

APPLICATION OF DESIGN THINKING METHOD FOR PROTOTYPE USER INTERFACE DESIGN AND USER EXPERIENCE TESTING OF DIGITAL VILLAGE WEBSITE

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Abstract

In the ever-evolving digital era, the utilization of information and communication technology (ICT) has become an integral part of daily life, affecting various aspects of society, including rural areas. One indicator of the implementation of a digital village is the existence of a village website. This research explores the application of the Design Thinking method to design a prototype User Interface (UI) and test the User Experience (UX) of the Digital Village Website. This research aims to understand user needs and expectations, create creative solutions, and thoroughly test the user experience. The results showed that the UI/UX design of the Digital Village website using the Design thinking method was able to improve the quality of the user experience in using the Digital Village website. This is evidenced by the results of usability testing which shows an increase in user satisfaction with the Digital Village website. The UI/UX design of the Digital Village website is expected to be the basis for developing further recommendations on the development of other Digital Village websites.

Keywords :

digital village, user interface, user experience, design thinking, website

Introduction

In the ever-evolving digital era, the utilization of information and communication technology (ICT) has become an integral part of daily life, affecting various aspects of society, including rural areas. The concept of digital villages emerged as a program launched by the government of the Republic of Indonesia to bridge the technology gap between urban and rural areas, promising accessibility and community empowerment through digital platforms [1]. In the midst of this transformation, the Digital Village concept is the foundation for bringing services and access to technology to villages.

One of the indicators of digital village implementation is the existence of a village website. Village websites are one of the digital media that can help local governments promote the potential of their villages and disseminate information widely [2]. In this context, designing an effective User Interface (UI) prototype and in-depth User Experience (UX) testing of a digital village website is very important. UI design and UX testing have become crucial parts of successful website development. UI design and UX testing have become crucial parts of successful website development [3]. However, in the context of digital villages, special challenges arise. The needs and preferences of rural users are often different from urban users. Therefore, the adaptation of responsive and user-friendly design to rural needs is crucial [4].

One method that is proven to be able to provide solutions in designing user interfaces based on the experiences, emotions and situations of users (user experience) is the design thinking method [5]. In addition, according to [6] the design thinking method is able to provide a deep understanding of users and their problems, which are then integrated into the design of innovative solutions.

Literature Review

Research with a similar theme has been carried out with the title "Perancangan Prototype User Interface Dan Pengujian User Experience Aplikasi Rental Mobil Berbasis Menggunakan Metode Design Thinking (Studi Kasus: PT Trans Berjaya Khatulistiwa)" [7]. This research discusses a travel ticket booking service company that is developing a web application about car rental, to get the results of the UI / UX design design that is right on target with user needs using the design thinking method. The research method used is a mix method, namely making observations, distributing questionnaires, and searching for data literature through books or journals related to the research. The results produced by this car rental application are very user-friendly.

The second research with a similar theme was also conducted with the title "Implementasi Metode Design Thinking Pada Perancangan UI/UX Website Tracking GPS Tiara Track" [8]. This research discusses the design of the Tiara Track tracking website prototype using design thinking and testing

using Usability Testing to determine how efficiently and effectively the website can be used by users. The test results get a 91% success rate for the effective design and efficient completion time of respondents for the Tiara Track tracking website prototype that has been made.

The third research with a similar theme with the title “Penerapan Metode Design Thinking Pada Perancangan Website UMKM KiriHuci” [9] This research aims to design the website of UMKM KiriHuci using the Design Thinking method. One of the design goals of this method is to use an approach that prioritizes user experience and not just user interface. This research found that using the Design Thinking method when building the KiriHuci MSME website made it easier to use. User comments about the appearance of the web interface design with good results during the usability testing stage can show this.

Research Methods

In this research, the method used for the design of the village website design is using the design thinking method. Design Thinking emphasizes a deep understanding of user needs, goals, and experiences. This approach involves a series of steps that focus on understanding the problem, collaborating, and testing and refining design concepts. In the context of UI/UX design, Design Thinking involves four main stages, namely Empathize, Define, Ideate, Prototype, and Test. Each

stage provides a systematic approach and focuses on user needs in the design process. The stages used in the design thinking method can be seen in Figure 1.



Figure 1. Stages of Design Thinking

Source: <https://techbootcamps.utexas.edu/blog/design-thinking-process/>

Empathize

Empathy in the context of Design Thinking is a very important early stage in problem solving and designing user-driven solutions. The main focus is to achieve a better level of understanding of the problem context and create a strong foundation for the development of relevant and effective solutions.

During this phase, the researcher observed the user experience to find the basic information needed for the next phase. To obtain this information, the researcher conducted structured interviews directly with 15 to 20 users. The interviews were conducted to understand the users' needs and expectations of the designed application. During the interview process, the researcher developed a list of questions related to the research objectives. The list of questions asked in the research can be seen in Table 1.

No.	Question Category	Question
1	Current User Experience	a. What is your current experience in using the Digital Village website? b. What do you like and dislike?
2	Challenges in Using the Website	What are your biggest challenges or obstacles in using the Digital Village website?
3	Expectations for the Digital Village	What is your biggest hope or wish when using the Digital Village website?
4	Information Needs	What information is most important to you as part of the Digital Village?
5	Navigation Preferences	How do you prefer to view and navigate websites?
6	Feature-related wishes	Do you want a special feature on the Digital Village website?
7	Context of Use	When and where do you use the Digital Village website the most?
8	Perception of Digital Village	How do you see the role of the Digital Village in meeting your needs and expectations?
9	Reaction to Change	How do you handle major changes to layout or functionality?
10	Proposed Improvements	If you had the opportunity to improve the Digital Village website, what would you do?

Table 1. Interview Question List for Empathy Stage

Define

Define is the process of analyzing and understanding the various insights gained through empathy with the aim of determining the problem formulation as a research perspective or main concern. Based on the questions presented in Table 1, researchers analyzed

the data collected from user observations in the previous stage.

This data analysis was carried out to identify the needs and problems faced by users while using the application being developed. The results of this analysis form the basis for formulating problems and user needs at the definition stage. In this section, an

explanation of the research steps is given, which explains the logical sequence to obtain the expected research results.

Ideate

The Ideate stage in the Design Thinking method is a creative moment where teams or individuals generate as many ideas as possible without any initial judgment. The main purpose of this stage is to stimulate creative thinking and express innovative ideas that can lead to unexpected solutions to the problems identified in the previous stage, which is Define. During the Ideate stage, various brainstorming techniques can be used. Brainstorming is a process in which team members spontaneously generate ideas without inhibition, promoting a free and uncritical flux of ideas at first. Besides brainstorming, other techniques such as mind mapping, brainwriting, or rolestorming can also be applied to trigger creative thinking.

Prototype

The Prototype stage in the Design Thinking method is an important step where the creative ideas generated at the Ideate stage are transformed into a physical or digital form that can be tested and evaluated. The main focus of this stage is to create a tangible representation of the desired solution to give users a real experience with the concept. The prototyping process can involve a variety of tools and techniques, depending on the type of solution being designed. In the context of user interface (UI)

or user experience (UX) design for a Digital Village website, prototyping may involve hand sketches, digital mockups, or even more advanced interactive prototypes.

Test

The Test stage in the Design Thinking method is the final step of the design process, where the developed prototype is tested directly by end users. The main focus of this stage is to get valuable feedback from actual users to ensure that the proposed solution meets their needs and expectations. This testing allows designers to identify potential problems or weaknesses in the solution and provides an opportunity to make improvements before the final launch.

Results and Discussion

1. Emphasize Stage Results

At this stage, the main focus of the research was to deepen the understanding of users' needs, experiences and expectations related to the use of the Digital Village Website. Through in-depth interviews with potential users, both villagers and relevant stakeholders, researchers sought to gain in-depth insight into the challenges and opportunities faced by them in interacting with the Digital Village website. The results of the interviews conducted at this stage can be seen in Table 2.

No.	Question Category	Pertanyaan
1	Current User Experience	"At the moment, my experience using the Digital Village website is quite good. I am happy with the information provided, but often find it difficult to find the page I need"
2	Challenges in Using the Website	"My main challenge was the less-than-intuitive navigation. Sometimes, I had to search for information for too long or couldn't find certain features easily"
3	Expectations for the Digital Village	"I hope the Digital Village can provide more interactive information and tempt community participation. I would like to see more features that allow us to actively contribute"
4	Information Needs	"Information about events in the village, social programs, and infrastructure development are most important to me. I want to stay informed about the latest developments"

Table 2 continue

5	Navigation Preferences	"I prefer simple navigation and easy-to-understand menus. An efficient search system and separation of information by category would make using the site better"
6	Feature-related wishes	"I would really like an interactive map feature that makes it easier for me to find the location of events or services in the village. Also, notifications for important updates would be very helpful"
7	Context of Use	"I use the Digital Village website frequently at home and at work. Having information quickly accessible and easily accessible from my mobile device or laptop is very important to me"
8	Perception of Digital Village	"I see the Digital Village as a potential resource for

		building stronger, more connected communities. However, changes are needed to increase community engagement"
9	Reaction to Change	"If there are significant changes, I would be open to trying them as long as they make the site easier to use. I believe changes can be positive if designed well"
10	Proposed Improvements	"If I could improve anything, I would focus on simplifying the navigation and adding collaborative features to allow villagers to participate more actively"

Table 2. Interview Results

2. Define Stage Results

Based on the interview results in Table 2, it can be found that users experienced a number of challenges in using the website. One of the key findings was difficulties in navigation, where users often found it difficult to find relevant information and understand the overall structure of the site. This creates a less efficient experience and may hinder the active participation of villagers.

In addition, diverse information needs also emerged as an important theme in the Empathize results. Users expressed a desire for easier access to up-to-date information on village events, development projects and social activities. It was also found that a preference for interactive features, such as event location maps or discussion forums, emerged as users' top expectations to increase their engagement. Emotional aspects and user motivation were also the focus of the Empathize stage results. Most respondents expressed their hopes for Desa Digital as a platform that not only provides information but also builds a stronger community. Curiosity,

engagement, and the desire to actively contribute to the development of the village were motivational factors that emerged during the interviews.

Overall, the results of the Empathize stage provided a deeper look into user needs and expectations. These findings became an important foundation for the next design steps, with the main goal of creating a prototype User Interface that is more intuitive and meets the everyday needs of Digital Village users. These steps will then be carried forward to the next stage of the Design Thinking method, Ideate, to come up with creative solutions that can improve the overall user experience.

3. Ideate Stage Results

Based on the results of problem identification and user needs that have been carried out at the empathize and define stages, researchers produce ideas and solutions that can be used as a guide in designing the User Interface of the Digital Village Website. The results of the ideate process can be seen in Table 3.

No.	Idea	Description
1	Interactive Map	The idea of developing an interactive map for the Digital Village emerged as a creative solution. The map will allow users to easily locate community activities, development projects, and important events in the village. Users can explore the map intuitively and get more information with a single click.
2	Personalized Notifications	This solution involves developing a notification system that can be customized according to user preferences. Users can set their notification preferences to receive notifications about events, project updates, or other important information. This aims to provide a more personalized experience that suits individual needs.
3	Discussion and Collaboration Forums	The idea of integrating a discussion forum and collaboration platform emerged as a solution to build community in the Digital Village. Users can participate in discussions, share ideas, and collaborate on village initiatives. This will not only increase engagement, but also strengthen the sense of community among village members.
4	Rewards and Incentive Programs	The idea of developing a reward and incentive program emerged as a solution to encourage active user participation. Users who contribute positively or actively in village activities can receive certain rewards or incentives, creating additional motivation to engage in the platform.
5	Intuitive Layout Changes	The solution focused on changing the layout of the Digital

	Village website to make it more intuitive. Through adjustments in layout, navigation and information organization, it is expected that users will find it easier to find relevant content and navigate the site more smoothly.
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Table 3. Ideate Results

4. Prototype Stage Results

The prototype stage consists of several important steps that must be taken [10], including:

Userflow

User flow includes the main steps that users can take in exploring and interacting with the digital village website. The user flow can be seen in Figure 2.

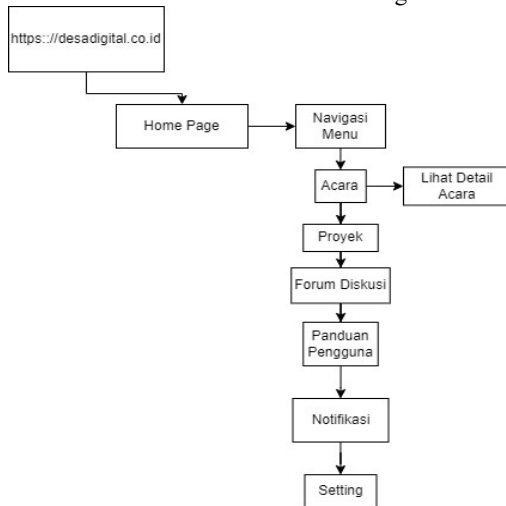


Figure 2. User Flow of Digital Village Website

Wireframe

At this stage researchers design a simple, schematic visual representation of a user interface or web page designed to illustrate the structure and layout of key elements without regard to graphic design or complex visual elements. Wireframes aim to focus on information organization, content layout, and navigation, so that the design and development team can clearly understand and discuss the basic structure of a page or application before entering a more in-depth visual design stage. In addition, this wireframe is used to show the position of important elements in the application display, such as buttons, menus, and so on. The wireframe view of the Home page of the Digital Village website can be seen in Figure 3.

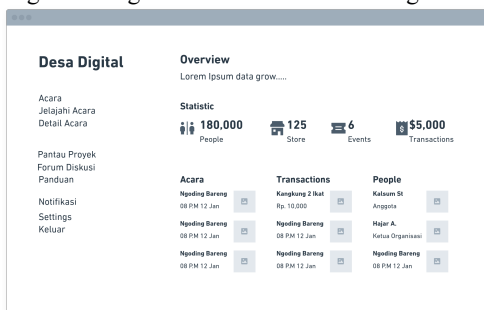


Figure 3. Home Page Wireframe

Mockup

In the next stage, researchers create a more complete and detailed visual representation of the user interface or web page design, involving visual elements such as colors, typography, and other graphic elements. Compared to wireframes that are more schematic in nature, mockups provide a more tangible view of the expected look and feel of the design. Mockups allow design teams and stakeholders to see firsthand how design elements will look and interact, thus easing aesthetic judgment and providing a more accurate picture of the end-user experience. Mockups can also be used for presentations to clients or other stakeholders, helping them to better understand the design before it goes into a more advanced stage of development. A mockup of the Digital Village website can be seen in Figure 4.

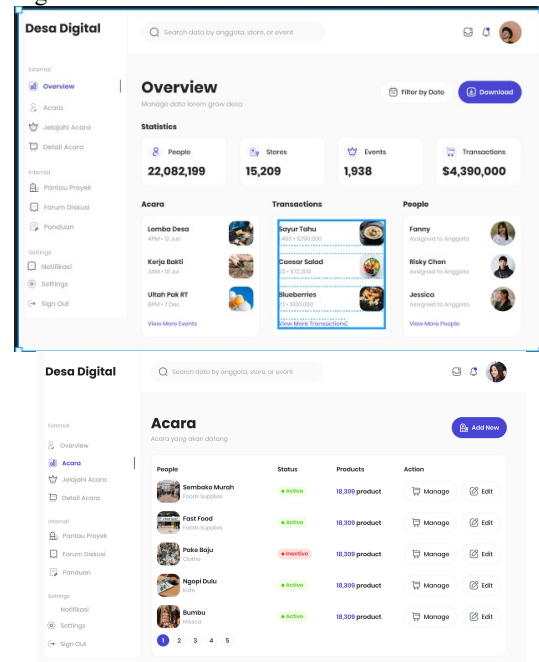


Figure 4. Digital Village Website Mockup

The result of this prototype stage is an interface design for the Digital Village website that researchers have designed using Userflow, Wireframe, and Mockup. The interface design in Figure 4 will be used as a reference in the development of the actual Digital Village website. In this stage, the researcher also evaluates the design that has been designed by involving users to collect input and

suggestions that can improve the quality of the application interface.

Test

System Usability Scale (SUS) is a usability assessment tool that includes a series of statements used to measure the level of user satisfaction with a system or product (Yusuf & Astuti, 2020). This tool consists of 10 questions with 5 answer options for each question which can be seen in Figure 5. The answer options consist of strongly disagree, disagree, undecided, agree, and strongly agree.

SUS scores range from 0 to 100, where the higher the score indicates the better the usability of the system or product.

FORM KUISIONER USABILITY

Berilah tanda (√) pada bagian jawaban yang Anda anggap sesuai

STS (Sangat Tidak Setuju), TS (Tidak Setuju), RR (Ragu-Ragu), S (Setuju), SS (Sangat Setuju).

No	Pertanyaan	Jawaban				
		STS	TS	RR	S	SS
1	Saya berpikir akan menggunakan website ini lagi					
2	Saya merasa website ini rumit untuk digunakan					
3	Saya merasa website ini mudah digunakan					
4	Saya membutuhkan bantuan dari orang lain atau teknisi dalam menggunakan website ini					
5	Saya merasa fitur-fitur website ini berjalan dengan semestinya					
6	Saya merasa ada banyak hal yang tidak konsisten (tidak serasi pada website ini)					
7	Saya merasa orang lain akan memahami cara menggunakan website ini dengan cepat					
8	Saya merasa website ini membingungkan					
9	Saya merasa tidak ada hambatan dalam menggunakan website ini					
10	Saya perlu membiasakan diri terlebih dahulu menggunakan website ini					

Figure 5. SUS question

In the SUS assessment, participants will be asked to provide a review of the prototype Digital Village website that is being designed. Each question has an option to answer based on a five-point scale, with values ranging from one to five, where one is strongly disagree and five is strongly agree. Once the respondents have answered all the questions, a formula will be used to calculate the SUS score. SUS is usually used during the evaluation and product development phases. But in this study, the researcher used SUS, as a tool for testing the design of the Digital Village website. To find out how satisfied users are with the design that has been made, the researcher calculates the total SUS score after collecting data from the SUS questionnaire. The results of the SUS calculation can be seen in Table 4.

Respondens	Calculated Score										Total	Score (Total x 2.5)
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10		
User 1	4	2	4	2	5	2	5	2	4	2	32	80
User 2	4	2	4	3	4	2	5	1	4	2	31	78
User 3	4	2	4	2	5	2	4	2	4	2	31	78
User 4	4	2	5	2	4	2	5	2	4	2	32	80
User 5	4	2	4	2	4	1	5	2	4	2	30	75
User 6	4	2	4	2	5	2	4	1	4	2	30	75
User 7	4	1	4	2	4	2	5	2	4	2	30	75
User 8	4	2	5	2	5	2	4	2	5	2	33	83
User 9	4	1	4	3	4	2	4	1	4	2	29	73
User 10	4	1	4	1	5	2	5	1	4	2	29	73
Average Score (Final Result)											77	

Table 4: SUS Calculation Results

After multiplying the total SUS score by 2.5, the following formula is used to calculate the average SUS score:

$$\bar{x} = \frac{\sum x}{n} \tag{1}$$

where \bar{x} is the average score, $\sum x$ is the sum of SUS scores, and n is the number of respondents.

Based on the results of the UI testing of the Digital Village website, which was carried out by sending

SUS questionnaires to 10 (ten) users, resulting in an average SUS score of 77, which indicates that users have a positive perception of the ease of use of the application.

User feedback was very positive about the ease of use and navigation of the website. Users gave high scores for user interface complexity, indicating that the website design was easy to understand and not confusing, and high scores for the desire to use the website further, indicating their satisfaction with the

application. The results indicate that the design of the user interface for the Digital Village website has successfully achieved the desired goals of improving usability and user satisfaction.

In addition, the assessment, as shown in figure 6, can be used to determine the final conclusion

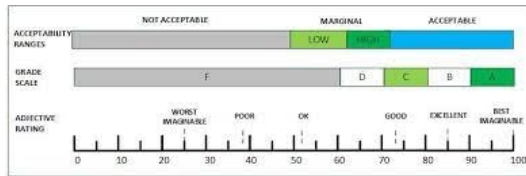


Figure 6: SUS Value Indicator

Based on the score obtained of 77, it can be categorized as **“GOOD”** with grade scale C. This shows that the design of the Digital Village website application has a good level of usability and can be accepted by users. In other words, the design of the Digital Village website has successfully met user needs and provided a satisfying experience for users.

Conclusions and Recommendations

Based on the results of the research that has been conducted, the application of design thinking methods for designing prototype user interfaces and testing the user experience of digital village websites has proven effective. Users have responded well to the application design that has been made, based on the SUS results sheet which shows a good level of usability with an average score of 77. For further development and improvement in this research, it is expected to add a mixed approach with quantitative and qualitative analysis to gain more holistic insights. In addition, we recommend expanding the sample of interview respondents to gain variety in user perspectives and understand diverse needs and expectations.

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