# UX Validation of Village Administration Information System Using User Experience Questionnaire (UEQ) and Usability Testing


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***Abstract*— Most of the conventional administrative service systems in Indonesia have been transformed into online services. In addition to improving the administrative process, online services also help managers to make data management better and safer. However, the development of online information systems has not been evenly distributed and is still centered on certain areas. Thus, an administrative information system platform is needed on the village level government. The information system which is commonly used and has high flexibility is a website. Based on a survey conducted by Statista Indonesia, smartphone users in Indonesia would be increased by 25% for the next 5 years. So that the development of a flexible and easily accessible website by various groups is the right solution. To develop a website that can be implemented among rural communities, a system testing framework is needed in the case to represent the extent to which the performance of the system conforms to user needs. Several frameworks that can be used are the User Experience Questionnaire (UEQ) and Usability Testing.**



***Keywords*— user experience, information system, UEQ, usability testing, rural administrative**


## I. INTRODUCTION

Technology and humans today are two things that cannot be separated, especially during the COVID-19 pandemic which limit people's activities around the world for the past year. The COVID-19 virus (coronavirus disease) has been declared a Global Pandemic since March 11, 2020, by the World Health Organization (WHO). Because of the pandemic status, the Indonesian Government issued Presidential Decree Number 12 of 2020 on April 13, 2020, concerning the Determination of Non-Natural Disasters Spreading Corona Virus Disease 2019 (COVID-19) as a National Disaster [1].

The confirmation of COVID-19's status as Pandemic Non-Natural Disaster Emergency, social restrictions have also been implemented in various sectors, such as education, economy, transportation, offices, and so on. Social restriction in several sections is one way to reduce the spread of COVID-19, which increasingly does not give advantages to the global community. People from various circles are required to be able to take advantage of available technology so that their daily activities can continue even in the midst of limitations. The education sector is generally carried out face-to-face learning offline. In the pandemic era, this sector must change drastically to be online learning by utilizing supporting software [2][3][4]. This means that everyone depends on mobile communication for the mobility of various interests in society [5][6].

Likewise, in the office sector, there is a new term that is now known as WFH or work from home. All forms of work that can be done remotely are turned into WFH activities. However, it is undeniable that optimizing the use of technology in almost all sectors at the beginning of the pandemic made the gap wider in the distribution of technology in Indonesia.

On the other hand, the use of technology, which had its pros and cons a decade ago, is now the only alternative that can help people do their primary and tertiary needs. One of the most crucial needs in the midst of current limitations is information. Since the introduction of social restrictions, information seems to be the primary need for the community, namely information on the development of COVID-19 cases, ways of prevention, and so on. This information is packaged in various forms and disseminated through various media as well. Many information provider platforms are competing to improve quality and provide up-to-date information. However, the rapid development of digital technology should be balanced with equal distribution of digital literacy for people in all classes, including rural communities who need to understand to what extent technological innovation is present to make their lives easier. Many paradigms have emerged in the general public that there are many rural communities from generation X and even millennials who are technologically illiterate.

This problem is in contrast to the results of the Indonesian Digital Literacy Status survey conducted by the Kata Data Insight Center and KOMINFO (Ministry of Communication and Information Technology) in 34 provinces in Indonesia. Based on the results of the survey involving 53.9% of the rural population and 46.1% of the urban population, it was found that 82.3% (data that has been averaged) of the population have the ability to search & access data, information & content in the digital media. Given the fact, there should be no more stereotypes of rural people being technology blind. While advancing civilization, rural communities have an equally important role in national integration.


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Indonesian Law no. 6 of 2014 explains the concept, and form of the village as it originated. It is explained that the village is a legal community unit that has the right to regulate and manage the interests or needs of the local community in accordance with local customs and history recognized by the district or city in the government national system [7]. A village is a government agency that is directly related to the community but is far from the center of government structurally. This makes a village took an important role as a basis in providing public services and encouraging the realization of public rights in local communities.

The importance of the rural communities' role makes many agencies and the digital technology industry offer something to empower rural communities through various activities, both directly improving human resources or through the development of supporting facilities for the local community activities. One of the activities to improve the quality of facilities is the creation of a website-based village information system. The number of complaints regarding administration, which often takes a long time, to poor archiving management, makes developers make efforts to fulfill the public rights of local communities through the development of a village administration information system website. With the development of the website, it is hoped that village administration services can be carried out efficiently and precisely. Especially during the COVID-19 pandemic which limits people's mobility. In addition, the development of this website also aims to update archive management which is still not good and vulnerable to damage/loss of physical form of documents. So that village archives can be more secure and well organized.

To produce a website-based information system that is user-friendly and appropriate, it is necessary to test the system. System testing frameworks being used in this research are the User Experience Questionnaire (UEQ) and Usability Testing. This test has several benchmarks that represent user needs. Developers can find out quickly and efficiently how the user experience of the website that is being developed by using this framework. Furthermore, developers can analyze the problems experienced by users and implement updates that are more user-friendly and certainly efficient.

## II. Literature Review

### A. Information system

Nowadays, information system is widely used to manage massive and structured information. An information system is very practical to make the users of a platform access their data easily. Information systems can also be interpreted as an organization's internal system, which unites the daily transaction processing needs, supports operations, is the management of the organization's strategic activities, and provides special reports for certain external parties [8].

### B. User Experience (UX)

According to the definition of ISO 9241-210, User Experience is a perception that results from a person's experience of a system, product, or Java. User Experience (UX) can provide an overview of the level of comfort to a person's satisfaction with a product, system, or service. The principle in developing UX is that users have the right to determine their own level of satisfaction (customer rule) [9]. No matter how good the features offered by a system, product, or service, if the user does not feel comfortable and satisfied when interacting, then the UX level is considered low. The development of digital media makes UX development and usability more complex and multidimensional.

### C. User Experience Quessionnaire (UEQ)

The User Experience Questionnaire (UEQ) is a framework that can assist researchers in processing survey data with an easy, valid, and reliable application. UEQ can be used as the completeness of data from evaluation methods with high subjectivity [10].

UEQ provides a questionnaire format that accommodates user responses to the convenience of interaction and the impression of a system. The main purpose of using UEQ is to assess the UX of an interactive product [11]. UEQ has six scales, namely;

- Attractive: The attractiveness level of a product.
- Perspicuity: The clarity level of a product.
- Efficiency: The time of task completion to achieve goals or efficiency.
- Dependability: The level of accuracy based on user control of the system.
- Stimulation: The level of the user's eagerness to use a product.
- Novelty: The level of novelty offered by a product.

### D. Usability Testing

According to Jacob Nielsen, usability is an indication of quality that shows how high the level of easiness in using the system/product [9]. The word "usability" can refer to the efforts to increase the use of a development process easily. Usability Testing is measured by five criteria, namely:

- Learnability represents how easy it is to use a system when it is first used.
- Efficiency represents the speed with which the system is used after learning it.
- Memorability represents how quickly users can interact proficiently after a long period of inactivity.
- Errors represent how many and fatal errors users make, to how easy it is for them to find a solution.
- Satisfaction represents how satisfied users are with the system.

## III. Research Method

The research and development method of user experience design used in this research is Design Thinking with a User Centered Design (UCD) approach. The application of the Design Thinking method with the UCD approach is a product design method that is oriented to user problems and needs. Broadly speaking, this method is grouped into 3 main stages, namely pre-development, development and evaluation, all of which consist of five sub-stages of Design Thinking, namely empathy, define, ideation, prototype, and testing [12].

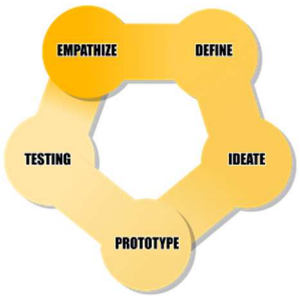


Fig. 1. Five Sub-stages of Design Thinking

*1) Empathize*

This stage is done to explore the problem to be solved through an empathetic approach. Through this stage, the researchers collect, find out, and validates the problems experienced by users. In addition, the researchers are also directed to find out what kind of achievements users want.

*2) Define*

This stage is where the researchers analyze and synthesize the information that has been obtained through the empathize stage. The problem will be further identified to determine the core problem. Thus, the researchers can find the troubleshooting solutions easier.

*3) Ideate*

This stage requires innovation. The researchers will generate ideas that will then be accommodated and tested to establish ideas that have an up-to-date solution in problem solving. In addition, the researchers are also expected to be able to provide alternatives if in the future there are development constraints.

*4) Prototype*

The prototype is the stage of making a system based on special features or products in small and inexpensive versions to find out whether the solutions offered have answered the user's problems or not. Prototype testing can be done by the researchers themselves or users.

*5) Testing*

Finally, the stage of testing and evaluating the products with the help of experts is conducted. The results of the evaluation will then be used as a reference for system improvement to refinement in order to obtain the optimal results.

The prototype that is being developed by the SIDESA website developer has reached the testing stage. Furthermore, in this paper, the discussion will focus on developing the validity test instrument for the SIDESA website using the Short User Experience Questionnaire (UEQ) framework based on six scales, namely Attractiveness, Perspicuity, Efficiency, Dependability, Stimulation, and Novelty. The scale is translated into 8 questions based on the UEQ-S framework with 2 groupings, namely data with Pragmatic Quality and Hedonic Quality.

TABLE I. ASSESMENT CRITERIA

| Negative | Positive | Scale |
|---|---|---|
| Obstruct | Support | Pragmatic Quality |
| Complex | Simple | Pragmatic Quality |
| Not efficient | Efficient | Pragmatic Quality |
| Confusing | Clear | Pragmatic Quality |
| Boring | Interesting | Hedonic Quality |
| Not attractive | Attractive | Hedonic Quality |
| Conventional | Modern | Hedonic Quality |
| Common | Advanced | Hedonic Quality |

In addition to using UEQ, the SIDESA website validity test was also carried out by Usability Testing using an assessment instrument based on 4 scales, namely Operability, Learnability, Understandability, and Attractiveness. The scale is translated into several questions.

The instrument was distributed to experts in the form of a questionnaire with a Likert scale using a rating range of 1-5 where the information was given was 'Disagree', 'Rather Agree', 'Neutral', 'Agree', to 'Strongly Agree'. As a reference for assessment, the total percentage must be at least 76% so that the SIDESA website can be said to be valid as presented in Table II.

TABLE II. ELIGIBITY LEVEL CRITERIA

| Percentage (%) | Eligibility Level | Note |
|---|---|---|
| 76% - 100% | Valid | Does not need a revision |
| 51% - 75% | Good | Need revision |
| 26% - 50% | Deficient | Need revision |
| < 26% | Not Valid | Need revision |

## IV. RESULTS AND DISCUSSIONS

### A. Need Assessment

SIDESA website is developed to adjust to the user's need for the administration process in rural areas. Commonly, the system of administrative service in the rural areas utilized a conventional system by employing the archive, letter submission, and entering the information/data manually. This conventional way is considered less efficient and prone to the loss of archives due to not well-managed documents. Therefore, it has a probability of unexpected moments such as disaster which could make the documents of the rural areas being destroyed or lost.

The rural administration includes recording village assets, recording population, development planning, and so on. Many administrative problems managed by the village that a platform is to facilitate the administrative service process for villagers is needed. The stigma regarding the complexity of the administrative process must slowly be removed so that the management of information becomes easier and more organized.

The website-based village administration information system platform is one of the solutions that can be developed as an initial step in the efficiency of the administrative process. Due to the segmentation of users of this information system are rural residents, developers should pay attention to important aspects in terms of website usability [13]. User convenience in learning to use the website is a benchmark so that this platform can facilitate the work of village communities and local government parties.

## B. Design and Development

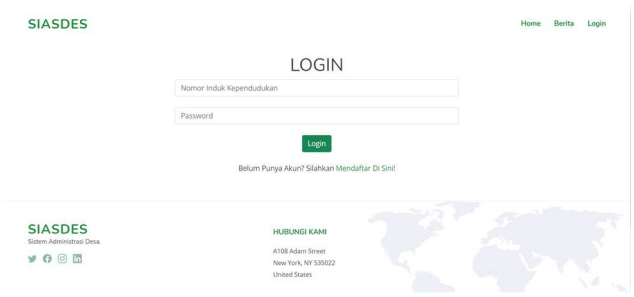


Fig. 2. Login Page

This page displays a login form for admins and users. On this page, there are 'Home', 'News', and 'Login' buttons on the right side of the navigation bar.

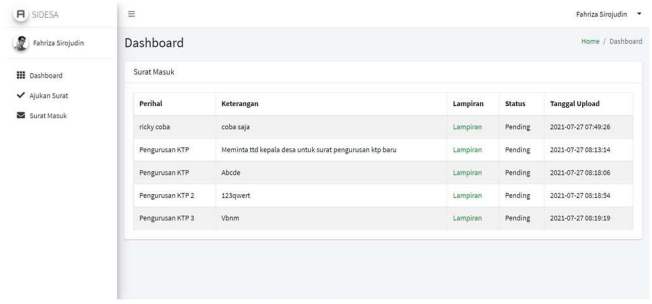


Fig. 3. Dashboard and Content Page

The dashboard menu contains a table that displays the details of the letter submitted to the local village government. On the left side there is a navigation bar with the options of 'Dashboard', 'Submit Mail', & 'Incoming Mail'.

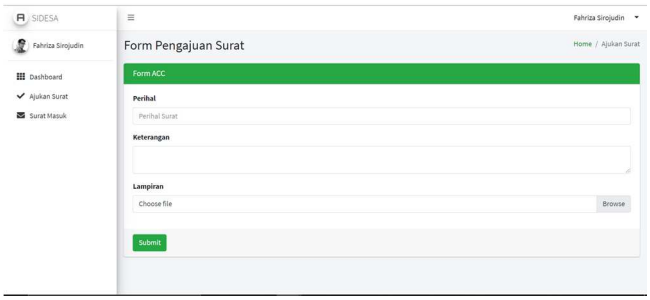


Fig. 4. Letter Submission

This menu displays a form for submitting a letter to the village government. There are columns to fill in the subject of the letter, information, to letter attachments.

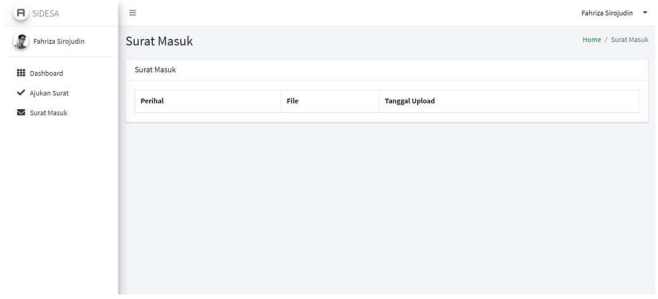


Fig. 5. Inbox

This menu will display a reply letter from the village government. Details are displayed using a table containing information about the letter, file attachments, and upload date.

## C. Evaluation

Individual trials were conducted on expert judgment to assess the validity of the media. Based on the test results, the results obtained are in accordance with Table II which means that VJ is a valid media and can be used for learning.

### 1) Evaluation

The SIDESA website testing using the UEQ framework resulting data that is processed using a data analysis tool. The data is calculated using a certain formula to get a value with predetermined parameters. The following are the results of data processing based on the UEQ framework.

TABLE III. UEQ TEST RESULT

| Short UEQ Scale | |
|---|---|
| Pragmatic Quality | 1,583 |
| Hedonic Quality | 0,500 |
| Overall | 1,042 |

Based on the criteria set out in Table I, the 8 validation questions measured using the UEQ framework were grouped into 2 data groups, namely data based on pragmatic quality and hedonic quality. The pragmatic quality represents how the quality of user interaction when doing a job to achieve the desired goal. On the other hand, the hedonic quality represents user satisfaction in using the website without being related to how the system works in achieving goals.

The data in TABLE III is the final result of data processing that has been collected from respondents using a simplified version of the UEQ framework or better known as UEQ-S. It can be seen that the pragmatic quality of the SIDESA website has a final score of 1.583 and a hedonic quality of 0.500. The range of positive ratings is >0.8 and negative ratings is <-0.8. It can be concluded that the pragmatic quality of the SIDESA website has received a positive response from respondents. Meanwhile, the assessment in terms of hedonic quality has not received a positive response from respondents because the final score of the data does not reach 0.8. However, if the overall score is taken from data processing, the SIDESA website user experience assessment gets a positive assessment with a final score of 1.042.

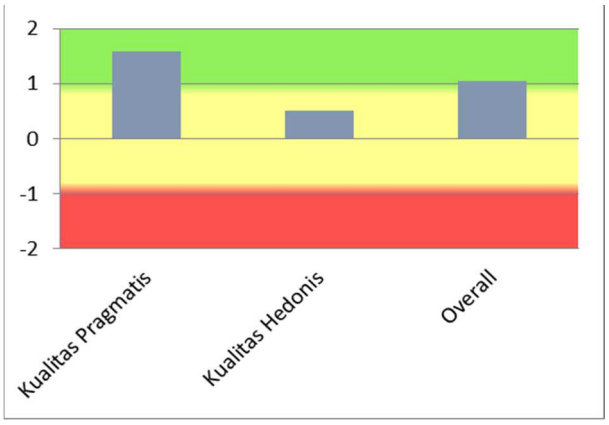


Fig. 6. Statistics

The results of data processing are depicted through the statistical graph in figure 6. It can be seen in the graph that the pragmatic quality statistic has the highest value and is in the green zone which indicates a positive assessment. Meanwhile, the hedonic quality is still in the yellow zone, which means that it has not yet reached the positive rating standard. However, the overall graph of the assessment results is still in the green zone, which means it is still receiving positive responses from users.

TABLE IV. USABILITY TEST RESULT

| Respondent 1 | Respondent 2 | Respondent 3 |
|---|---|---|
| The main function of the website is running well, but other features and error notifications still need to be developed to make it more user-friendly. | Guidelines for using the website need to be placed on the website so that users can access it more easily. | The appearance of the website on the mobile version is still uncomfortable. It would be better if the mobile version was made more flexible and convenient for users. |

In addition to the assessment using objective data, there are subjective assessments put forward by users which are summarized in TABLE IV. With this subjective opinion, website development can be done by focusing more on user needs. Hedonic quality improvement can also be carried out more effectively and on target.

*2) Usability Testing Results*

The testing of the SIDESA website is based on aspects that become a benchmark for the efficiency of using the software. In this test, 4 scales are the basis for testing with each scale having a different number of statements as contained in Table V. The following are the results of Usability testing by experts.

TABLE V. USABILITY TEST RESULT

| Aspects | Number of Statements | Scores (%) |
|---|---|---|
| *Operability* | 6 | 74 % |
| *Learnability* | 5 | 81 % |
| *Understandability* | 3 | 78 % |
| *Attractiveness* | 4 | 80 % |
| **Total** | **19** | 313 % |
| **Averages** | | **78,25 %** |

Based on the test results above, it can be concluded that the SIDESA website is valid and can be used properly. The learnability aspect has the highest score and becomes the basic benchmark for software. According to Nielsen in the book "Usability Engineering", learnability is a fundamental dimension in usability [14]. Based on the learnability aspect, the SIDESA website already supports user's needs in terms of learning the system. Especially the development of this website is intended for rural communities who are not always in contact with digital media. Using the data generated from user experience testing using usability testing can help both parties, namely the developer and the user. Appropriate research revealed that people as social beings are more easily influenced by the people around them, especially if they get an urge to do something such as using a new system [15][16].

In addition, experts who have validated the system subjectively analyze the website from various perspectives as an evaluation. The following is a subjective analysis presented by the validator.

TABLE VI. SUBJECTIVE ANALYSIS

| Expert 1 | Expert 2 | Expert 3 |
|---|---|---|
| The use of NIK as a username is less convenient but can be used considering that in the village not all residents have an email. | It would be better if there were different color indicators on the buttons as well as error/success warnings. | Optimization of website development on the mobile version must be further improved considering that most users will find it easier to access via smartphones. |
| Need to be given instructions in the application. | It is better if there is a color pattern/color theme from the application. | The flexibility of the mobile version should be further improved. |

Based on the results of subjective analysis from experts, several things must be considered in developing the SIDESA website. Expert 1 opinion is the use of NIK as a username is less convenient. However, it can be one of the right solutions considering that not all village residents have an email. In addition, Expert 1 also believes that the instructions for using the application should be on the SIDESA website to make it easier for users who are still new to using the website.

Meanwhile, Expert 2 gave an opinion in terms of website coloring which should have guidelines so that the use of color is in line to make related features. This is in accordance with the presentation by Arifin et al. sourced from Google Material Design (GMD), that color guidelines are indispensable. Color is an indication of an interactive element and how these elements relate to one another [17][18][19]. Thus, important elements must stand out from other elements [9][20].

The last analysis was provided by Expert 3, whose analysis partly criticized the appearance of the website from the perspective of mobile users. According to Expert 3, the SIDESA website developer should pay more attention to the flexibility of the website when accessed via a smartphone [21]. This refers to the results of a survey conducted by Statista Indonesia in 2020 which showed that as many as 63.3% of Indonesians in 2019 had used smartphones. Thus, based on data from the previous 2 years, it can be estimated that in 2025 as many as 89.2% of Indonesians have used smartphones. Thus, mobile-based software development must be optimized by developers. This finding is in line with research that is with empirical evidence, which states that business expectations have a significant effect on user behavior in the use of information systems [22][23][24].

Based on the analysis of the objective to subjective data, it can be concluded that the quantity of the SIDESA website has met the needs of users. However, in terms of quality, there are still some functions that need to be improved so that the SIDESA website can be used as a more professional and user-friendly village administration information system.

## V. CONCLUSIONS

SIDESA is a website-based information system that is intended as a rural area administrative service platform. This website has various features, including the Submit Letter, Entry Letter, and Dashboard features. The existence of the SIDESA website is expected to help the performance of the village government in serving the community administration process and making the service process more effective. To achieve this goal, system validation is needed so that the website developed can meet the needs of users appropriately. System testing is carried out using the User Experience Questionnaire (UEQ) and Usability Testing framework.

Through the testing process of respondents and experts, the final result is that the SIDESA website is valid as a whole with a score of 1,042 based on the UEQ framework, and valid based on Usability Testing with a final percentage of 78.25%. However, there are still several aspects that must be developed so that the SIDESA website can be used more professionally.

Thus, the development of the SIDESA website will continue to be carried out in order to optimize the potential for a systemically valid user experience. In the future, by referring to the results of the validation that has been carried out, it is hoped that the developer can implement important aspects that still need improvement so that the usefulness of the SIDESA website can be implemented among the village community.

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