Analysis of Website Usability of Provincial Governments in Indonesia with The Heuristic Evaluation Method

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Abstrak–Penerapan E-government sebagai layanan pubik telah dimulai oleh pemerintah Indonesia sejak tahun 2003 dengan dikeluarkannya Instruksi Presiden Nomor 3 tahun 2003 tentang Kebijakan dan Strategi Nasional Pengembangan E-Government. Aturan ini diperkuat pada tahun 2007 dengan Peraturan Menteri Komunikasi dan Informatika Nomor 41/PER/M.KOMINFO/2007 tentang Pedoman Umum Tata Kelola Teknologi Informasi dan Komunikasi Nasional. Namun, masih banyak situs pemerintah provinsi belum menerapkan uji usabilitas yang diperkuat dengan antarmuka website belum memenuhi standar yang telah ditetapkan pemerintah. Maka diperlukan pengujian usabilitas untuk mengetahui masalah terdapat pada website pemerintah provinsi. Metode yang dipakai dalam uji usabilitas tersebut salah satunya dengan metode heuristic evaluation. Evaluasi dilakukan dengan melibatkan tiga evaluator untuk mengevaluasi 28 situs pemerintah provinsi. Evaluator mendeteksi permasalahan berdasarkan sepuluh prinsip heuristic dikemukakan Jakob Nielsen dan dinilai severity rating. Hasil analisis menunjukkan website provinsi Aceh dan Daerah Istimewa Yogyakarta menduduki peringkat pertama dengan memiliki nilai severity rating terendah dengan nilai 0,43 sedangkan Kalimantan utara menduduki peringkat terakhir dengan memiliki nilai severity rating tertinggi dengan nilai 1,08. Sekitar 71,4% website pemerintah provinsi tidak ada masalah pada user control & freedom dan consistency & standards. Kemudian 50% dari website pemerintah provinsi terdapat masalah recognition rather than recall. Terakhir, Lebih dari 50% website terdapat masalah pada prinsip heuristik lainnya.

Kata Kunci: Usabilitas; E-Government; Website; Heuristic Evaluation; Severity Rating

Abstract–The Indonesian government initiated the implementation of E-government as a public service in 2003 with Presidential Instruction No.3 of 2003 issuance of National Policy and Strategy for E-Government Development. This rule was strengthened in 2007 by Regulation of the Minister of Communication and Information Technology No.41/PER/M.KOMINFO/2007 concerning General Guidelines for National Information and Communication Technology Governance. However, many provincial government sites still have not implemented a usability test. This problem is reinforced by the website interface not meeting the standards set by the government. So, usability testing is needed to find the problems found on the provincial government website. The method used in this usability test is the heuristic evaluation method. The evaluation was carried out by involving three evaluators to evaluate 28 provincial government sites. The evaluator detects problems based on ten heuristic principles proposed by Jakob Nielsen and is assessed with a severity rating. analysis results show the province of Aceh and the Special Region of Yogyakarta website is ranked first with the lowest severity rating value with a value of 0.43. In contrast, North Kalimantan is ranked last with the highest severity rating value with a value of 1.08. Around 71.4% of provincial government websites have no problems with user control & freedom, and consistency & standards. Then half of the provincial government's websites have problems with recognition rather than recall. Last, more than 50% of websites have problems with other heuristic principles.

Keywords: Usability; E-Government; Website; Heuristic Evaluation; Severity Rating

1. INTRODUCTION

In 2003, the rapid development of information technology (IT) made Indonesia issue a policy to utilize the IT by providing access to information to the public. According to [1], E-government is applying information technology in the administration level to realize better public services and support the industry. This matter is manifested in Presidential Instruction No. 3 of 2003 concerning National Policy and Strategy for E-Government Development as a form of seriousness of the Indonesian government to implement e-government [2] The Presidential Instruction explains that all institutions or institutions must implement good governance through e-government for accountability in government administration and to improve efficient, effective, and transparent public services. In 2007, The e-government policy is also regulated in the Regulation of the Minister of Communication and Information Technology No. 41/PER/M.KOMINFO/2007 concerning General Guidelines for National Information and Communication Technology Governance [3]. The decision holds the guidelines or standarts for E-Government, which must be a reference for e-government development in every government institution.

With this regulation, government agencies began to develop public service facilities for E-government, such as websites. However, many agencies, especially the provincial government, still create websites without conducting usability tests. This issue can be seen in many provincial government websites that do not pay attention to website guidelines that the Indonesian government has determined. Without evaluation, it will not know how the condition of the website has been in its implementation since it was developed [4]. In addition, problems in the website design interface will affect the impression and experience when users use it [5].

In other studies, usability testing is useful for meeting the community's needs, which will experience changes over time [6]. Therefore, maintenance is needed by conducting a usability test. According [7], definition

of usability is the degree to which specific users can use a system, product, or service to achieve specific goals with effectiveness, efficiency, and satisfaction in a particular usage context. Another definition according [8], is the experience experienced by users in using specific applications, websites, or technologies.

Usability evaluation is needed to find out the extent of the ease of using the website. The method used in this study is heuristic evaluation. This method aims to identify usability problems related to interface design. The benefit of heuristic evaluation is that the process can be conducted easily and quickly [9].

Previous research [10] with the same object of this research, titled "EVALUATION OF PROVINCE GOVERNMENT'S WEB PERFORMANCE IN INDONESIA," inspire for conducting this research. Unlike research [10] evaluating website performance through pagespeed applications, this research evaluates in terms website design interface through usability tests. Compared to other methods, such as the cognitive walkthrough method, where the evaluation process involves new users as respondents, heuristic evaluation involves respondents from UX experts as evaluators [11]. This method is carried out by evaluators who evaluate the website's interface by considering Jakob Nielsen's ten heuristics principles for interaction design. By using this method, it can be seen which provincial government websites that have been appropriately developed meet the Jakob Nielsen's ten heuristics principles and as comparison for further research.

2. RESEARCH METHOD

2.1 Procedure

The heuristic evaluation method is a technique to measure the extent of the usability problem (usability) of software in the design interface [12]. This research is quantitative. The number of evaluators in this study was three people. The more evaluators, the more usability problems found [13].
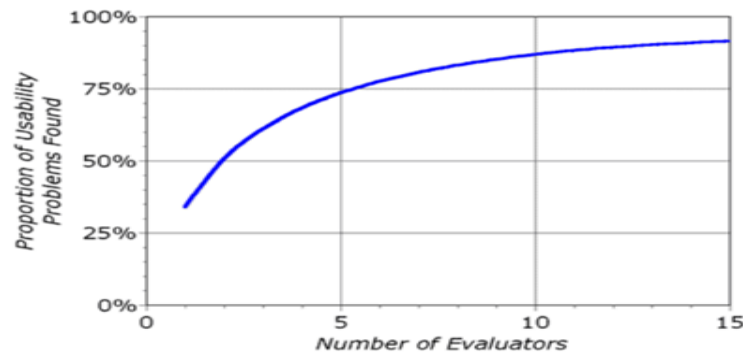

Figure 1. The more evaluators, the more usability problems are found.

Several stages were carried out during the research process, as shown in the image below.
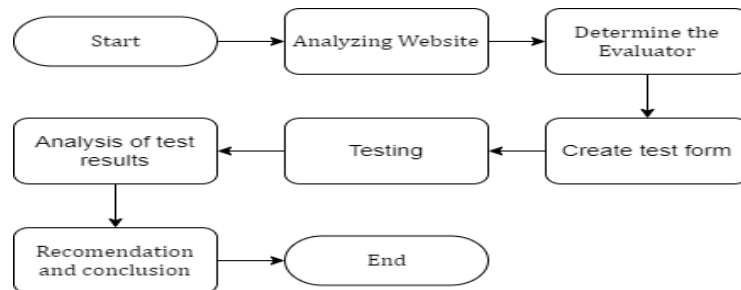
Figure 2. Research flow

Testing was carried out from June 4, 2022, to June 10, 2022, using the zoom application. The evaluator evaluates the website by analyzing several pages from each provincial website. Next Every time the evaluator finishes analyzing a website, the evaluator fills out the assessment form in the google form that has been provided. The results of the three evaluators will be analyzed.

2.2 Ten heuristics principles

In using heuristic evaluation, there are ten design principles put forward by Jakob Nielsen as a reference in evaluating website interfaces [6].

Table 1. Jakob Nielsen's ten heuristics principles

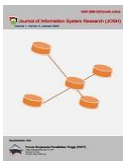| Kode	Principle	Description
Z1	visibility of system status	The system provides status information to users.
Z2	Match between system and the real world	Presents language and icons that are easy to understand.
Z3	User control and freedom	The system gives users the freedom to operate the system elements in the system consistently and do not change.
Z4	Consystency and standards	
Z5	Error prevention	The system design prevents users from making mistakes.
Z6	Recognition rather than recall	The system's design is easy to remember to use, minimizing to remember.
Z7	Flexibility and efficiency of use	The system provides options for operating the system.
Z8	Aesthetic and minimalist design	The appearance of the design is simple and not too crowded.
Z9	Help user recognize , diagnose, and recover from errors	The system alerts if there is an error and how to fix it.
Z10	Help and documentation	The system assists in finding information quickly.

2.3 Sub-aspects of 10 principles of design

The following sub-aspects are used as assessment questions during testing.

Table 2. Sub-aspects of ten principles of design

Aspect	Code	Sub - Aspect
Z1	A1	Is there any visual feedback that shows the user's location?
	A2	Does the element provide a different response when an element is acted upon?
	A3	Does each page have a title/favicon in the browser tab that describes the page's content?
	A4	Is there visual loading when entering/moving pages?
Z2	B1	Is the use of the word easy to understand without having to look up the definition?
	B2	Are the icons used familiar to the user and appropriate for their purpose?
	B3	Is there an option for changing the language?
Z3	C1	When a user clicks the back button or a link in the breadcrumb, can the user return to the previous page?
	C2	When a notification or pop-up appears from the website, can the user find the cancel/exit button easily?
Z4	D1	Does every page have a title?
	D2	Are visual elements consistent from page to page?
	D3	Are the IDE site/logo and search box always present in the navigation on every page?
Z5	E1	When typing in the search box, does it display suggestions?
	E2	Can contact information be found in headers or footers?
	E3	Is an element clickable or not?
	E4	Is the information presented well grouped?
Z6	F1	Are the icons easy to recognize and understand so they can be used immediately?
	F2	Can users immediately use the website with the existing layout without having to study the website first?
	F3	Can users find a list of existing menus quickly?
Z7	G1	Does the website layout make it easier for users to find the menu/link they want?
	G2	Are menu groupings and information easy to remember?
	G3	Does the website have the option of displaying a different language?
Z8	H1	Is the hierarchy visualization good?
	H2	Has the use of whitespace been implemented properly?
	H3	Is the use of color and color contrast, correct?
	H4	Is the element size scale good?
	H5	How is the typography?
Z9	I1	When the user enters the website page and cannot find the link, is there an explanation why the link cannot be found?
Z10	J1	Is there a help page?
	J2	Is there a site map containing all the links on the website to make navigation easier?
	J3	Is there a link containing contacts either by email or by phone?

Description:
Z1 – Z34   : Severity rating results in every aspect of heuristic principles

2.4 Severity rating
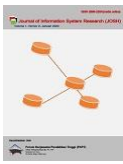
Heuristic evaluations identify usability issues. These problems are assessed based on the difficulty level of the problem, which is called the severity rating [14].

Table 3. Severity rating

Severity Rating	Description
0	Not usability problem
1	Fixed if there is time.
2	need to be fixed with low priority.
3	need to be fixed with high priority.
4	immediately to be fixed before it was released.

According to [15], The evaluation value is obtained by calculating the heuristic principle in Table 1. Jakob Nielsen's ten heuristics principles. Calculation of the heuristic evaluation using the equation **Error! Reference source not found.**.

$$\sum H_X = 0*x + 1*x + 2*x + 3*x + 4*x \qquad (1)$$

Descripstion:
$\sum H_X$: Heuristic principles (Z1, Z2, Z3, . . . , Z10), the total value of the sub-aspects of each aspect.
x : The number of evaluators who gave a rating

Then use the equation **Error! Reference source not found.** to generate severity rating values for each aspect of the heuristic principle.

$$Sv = \sum \frac{H_x}{n} \qquad (2)$$

Description:
Sv : Severity rating results in every aspect of heuristic principles
n : Total of sub-aspects in each aspect of the heuristic principle.

2.5 Provincial government website

The following is a list of provincial government from [10], whose websites are the research object.

Table 4. List of provinces in Indonesia

Code	Province
PR1	Aceh
PR2	North Sumatra
PR3	West Sumatra
PR4	Riau
PR5	Jambi
PR6	South Sumatera
PR7	Bengkulu
PR8	Lampung
PR9	Bangka Belitung
PR10	Riau Islands
PR11	Capital Special Region of Jakarta
PR12	West Jawa
PR13	Central Jawa
PR14	Special Region of Yogyakarta
PR15	East Jawa
PR16	Banten
PR17	Bali
PR18	West Nusa Tenggara
PR19	East Nusa Tenggara
PR20	West Kalimantan
PR21	Central Kalimantan
PR22	South Kalimantan
PR23	East Kalimantan
PR24	North Kalimantan
PR25	North Sulawesi
PR26	Central Sulawasi
PR27	South Sulawesi
PR28	Southeast Sulawesi
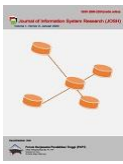
PR29	Gorontalo
PR30	West Sulawesi
PR31	Maluku
PR32	North Maluku
PR33	Papua
PR34	West Papua

3. RESULT AND DISCUSSION

3.1 Data Collection

The following is an example of the assessment results for the government websites of West Kalimantan, Central Kalimantan, and South Kalimantan by evaluator 3.

Table 5. The results of the evaluation of the website by the evaluator 3

Aspect	Sub-Aspect	Province		
		PR20	**PR21**	**PR22**
Z1	A1	0	0	0
	A2	0	0	1
	A3	2	0	2
	A4	0	0	0
Z2	B1	0	0	2
	B2	0	0	1
	B3	2	2	0
Z3	C1	0	0	3
	C2	1	0	1
Z4	D1	0	0	0
	D2	0	2	2
	D3	0	2	2
Z5	E1	1	3	3
	E2	0	0	0
	E3	1	2	1
	E4	0	0	1
Z6	F1	0	2	2
	F2	0	1	3
	F3	0	1	2
Z7	G1	0	1	3
	G2	0	0	2
	G3	2	2	2
Z8	H1	1	0	0
	H2	1	0	2
	H3	0	1	0
	H4	0	2	3
	H5	0	0	0
Z9	I1	3	3	3
Z10	J1	0	4	4
	J2	3	3	3
	J3	0	0	3

Description　　　:
Z1 – Z10: Jakob Nielsen's ten heuristics principles.
A1 – J3　: Sub-aspects of heuristic principles
PR20　　 : West Kalimantan Province
PR21　　 : Central Kalimantan Province
PR22　　 : South Kalimantan Province

　　During the evaluation process, some websites were not accessible due to server problems. The websites of the governments of the Provinces of South Sumatra, the Special Region of Yogyakarta, and West Papua could not be accessed by the two evaluators. Meanwhile, the websites of the Provincial Governments of West Nusa Tenggara, South Kalimantan and North Sulawesi could not be accessed by one evaluator.

3.2 Calculation Process

The results of the evaluation from the evaluator are then searched for the severity rating of the aspect from each province. The following is an example of calculating the severity rating aspect of the visibility of system status in the province of South Kalimantan and the Aesthetic and minimalist design aspect of the province of Central Kalimantan.

Table 6. Calculation of the visibility of system status on the South Kalimantan website

Aspect	Sub-aspect	SR 0	1	2	3	4	Total	Value
Z8	H1	2	0	1	0	0	2	0,4
	H2	1	0	2	0	0	4	0,8
	H3	0	2	1	0	0	4	0,8
	H4	0	2	1	0	0	4	0.8
	H5	1	0	2	0	0	4	0,8
	Total SR value							2,8
	SR value of aspect							0,7

Table 7. Calculation severity rating of the Aesthetic and minimalist design aspect on the Central Kalimantan website

Aspect	Sub-aspect	SR 0	1	2	3	4	Total	Value
Z8	A1	2	0	0	0	0	0	0
	A2	1	1	0	0	0	1	0,2
	A3	1	0	1	0	0	2	0,4
	A4	1	1	0	0	0	1	0,2
	Total SR value							0,8
	SR value of aspect							0,2

Description   :
Total   : the number of severity ratings for each sub-aspect
H1 – H5 : sub – aspect of aesthetic & minimalist design
A1 – A5 : sub – aspect of visibility of system status
Value   : the number of severity ratings of each sub-aspect divided by five

In the two tables above, the severity rating of the aspect is calculated using **Error! Reference source not found.** and **Error! Reference source not found.**. For example, the calculation of Table 5 sub-aspects of A3. Using **Error! Reference source not found.**, acquired 0*1 + 1*0 + 2*1 + 3*0 + 4*0 (x is the number of evaluators who gave the score) the result is 2. Then divided by five (severity rating value, 0 to 4), the result is 0.4. Then add up the severity rating of the sub-aspects A1 – A4; the result is 1.2. Then using **Error! Reference source not found.**, the sum of the severity rating values of the sub-aspects divided by four (the number of sub-aspects for each aspect) results in the severity rating of the usability aspect.

With the explanation of the previous calculations, the following is the severity rating value for each province's government website.

Table 8. The calculation results from three evaluators

No.	Province	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Average
1	PR1	0,6	0,8	0,1	0,2	0,5	0,3	0,4	0,5	0,4	0,6	0,43
2	PR2	0,9	0,4	0,8	0,7	0,7	0,4	0,7	0,6	0,2	0,6	0,60
3	PR3	0,7	0,7	0,3	0,1	0,8	0,7	0,8	1,0	1,0	0,9	0,70
4	PR4	0,9	0,9	0,1	0,3	0,7	0,5	0,9	0,3	1,0	0,9	0,64
5	PR5	0,7	0,6	0,6	0,6	0,8	0,3	1,1	0,8	0,8	0,7	0,70
6	PR7	0,9	0,7	0,5	0,7	0,9	0,3	0,5	0,7	0,8	0,9	0,68
7	PR8	0,5	0,6	0,2	0,3	0,5	0,8	0,9	0,4	0,8	0,7	0,58
8	PR9	0,8	1,0	0,2	0,5	0,8	0,9	0,9	0,6	0,8	1,1	0,75
9	PR10	0,6	0,8	0,3	0,4	0,6	0,7	0,6	0,3	0,4	1,1	0,58
10	PR11	0,6	0,4	0,1	0,3	0,4	0,5	0,7	0,3	1,0	0,9	0,52
11	PR12	0,5	0,4	0,1	0,4	0,7	0,3	0,5	0,5	0,4	0,7	0,45
12	PR13	1,0	0,3	0,7	0,4	0,5	0,6	0,5	0,6	0,6	0,9	0,60
13	PR14	0,5	0,3	0,1	0,3	0,3	0,2	0,3	0,5	1,0	0,9	0,43
14	PR16	0,5	0,9	0,3	0,5	1,0	0,5	1,1	0,8	1,0	1,0	0,75
15	PR17	0,7	0,5	0,4	0,5	0,4	0,4	0,5	0,2	0,4	0,9	0,48
16	PR18	0,9	0,7	0,7	0,3	0,5	0,7	0,7	0,4	1,2	0,9	0,70
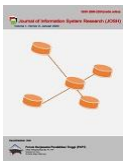
No.	Province	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Average
17	PR20	0,6	0,5	0,4	0,3	0,5	0,3	0,4	0,4	1,0	0,5	0,48
18	PR21	0,5	0,3	0,3	0,6	0,5	0,7	0,7	0,6	1,2	0,8	0,62
19	PR23	0,5	0,5	0,3	0,3	0,6	0,6	0,3	0,7	1,0	0,5	0,53
20	PR24	1,1	1,2	1,0	0,9	1,0	1,2	0,9	0,9	1,6	1,1	1,08
21	PR26	0,7	0,5	0,5	0,5	0,5	0,3	0,3	0,7	0,4	0,9	0,52
22	PR27	0,6	0,5	0,2	0,4	0,5	0,5	0,4	0,5	1,2	0,9	0,56
23	PR28	0,5	0,5	0,3	0,5	0,5	0,3	0,3	0,5	1,0	0,8	0,52
24	PR29	0,6	0,5	0,3	0,5	1,0	0,7	0,6	0,7	0,4	1,0	0,63
25	PR30	0,5	0,5	0,4	0,3	0,7	0,6	0,5	0,5	1,0	1,0	0,60
26	PR31	0,6	0,4	0,5	0,5	0,6	0,5	0,4	0,6	1,2	1,0	0,62
27	PR32	0,7	0,7	0,3	0,5	1,0	0,7	0,5	0,6	1,2	1,0	0,72
28	PR33	0,8	0,4	0,4	0,5	0,8	0,7	0,5	0,7	1,0	0,9	0,67

Description   :
Z1 – Z10   : Jakob Nielsen's ten heuristics principles. See Table 1.
PR1–PR33   : province of indonesia, see Table 4.

By rounding to the nearest number, regarding "visibility of system status" aspect, the severity rating of five provincial websites (17.9%) is 0, and 23 provincial websites (82.1%) are 1. In the "match between the system & the real-world" aspect, the severity rating of 12 provincial websites (42.9%) is 0, and 16 websites (57.1%) is 1. In terms of "user control & freedom", the severity rating of 20 provincial websites (71.4%) is 0, and eight websites (28.6%) is 1. In the "consistency & standards" aspect, the severity rating of 20 provincial websites (71.4%) is 0, and 8 websites (28.6%) is 1. In the "error prevention" aspect, the severity rating of seven provincial websites (25%) is 0, and 21 websites (75%) is 1. In the "recognition rather than recall" aspect, the severity rating of 14 provincial websites (50%) is 0, and 14 websites (50%) is 1. In terms of "flexibility & efficiency of use", the severity rating of eleven provincial websites (39.3%) is 0, and 17 websites (60.7%) is 1. In the "aesthetic & minimalist design" aspect, the severity rating of nine provincial websites (32.1%) is 0, and 19 websites (67.9%) is 1. In the "help users recognize, diagnose, & recover from errors" aspect, the severity rating of seven provincial websites (25%) is 0, and 21 websites (75%) is 1. Lastly, on the "help & documentation" aspect, the severity rating of one provincial website (3.6%) is 0, and 27 websites (96.4%) is 1.

4. CONCLUSION

The analysis results show that from 28 websites, most provincial government websites have no problems with aspects of "user control & freedom" and "consistency & standards". The usability problems found in aspects of "visibility of system status", "match between system & the real world", "error prevention", "recognition rather than recall", "flexibility & efficiency of use", "aesthetic & minimalist design", "help user recognize", "diagnose, & recover from errors", and "help & documentation". Based on the averages in Table 8, Aceh and Special Region Of Yogyakarta provinces ranked first for websites with the lowest usability problems with a score of 0.43 (closer to 0). Meanwhile, the North Kalimantan website was in the last position as the website with the most usability problems, with a score of 1.08.

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