah binjai.

1. System Design

The utilization case chart showing administrator access rights has a landing page, document information that includes (Development Equipment Information, borrower information, candidate information, and return information), Development Hardware Reports combined (Borrower and bring back reports). On the administrator page there is a client page where administrator access rights can add new clients. Methods or actions can be obtained from this data: Add Information, Change Information, Delete Information, Search Information, and Print Information, which should be seen in Figure 2 below.

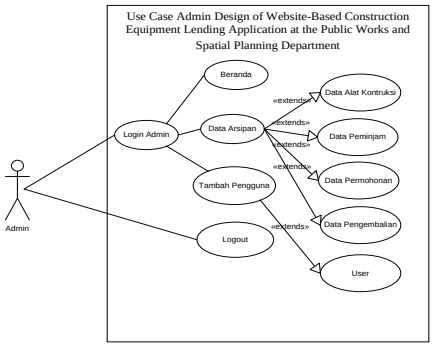

Figure 2. Use Case Diagram Admin Information System

The use case diagram of the User access rights display has a home page to inform the latest news about the Public Works and Spatial Planning Agency. Users can see a list of vehicles and borrow vehicles that have the status Ready and can return the vehicle on the return data page, as seen in Figure 3 below:

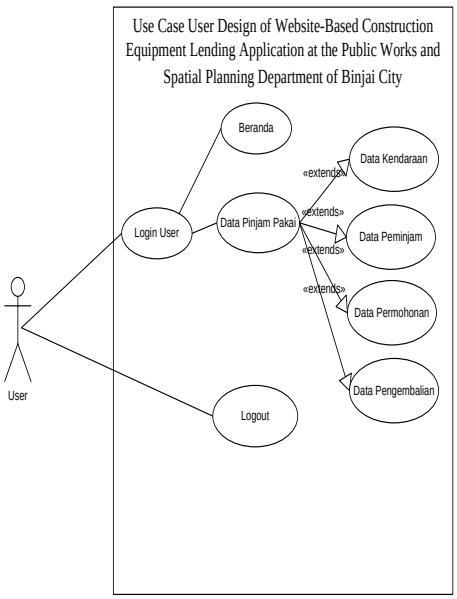

Figure 3. Use Case Diagram User Information System

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2. Class Diagram

Class diagrams have classes that are interconnected with each other. The goal is to explain the direction or an activity in the system. Figure 4 is a class diagram design for the Design of a Website-Based Construction Equipment Lending Application at the Public Works and Spatial Planning Agency.

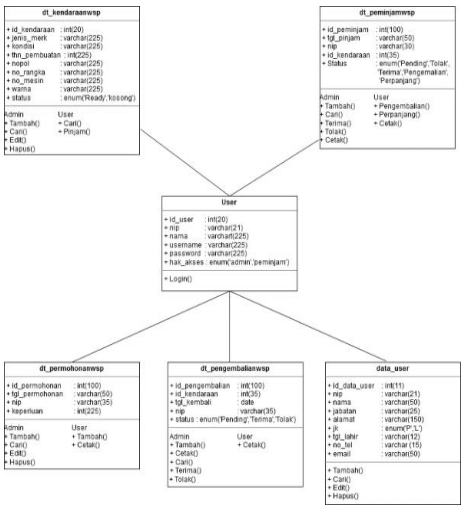
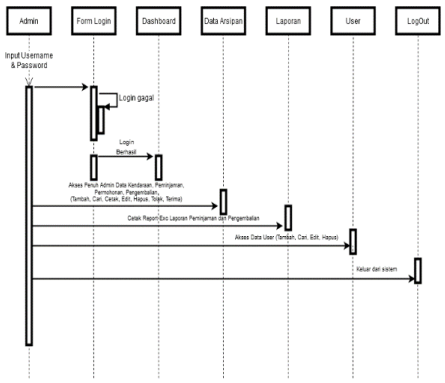


Figure 4. Class Diagram

3. Sequence Diagram

Sequence Diagram is a sequence that describes the life cycle of a system that is sent, processed, and then received by the system so that the flow interacts with each other from beginning to end. Figure 5 is a sequence diagram of full access for Admin and User interacting with each other from the vehicle loan and return information system. The sequence diagram for the display of admin access rights can be seen in the figure 5.



Gambar 5. *Sequence* Diagram Admin

4. Activity Diagram

Activity Diagram explains the activities carried out by the user on the system. This diagram will explain how the information system process interacts with the user. Figure 6 is an Activity Diagram of the designed system.

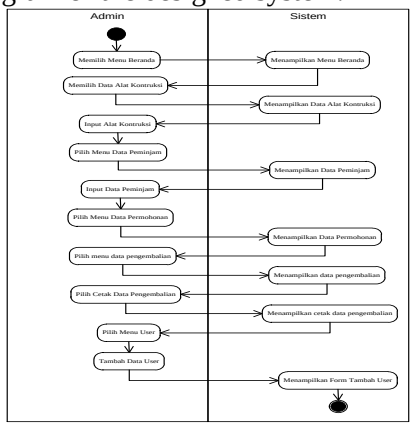


Figure 6. *Activity* Diagram Admin

From the image above explains about how the process of Admin activity in selecting a menu on the Website-Based Construction Equipment Lending Application at the Public Works and Spatial Planning Agency. The system will display if the admin selects several menus and submenus. The admin also inputs some data, namely inputting construction equipment data, and borrower data. Next, it will be shown how the user activity process uses the construction equipment lending application system. Figure 7 displays the user activity diagram process.

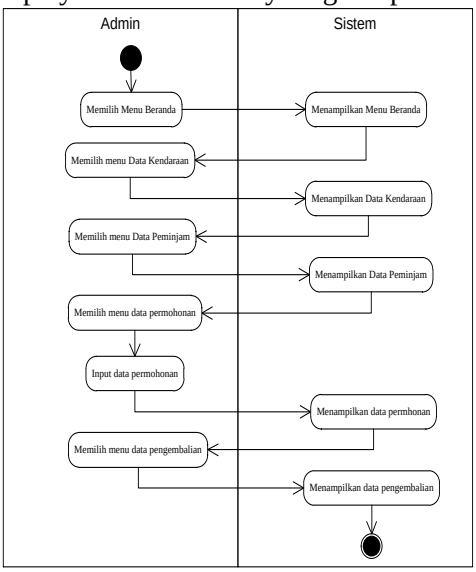


Figure 7. *Activity* Diagram User

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RESULTS AND DISCUSSION

The results and discussion are the results of the implementation of the construction equipment lending system application by utilizing the user centered design (UCD) method. The author conducted a trial using data provided by the company. However, before conducting the test there are several device requirements for the information system.

Home Admin Menu Display

On the home menu page is the admin home menu display when after the admin logs in, the front page will be displayed. The admin home menu is displayed in the image below.

Figure 8. Home Admin Menu View

Admin Construction Tools Data Menu Display

On the construction tool data menu display is a display where the admin if he wants to add the latest construction tools based on type/brand, condition, year of purchase, image, color and stock. The display of the construction tool data menu on the admin account can be seen in the image below.

Figure 9. Admin Configuration Menu View

Admin Borrower Data Menu Display

On the borrower data menu display, the admin, after approving the employee to make a request to borrow construction equipment, enters the loan data table. The borrower data menu display can be displayed in the image below.

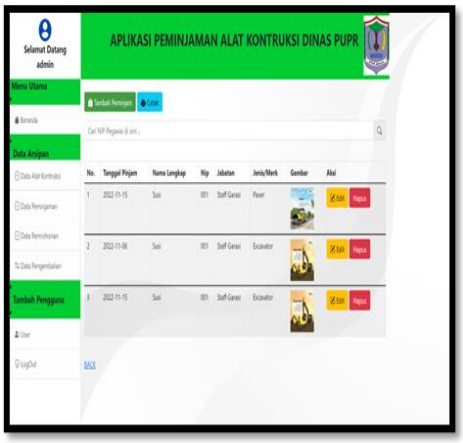

Figure 10. Admin Borrower Data Menu View

Admin Request Menu Display

On the application menu page, the admin page sees which employees are applying for construction equipment loans. If an employee applies, the admin validates the data and accepts it if the loan application is feasible. The appearance of the application menu can be seen in the image below.

Figure 11. Admin Request Menu View

Display the Admin Return Data Menu

On the return data menu page is a display where data if the employee has borrowed the tool then the employee makes a return and in the return data menu the admin can also print a return

report. The display of the return data menu can be seen in the image below.

Figure 12. Admin Return Data Menu View

User Menu Display

On the user menu page is a page where the admin can create a user account for employees of the Public Works and Spatial Planning Service. The user menu display can be seen in the image below.

Figure 13. User Admin Menu View

CONCLUSION

The application of the construction equipment lending system by utilizing the User Centered Design (UCD) method has several conclusions that can be presented, including:

1. Implementation of the construction equipment loan system application designed using the User Centered Design (UCD) method has succeeded in increasing efficiency in the process of borrowing and managing equipment. This system allows users to easily find out the availability of equipment, make orders, and manage loans more quickly and in a structured manner.
2. With the UCD approach, this application is developed based on user needs and preferences, thus providing a more intuitive and easy-to-use experience. This increases user satisfaction in accessing and interacting with the system, and minimizes errors in the borrowing process.
3. This construction equipment loan system application provides an integrated solution to overcome problems in managing equipment loans, such as delays and irregularities. The evaluation results show that this application is effective in reducing operational costs and increasing the productivity of construction companies through better equipment management.

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