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Heuristic Analysis of the Indonesian Covid-19 Official Website Interface

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ABSTRACT

The Government of Indonesia's official Covid-19 website is the most trusted information link between relevant agencies and the wider community. Usability is an important factor in determining how easily and successfully users can obtain information from a website. Heuristic studies were conducted to obtain findings on the discrepancies in the previously released website design. The website's homepage has a usability percentage of 78.74 percent and a standard deviation of 8.84 percent. The Covid-19 distribution page is 70.36 percent usable, with a standard deviation of 9.84 percent. The evaluation results are based on the United States' Research-Based Web Design and Usability Guidelines. The Department of Health and Human Services (HHS) discovered that the home page's links were poorly identified, that important information was not relevant, and that the use of icons was inconsistent. The distribution page discovered difficult-to-identify links, scrollbar redundancy in the frameset, and content complexity that required the user to be able to read diagrams well.

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1. INTRODUCTION

The Covid-19 pandemic has gotten a lot of attention recently. The disease's news is still being broadcast on a variety of digital platforms. One of the reasons a forum is needed as a reliable source of information from related parties is the amount of news. The media plays a critical role in reducing hoaxes and misleading information about the covid-19 pandemic in Indonesia. The covid-19 website serves as a channel of communication for related parties and the community [1], [2].

The Covid-19 website has become even more important as public awareness of the corona disease might have declined. The availability of information facilities must support efforts to transition from a pandemic to an epidemic and endemic. Policy changes are made quickly in response to the changing situation and conditions of Covid-19. At any time, the public requires up- to-date information on the development of Covid-19 [3].

There are three challenges that have arisen since the pandemic. The first is the presence of negative narratives and slow policies. The second issue is a lack of coordination between policy lines. Third, because of the community's growing apathy [4]. A critical requirement is the successful dissemination of information from stakeholders to the community and vice versa [5].

The ability to convey information successfully is an important aspect of website development. The way the website presents the information to be conveyed must be considered [6]. These factors influence the reader's attractiveness, resistance to continue reading, the quality of information that can be received completely, and the implementation of policies based on the information obtained.

The reader will ignore important information if it is presented in an unappealing manner. If you submit information that makes you uncomfortable, the reader will disregard it. Submission of low-quality information may cause readers to become confused before obtaining information. All of these flaws can lead to bias. More research is needed to determine how the web interface affects readers. A heuristic study of usability can obtain more comprehensive results [7].

This study gains significance when applied to websites that provide information other than Covid-19. Another use for the research findings is for diseases with a high rate of transmission or spread, such as dengue fever, chikungunya, malaria, hepatitis B, tuberculosis, and others. One of the preventive measures is to provide the most up-to-date information, which can be done through a media website on the internet. Controlling the transmission and spread of communicable diseases also aids in the control of hospital proportions, ensuring that there are no cases of overcapacity or a lack of places in health facilities.

The success of conveying information via a website has many implications. The impact obtained may be greater than that obtained through traditional methods used by relevant local agencies and government. These advantages are obtained as a result of the website's ability to be accessed at any time and from any location. Websites receive more attention than television, radio, newspapers, magazines, and similar media. One of its main competitors is social media, which has high and quick information transactions. The limitation of information is a weakness of official social media accounts. The more information shared on social media, the more other information is shifted and piled up. Although social media is very effective at capturing attention, websites are far more effective at conveying more complete information [8].

Momenipour will conduct a similar study in the United States in 2021 [9]. They conduct heuristic studies for Covid-19-related sites of health facilities or public health agencies. Five experts were chosen to evaluate the heuristic study method independently on a scale of 0-4. Overall, the website is easy to use, but many websites fall short of providing critical information.

A similar study was carried out in Peru [10]. To ensure a good user experience, a heuristic study was conducted on the Peruvian Government website regarding Covid-19. Evaluation with heuristic studies conducted using ten Nielsen [11] principles include, Visibility and System Status (H1), Connection between the system and the real world (H2), User Control and Freedom (H3), Consistency and Standards (H4), Recognition Instead of Memory, Learning and Anticipation (H5), Flexibility and Efficiency of Use (H6), Error Prevention (H8), Aesthetic and Minimalist Design (H9), Help and Assistance (H9) (H10). Flores [10] suggests that it be equipped with Save the status and protect the work (H11), Color and readability (H12), Autonomy Controlled freedom to the user (H13), Default values (H14), and Latency reduction for a better evaluation (H15). These fifteen principles are indicators of heuristic study success. Each indicator has a number of questions. Each question is represented by four answer options: yes, between yes and no, no, and not filled. The percentage of correct answers is the result of a heuristic study and will be used as evaluation material for usability issues in the future.

Heuristic studies are used to assess a website's accessibility to users who have difficulty accessing web services, such as those with low vision and limited motor skills [12]. Heuristic studies provide expert assistance in manually assessing by specifying a severity range. The study time was discovered to be relatively long and expensive. Heuristic studies have been used for a variety of purposes, including heuristic studies of map service provider sites [13], games[14], Human-Robot Interaction (HRI) [15], Conversation Agents such as Chatbots and Voice Assistants [16], and so on. Heuristic studies will continue to be one of the future options for linking human- machine interactions.

Web accessibility is regarded as a fundamental component in the design and

development of information services. In contrast to other studies, Yeison [17] conducted a heuristic study from the perspective of people with disabilities. The study's goal is to

ensure that people with disabilities can interact effectively with the content on a website. Expert inspection evaluators are used to examine a set of heuristics for a website. The results are in the form of accessibility recommendations for websites. Heuristic studies are also commonly used in the health sector, such as heuristic studies of websites on people with disabilities [17], health promotion [18], national health information systems [19], telepsychology and virtual reality [20], outpatient platforms covering treatment routes and scheduling [21], Internet of Medical Things (IoMT) [22], and many others. Heuristic studies are one of the most popular and in-depth methods for evaluating usability, but they have the disadvantage of differing evaluators' perspectives [23], [24].

This study is expected to help in measuring the ease with which readers can obtain information. The study's findings can be used as evaluation material for future improvement to become even better than before.

2. RESEARCH METHOD

The research was conducted in stages, including a literature review, data collection, and data analysis. A literature review is carried out by researching various scientific sources related to heuristic studies on a website. The following stage involves collecting data from the government, including the Covid-19 website, as well as expert evaluation results based on heuristic principles [25]. The final stage is data analysis, which involves analyzing all of the collected data.

There are many methods for determining the utility of a technology. Heuristic evaluation is a method for solving many problems that is based on a set of heuristic principles [26]. Percy Santiago et al [10] compiled and carried out data collection using heuristic principles into several questions. The following questions are used as study indicators on the Indonesian Government's Covid-19 website:

1) System visibility and status: Information that is easy to understand
   - Is there a visible title page, page, section, or site in the application?
   - Is the user always aware of his location?
   - Is it always clear to users what the system or application is doing?
   - Are the links defined clearly?
   - Is it possible to see all actions in real time? (No other action is required.)
2) Relationships between the system and the real world, including the use of metaphors and human objects: Approaching the system in the user's language rather than the programming language
   - Does the user's information appear in a logical order?
   - Is the icon design suitable for everyday use?
   - Does each icon perform the expected action?
   - Does the system make use of user-friendly phrases and concepts?
3) User control and freedom: The ability for the user to perform and undo system actions.
   - Is there a link to the previous state or the homepage?
   - Do the "undo" and "redo" functions work?
   - Is it simple to return to the previous application state?
4) Consistency and standards: Maintain a consistent style on the website and an appealing structure for users.
   - Is the name of the link tag the same as the name of the destination?
   - Does the same action always produce the same outcome?
   - Do icons have the same meaning everywhere?
   - Does the information appear consistently on all pages?
   - What color is the default link? If not, can they be used?
   - Are the navigation elements consistent? (Buttons, checkboxes, and so on.)

5) Recognition rather than reminder, learning, and anticipation: Users can quickly identify specific server actions.

- Is it easy to use the system for the first time?
- Is it easy to find existing information? (Search)
- Can you use the system without remembering the previous screen?
- Is all content required for navigation or on-screen tasks?
- Is the information organized in a logical order from beginning to end?

6) Usability and flexibility: Facilitates navigation through shortcuts.
   - Are there keyboard shortcuts for common actions?
   - If yes, is it clear how to use it?
   - Is it possible to easily repeat previously performed actions?
   - Is the design adaptable to changing screen resolutions?
   - Is the use of the accelerator visible to ordinary users?
7) Assisting users in recognizing, diagnosing, and reproducing errors: Validate errors before acting.
   - Is it irreversible to show a message before performing an action?
   - Is it possible to see errors in real time?
   - Is the error message simple to comprehend?
   - Is there a code for the error?
8) Error prevention: Communicate errors to users and suggest possible solutions.
   - Does a confirmation message appear before action is taken?
   - Is it clear what information should be included in each form box?
   - Do search engines accept typos and misspellings?
9) Aesthetics and minimalism in design: focuses on what is important:
   - Is there no information redundancy in the design?
   - Is the information brief, concise, and correct?
   - Is each piece of information distinct and not contradictory?
   - Is the text well-structured, with short sentences and rapid interpretation?
10) Assistance and documentation: The system provides relevant, easily accessible assistance.
   - Is there a "help" button available?
   - Is it visible and easily accessible, if so?
   - Is the help section devoted to problem-solving?
   - Is there a Frequently Asked Questions section?
   - Is the help documentation clear and includes examples?
11) Save state and protect jobs: All information should be automatically saved whenever the client desires and stored on the server, which has the ability to disconnect and reconnect elsewhere.
   - Can users resume from where they left off (from another device)?
   - Does "AutoSave" work?
   - Does the system handle external failures well? (Power outage, inaccessible Internet)
12) Color and legibility: Use high contrast text, preferably black on white or contrasting dark and light colors. Font size that is readable.
   - Does the font size appear to be correct?
   - Is the font's background color sufficiently contrasted?
   - Is the background image or pattern legible?
   - Do you take into account people with low vision?
13) User autonomy and freedom of control: When administrators manage their variables, users are notified about the state of the system.
   - Do you always inform users about system status?
   - Can you see and update the status?
   - Are users able to make their own decisions? (Personalization)

14) Default value: Easy detection and correction of user flaws
    - Is it possible to reset the system or device to factory settings?

- If yes, does it clearly state the action's consequences?
- Does the term "default" appear?

15) Reduced latency: Load state removal
- Is heavy work execution visible to users?
- Is the remaining time or animation displayed when performing heavy tasks?

All questions were evaluated by a panel of experts. Every evaluator is welcome to access the website and determine whether or not each point has been met. The summary of all responses is then evaluated to produce recommendations for related websites. The analysis stage involves computing the percentage of correct answers and comparing each evaluator. The standard deviation study was used to determine sample confidence [10].

$$S = \sqrt{\frac{\sum(x_i - \bar{x})^2}{n}}$$

Figure 1. Standard Deviation Study Formula

As shown in Figure 1, the standard deviation (S) is intended to determine the variation in the distribution of answers from evaluators as a representative sample of the population. The analysis is performed by reducing the evaluator's answer (x value) to -i using the average of the evaluators' answers to a question. The obtained results are then divided by the total number of answers (n) in each answer. This method generates a percentage that describes the differences in opinion between the evaluators. The higher the percentage obtained, the more disparate the opinions of each evaluator. The lower the percentage obtained, the closer the evaluators' opinions are. This step provides conclusions on the sample's quality and whether the sample obtained can represent the entire population.

3. RESULTS AND DISCUSSION

As a result of data collection, four samples of evaluators who are experts in their fields were obtained. For 10 minutes, evaluators are welcome to access and interact with the Covid-19 website. The equipment used includes the same computer for all evaluators as well as their personal devices. The evaluators then respond to each question using heuristic principles.

Table 1: Evaluation of the Indonesian Government's Covid-19 Website's Homepage

Evaluator	Usability	Applicable	No Applicable
	Percentage	Question	Question
Ev1	77,55%	49	10
Ev2	82,98%	47	12
Ev3	74,04%	52	7
Ev4	80,39%	51	8

Table 1 displays the results of all evaluators using the heuristic principle. The most crucial section is shown in the second column. Each evaluator assigns a percentage to usability. The evaluator does not completely answer the questions, as shown in the third and fourth columns. The following are the reasons for the unanswered question:

1) The Covid-19 website's home page is one-way and only provides information. There are no forms or fields to fill out.
2) There are no navigation aids or help options on the Covid-19 website.
3) There are no potential user defects or consequences in using the website from the user's perspective. This is due to the fact that the Covid-19 website is one-way from provider to user.

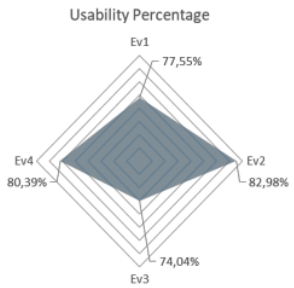

Figure 1: The final result of each evaluator's usability percentage on the Covid-19 website's home page.

Figure 1 shows the evaluators' differences in usability percentages on the Covid-19 website's home page. Evaluator 3 had the lowest usability percentage of 74.04 percent, while Evaluator 2 had the highest usability percentage of 82.98 percent. The difference in percentage between Evaluator 2 and Evaluator 3 is 8.94%. The surface area of the graph also illustrates that the opinions of all Evaluators are nearly balanced, with a maximum difference of 8.94 percent. Figure 2 show that the home page on the Covid-19 website has a good usability percentage in general, with an average overall usability percentage of 78.74 percent.

Figure 2: The Final Usability Percentage and Standard Deviation on the Covid-19 Site's Home Page.

The standard deviation obtained is 8.84 percent, as shown in Figure 2. This value is calculated by taking the average deviation of each evaluator's answer from the average answer of the other evaluators. The results show that the percentage of reusability on the Covid-19 website's home page has a relatively small deviation, implying that the sample can represent the population with a confidence level of around 91.16 percent. The lower the standard deviation value, the better the quality of the data distribution.

Table 2: Recommendations for Evaluating the Homepage of the Indonesian Government's Covid-19 Website

Indicator	Evaluation	Recommendation	Guidelines
Format for Writing with a Link	The links are not well defined or consistent.	Use meaningful, understandable, and distinguishable link labels and concepts for the user rather than easy for the designer.	HHS 10:1 Use Meaningful Link Labels Relative Importance 5 Strength of Evidence 4 HHS 10:4 Avoid Misleading Cues to Click Relative Importance 4 Strength of Evidence 2
Important data selection	There is a lot of important information presented in a variety of ways.	During the design process, consider as many user interface issues as possible. Use eye-catching features sparingly and only when necessary.	HHS 1:7 Consider Many User Interface Issues Relative Importance 4 Strength of Evidence 3 HHS 11:6 Use Attention-Attracting Features when Appropriate

Relative Importance 3
Strength of Evidence 5

Using Icons	The icons used on the home page are inconsistent.	Ensure that Web site elements are visually consistent within and between Web pages.	HHS 11:4 Ensure Visual Consistency Relative Importance 4 Strength of Evidence 4

The evaluator provided additional notes to enhance reusability on the COVID-19 website's home page based on the HHS Research-Based Web Design and Usability Guidelines, as shown in table II. One of the evaluator's suggestions is to use the color of the underlined text more consistently. It was found that there were many colors of linked text using various colors, so users had to guess whether the text was linked or not, even though hover and personalization of underline links were provided.

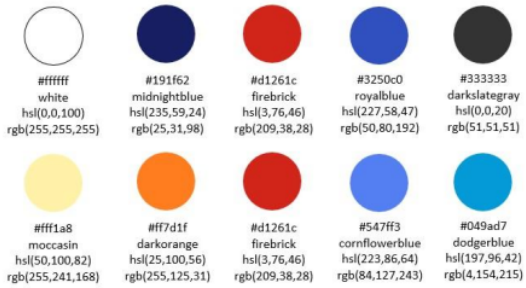

Figure 3: Colors used on the Indonesian Government Covid-19 Website's Homepage.

The color chosen should emphasize the important information to be conveyed. Figure 3 displays colors used on the Covid-19 website's home page. These colors do not include any embedded images or photos. Many and impressive colors are very appealing, but too many colors confuse users and make them tired of searching for information on websites. The decision not to use green is considered appropriate because it avoids the problem of the majority of users who are colorblind. The use of serif or sans-serif fonts should also be considered in terms of user fatigue when reading the information presented. When the Covid-19 website was accessed using different devices, it was discovered that some layouts could not accommodate the text, so the text was lost and unreadable. These flaws do not have a significant impact, but it would be preferable if the text could adjust the layout that changes depending on the device used.

Figure 4: The next and before icons used on the Covid-19 website's home page.

Figure 4 shows three different shapes for the use of the next and before icons. It would be preferable if the next and previous icons used a consistent shape. Personalizing the appearance of the Covid-19 website helps improve usability, but the first look is important in giving users the impression of ease when they first visit without having to personalize with the Accessibility Toolbar Plugin.

The Spread Page is another page on the Covid-19 website where usability studies are conducted. The page's submenus include the Map of Covid-19 Case Distribution, Monitoring of Covid-19 Cases of Foreign Nationals, National Covid-19 Situation, Risk Map, and Monitoring of Health Protocol Compliance. The majority of the information on the home page is in the form of images and text, whereas the majority of the information on the distribution page is graphic in nature. Further heuristic studies for distribution pages are based on these considerations.

Table 3: Assessment of the Indonesian Government's Covid-19 Website Distribution Pages

Evaluator	Usability Percentage	Applicable Question	No Applicable Question
Ev1	69,39%	49	10
Ev2	76,09%	46	13
Ev3	72,22%	45	14
Ev4	63,73%	51	8

Table 3 shows the evaluator cannot answer all questions. Evaluator 4 answered 51 questions based on the heuristic principle, while Evaluator 3 answered at least 45 questions out of a total of 59 questions given. The reasons given are similar to those given in a study conducted on the Covid-19 website's home page, including its one-way nature, lack of help features for browsing the website, and lack of forms or fillings that cause user-side errors.

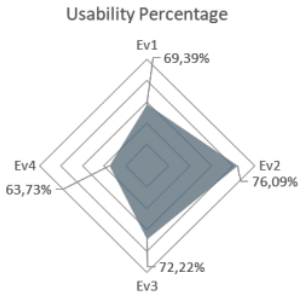

Figure 5: The final result of each evaluator's usability percentage on the spread pages of the Covid-19 website.

As shown in Figure 5, each evaluator generates a different usability percentage. Evaluator 2 achieves the highest usability percentage with a value of 76.09 percent. Evaluator 4 had the lowest usability percentage, with 63.73 percent. The difference in usability percentages between Evaluators 2 and 4 is approximately 12.36 percent. This value can be interpreted to mean that there are 12.36 percent of opinions that differ between the two. The closer the Evaluators' usability percentages values are to each other, the more likely their opinions are similar. To ensure this, examine the data distribution using the standard deviation.

Figure 6. The final Usability Percentage and Standard Deviation on the Covid-19 Site's Home Page

The average usability percentage obtained by all evaluators is 70.36 percent. In general, the usability percentage is good, with the highest percentage of evaluators (76.09%) and the lowest percentage of evaluators (63.73%). The calculated standard deviation is 9.84 percent. Greater than the Covid-19 homepage's standard deviation evaluation results. This value indicates that each evaluator has a 9.84 percent difference in opinion based on the deviation of answers between

evaluators. This percentage remains low. Based on the deviation value, the confidence in the study's findings is 90.16 percent. It also means that all evaluators agree on 90.16 percent of the Covid-19 website distribution page evaluation with heuristic principles.

Table 4. Recommendations for Evaluating the Indonesian Government's Covid-19 Website Distribution Page

Indicator	Evaluation	recommendation	Guidelines
Covid-19 distribution data representation	The link is not clearly defined.	Instead of being easy for the designer, use link labels and concepts that are meaningful, understandable, and easy to distinguish for the user. Use link labels that clearly differentiate one link from another to avoid user confusion. The user should be able to view each link and learn something about the purpose of the link that is currently being or has recently been visited.	HHS 10:1 Use Meaningful Link Labels Relative Importance 5 Strength of Evidence 4 HHS 10:4 Avoid Misleading Cues to Click Relative Importance 4 Strength of Evidence 2 HHS 10:13 Clarify Clickable Regions of Images Relative Importance 3 Strength of Evidence 3
Using the Scroll Bar	On a single page with a single column format, there are two scroll bars.	In general, shorter pages should be used for homepages, navigation pages, and pages that must be browsed and/or read online quickly. Use longer pages to (1) facilitate uninterrupted reading, especially on content pages; (2) match the structure of the paper counterpart; (3) simplify page maintenance (fewer Web page files to maintain); and (4) make the page easier to download and print.	HHS 6:10 Set Appropriate Page Lengths Relative Importance 3 Strength of Evidence 3 HHS 2:9 Format Information for Reading and Printing Relative Importance 4 Strength of Evidence 3
Content and page length	Long pages with a lot of information on a single page	Keep the page length to a minimum and as short as possible. It is preferable to use paging rather than scrolling.	HHS 5:7 Limit Homepage Length Relative Importance 3 Strength of Evidence 2 HHS 8:5 Scroll Fewer Screenfuls Relative Importance 2 Strength of Evidence 2 HHS 8:4 Use Paging Rather Than Scrolling Relative Importance 2 Strength of Evidence 4

Each Evaluator provides several notes about their assessments. As shown in table 4, the assessment is supplemented by solution recommendations from the U.S. Department of Health and Human Services' (HHS) Research-Based Web Design and Usability Guidelines.

The first point that all evaluators agreed on was link complexity. The link names used are simple, but some require clarification. Such as the use of abbreviations despite the fact that they are commonly used abbreviations. Many undefined or unmarked links cause site visitors to be unaware that some posts contain links. Hovering is useful for distinguishing links, but users should double-check this first. The use of link colors is not fully utilized.

It should be noted that the use of framesets on the site is not thought to maximize the available site space. Users will struggle because there are two scroll bars on one page. Particularly for mobile device users. Considerations for ease of site management are acceptable, but using two scroll bars on a page with only one column is not.

It should be noted that the use of map diagrams is very interesting and appropriate for representing existing information. This technique is simple for anyone to understand. In general, the distribution page on the Covid-19 site is intended for users with a high school diploma or higher. It requires the ability to read diagrams and complex data sequences. As a result, cloud users have a difficult time obtaining information from this page. The distribution page of the Covid-19 website is good as an information link that conveys information about the development of Covid-19 in Indonesia.

4. CONCLUSION

The Covid-19 website has evolved into the most trusted information conduit between relevant agencies and the larger society. A heuristic study of the Covid-19 homepage and distribution page on

the Indonesian Government's official Covid-19 website was used to assess usability. The website's homepage has a usability percentage of 78.74 percent and a standard

deviation of 8.84 percent. The usability of the Covid-19 distribution page is 70.36 percent, with a standard deviation of 9.84 percent. This value indicates that the usability study on the Covid-19 website in Indonesia gained a good positive assessment.

The following research is an evaluation to improve usability. The evaluation was based on the U.S. Department of Health and Human Services' (HHS) Research-Based Web Design & Usability Guidelines and the solutions provided. The Home page includes an assessment of unidentified links, the significance of important information, and the consistent use of icons. Spread sites have evaluations for difficult-to-identify links, scrollbar redundancy in the frameset, and content complexity that requires good chart reading skills from users.

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