

Penerapan Design Thinking UI/UX Aplikasi RAB Konstruksi di PT PLN (Persero) UID S2JB Lahat

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Abstract: An effective and precise Budget Plan is essential in the construction sector because it is important in carrying out construction, especially cost expenditures. RAB is a report containing information about the estimated budget costs of a project for each organization. PT PLN (Persero) UID S2JB UP3 Lahat in managing RAB uses a manual method that causes a long search for document requirements, making it ineffective and inefficient. The Construction RAB application designed using Design Thinking aims to design the RAB interface and user experience (UI/UX) for the construction of PT PLN (Persero) UID S2JB UP3 Lahat based on the website, develop a UI/UX design prototype for Construction RAB to improve user experience and convenience in accessing construction information, and produce a UI/UX design prototype for Construction RAB using the Design Thinking method. The stages of design thinking include empathize, define, ideate, prototype and test. Develop solutions and ideas for applications that are realized in wireframes and interactive prototypes using Figma that provide visual and functional representations of new designs to reduce the time required to manage RABs, thereby increasing effectiveness and efficiency at PT PLN (Persero) UID S2JB UP3 Lahat.

Keywords: RAB; Design Thinking; UI/UX; Website; Prototype; Figma.

1. Introduction

Utilizing existing technology can help companies reduce errors in managing data such as recording and storing data and reduce the risk of data loss (Favian Limas, 2023). The Cost Budget Plan or RAB is a document that contains an estimate of the budget costs needed for both wages and materials in a construction project. Cost budget estimation is defined as the process of calculating the volume of work, the price of various materials calculated based on related specifications, and also additional data such as location survey data that will be needed in a construction project (Harahap et al., 2023). By making a RAB before carrying out construction work, it can reduce cost overruns, so that the project can get maximum results with efficient costs (Junaidi et al., 2023). Therefore, RAB functions as the main tool in planning and controlling project costs that will be incurred.

User Interface focuses on the design of the appearance of a website or application that aims to improve the visual experience for users (Febriani et al., 2023). In contrast to User Experience which focuses on the work process of the website or application which aims to provide ease of use to meet the specific needs of users (Karo Sekali et al., 2023). Applying appropriate UI/UX to a website or application can make the user experience feel comfortable, easy, and safe when using the website (Hendra & Riti, 2023). The Design Thinking method has benefits in developing websites or applications, including increasing user satisfaction, speeding up use, and reducing errors for users of the website/application (Sugiyarti & Hasani, 2023). Therefore, the UI/UX results of implementing Design Thinking are not only visually appealing but also functional and easy for users to use (Sanjaya & Ibadi, 2023). As for the design using Design Thinking by understanding users in depth, the resulting solution is more relevant and in accordance with what is really needed (Amalia Ristias et al., 2023). This method has 5 stages in designing a design, namely Empathize, Define, Ideate, Prototype, and Test (Alsindo et al., 2023).

PT PLN (Persero) UID S2JB UP3 Lahat is part of the implementing unit under the parent unit or centers as a division of PLN service areas can be more focused and directly touch the community. PT PLN (Persero) UID S2JB UP 3 Lahat

needs to know the condition of its company's development in order to find out how far the company has developed. In the construction of a construction project, an initial estimate of decision-making related to costs is very important. Therefore, Construction analysis is very much needed by the company to form a Building Budget Plan (RAB). There are several main problems in the RAB data processing system at PT. PLN (Persero) UID S2JB UP3 Lahat especially the KEU and MUM sections which include: the RAB data processing process which still uses Microsoft Excel so that there is data accumulation and data duplication which hinders users in creating RAB documents. Difficulty in finding data on material and service costs often occurs when creating RAB due to the accumulation of data in one file. Data that is difficult to find can make it difficult for users to update project cost data. Therefore, a system that can assist in designing RAB in the Company is needed.

2. Research Method

The research method used in this research is design thinking which has 5 stages, namely Empathize, Define, Ideate, Prototype, and Test. Data collection is carried out by interviewing employees and literature studies of books and websites that explain UI/UX which will then be defined for each existing problem so that they can find solution ideas for designing the UI/UX design of the Construction RAB application. The following is a flowchart of the current system.

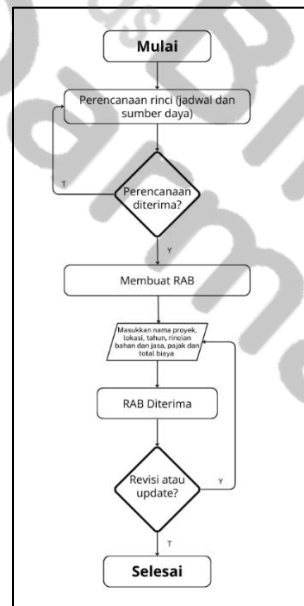


Figure 1. Flowchart of the Running System

Based on the flowchart above, it can be explained that the RAB management process is still carried out manually or using Ms. Excel so there can be a buildup of files and difficulty in finding the data needed, causing it to be less effective and efficient. From the results of the observations made, the researcher analyzed what the needs of the current system are, and user needs, including:

- 1) Designing a RAB application design that is easy to understand and use by employees to assist in making RAB reports
- 2) Shortening data search time and avoiding data accumulation

As for the define stage, there is how-might we which explains the solution to each problem and will be built into the application system to be created. Here is the use of How might we:

Table 1 How-Might We

No	Problem	How	Might
1	Preparing RAB reports requires a lot of time, as manual searching for detailed material and service data takes up much of that time, making them less effective.	How we make the RAB report more effective?	Create an application design that can create RAB reports

2	Requires a simple application design to make it easier to find information on material and service data.	How to create an application design that makes it easier for users?	Create an application design that is attractive and easy for users to use in searching for information on compiling RAB reports
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Solution ideas are collected and arranged into several groups according to their categories. The interface category is a solution idea related to the appearance of a website application that contains solutions to interface design problems. The information category is a solution idea for information problems such as content displayed on a website page in the form of text or design components that support the information.

Table 2 Affinity Diagram Interface and Information

Interface	Information
Create a simple and easy-to-understand interface design to facilitate navigation.	Provides RAB report templates that can be customized according to project needs
Create a quick search feature to make it easier to search for data	Data export feature to common formats such as Excel or PDF
Consistent use of colors and icons	

3. Result and Discussion

3.1. Result

The use case diagram explains that this RAB application is designed to assist in planning project budget costs, with two main actors, namely Finance Employees and General Employees. This application allows both actors to create projects, manage the details of the work, materials, and services required, and export reports in PDF or Excel format. In addition, both actors can also edit their profiles. Here is the use case diagram of the Construction RAB application.

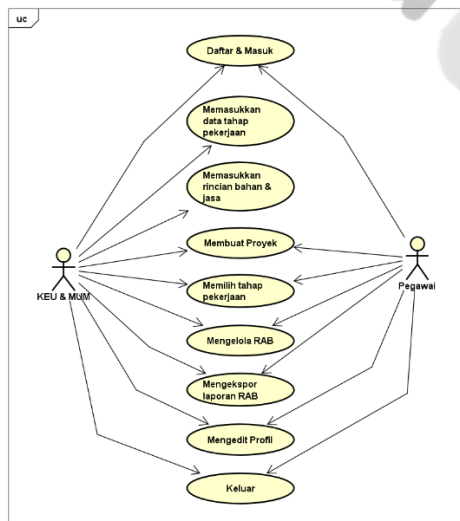


Figure 2 Use case diagram of the Construction RAB application

The solution ideas created will be visualized into a flowchart that describes the process or workflow with a focus on logical decisions and results in using the Construction RAB application. The following is a flowchart of the Construction RAB application.

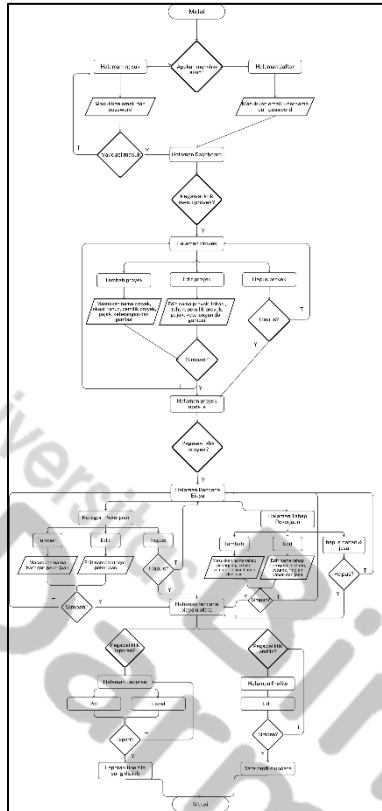


Figure 3. Flowchart of the System Process to be created

The flowchart that has been designed will be implemented or developed into the Construction RAB UI/UX design using Figma as a tool in creating the design. The designed system has menu and sub-menu features, such as Registration Form, Login Form, Project Menu, Budget Plan Menu with job category sub-menus and job stage sub-menus, Profile Menu, and Exit Menu. With the results of this prototype, it is hoped that it can provide a good user experience and help improve efficiency in managing RAB data at PT PLN (Persero) UID S2JB UP3 Lahat.

3.2 Discussion

In this discussion we will discuss in more detail about page layout. The image above is the initial display when employees access the Construction RAB application, namely the registration page. If employees do not/ do not yet have an account, employees will be asked to register for an account first. Employees who have an account can skip registration by clicking "login" below the register button which will take employees to the login page.

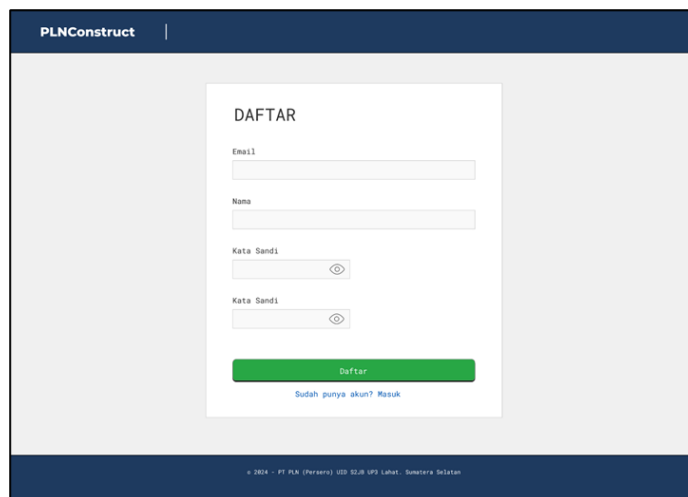


Figure 4 Register Page

After employees have successfully registered for an account and logged in with their account, the system will generate a main page (dashboard) that shows the scale of the number of projects, services, and materials that have been created and 2 (two) menus, namely projects to go to the project page and profiles which are depicted using icons.

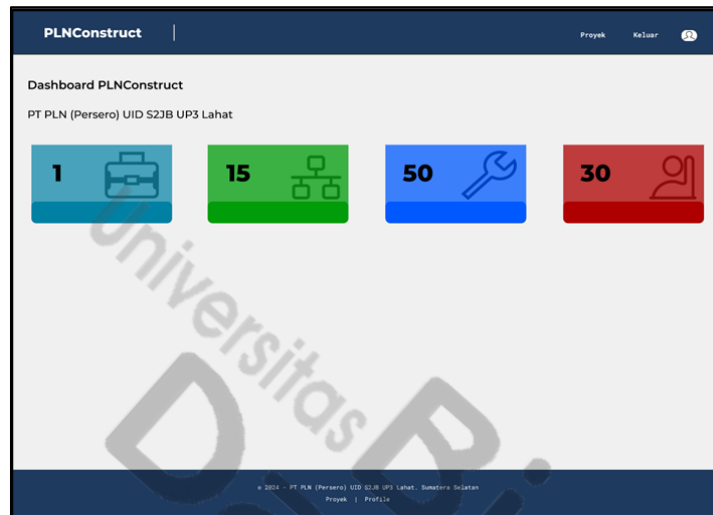


Figure 5. Dashboard Page

On the project page, users can see a list of existing projects and have the option to edit them with the edit icon or delete them with the trash can icon. This page also provides a data filter feature that makes it easy for employees to find old projects. Employees can also create new projects by pressing the add project button, which will display a pop-up with an input form that must be filled in, such as project name, location, year, project owner, tax, description, and the option to add images.

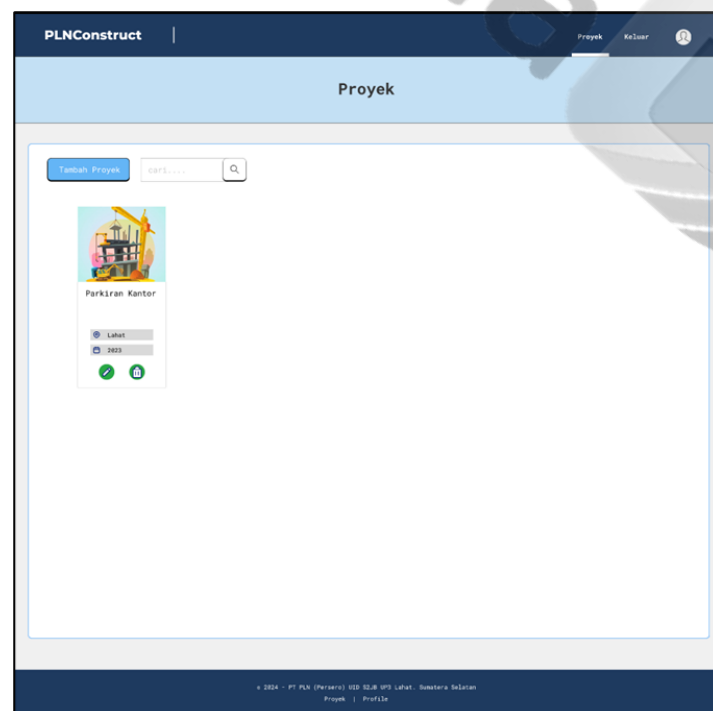


Figure 6. Project Page

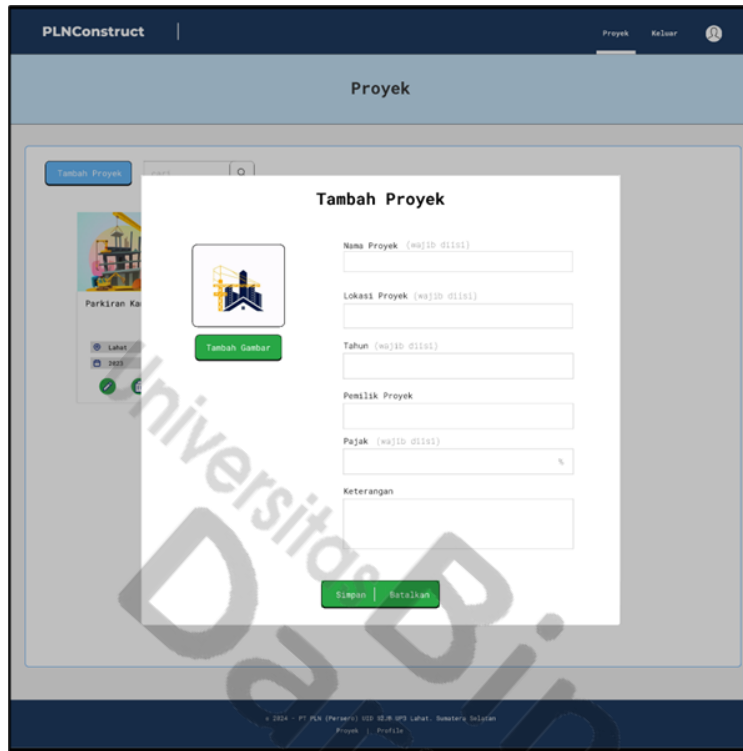


Figure 7. Form Insert Project

On this page, there is a job category template that makes it easy for employees to add new job categories. The budget plan page content is displayed in a table format that includes job descriptions, units, volumes, unit prices of materials, unit prices of services, total costs of materials and services, and action options. Employees can add job categories by pressing the add category button, which will display a pop-up input form for adding categories. There is also a delete option to delete data, as well as an edit icon to change the work stage data in each job category.

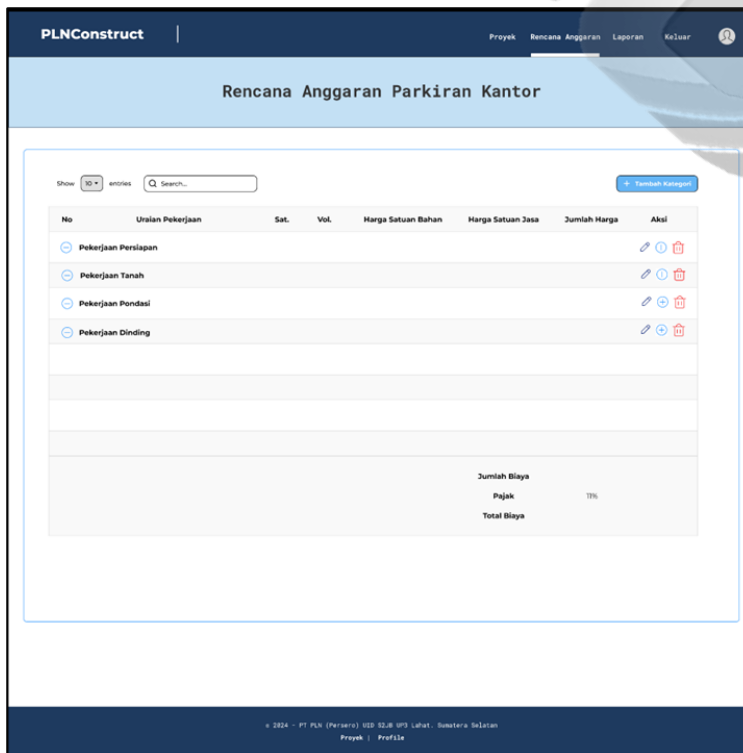


Figure 8. Budget Plan Page

On the work stage page, employees can input work stage data, namely stage name, stage unit, and stage volume in the input boxes provided. Employees can also input detailed data on materials and services by clicking the add icon in each table.

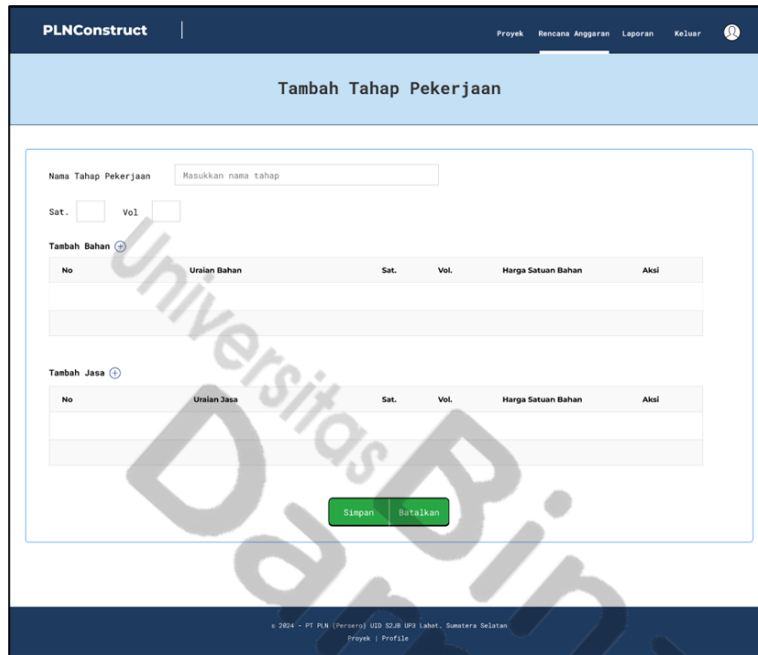


Figure 9. Add Job Stage Form

After adding detailed data on materials or services, employees can edit them using the edit icon in each column of materials and services. Employees can delete each material or service data using the delete icon.

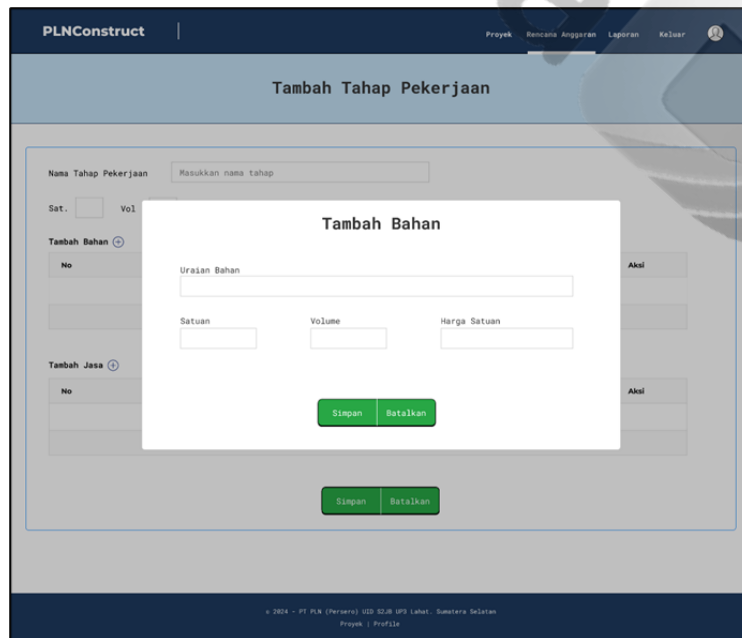


Figure 10. Add Material Form

After employees complete the process of inputting project data, employees can click the report menu if they want to change it to a report format. Employees choose the type of report they want, such as PDF or Excel by clicking one of the available buttons.

No	Uraian Pekerjaan	Sat.	Vol.	Harga Satuan Bahan	Harga Satuan Jasa	Jumlah Harga
Pekerjaan Persiapan						
1	Membersihkan Lapangan dan Perataan	M2	1	-	14,050.00	14,050.00
2	Urugan Tanah Kembali	M2	1	922,604.10	269,500.00	1,192,104.10
Pekerjaan Tanah						
1	Galian Tanah	M3	23,328	-	63,375.00	1,478,412.00
Pekerjaan Pondasi						
Pekerjaan Dinding						
Pekerjaan Plesteran						
Jumlah Biaya						120,702,872.00
Pajak						1%
Total Biaya						144,222,360.00

Figure 11. Report Page

On the profile page consisting of data that employees fill in when registering an account. If the full name is not included in the account registration process, it can be filled in by clicking the edit button below the description.

Profile Anda

Nama Lengkap

Username (Wajib Diisi)

Dita

Email (Wajib Diisi)

dit@gmail.com

Password (Wajib Diisi)

.....

Figure 12. Profile Page

3.3 Test Result

At this stage, testing is carried out on the prototype that has been created. Testing will be carried out by prospective users, namely KEU & MUM and K3 employees who are tasked with making RAB reports. This testing process applies a remote trial system with the help of a testing website, namely Maze, by providing task scenarios that must be completed by employees/users. This testing was carried out by 5 prospective users. For user usability testing, the Single Ease Question (SEQ) measurement is used. Each question given only applies to one item on a Likert scale of 1 to 7 choices, Copyright © 202x IJSECS *International Journal Software Engineering and Computer Science (IJSECS)*, x (x) 202x, xx-xx

consisting of very difficult, difficult, somewhat difficult, sufficient, somewhat easy, easy, and very easy. The following are the results of the Single Ease Question (SEQ) measurement.

Table 3. Result of Single Ease Question (SEQ)

Task	Respondent					Average
	R1	R2	R3	R4	R5	
T1	7	7	7	7	7	7
T2	5	5	6	5	6	5,4
T3	7	7	7	6	7	7
SEQ Average						6,4

In the table above, the Ease Question test for 5 respondents resulted in an average score of 6.4, which states that the PLNConstruct application is easy to use.

4 Related Work

Research Alsindo et al., (2023) is the design of UI/UX design on the Workfit application using the Design Thinking method which aims to design a user interface that suits user needs. The research conducted Amalia Ristias et al., (2023) is to evaluate and redesign the Leadership Engagement support application with a design thinking approach. Favian Limas (2023) conducted research to build a system that is able to manage project data, view project status, calculate project costs, and manage projects as a whole. It is expected to facilitate the project development process to be more effective and efficient. Febriani et al., (2023) conducted research on designing the interface design (UI/UX) of the Administration Service Information System Application (SILASTRI) by applying a psychological perspective to support digital administration services for Bina Darma University students. In the research Harahap et al., (2023) explains that the calculation of the Cost Budget Plan (RAB) needs to be done in detail so that project implementation avoids cost overruns. Research Hendra & Riti (2023) discusses the design and implementation of the official website of PT. Surya Agung Tehnik Utama by considering the concepts of User Interface (UI) and User Experience (UX).

The research conducted by Junaidi et al., (2023) is the development of a web-based RAB vs realization information system to facilitate the creation and monitoring of project financial reports according to the RAB in real-time at PT. Nusa Raya Cipta Tbk Semarang. Karo Sekali et al., (2023) conducted a study discussing the UI/UX Design of a Men's Fashion Product Mobile Application at the Celcius Store in Manado City to facilitate buyers in making purchases and knowing product information clearly. The research conducted by Sanjaya & Ibadi (2023) designed the user interface (UI) and user experience (UX) design for an agricultural product buying and selling application at the Ogan Ilir Farmers Market which is mobile-based and aims to design the UI/UX design of the application and test its feasibility (usability test). The research conducted by Sugiyarti & Hasani (2023) discussed the redesign of the user interface (UI/UX) of the IBS Core Core Banking System application using the Design Thinking method to improve the user experience. These studies provide insight into supporting the planning of the UI/UX design of the Construction RAB and also the overall success of the research.

5 Conclusion and Recommendation

Based on the research that has been conducted, the following are the conclusions and suggestions that can be drawn:

1) Conclusion

The design thinking method has proven effective in designing the UI/UX of the Construction RAB application (PLNConstruct), helping to produce user-friendly designs that meet user needs. The resulting prototype increases efficiency in creating RAB reports and has also been tested using the Single Ease Question (SEQ) method which produces an average value of 6.4 which states that the PLNConstruct application is easy to use. The new design resulting from this method improves user experience and satisfaction in using this application.

2) Recommendation

The suggestions for this prototype are that further testing is needed by involving more respondents or users to improve the quality of the design. Provide a tutorial for users to maximize the use of this application such as the RAB creation process.

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