Evaluating the Accessibility of Malaysia E-Government Website

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ABSTRACT

With the proliferation number existence of Malaysia e-government websites, the accessibility feature may has been overlooked by website developers. Thus, the main objective of this study is to investigate the accessibility of Malaysia e-government websites with reference to the Web Content Accessibility Guidelines 1.0 (WCAG) by using quantitative measures to evaluate accessibility. Samples of 155 websites were selected from federal government websites and state government websites from http://www.malaysia.gov.my. The evaluation process was done by using automatic evaluation tool, EvalAccess 2.0 which revealed several issues on accessibility. We end our study with few recommendations for further improvement of the accessibility features.

Keywords
Accessibility, E-Government, Human Computer Interaction, Malaysia

1.0 INTRODUCTION

With the expansion of the Information and Communication Technology (ICT) globally, many peoples opt to conduct transactions, communication and official processes with the government by using the web technology. The web technology provides various benefits of changing the way people work and becomes a tool for government sectors to provide information and services to citizens.
However, these web technologies are not perfect in terms of accessibility. People with physical disabilities such as sight and hearing disabilities might face problem to access that website. To solve the accessibility problems, innovative designs are being required for web developer to make their web site more accessible by everyone including people with disabilities (Lee, Kim & Kim, 2007). One well-known guideline is Web Content Accessibility Guidelines 1.0 (WCAG 1.0) (Robbins, 2006). Thus, the main objective of this study is to investigate the accessibility of Malaysia e-government

websites with reference to the WCAG 1.0 by using quantitative measures to evaluate accessibility.

2.0 LITERATURE REVIEW

2.1 E-Government

In general, the term "e-government" is defined as *"streamlining government by providing efficient and effective services and information to citizens and business through advanced technology"* (Blackstone, Bognanno & Hakim, 2005). It presents a way for governments to provide convenient access to services via Internet and wireless communication technology (Siau & Long, 2006).

As shown in Table 1, there are growing numbers of research on e-government studies in various parts of regions, worldwide. In Malaysia, the E-government projects are closely monitored by Malaysian Administrative Modernisation and Management Planning Unit (MAMPU) of the Prime Minister's Department (Ahmed Bakeri, 2008). One of the MAMPU initiatives is MyGovernment portal (http://www.gov.my). The portal is being used for citizens accessing government information and online services and received nearly 6.5 million visitors, as of May 2008 (Ahmed Bakeri, 2008). However, the state of the accessibility level of federal, state and local authorities listed inside the portal is yet to be unknown.

Table 1: E-government accessibility studies

Country	Studies	Authors
Australia	E-government website accessibility in Australia and China	Shi (2006)
China	Accessibility of Chinese local government sites	Shi (2007)
Czech Republic	Accessibility of local e-government websites in the Czech Republic	Kopackova, Michalek & Cejna (2009)
Ireland	Accessibility of local e-government websites in	Paris (2006)

	Northern Ireland	
Japan	Policy issues regarding e-government and Web accessibility in Japan	Koga (2006)
Korea	Accessibility Evaluation of Korean e-government	Lee, Kim & Kim (2007)
Malaysia	Evaluation of Federal and State e-government websites in Malaysia	Ahmad Bakeri (2008)
Nepal	Evaluating the Web Accessibility of Websites of the Central Government of Nepal	Shah & Shakya (2007)
Saudi Arabia & Oman	E-Government Website Accessibility of Saudi Arabia & Oman	Abanumy, Albadi & Mayhew (2005)
South Africa	Evaluating South African government Websites	Korsten, & Bothma (2007)
Taiwan	Accessibility Diagnosis on the Taiwan Government Web Sites	Chen, Chen & Shao (2005)
United States of America	Accessibility of Federal Electronic Government	Becker (2007)
	Accessibility of Alabama government sites	Potter (2002)

2.2 Website Accessibility

In general, World Wide Web Consortium (W3C) defined web accessibility as *"accessibility means that people with disabilities can perceive, understand, navigate and interact with the web"*. The W3C has produced a set of international standards for the design of accessible Web content - the Web Content Accessibility Guidelines 1.0 (WCAG 1.0) (Robbins, 2006). Published in 1999, WCAG 1.0 has become an important reference for web accessibility for web community (Centeno, Kloos, Gaedke & Nussbaumer, 2005), influencing policy and legislation (Alexander, 2003) and have been used for developing accessibility authoring and checking tools (Tillett, 2001).

Table 2: WCAG 1.0 Guidelines (Robbins, 2006)

No.	Guideline
1	Provide equivalent alternatives to auditory and visual content.
2	Don't rely on color alone.
3	Use markup and style sheets and do so properly.
4	Clarify natural language usage
5.	Create tables that transform gracefully.
6.	Ensure that pages featuring new technologies transform gracefully.
7.	Ensure user control of time-sensitive content changes.
8.	Ensure direct accessibility of embedded user interfaces.
9.	Design for device-independence.
10.	Use interim solutions.
11.	Use W3C technologies and guidelines.
12.	Provide context and orientation information.
13.	Provide clear navigation mechanisms.
14.	Ensure that documents are clear and simple.

WCAG 1.0 is an internationally accepted standard that consists of 14 guidelines that provide specifications on how to develop an accessible site (Thatcher, 2002). These 14 guidelines are divided into Priority 1, 2 and 3 checkpoints, with Priority 1 being the most important. According to Cartel and Markel (2001), the number of checkpoints varies between guidelines. Table 2 shows the 14 guidelines, specified by WCAG 1.0 (Robbins, 2006).

Each guideline includes one or more checkpoints with 65 checkpoints in total. The checkpoints are categorized into three priority levels based on the checkpoint's impact on accessibility. Checkpoints under the same guideline may be categorized into different priority levels (Thatcher, 2002):

• *Priority 1 (16 checkpoints)*

A Web content developer must satisfy these checkpoints specified in Priority 1. Otherwise, it will rather difficult for user to access information in the document. Satisfying this checkpoint is a basic requirement for some groups to be able to use the Web documents.

• *Priority 2 (30 checkpoints)*

A Web content developer should also satisfy these checkpoints specified in Priority 2. Otherwise, one or more groups will find it difficult to access information in the document. Satisfying this checkpoint will remove significant barriers to accessing Web documents.

• *Priority 3 (19 checkpoints)*

A Web content developer may address this checkpoint. Otherwise, one or more groups will find it somewhat difficult to access information in the document. Satisfying this checkpoint will improve access to Web documents. However, for the scope of the study, we only focus on error or automatic tests for Priority 1 and Priority 2.

3.0 RESEARCH METHOD

The evaluation process was conducted between 15 August 2009 and 10 September 2009. The time of evaluation is between 10 pm and 12 am. Samples of 155 websites were selected by using convenient sampling from Malaysia government portal (http://www.malaysia.gov.my). The websites comprised of federal government and state government Table 3 shows the composition of the 155 websites in term of their administrative level (Federal/State). The evaluation process was done by using automatic evaluation tool, EvalAccess 2.0 which is limited to only WCAG 1.0 guidelines.

Table 3: Malaysia Government Sample Websites

Administrative	Frequency	(%)
Federal	25	16.1
State	130	83.9
Total	155	100

4.0 RESULTS AND DISCUSSION

4.1 Accessibility Analysis on E-government Website

Table 4 and Table 5 revealed the accessibility analysis and summary description of the violated accessibility checkpoints based on the sampling of 155 websites. However, 7 critical checkpoints had being identified as among being highly violated by Malaysian e-government websites. The 7 critical checkpoints identified are:

1. Image, Alt (Checkpoint 1.1)
2. Table, Border (Checkpoint 3.4)
3. Table, Cell padding (Checkpoint 3.4)
4. Table, Width (Checkpoint 3.4)
5. A, Target (Checkpoint 10.1)
6. Font (Checkpoint 11.2)
7. Input, Id (Checkpoint 12.4)

The results in the section 4.2 report the listing of top 5 government websites with these 7 critical errors. To protect the anonymity and confidentiality of the name of government websites with critical error, only the type of the government websites are being reported in this study.

Table 4: Accessibility analysis on E-Government Site

Priority	Checkpoint With HTML element and attribute	Number of websites violates this checkpoint and (%)	
1	1.1 Image, Alt	128	82.6
	1.1 Area, Alt	17	11.0
	1.1 Applet, Alt	2	1.3
	1.1 Button, Alt	2	1.3
2	3.4 Table, Border	145	93.5
	3.4 Table, Cell pad	143	92.3
	3.4 Table, Width	116	74.8
2	6.4 A, On click	58	37.4
	6.4 A, On mouse out	34	21.9
	6.4 A, On mouse over	36	23.2
	6.4 A, On mouse down	2	1.3
	6.4 A, On mouse up	1	0.6
	6.4 Area, On click	1	0.6
	6.4 Input, On click	40	25.8
	6.4 Input, On key press	1	0.6
	6.4 Input, On Mouse out	7	4.5
	6.4 Input, On Mouse over	7	4.5
2	7.2 Blink	4	2.6
2	7.3 Marquee	51	32.9
2	10.1 A, Target	115	74.2
	10.1 Area, Target	8	5.2
2	11.2 Applet	2	1.3
	11.2 Base, font	1	0.6
	11.2 Font	110	71.0
	11.2 Center	44	28.4
	11.2 U	34	21.9

Table 5: Summary description of violated checkpoint.

Priority	Checkpoint	Description
1	1.1	Provide text equivalent for non-text
2	3.4	Use relative rather than absolute units in markup language attribute values and style sheet property values.
2	6.4	For scripts & applets, ensure that event handlers are input device-independent.
2	7.2	Until user agents allow users to control blinking, avoid causing content to blink
2	7.3	Until user agents allow users to freeze moving content, avoid movement in pages
2	10.1	Until user agents provide the ability to stop auto-redirect, do not use markup to redirect pages automatically. Instead, configure the server to perform redirects.
2	11.2	Avoid deprecated features of W3C technologies.
2	12.4	Associate labels explicitly with their controls.
2	13.2	Provide metadata to add semantic information to pages and sites.

4.2 E-Government Website with High Critical Errors

4.2.1 High Critical Error for Checkpoint 1.1 (Image, Alt)

According to Table 6, state government websites lead the highest error ranking by having 136, 107 and 105 numbers of errors for *"Checkpoint 1.1 (Img, Alt)"*, respectively. However, federal websites tops the error ranking with 139 errors.

Table 6: High critical error for checkpoint 1.1 (image, alt)

Type	No of error (lines)
Federal	139
State	136
Federal	123
State	107
State	105

4.2.2 High Critical Error for Checkpoint 3.4 (Table, Border)

Table 7: High critical error for checkpoint 3.4 (Table, Border)

Type	No error (lines)
Federal	104
Federal	97

Federal	87
State	83
Federal	83

Table 7 shows the number of errors for websites that violate *"Checkpoint 3.4 (Table, Border)"*. Federal websites is leading the errors with 104, 97, 87 and 83 errors. In general, websites from federal government dominates the table by violating the checklist the most as compared to state government.

4.2.3 High Critical Error for Checkpoint 3.4 (Table, Cell Padding)

The websites with high critical error for *"Checkpoint 3.4 (Table, Cell Padding)"* are vividly displayed in Table 8, which reports Federal websites to have significant 104, 96, 90 and 82 errors, respectively. Here, the websites from federal government also dominates the table by violating the checklist the most as compared to state government websites.

Table 8: High critical error for checkpoint 3.4 (Table, Cell padding)

Type	No of error (lines)
Federal	104
Federal	96
Federal	90
State	83
Federal	82

4.2.4 High Critical Error for Checkpoint 3.4 (Table, Width)

Table 9: Checkpoint 3.4 (Table, Width)

Type	No of error (lines)
Federal	62
State	48
Federal	46
State	42
State	40

Table 9 reports federal websites tops the error ranking with 62 errors. However, the websites from states government dominates the table by violating the checklist the most as compared to federal government with 48, 42 and 40 errors.

4.2.5 High Critical Error for Checkpoint 10.1 (A, Target)

In general, Table 10 shows federal websites dominating the error ranking. The federal government websites with critical errors for *"Checkpoint 10.1 (A, Target)"* are being reported in the table with 141, 80, 65 and 64 errors, respectively.

Table 10: Checkpoint 10.1 (A, Target)

Type	No of error (lines)
Federal	141
Federal	80
Federal	65
Federal	64
State	57

4.2.6 High Critical Error for checkpoint 11.2 (Font)

State government website violates the most for "*Checkpoint 11.2 (Font)*", as shown in Table 11, with 862 errors. Here, the websites from state government dominates the table by violating the checklist the most as compared to state government with 186, 156 and 130 errors, respectively.

Table 11: Checkpoint 11.2 (Font)

Type	No of error (lines)
State	862
State	186
Federal	182
State	156
State	130

4.2.7 High Critical Error for checkpoint 12.4 (Input, Id)

As shown in Table 12, state government website led the ranking of violating *"Checkpoint 12.4 (Input, Id)"* with 39 errors. Here, the websites from state government dominates the table by violating the checklist the most as compared to state government with 23, 21 and 20 errors, respectively.

Table 12: Checkpoint 12.4 (Input, Id)

Type	No of error (lines)
State	39
Federal	31
State	23
State	21
State	20

4.3 Accessibility error (Federal/State)

As shown in Table 13, only checkpoint 3.4, checkpoint 10.1, checkpoint 11.2 and checkpoint 12.4 are valid and meet the assumption for the data interpretation as suggested by Pallant (2008) for cross tabulation analysis. The findings also revealed that websites under federal government may need to increase the accessibility level of the sites compared to state government due to the high number of accessibility errors reported in this study. This assumption is based of the comparison made with the percentage of error showed for Federal websites are higher than state websites for the checklist as shown in Table 13.

Table 13: Cross tabulation analysis (Federal/State)

| Checkpoint | Violate | Government Type | | | |
| | | Federal | | State | |
		Count	% within type	Count	% within type
3.4	Y	22	88.0	94	72.3
(Table, Width)	N	3	12.0	36	27.7
Total		25	100.0	130	100.0
10.1	Y	22	88.0	93	71.5
(A, Target)	N	3	12.0	37	28.5
Total		25	100.0	130	100.0
11.2	Y	19	76.0	91	70.0
(Font)	N	6	24.0	39	30.0
Total		25	100.0	130	100.0
12.4	Y	20	80.0	82	63.1
(Input, Id)	N	5	20.0	48	36.9
Total		25	100.0	130	100.0

5.0 CONCLUSION

Ensuring access for people with disability should be one key aspect of Malaysian e-government. There is a need to raise the level of awareness towards increasing the number of accesses and participation of all Malaysian citizens. Further improvement has to be made by web developer so that the e-government websites are more accessible. The findings reported in this study may alert web developer for Malaysia e-government websites to give more emphasis on accessibility features which are often being neglected. However, the quantitative measures used in this study is only subjected to WCAG 1.0 guidelines as there is limitation on the availability of the automatic tool that supports WCAG 2.0 guidelines. Future researcher should also consider evaluating the website accessibility based on WCAG 2.0 guidelines. The issues and recommendations highlights for further improvement of accessibility level in government websites (federal/state) reported in this study may also be taken into consideration towards ensuring that e-government delivers for all citizens especially for citizens with disabilities.

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