DEVELOPMENT OF ABDULLAH PERMATA JINGGA MOSQUE WEBSITE INTERFACE WITH USER CENTERED DESIGN METHOD

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Abstract

Indonesia as a country with the largest Muslim population in the world, is inseparable from the existence of mosques. The mosque, as a place of worship for Muslims, should function properly, therefore the surrounding environment can benefit from it. Currently, mosques are starting to use website as a representation that describes the characteristics of mosques as well as a source of information for worshippers and the society. One of the mosques initiated implementing the website is the Abdullah Permata Jingga Mosque. However, in the use of the Abdullah Permata Jingga Mosque website, it found a problem with the interface that had an impact in the form of information conveyed was very limited to be accessed by its users. Based on these problems, an analysis and development of the website interface was carried out with aims to design an interface that can meet user needs. The method used to process data is with a User Centered Design approach. In testing the usability of the frontend interface solution design of the Abdullah Permata Jingga Mosque website, it was carried out using the heuristic evaluation method. Heuristics are evaluate 10 aspects of the principle of usability in the user interface. The results of the evaluation obtained 8 aspects of the principle with the category of "Very High" usability results. These results show that the user interface design solution of the Abdullah Permata Jingga Mosque is in accordance with user needs.

Kata kunci : User Centered Design, Mosque, Interface

1. Introduction

In this globalization era, the development of technology will not cease to progress. Several factors influence this development itself. According to (Pettinger et al., 2020) driving force is one of the factors which affects the development of technology. Since the time of it's invention in the early 1990, internet has greatly reduce the difficulty of accessing information in every part of the world (Sari, 2018). The internet is regarded as the most effective mass media communication tool, which brings countless opportunities to deliver messages faster with a wider range of reach. Nowadays, companies and public services are using technology as a media to promote themselves through websites or applications to present their profiles. Social buildings, such as mosques, are one of them.

Indonesia is the country with the largest muslim population in the world. According to the data (The Royal Islamic Strategic Studies Centre, 2021) taken from the book with the title "Muslim 500" shows that the total population of Indonesia by the year of 2021 who adheres to Islamic religion is 231,06 million, a whopping 86,7% of the entire population of Indonesia. Therefore, it is clear that Indonesia has a significant number of mosques. *Masjid* (Indonesian word for mosque) derives from the Arabic word *sajada*, which means the place to prostrate or worship Allah SWT for Muslims. Mosques have had a significant role throughout the history of Muslims, and the mosque is also used as a place to gain Islamic knowledge, host social activities, and as a place to learn. A mosque has to function appropriately for it to be able to benefit the neighboring environment. To do that, information about said mosque needs to be conveyed in a way that is easy to understand. So, they made a website to display the profile of the mosque.

Abdullah Permata Jingga Mosque is one of the mosques in Housing Area Permata Jingga in Malang City. Abdullah Permata Jingga Mosque actively spreads Islam for the community in Malang, especially around the mosque. Based on discussions with the Mosque Development Council / *Dewan Kemakmuran Masjid* (DKM) of Abdullah Permata Jingga Mosque, it was obtained that the profile website is still in the early stages of development. Where also based of DKM and its users stated that the available menu features can be categorized as less than optimal. Moreover, the existing menu feature is still incorporated on one page, so that the lack of information that can be conveyed

The writer has been given an opportunity to be a partner in the website development project of Abdullah Permata Jingga Mosque's website. Based on that problem, the writer cooperates with the

partner from Abdullah Permata Jingga Mosque to analyze and redesign the User Interface (UI) of Abdullah Permata Jingga Mosque's website by using the User Centered Design (UCD) method.

2. Literature Studies

2.1 Literature Study

This study refers to previous research to help facilitate the research process carried out in determining systematic steps in terms of theory and concepts. The purpose of the previous research is so that the author can learn from other methods used and can correct the shortcomings of previous researchers so that they can be better. In this study, the authors found previous research that had similar concepts. As for references from previous researchers who become references or references as follows.

Research "Perancangan Antarmuka Aplikasi Berbasis Web Menggunakan User Centered Design Dalam Pembelajaran Keragaman Budaya" (Lubis, 2018), got a conclusion that user-centered design is able to design and build Web-based applications that suit the needs and characteristics of its users. The design of the interface is able to make it easier for users to learn about cultural diversity and get information.

Research with the title "A User-centered Design for Redesigning E-Government Website in Public Health Sector" (Puspitasari & Cahyani, 2018). The result of this study support three main contributions, detailed identification of the targeted users, the inclusion of specific requirements for users with special needs, and the application of UCD to improve the user experience. The enhancement of the user experience is exhibited in the heuristic evaluation scores between the existing website and the newly redesigned website.

2.2 Abdullah Permata Jingga Mosque

Abdullah Permata Jingga Mosque or commonly called MAPJ is a mosque located in the Housing Area of Permata Jingga Malang City. The mosque, which was established in 2001, is a facility of worship for the majority of Muslims in the Housing Area Permata Jingga and surrounding areas. Along with the development of Housing Area Permata Jingga, the potential of the Muslim community of its residents is also growing as well. In the future, the existence of MAPJ in the environment of Permata Jingga and its surroundings must increase, both related to facilities, management systems, and also marketing. MAPJ applies internet technology as a medium for the publication of mosque profiles. It is also a medium for da'wah, especially for the residents of Permata Jingga Housing Area, Malang City in general, and especially for residents outside Malang city. The website https://masjidabdullah.id/ is a bridge of communication between MAPJ and jama'ah.

2.3 Usability

Usability comes from the word usable, which in general, has the meaning of being used well. Usability becomes the main principle that serves as a measure of the success of the development of a system. The level of usability can determine whether the system is useful, acceptable to the user, and long-lasting in its use. (Wiratama & Sasongko, 2017). Therefore, usability in this development becomes a measure of the system's quality that has been evaluated and improved by researchers based on user needs.

2.4 User Interface

A user interface is what interacts with the user and becomes part of an experience, first impression and lasting impression (Rochmawati, 2019). The user interface becomes crucial because it can affect productivity and user experience when visiting a system.

2.5 User Centered Design

User Centered Design (UCD) is a design philosophy that positions the user as the center of a system development process. UCD approach involves users in the development process so that users can provide advice regarding the interface on the website. The final result in this design is expected to result in the design of the solution following the needs of the user. In UCD method according to (Puspitasari & Cahyani, 2018), there is some step that needs to be done as like in **Figure 1**.

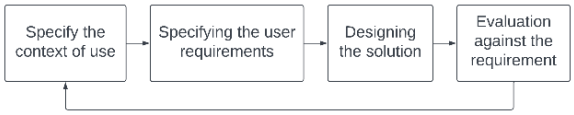

Figure 1. User Centered Design Process

2.6 Heuristic Evaluation

Heuristic evaluation is a method used to check usability aspects and identify problems with the software interface. The heuristic evaluation proposed by Nielsen and Molich in 1990 was intended to improve the design effectively (Geasela et al., 2018).

Evaluation using heuristic evaluation aims to be able to determine the usefulness of efficiency, and effectiveness of interfaces based on the ten principles of Jacob Nielsen (Fitri et al., 2020). Ten aspects of the principle assessed in the heuristic evaluation method according to (Nielsen, 1994) as a reference in testing and assessing the user interface of the website.

2.7 Wordpress

WordPress is a website building platform created by Matt Mullenweg and Mike Little in 2003. WordPress occupies the first position as the most popular Content Management System (CMS) with 43% usage (*World Wide Web Technology Surveys*, 2022).

A CMS system also facilitates the creation and publication of digital content and the category includes platforms for creating static sites, blogs, forums, online stores, and everything in between (Jordi, 2018).

3. Development Methodology

In designing the user interface on Abdullah Permata Jingga Mosque's website, researchers used the User Centered Design (UCD) method as a method of development. The development flow that is carried out can be seen in **Figure 2** below.

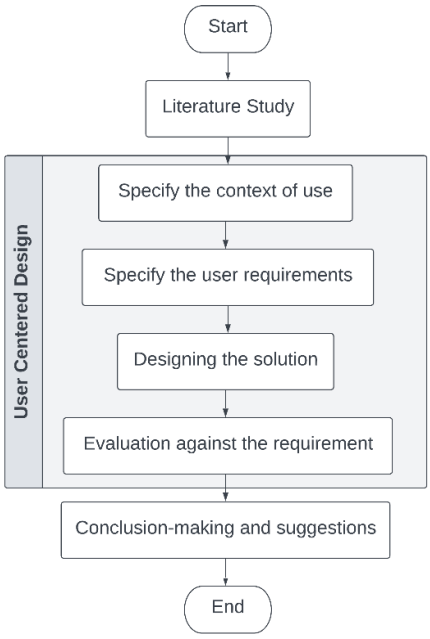

Figure 2. Development Flow

3.1 Specify the Context of Use

3.1.1 User Identification

Based on the interview with the DKM about the Abdullah Mosque website, there were two user classes, as elaborated in **Table 1**. Each user class used the website for a specific purpose and carried out the different tasks.

Table 1. User Identification Table

User Class	Organizational Environment	Usage Purpose
Dewan Kemakmuran Masjid	Abdullah Mosque in Permata Jingga Housing Area	Managing the nearest agenda, history archive, activity archive, kajian archive, gallery archive, finance archive, message on admin page.
Residents of Permata Jingga Housing Area	Permata Jingga Housing Area	Access nearest agenda, fill out nearest agenda attendance, archive activity, archive kajian, archive gallery and finance report information
Society	Citizen and pilgrims outside Permata Jingga Housing Area	Access dashboard, profile, archive activity, big days, TPQ, archive kajian, gallery, finance report, facility, contact us information, send massage and fill out nearest agenda attendance form.

3.1.2 Assigning the Context of Use

Assigning the context of use involved data collecting the user feedback and evaluating the existing website. Data collection is also done to find out what problems and needs are needed by partners and users. From the data collected will be the basis of the development of Abdullah Permata Jingga Mosque website. Data can be obtained through discussions with partners, as well as the dissemination of questionnaires to respondents who have accessed the website.

3.2 Specify the User Requirement

3.2.1 User Persona

The basic purpose of using a user persona is to identify and analyze needs and understand the problems experienced by the user. So it is hoped that through the use of user personas, this development can create features and functions in a software that suits the user (Ghufron et al., 2020). The creation of a user persona is carried out based on the results of problem analysis through an online questionnaire. The author selected five respondents who had filled out the questionnaire before to be able to become respondents on this user persona questionnaire and analyze further. An example of a user persona can be seen in **Figure 3**.

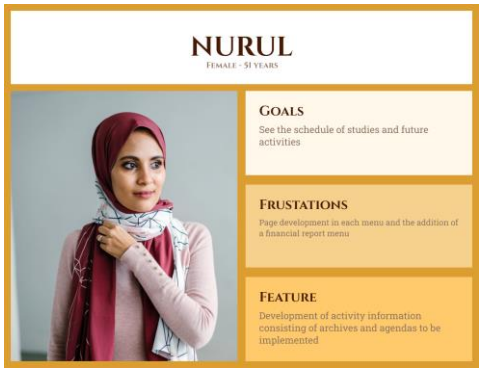

Figure 3. User Persona

3.2.2 Task Analysis

The users' tasks analysis integrated the user identification from the service provider perspective and the requirements from the user's perspective. **Table 2** shows the task analysis result for each defined user class.

Table 2. Task Analysis Table

User Class	Task	
Dewan Kemakmuran Masjid	1.1	Managing the nearest agenda
	1.2	Managing the history archive
	1.3	Managing the activity archive
	1.4	Managing the kajian archive
	1.5	Managing the gallery archive
	1.6	Managing the finance archive
	1.7	Managing the message on admin page
Residents of Permata Jingga Housing Area	2.1	Access nearest agenda information
	2.2	Fill out nearest agenda attendance
	2.3	Access archive activity information
	2.4	Access archive kajian information
	2.5	Access archive gallery information
	2.6	Access finance report information
Society	3.1	Access dashboard information
	3.2	Access nearest agenda information
	3.3	Fill out nearest agenda attendance form
	3.4	Access profile information
	3.5	Access archive activity information
	3.6	Access big days information
	3.7	Access TPQ information
	3.8	Access archive kajian information
	3.9	Access Gallery information
	3.10	Access finance report information
	3.11	Access Facility information
	3.12	Access contact us information information
	3.13	Access send massage information

3.2.3 User Flow

After the user requirement and task analysis in the previous stage are done, it will be based on the user flow manufacture. User Flow, which can be seen in **Figure 4,** is the steps performed by the user when using the system in order to achieve the goal and interact with the system.

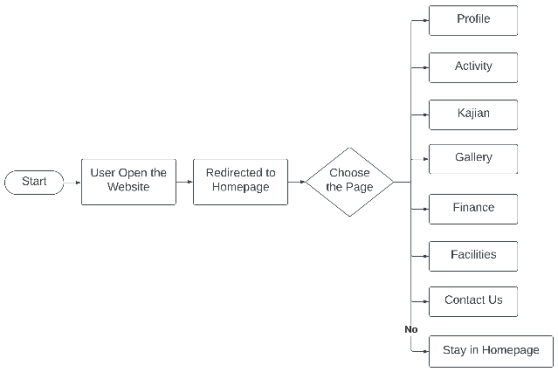

Figure 4. User's User Flow

3.2.4 Wireframe

A wireframe is a framework of images or website designs, or applications for structuring items in the design display before the actual design process is carried out. A wireframe shown in **Figure 5** is made based on the results of the research and the results of the analysis carried out in the previous stage. From the analysis that has been carried out, the results of this image framework are made according to the needs and goals of the user in using the prototype of Abdullah Permata Jingga Mosque's website in accordance with the flow of user flow.

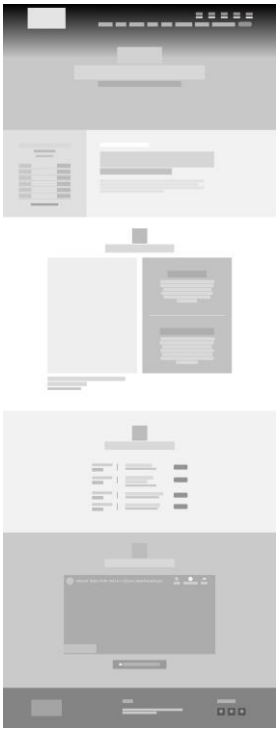

Figure 4. Wireframe

3.3 Designing the Solution

3.3.1 High Fidelity Protoype

The low fidelity wireframe design, which has been designed at an earlier stage, will then be developed into a high fidelity prototype at this stage. The prototype manufacturing process is done using Figma Design.

3.4 Implementation

In this process, the author carries out the development stage in the UCD approach. The author implements a design solution based on the reference from the concept and design stages that have been done previously into high-fidelity prototype form and then will be implemented on the front end of the website.

3.4.1 High-fidelity Prototype

This prototyping is made using Figma. This prototyping is done by providing an animation in the prototype flow so that it can run as desired. Here are examples of prototyping will be presented as follows in **Figure 6**.

Figure 5. High Fidelity Prototype

3.4.2 Implementation of Interface Design

At this stage, the author implements the results of a pre-designed high-fidelity prototype into programming code frontend development using the ReactJs library for the desktop view. In its development, the author worked closely with the backend developer of the Abdullah mosque. An example of the implementation of interface design can be seen in **Figure 7**.

Figure 6. Implementation of Interface Design

3.5 Evaluating Against the Requirement

3.5.1 Jest

Unit testing is a test that is included as an automated test, so the author needs to provide the program code to test the desired feature or functionality, then run the software program. In this unit testing test, the author uses the Jest testing framework as a testing tool because, in the development process, the author uses the React Js framework.

Jest is a framework developed by Facebook and is an open-source test built on JavaScript,

designed primarily for React and React Native-based web applications (APPKEY, 2020). Jest's testing framework has fast running test suites and, by default, test suites will be run in parallel, making it very suitable for testing react framework components (Rijal, 2017).

3.5.2 Heuristic Evaluation

This phase is performed to find out how the user can easily complete the previous scenario by evaluating the user interface based on the ten heuristic evaluation principle. The author conducted an evaluation that involved 10 participants, where all the participants were DKM members. Heuristic evaluation is done by distributing the questionnaire online using google Forms with 22 questions about heuristic evaluation.

4. Result

4.1 Jest

This phase is to run the unit test that was created, namely with the npm run test or yarn test (for yarn users) on the terminal. The unit test that has been created must run and pass the scenario that the author created. The results of the four tests with PASS status are obtained, as shown in **Figure 8**. The test has passed and runs properly according to the scenario of each component tested. A description of the test can be seen in **Table 3**.

Table 3. Jest Testing Result Table

Interface Page	Expected	Status	Result
Home page	get Text 'Masjid Abdullah' and text 'AGENDA KAJIAN' on the homepage interface	PASS	Successfully rendered get Text 'Masjid Abdullah' and text 'AGENDA KAJIAN' on the homepage interface
Facilities Page	get Text 'FASILITAS' and text 'Korner Kopi' on the facilities page interface	PASS	Successfully rendered get Text 'FASILITAS' and text 'Korner Kopi' on the facilities page interface
Finance Page	get Text 'LAPORAN KEUANGAN' and text 'Juni 2022' on the finance page interface	PASS	Successfully rendered get Text 'LAPORAN KEUANGAN' and text 'Juni 2022' on the finance page interface
Admin Login Page	get Text 'Admin Login' and text 'Login' on the homepage interface	PASS	Successfully rendered get Text 'Admin Login' and text 'Login' on the homepage interface

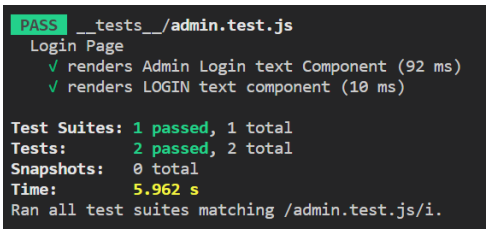

Figure 7. Jest Testing Pass Status Result

4.2 Heuristic Evaluation

Based on the calculation of the total, percentage, and rating scale in each of the questions, the results of heuristic evaluation data processing are obtained on the website solution interface of the Abdullah Permata Jingga Mosque Website as in the following **Table 4**.

Table 4. Heuristic Evaluation Result Table

Code of Principles	Question Code	Total	Persentages	Rating Scale
H1	H1.1	36	90%	Very High
	H1.2	36	90%	Very High
H2	H2.1	36	90%	Very High
	H2.2	35	88%	Very High
	H2.3	36	90%	Very High
H3	H3.1	36	90%	Very High
	H3.2	33	83%	Very High
H4	H4.1	32	80%	Very High

	H4.2	35	88%	Very High
	H4.3	37	93%	Very High
H5	H5.1	17	43%	Low
H6	H6.1	34	85%	Very High
	H6.2	34	85%	Very High
H7	H7.1	33	83%	Very High
	H7.2	31	78%	Very High
H8	H8.1	32	80%	Very High
	H8.2	32	80%	Very High
	H8.3	29	73%	High
H9	H9.1	33	83%	Very High
	H9.2	16	40%	Low
H10	H10.1	38	95%	Very High
	H10.2	37	93%	Very High

Based on the results and discussions in the heuristic evaluation, the results were obtained that the design of the Abdullah Permata Jingga Mosque website interface solution was good. This result is based on the results of the likert scale percentage which states that the 10 principles of heuristic evaluation on average get very high results.

Heuristic principles that have a very high usability value include visibility of system status, match between system and the real world, user control and freedom, consistency and standards, recognition rather than recall, flexibility and efficiency of use, aesthethic and minimanlist design and help and documentation.

The usability principles that need to be fixed are error prevention and helps users recognize, diagnose and recovers user. This can be analyzed on the H5.1 question getting a percentage result of 43%, so it can be concluded that the user has not received a warning if filling out the form is incomplete. The form in question can be in the form of a message submission form, login form and data input form on the admin page. Based on that, the H9.2 question gets a 40% percentage result. Where the result of the system has not given a warning if there is an error, the user cannot recognize the error that occurs based on the information the system should provide.

5. Conclution and Suggestion

Based on the results of the development and discussion that has been carried out by the author, it can be concluded that the design of Abdullah Permata Jingga Mosque's website interface solution can be completed well using the User Centered Design approach and the Heuristic Evaluation testing method.

The results of the evaluation of the assessment of the usability user interface design solution of Abdullah Permata Jingga Mosque with the heuristic evaluation technique showed that out of the ten principles of heuristic evaluation, eight principles were obtained, including in the category of very high usability results. The results show that the user interface design solution of the Abdullah Permata Jingga Mosque website suits the user's needs.

Based on the development that has been carried out by researchers, it is hoped that it will become the basis for the follow-up development process on the Abdullah Permata Jingga Mosque's website interface by paying attention to the heuristic evaluation principles and the result that have been explained previously.

The following are some of the suggestions for future system development. These suggestions are based on the results of the design, implementation, and testing that have been carried out. From the entire results of the research that has been carried out, the following conclusions can be drawn:

1. For future website development, it is expect to use methods that can improve the usability value on aspect error prevention and helps users recognize, diagnose, and recover user.
2. In the research stage, data collection can be maximized through user interviews with a large enough number of respondents to produce more accurate insights.
3. Conducting heuristic evaluations on existing designs at the data collection stage so that a comparison of value usability on the original website interface and solution design interface can be carry out
4. Use more diverse testing techniques in research on the user experience section.

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