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Designing a Prototype User Interface Website into Mobile Form using the Goal-Directed Design Method (Case Study: Population Administration Service Website)

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Abstrak

Sebuah Dinas Kependudukan dan Pencatatan Sipil di Kabupaten Indonesia telah memperkenalkan sistem pelayanan berbasis website yang memungkinkan akses mudah bagi masyarakat, kapan saja dan di mana saja. Website ini menyediakan layanan seperti pembuatan akta kelahiran, KTP elektronik, dan berbagai dokumen kependudukan lainnya. Meskipun dinas ini telah mengalami kemajuan dalam pelayanannya, masih terdapat tantangan terutama terkait desain antarmuka yang belum memadai, yang sering kali membingungkan pengguna. Melalui evaluasi heuristik, ditemukan bahwa ada 12 aspek yang perlu diperbaiki dengan nilai rata-rata di bawah 2.50. Oleh karena itu, diperlukan redesain untuk mengatasi masalah fungsi yang mempersulit pengguna. Redesain dilakukan menggunakan metode Goal-Directed Design (GDD) untuk memberikan saran yang lebih baik dalam pengembangan website. Hasil dari perbaikan ini, setelah pengujian kembali dengan menggunakan evaluasi heuristik, menunjukkan peningkatan signifikan dengan nilai rata-rata perbaikan mencapai 4.13.

Kata kunci: *Evaluasi Heuristik, Goal-Directed Design, User Interface, User Experience.*

Abstract

The Population and Civil Registration Office in an Indonesian district has introduced a web-based service system that enables easy access for the public anytime and anywhere. This website offers services such as birth certificate issuance, electronic ID cards (e-KTP), and various other civil registration documents. Despite advancements in service delivery, challenges persist, particularly regarding inadequate interface design that often confuses users. Through heuristic evaluation, it was found that 12 aspects require improvement with average scores below 2.50. Therefore, a redesign is necessary to address user interface issues. The redesign employs the Goal-Directed Design (GDD) method to provide better recommendations for website development. Following these improvements and subsequent heuristic evaluations, there was a significant increase in average improvement scores, reaching 4.13.

Keywords: *Heuristic Evaluation, Goal-Directed Design, User Interface, User Experience.*

1. Introduction

The population administration service in a district in Indonesia has a website utilized by the district as an innovative electronic-based population administration service that leverages web technology and information facilities. The website can accommodate and provide various necessary information with broad coverage, as information spreads globally through the website. Each website provides its own information. It also has the ability to display text, graphics, sound, and video [1]. Through this website, the public can access existing services flexibly, wherever and whenever. The function and task of this Population and Civil Registration Office include handling

various documents such as birth certificates, identity documents, family cards (KK), marriage certificates, relocation certificates, electronic ID cards (e-KTP), and others.

The previous research titled "Analysis and Design of Website User Interface to Enhance User Experience Using User-Centered Design and Think Aloud Method (case study: population administration service website)" [2]. The result of the related research is a design solution using the Figma application, with significant improvements achieved, where the effectiveness variable increased to 94.8%, the efficiency variable decreased to 12.67 seconds, and the user satisfaction variable increased to 78% after reanalysis. The difference between the related research and this study lies in the method used, which is Heuristic Evaluation. The platform used is also different, as it utilizes a mobile application.

Based on the changes and advancements made in the services provided by the Population and Civil Registration Office (Disdukcapil) of the district, there are still constraints, such as inadequate interface design, resulting in numerous inquiries from the public on how to access it. The author analyzed the website based on heuristic evaluation and found 12 indicators that require improvement, with mean values below 2.50. Therefore, redesign is necessary because certain functions are complicating users' experience with the website. Improvement is carried out using the Goal-Directed Design method to facilitate providing suggestions for future website system development.

To create a positive initial impression and compete with competitors, it is important to have good UI and UX design. UI facilitates interaction between users and the system, akin to how athletes input data, while UX encompasses the user experience in terms of reactions, perceptions, behaviors, emotions, and thoughts when using the system [3]. According to research conducted by User Interface Engineering, Inc., it is found that 60% of time is wasted because people cannot find the information they are looking for, and this impacts productivity decline.

In the process of designing user interface on the website to meet user preferences, the author will utilize the Goal-Directed Design (GDD) method and Heuristic Evaluation in conducting this research. The GDD method consists of several phases including research, modeling, requirements gathering, framework definition, refinement, and development support. After the observation and interview processes are conducted, researchers can ascertain the community's preferences regarding the design of the mobile application. Thus, the GDD method can serve as a fundamental guideline in designing a user interface for the population administration mobile application.

2. Research Method / Proposed Method

The design method used in this research is the Goal-Directed Design (GDD) method. This method focuses on interface design and user objectives. It consists of 6 stages: Research, Modeling, Requirements Definition, Framework Definition, Refinement, and Support. After that, testing will be conducted using the Heuristic Evaluation method.

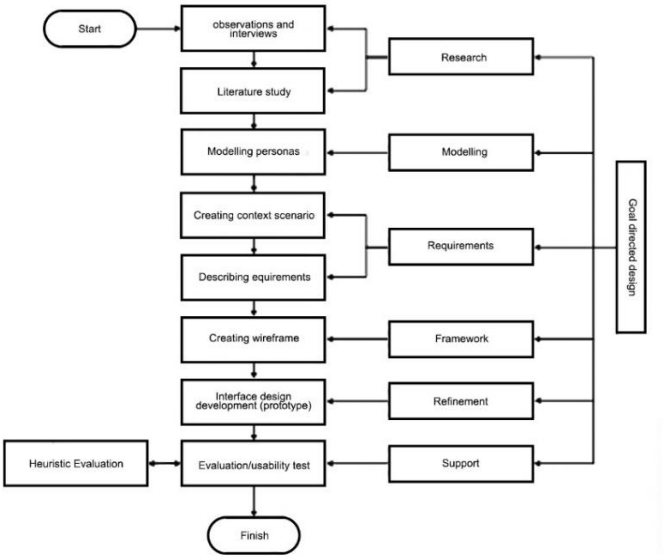

Figure 1. Research flow

3. Literature Study

3.1. Population Administration Service Website

The Population Administration Service Website is an innovative electronic-based population administration service utilizing web-based technology and information facilities. This innovation facilitates and brings services closer to the community, allowing citizens to process their population documents by accessing the website from their own homes. The resulting services will be directly sent to the citizens' WhatsApp (except for ID cards and family cards (KTP and KIA) due to security printing, which is still done at the Population and Civil Registration Office (Disdukcapil) and/or public services in the sub-district). Apart from these two documents (KTP, KIA), citizens can directly print them at their own homes or elsewhere.

3.2. User Interface

User interface is the visual representation of computer hardware used to interact with users. Effective user interface design requires careful preparation to ensure an attractive appearance and ease of use for users. A good user interface should be able to create a friendly and easily understandable communication experience for users [4]. The purpose of the user interface is to connect and convey information between users and the operating system so that users can effectively use the computer.

3.3. User Experience

The definition of UX or User Experience is not significantly different from UI. The difference lies in the main focus of the communication relationship between the user and the program, which focuses on the user's experience regarding reactions, perceptions, behaviors, emotions, and thoughts when using the system [5]. A UX designer will design web or mobile applications based on the user's experience after using the web or mobile applications. Consequently, the designed program becomes easier for users to use. User experience (UX), as its name suggests in Indonesian, "pengalaman pengguna," is the experience provided by a website or software to its users to make interactions engaging and enjoyable. User experience is the perception and response associated with the user's interaction with the system or product [6].

3.4. Heuristic Evaluation

Heuristic evaluation is one of the methods used to identify and uncover usability issues in a system being studied. By identifying known issues, it is hoped that a system can be improved according to standards and ultimately enhance the quality of the system itself [7]. Heuristic evaluation was developed by Jacob Nielsen and Rolf Molich to assess whether a website can be considered easy to use (usable) or not [8]. They successfully developed 10 usability heuristics, often referred to as Nielsen's heuristics, which are widely used in the HE method.

Based on Heuristic Evaluation, analysis is required to determine the mean value, followed by conducting validity and reliability tests on each indicator to determine whether the value is suitable for use. The test results to determine whether improvements are needed are determined by the average value obtained. If the average is between 0 and 2.50, improvement is needed. If the average is between 2.51 and 5, no improvement is required.

Table 1 The average improvement

Mean	information
0 – 2.50	Needs to be repaired
2.51 - 5	No need for repairs

In Table 1, the priority of improvements in the analysis using the Heuristic Evaluation method is described. In this research, the mean value is used to determine whether the indicators require improvement or not.

3.5. *Goal-Directed Design*

Goal-Directed Design (GDD) is one of the interface design methods that focuses on user goals and needs, translating them into user interface designs. Developed by Alan Cooper, this method emphasizes user goals as the primary focus in designing an interface [9]. There is a series of processes involved in the Goal-Directed Design method, starting from Research, Modeling, Requirement Definition, Framework Definition, Refinement, and Support Development.

The main objective of each process is to generate information related to the design as a reference for executing the user interface design. The final outcome of this method is a user interface design that aligns with the needs, behaviors, and goals of the users.

4. Result and Discussion

4.1. Questionnaire Design

The questionnaire design refers to the 10 principles of heuristic evaluation by creating indicators for each principle to determine the evaluation boundaries. Here are the variables of the heuristic evaluation distributed through a Google Form, consisting of 10 principles with 30 statements already disseminated to website administrators and some website users. The number of respondents was 30, who were employees/staff and members of the public who had used the website to make requests.

Table 2 Questionnaire Recapitulation

	Visibility of system status
X.1.1	Menus and pages on the website display the appropriate title and content.
X.1.2	Notifications are given when the user has sent a file or when the admin has finished checking the file.
X.1.3	The website responds to what the user does (selected, pressed, etc.).
	Match between system and the real world
X.2.1	Page titles and menus are in accordance with good grammar.
X.2.2	The language used on the website is easy to understand.
X.2.3	Content that uses images as visual cues is easy to understand and neatly organized.
	User Control and Freedom
X.3.1	The many menus and pages in the system make it easy for users to return to the initial or previous menu.
X.3.2	When the user returns to the initial menu, the user can change the options they have entered.
X.3.3	Users have the flexibility to use a visual website that is easy to understand and neatly organized.
	Consistency and Standard
X.4.1	Consistent writing standards on every page accessed.
X.4.2	Each icon on each website page is consistent.
X.4.3	The appearance of the website on each page that is accessed has appropriate and consistent form and content.
	Error Prevention
X.5.1	Users can resolve errors made.
X.5.2	The information on the website has been grouped well.
X.5.3	The text of the instructions is clear and does not raise questions.
	Recognition Rather than Recall
X.6.1	Users can easily recognize and remember menus and website functions.
X.6.2	Menus or displays on websites are easy to remember when going to a particular page.
X.6.3	When returning to use the website, users can easily recognize the appearance, menus & functions on the website.
X.6.4	The information on each button makes it easier for users to know the function and buttons.
	Flexibility and efficiency of use
X.7.1	There is a list of admin contacts to contact if there are problems.
X.7.2	Menu options and information are well grouped.
X.7.3	All existing features can be accessed quickly.
X.7.4	Menu search is easy to use especially for new users.
	Aesthetic and minimalist design
X.8.1	The colors on the website are consistent.
X.8.2	The combination of colors and writing does not disturb users when accessing.

X.8.3	The menu layout is familiar and easy to access for users.
	Help users recognize, diagnose, and recover from errors
X.9.1	The suggestions given in the application when searching are useful to me.
X.9.2	The information provided makes it easier for users to make requests.
	Help and documentation
X.10.1	There is a help menu that can help users.
X.10.2	There is a contact us menu to contact the website management when the user experiences an error.

4.2. Tabulation of Questionnaire Results

The tabulation results of this questionnaire are obtained from statements disseminated via Google Form. There are 10 principles with 30 statements distributed to the residents of Badung and several administrators of the website. Below are the questionnaire results.

Table 3 Tabulation of Questionnaire Results

Id	Statement	Mean	Information
X.1.2	Notifications are given when the user has sent a file or when the admin has finished checking the file.	2.13	Needs to be repaired
X.2.1	Page titles and menus are in accordance with good grammar.	2.03	Needs to be repaired
X.2.3	Content that uses images as visual cues is easy to understand and neatly organized.	2.30	Needs to be repaired
X.4.2	Each icon on each website page is consistent.	2.23	Needs to be repaired
X.4.3	The appearance of the website on each page that is accessed has appropriate and consistent form and content.	2.16	Needs to be repaired
X.5.2	The information on the website has been grouped well.	2.10	Needs to be repaired
X.6.1	Users can easily recognize and remember menus and website functions.	2.13	Needs to be repaired
X.6.2	Menus or displays on websites are easy to remember when going to a particular page.	2.00	Needs to be repaired
X.7.2	Menu options and information are well grouped.	2.20	Needs to be repaired
X.8.1	The colors on the website are consistent.	2.43	Needs to be repaired
X.8.2	The combination of colors and writing does not disturb users when accessing.	2.26	Needs to be repaired
X.8.3	The menu layout is familiar and easy to access for users.	2.30	Needs to be repaired

Table 3 displays the summary of mean scores from all indicators that have been distributed to determine the extent of issues on the website. The heuristic evaluation results revealed 12 indicators requiring improvement with mean scores below 2.50. Based on this, redesign is necessary due to functions that complicate users' experience with the website. From the recommendations for improvement based on the heuristic evaluation of the website conducted, it can be concluded that respondents generally encounter several difficulties or issues when making requests. Therefore, improvement of the user interface design that is easier to use is needed to meet user expectations when using the website.

4.3. Login & Register Pages

The login and registration pages on the population administration service website will undergo several improvements based on the issues found by respondents from the heuristic evaluation testing results. The login interface issues identified can be seen in Figure 2.

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Figure 2 Recommendations for Login and Register Interface

Figure 2 shows the recommended login page layout. The login page aims to grant user access rights. The initial appearance of the previous login page had several issues, including difficult-to-read fonts, unorganized navigation, and numerous buttons confusing users. Based on the seventh heuristic principle (Flexibility and efficiency of use), providing a layout with familiar user conventions by implementing existing cultural norms can be achieved by establishing natural relationships between visible objects, grouping and organizing related objects, and minimizing cluttered displays.

4.4 Home Page

The Home page of the website will undergo several improvements based on the issues identified by respondents from the heuristic evaluation testing results. The issues with the Home page interface can be seen in Figure 3.

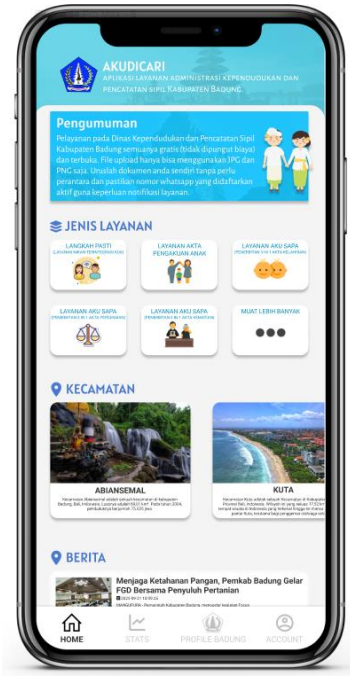

Figure 3 Recommendations for Home Interface

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Figure 3 represents the recommended Home page layout. The Home page focuses on services and information about the application. Improvements are made by making announcement information more prominent, following the design principle H8 (Aesthetic and Minimalist Design), which states that important information should be conveyed in the design. In addition, in the district content section, previously, the initial design did not include information about which districts are in the district. News content has also been added to the footer section, making it easier for users to view the latest news about the application. Based on the results of H6 (Recognition rather than recall) regarding the indicator that users can easily recognize and remember website menus and functions, different logos are provided for the menu being accessed by the user so that users know which page they are on, ensuring that the information is effectively conveyed to the user. Another recommended display is the service type display. The recommended service type display can be seen in Figure 4.

Figure 4 Recommendations for Service Type Interface

Figure 4 shows the recommended display for service types. Differences are evident based on respondent feedback regarding the H5 principle (Error prevention), where information on the website has been well-organized. Solutions that can be implemented include separating content in the menu so that users can easily select the service they want to apply for, and providing accurate information to users so that the information reaches them accurately and effectively.

4.5 Statistics Page

The statistics page on the website will undergo several improvements based on the issues identified by respondents from the heuristic evaluation testing results. The issues with the statistics display can be seen in Figure 5.

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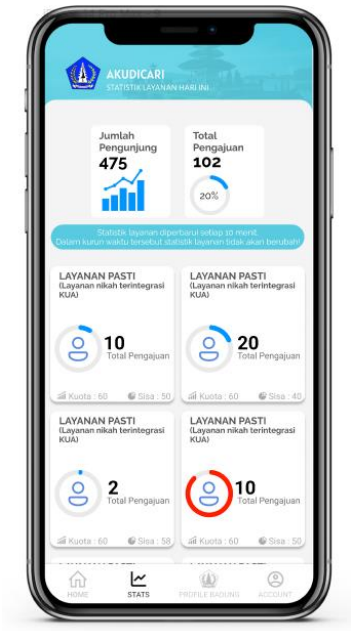

Figure 5 Recommendations for Statistics Interface

Figure 5 provides recommendations for improvements based on the issues encountered by users during testing on the statistics page of the Akudicari website. The recommended improvement is to create a more minimalist yet informative statistics display following the design principle H8 (Aesthetic and Minimalist Design). Another recommended layout is the profile display on the website. The recommended profile display can be seen in Image 8.

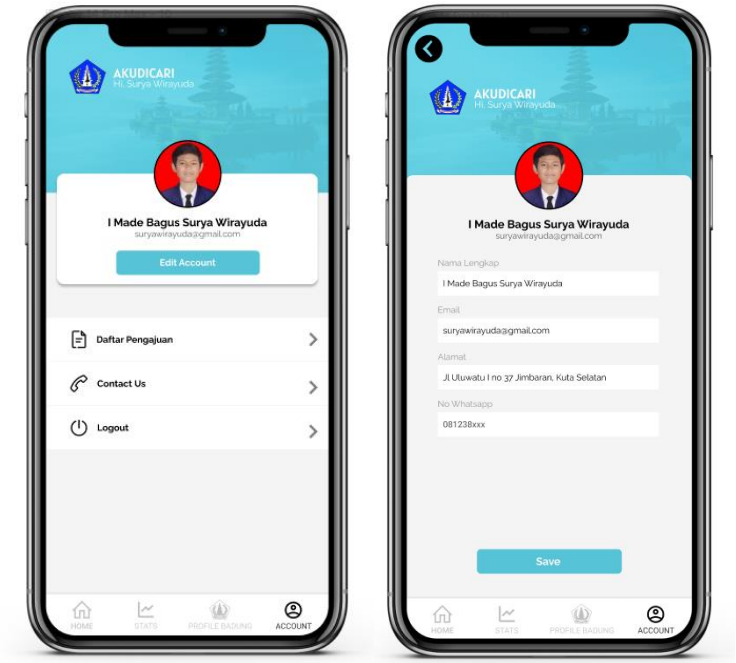

Figure 6 Recommendations for Profile Interface

Figure 6 provides recommendations for the profile display, including visual boundaries for ongoing application submissions and mapping to organize related objects within a single container. Recommendations include enabling users to edit their profile and track ongoing submissions.

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4.6 Submission Page

The submission page on the website will undergo several improvements based on issues identified by respondents from heuristic evaluation testing. The problems found in the detail service display can be seen in Figure 7.

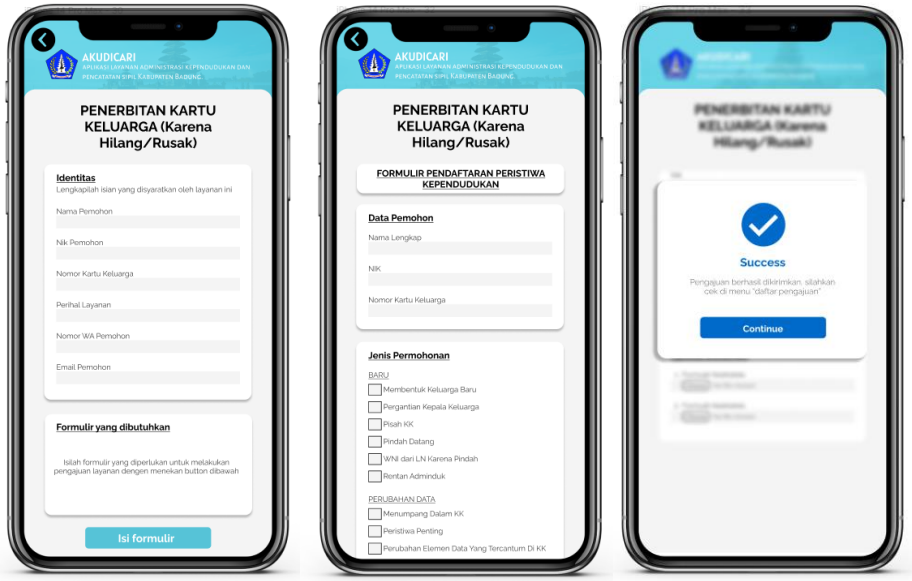

Figure 7 Recommendations for Submission Interface

Figure 7 represents the improvements made to the new application page. Considerations for improving the new application page include making the layout more appealing, especially in the section for filling out identity data and when uploading documents, so that users do not get confused about which requirements need to be met for document uploads, making it easier for users to create the desired application list according to the design principle H4 (Consistency and standards). Flow improvements are also made in the form filling section, where users no longer need to download and manually fill out forms; they can now directly fill out form data from the application according to the design principle H4 (Consistency and standards). Another recommended display is the list of applications available on the website. The recommended application list display can be seen in Figure 8.

Figure 8 Recommendations for Submission List Interface

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Figure 8 depicts a comparison before and after improvements on the submission list page. The display includes additions such as a search feature to facilitate users in finding uploaded documents, status information to indicate if there are errors or if the process is complete, and a print icon when the status is correct. The design follows the principle H1 (Visibility of system), addressing user issues by providing notifications when users have submitted documents or when administrators have finished checking documents. Problem-solving notifications or pop-ups are necessary when users request information about ongoing processes or when errors occur in documents submitted by users. In this case, four colors are applied to indicate the status of the provided document information.

4.7 Improvement Design Analysis

The evaluation results indicate the presence of issues that need attention. After the interface improvement design is implemented, an evaluation should be conducted to determine whether the recommended designs adequately meet user needs.

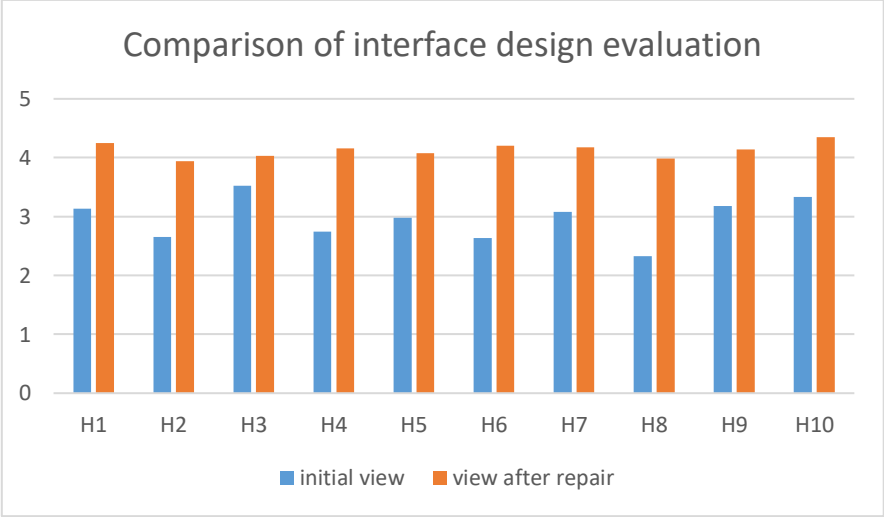

Figure 9 Comparison between the Initial Interface and the Improvements

The Figure above illustrates a comparison of usability heuristic evaluation scores between the initial interface of the population service website and the interface improvement recommendations. Prior to making improvements, there were 12 indicators identified for enhancement, with an average mean score of 2.95. After implementing the improvements, the scores increased with an average mean of 4.13. Based on these results, it is worthwhile to make improvements for the comfort and ease of users in accessing the application.

5. Conclusion

Based on the research findings, the following conclusions can be drawn: Based on the heuristic evaluation results, there are 12 indicators that require improvement. Among these, the principle of "Visibility of system status" has 1 indicator needing enhancement. Additionally, the principle of "Match between system and the real world" has 2 indicators requiring improvement, while the principle of "Consistency and standards" has 2 indicators needing attention. Furthermore, the principle of "Error prevention" has 1 indicator requiring improvement. Moreover, there are 2 indicators needing enhancement under the principle of "Recognition rather than recall". Under "Flexibility and efficiency of use", there is 1 indicator that needs improvement. Lastly, under the principle of "Aesthetic and minimalist design", there are 3 indicators requiring enhancement. Based on the design improvement recommendations, a re-analysis was conducted using heuristic evaluation, resulting in significant comparisons. Prior to redesign, there were 12 indicators requiring improvement. After redesign, the average score for all heuristic evaluation principles exceeded 2.50. Testing respondent answers using validity and reliability tests yielded results with validity scores above 0.349 and reliability scores above 0.6.

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