

A Case Study of an Analysis for E-Government Web Accessibility for the Disabled in Malaysia

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Abstract

The internet and World Wide Web has become important source of information. Graphical user interface, are designed for visual interaction through web for the user. Normal peoples can easily process the visual data and locate the information that is most relevant to them. However, this task can be time-consuming and difficult for people with disabilities. This paper will address the issue of designing accessibility government websites that substantially improves web browsing experience of people with disabilities. The study explores the web accessibility standards and guidelines, the web accessibility evaluation tools and then analyzing the government website in Malaysia. It investigates the issue of creating accessible website and the importance of implementing web accessible features to e-government websites. Then the evaluation of government websites using automated accessibility evaluation tools and manual testing according to the guidelines had been done to determine the adaption of W3C Web Content Accessibility Guidelines

Keywords: Graphic User Interface; Accessibility; Disable; Web Content Accessibility Guidelines.

1. Introduction

The World Wide Web provides a wealth of information, and the user population of the web is diverse, including users of all ages, educational levels, and levels of computing experience [1]. Website is purely text-based medium when it first invented. But then the website started to be used as a commercial platform. Web designing and graphical user interface become more popular and widely used among web developer. However it becomes problems that raise accessibility issue. Many of the web users have various types of disabilities including vision and hearing sensory, motor and cognitive impairments. However the people with disabilities can use various forms of assistive technology to allow them to browse websites. Assistive technologies include hardware and software such as screen reader, voice recognition, alternative pointing devices, alternate keyboard, and refreshable Braille display [2].

Web sites must be accessible for different segments of the target user including people with disabilities. There are 750 million people worldwide with disabilities [3]. World Health Organization (WHO) estimates that globally more than 161 million people were visually impaired in 2002. They represent 19% of the world's population [4]. In the UK alone, there are 1.7 million blind and partially sighted people [5].

The guidelines and tools are there to help the web developer in developing accessible websites. Unfortunately, most websites are not currently accessible. Recent studies point out that large percentage (70-98%, depending on the category of site) of website is not accessible. The studies on private and non-profit websites [5], profit commerce websites [6], US state websites [7], and US Federal websites [8] were found to have major accessibility problems. Over time, websites are getting more inaccessible [5].

2. Related Works

Several study on web accessibility had been done by other researcher that relate to this study. Most of the studies are using automated evaluation tools, Bobby and some of them are manually tested according to the guideline. Bobby is the name Center Accessibility Special Technologies (CAST) gave to the free public service, it launched in 1996 to automatically analyze accessibility features of web sites. Bobby offered easy-to-follow suggestions for the manual interpretation of the extensive WAI guidelines. However CAST no longer supports the Bobby accessibility testing software, and in fact, sold the application to Watchfire in 2004 and Bobby no longer available as a free service.

Paris. M had done a study of "Website accessibility: a survey on local e-government websites and legislation in Nothern Ireland" using Bobby. 26 homepages of local e-government website had been evaluate and Paris found that only 14% of the website was Bobby-compliant to level A. Overall, 85% of local e-government websites failed to meet the minimum standards of

accessibility [9].

A study of "Investigating the Accessibility of Maryland State Agency Web Sites" used human evaluators utilizing screen reader in their evaluation method. A total of 15 Maryland state government websites was evaluated; 10 agencies websites and 5 state impairment-related websites. Out of 15 websites, 14 of those websites violated at least one of the Maryland state guidelines related to web accessibility [10].

Abanumy, Al-Badi and Mayhew P. research on "e-Government Website Accessibility: In-Depth Evaluation of Saudi Arabia and Oman" applied evaluation processes that include testing each site manually as well as automatically using well-known accessibility evaluation tools, Bobby. The evaluation process of these government websites, (13 from Saudi Arabia and 14 ministries' sites from Oman), showed that none of these websites conform to all priority1 WCAG 1.0 checkpoints [11].

Andrew Jackson's research on "Web Page Design: A Study of Three Genres" looks at three genres of Websites (education, government, and shopping) and makes comparisons of their design elements. Part of his comparison focuses on Americans with Disabilities Act of 1990 (ADA). In the 45 Websites he evaluated (15 from each genre); only about half of the education websites (46.7%) and government websites (53.3%) met Bobby approval for accessibility. Zero of the shopping sites he evaluated earned Bobby approval [12].

A study on "Web Accessibility at University Libraries and Library Schools" by Schmetzke looked at the 24 highest ranked Schools of Library and Information Science according to the US New& World Report, and evaluated the department Websites and the university's main library Web page for accessibility. Using the Bobby software, he found that only 23% of the SLIS pages were approved and 59% of the main libraries were approved. His conclusions for such a low result were that these schools are "unlikely to teach principles of accessible Web design" [13].

3. Research Method

The research approach for this study is a quantitative approach. This research uses a form of the case survey method to access the web accessibility degree of each homepages that committed web design mistakes [14]. Recommendations are then made based on the data collection and analysis of the identified design problems for the website.

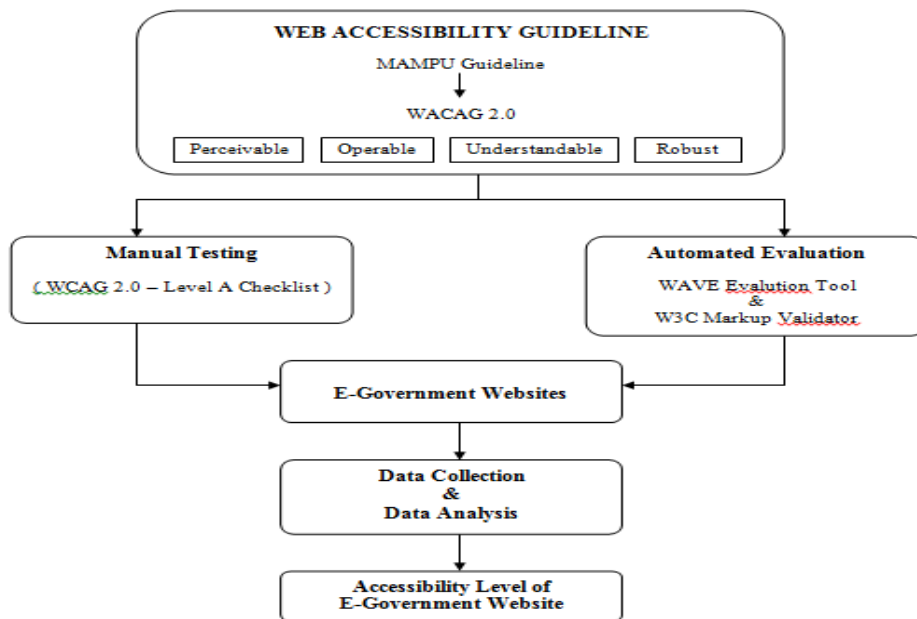


Fig. 1. Research activities flow

3.1 Sample size and Data Collection

The study select 40 government websites consist of 23 ministry websites and randomly selected 17 government agencies websites. The governments website will be tested manually and automatically using accessibility evaluation tools. Homepage of each websites were chosen in the context of the survey.

Manual testing is using close-ended questions. There are 30 indicators to evaluate in the case survey. The researcher will rate the assigned homepages on each of the selected indicator using a yes-no scale. The rate 0 is being "no problem on this indicator",

1 being "problem identified" and NA being "not applicable" and will not count as problem or error. In other words, a perfect website would be scored as 0 and the most problematic would be scored as a 30. Each homepage will be analysed individually, and the number and type of accessibility errors on each page were recorded.

Automated evaluation tool is using to assist the researcher in doing the survey. WAVE accessibility evaluation tools will check on accessibility aspect according to the WCAG guidelines and shows the number of accessibility errors occurred on a website. The results from WAVE are recorded and use to analyze the websites accessibility.

3.2 Research entrustment

The researcher created a survey to evaluate web accessibility of e-government websites. MAMPU guidelines and WCAG 2.0 is used as the elements in the survey. In WCAG 2.0 guideline, testable success criteria are provided to allow WCAG 2.0 to be used where requirements and conformance testing are necessary. Three levels of conformance are defined: A (lowest), AA, and AAA (highest).

The survey created based on the conformance to Level A of WCAG 2.0 guideline where it measure the minimum requirements of web accessibility. The survey consists of 30 indicators from four major aspects; perceivable, operable, understandable and robust, in 12 accessibility guidelines.

3.3 Validity and Reliability of Research Instruments

The case survey calls for a reader-analyst to answer the set of questions for each case study. The questions are closed-ended, so that the answers can be aggregated for further analysis. Reader-analysts are scientific observers. Their role is similar to that of the participant-observer, as described by Albert Reiss, Jr. (1971). Since the observations become the source of data for the study, the reader-analyst is the experimenter and the subject in the study. With the experiences in information and web technology, the researcher itself is the reader-analyst for this study.

In this case survey, reviewing the literature has always been more of an art than a science and, except in rare instances, there has been no attempt to assess the reliability of the method of review. The capability of the case survey in this regard is very straightforward: given a fixed set of closed-ended questions, the reliability of the reader-analyst's responses can be measured by having more than one analyst respond to each question for a single case study. The amount of inter-analyst agreement is then the measure of reliability. This measure of reliability does not address the issue of the accuracy of the original case study [15].

WAVE accessibility evaluation tool and W3C Markup Validator is renowned online automated evaluation tools. WAVE has been proposed by WebAIM, an organization within the Center for Persons with Disabilities (CPD) at Utah State University. Hence, the W3C Markup Validator is one the tools provided by World Wide Web Consortium, an HTML validating system conforming to International Standard ISO/IEC 15445-HyperText Markup Language, and International Standard ISO 8879-Standard Generalized Markup Language (SGML).

4. Result and Discussion

WAVE versus WCAG 2.0 Evaluation Results

This study is using both manual and automated evaluation approach. WAVE and WCAG 2.0 evaluation are both generating the accessibility errors of the website. Table 1 Shows the comparison between WAVE and WCAG 2.0

Table 1. Comparison of Accessibility Errors between WAVE and WCAG 2.0

No	Ministry and Government Agency	Website	Numbers of Accessibility Errors	
			WAVE	WCAG 2.0
1	The Malaysia Government	http://www.malaysia.gov.my	25	4
2	Office of The Prime Minister	http://www.pmo.gov.my	57	4
3	Malaysian Administrative Modernisation and Management Planning Unit	http://www.mampu.gov.my/	1	3
4	Ministry of Agriculture & Agro-Based Industry	http://www.moa.gov.my	36	3
5	Ministry of Defence	http://www.mod.gov.my/	3	4
6	Ministry of Domestic Trade, Co-operatives Consumerism	http://www.kpdnkk.gov.my	50	11
7	Ministry of Education	http://www.moe.gov.my/	30	5

8	Ministry of Energy, Green Technology and Water	http://www.kettha.gov.my	55	7
9	Ministry of Federal Territories	http://www.kwp.gov.my/	18	6
10	Ministry of Finance (Treasury Malaysia)	http://www.treasury.gov.my/	20	6
11	Ministry of Foreign Affairs	http://www.kln.gov.my	2	1
12	Ministry of Health	http://www.moh.gov.my/	16	4
13	Ministry of Higher Education	http://www.mohe.gov.my	67	4
14	Ministry of Home Affairs	www.moha.gov.my	26	5
15	Ministry of Housing & Local Government	http://www.kpkt.gov.my	0	4
16	Ministry Of Information Communication & Culture	http://www.moi.gov.my	78	4
17	Ministry of International Trade & Industry	http://www.miti.gov.my	130	4
18	Ministry of Natural Resources & Environment	http://www.nre.gov.my	5	4
19	Ministry of Plantation Industries and Commodities	http://www.kppk.gov.my/	44	3
20	Ministry of Rural & Regional Development	http://www.rurallink.gov.my	1	0
21	Ministry of Science, Technology & Innovations	http://www.mosti.gov.my	54	4
22	Ministry of Tourism Malaysia	http://www.motour.gov.my/	13	5
23	Ministry of Transport	http://www.mot.gov.my/	7	2
24	Ministry of Women, Family & Community Development	http://www.kpwkm.gov.my	0	0
25	Ministry of Works	http://www.kkr.gov.my	5	1
26	Ministry of Youth & Sports	http://www.kbs.gov.my/	37	3
27	Election Commission of Malaysia	http://www.spr.gov.my	13	6
28	Fire and Rescue Department of Malaysia	http://www.bomba.gov.my	29	4
29	Forest Research Institute Malaysia	http://www.frim.gov.my	18	3
30	Government and National Anti Drugs Agency	http://www.adk.gov.my	41	3
31	Inland Revenue Board of Malaysia	http://www.hasil.gov.my	65	3
32	Institute of Islamic Understanding Malaysia	http://www.ikim.gov.my	110	4
33	Malaysia External Trade Development Corporation	http://www.matrade.gov.my	53	7
34	National Institute of Public Administration	http://www.intanbk.intan.my	20	5
35	National Registration Department	http://www.jpn.gov.my	33	3
36	Public Service Department Of Malaysia	http://www.jpa.gov.my	80	6
37	Public Services Commission Malaysia	http://www.spa.gov.my	4	4
38	Royal Malaysia Police	http://www.rmp.gov.my	17	4
39	Rubber Industry Smallholders' Development Authority	http://www.risda.gov.my	23	3
40	Social Security Organisation	http://www.perkeso.gov.my	7	5

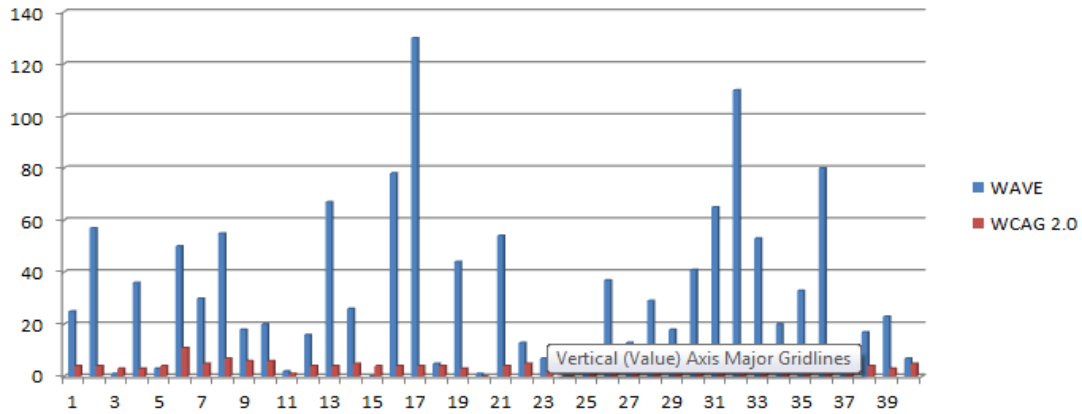


Fig. 2.WAVE versus WCAG 2.0 Evaluation Results

The numbers of errors shows a big gap between the error result of WAVE and WCAG 2.0. The reason of large numbers of errors reported by WAVE is because it did not specified errors according to the guidelines, it shows the number of how many errors occurred in the web page even it's the same errors. Different from WAVE, WCAG 2.0 guidelines used 30 success criteria based on the guidelines as the indicators that being checked carefully during the survey.

WAVE accessibility evaluation tools show various numbers of web accessibility errors. From all the 40 websites checked by WAVE, only two of them fully comply to the accessibility standards, they are Ministry of Housing & Local Government and Ministry of Women, Family & Community Development websites.

MAMPU has stressed about web accessibility to be implemented in government websites in their guidelines, however only few of them truly follow to the stated guidelines. WAVE also has been stated as web accessibility checker as being used by Brookings Institution to check on web accessibility features. Even though WAVE is checking the web page according to the WCAG standards, but it did not check with all the standards guidelines.

Numbers of errors reported by WAVE would reach more than 100 errors depends on the availability of accessibility features on the website. WAVE did not specifically report errors according to the guidelines but it show the location of web accessibility error which the same error could be repeated throughout the website. Therefore, it needs to be supported with other evaluation to look into details of web accessibility.

5. Conclusion

This study analyzed the home page of e-government websites in Malaysia and determines that only 2.5% of the government websites meet the World Wide Web Consortium - Web Content Accessibility Guidelines 2.0 for conformance to Level A. Other 97.5% did not even meet the minimum requirement of the standards. However, it is clearly show that the majority of the government websites in Malaysia trying to comply with the WCAG 2.0 guidelines.

Generally, government needs to understand the challenges of creating accessible e-government website. Government should either adapt the existing web accessibility guidelines or set their own standards of web accessibility. Appropriate solutions should be done to improve it and they need to spread awareness of the importance accessible website by enforcing suitable policies.

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