

# COMPARATIVE WEB ACCESSIBILITY EVALUATION OF SAUDI GOVERNMENT WEBSITES FOR COMPLIANCE WITH WCAG 1.0 AND WCAG 2.0 USING AUTOMATIC WEB ACCESSIBILITY TOOLS

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## ABSTRACT

Web sites are an essential source of information in education, social life, employment, government, commerce, e-shopping, healthcare etc. As the Saudi government is continuously introducing many new e-services for his citizen and residents, but still many disable peoples are not able to get full advantage from these e-services due to poor web accessibility. According to the World Health Organization (WHO) reports, more than one billion people live with different kinds of disabilities all over the world. Saudi Arabia has 720,000 disabled people which are about 4% of the total Saudi population. Many researchers documented that government official paid very little attention towards the need for disabled people during the planning and implementation of web projects. Therefore, it is essential that all citizens and resident of Saudi Arabia must have equal opportunities to access and benefit from all e-government recourses. The objective of this study is to evaluate and compare the web accessibility of Saudi government websites by using automatic web accessibility tools. Fifteen Saudi government websites were selected, and the homepage of each website was evaluated for web accessibility and HTML and CSS validity. Results generated by automatic accessibility tools exposes that most the government websites have serious accessibility problems which hinder the disable users to access the web contents completely. Furthermore, automated web accessibility tools are not able to report some accessibility issues found by users because it is difficult for accessibility analysis tools to understand the way web contents interact with assistive technologies used by disabled users. However, findings in this study demand to do extensive research by involving the disabled users, web developers and accessibility experts in web accessibility evaluation process to improve the website accessibility and overall quality of websites.

**Keywords:** *Web Accessibility, Disability, E-Government, Web Contents Accessibility Guidelines, Accessibility Evaluation*

## 1. INTRODUCTION

The rapid and continues growth of Information and Communication Technology (ICT) enforces to adopt these technologies in the different field of life such as education, employment, commerce, e-shopping, healthcare including the e-governmental websites. E-government is a process by which the government can deliver its services and information to its citizen including the disabled citizen via the Internet [1].

According to the World Health Organization (WHO) reports, more than one billion people live with different kinds of disabilities all over the world [2]. These disable persons categorised into long-term or permanent physical, cognitive, mental, intellectual, psychological or sensory impairments. These problems are the barriers to disable peoples to participate in the social activities with other peoples fully, equally and effectively [3]. Like other countries, 4% of Saudi citizens are disabled, which is 720,000 of total Saudi population [4].

UN assembly passed a treaty in 2006 [3], to promote and protect the rights of disabled people. This treaty contains the laws for different key areas such as employment, education, health and accessibility. The article 9 of the agreement demands from all countries of the world to determine and eliminate the difficulties which hinder the disabled people from accessing their environment, transportation, public facilities, services and information and communication technologies (ICT). The United Nations have recently included the web accessibility in Article 9. About 187 [5] countries already signed the UN treaty, and in June 2008, Saudi Arabia also signed this treaty and made the legislation to address the disability issues. Legislation mainly focused on skill development and employment and did not have a clear law for web accessibility.

In 2003 [6], a Royal Decree issued to the Ministry of Communication and Information Technology to make plans and policies to deliver all the government services online through the internet to all its citizen. In response to the Royal Decree, concern ministries and departments start planning and implementation to transform the traditional governmental services to online. By the end of 2016 [7, 8], total services provided by Saudi government were 2974, and 2668 services are electronic based.

As Saudi Arabia has a reasonable number of disable people using e-governmental services and most of the services are available online and to date not enough up-to-date comparative accessibility evaluation studies are available which motivated us to evaluate the HTML and CSS validity and web accessibility of ministry website using automatic web accessibility tools. Moreover, as it is stated above that 2668 services provided by Ministry websites are online so it is significant to identify the current web accessibility status. This study is limited to 15 government websites to explore that the e-services provided by the government websites are equally accessible to all citizen including the disabled citizen.

Saudi Ministry websites are not implemented by fully following the web accessibility guidelines which make the disable people deprive in getting full benefits from the e-services provided by the governmental websites. Proper usage of web accessibility guidelines during the design and implementation of web site have direct impact to improve the web accessibility of web sites. Governmental websites should be designed and implemented by following the proper web

accessibility guidelines to ensure that the disable users can also get benefit from services provided by government website. Therefore, in this paper, we have evaluated the web accessibility of the government website by using automatic web accessibility tools to detect the web accessibility issues. Accessibility issues are reported and proposed the further need of in-depth research by involving the disable user and web developer in accessibility evaluation process. The rest of research paper is organized into eight sections: section 2 briefly explains the existing studies of web accessibility. Section 3 describes about the guidelines provided by the W3C. Section 4 discuss about the automatic web accessibility tools. Section 5 talk about the research methodology adopted to complete the study. Section 6 represents the result of web accessibility evaluation. Section 7 briefly discuss about the limitation of study. Section 8 gives the conclusion and future work.

## 2. EXISTING STUDIES OF WEB ACCESSIBILITY

In last two decades, many researchers from different countries conducted many studies to find out the web accessibility issues in websites, especially the government websites. Researchers used various techniques to evaluate the accessibility of websites, i.e. literature review and automatic web accessibility tools. Moreover, these studies found that most of the websites have serious accessibility issues which need to address. This section briefly discusses some previous work done on web accessibility. Accessibility can be defined as “making web content available to all individuals, regardless of any disabilities or environmental constraints they experience” [9]. For disable users assistive technologies can be used to widen their access to web contents, such as by using the screen reading and magnifying software, alternative keyboard, pointing and mouse devices, voice input devices etc. [10, 11]

Yakup Akgul et al. [12] evaluated the accessibility of 25 Turkish government websites by using 13 automatic web accessibility tools and found that most of the websites are not fully comply with minimum web accessibility requirements. Mukhtar et al., [13] evaluated the accessibility of 25 university websites of Saudi Arabia for the compliance level of web content accessibility guidelines. They used automatic accessibility tools JAWS and Supernova. Evaluation result shows that navigation and orientation, text equivalent and styling partially implemented and average errors are

24.30%, 28.15% and 38.02% respectively. Moreover, scripting and HTML standards are entirely implemented with average errors 0% in scripting and 8.53% in HTML standards. The study concluded that 80% university websites not designed by following the web content accessibility guidelines. Mohd Hanapi et al. [14] evaluated the home page of nine Malaysian government website by using automatic web accessibility tool Bobby. Also, interviews conducted with web developers. The study concluded that not a single Malaysian government website is following web accessibility guidelines proposed by W3C. Moreover, web developers also did not have full and explicit knowledge of web accessibility guidelines. Addin Osman [15] performed a systematic literature review to evaluate the available automatic web accessibility tools and the web accessibility of website globally and in Saudi Arabia based on the web content accessibility guidelines. The study reveals that it is required to improve the accessibility of websites and web accessibility awareness among webmasters and decision-makers in Saudi Arabia. Knowledge about web accessibility for decision makers and web developer is an important factor which can affect the improvement of web accessibility. Majed Alshamari [16] examined the homepage of three online shopping websites in Saudi Arabia using accessibility evaluation tools: AChecker, TAW, MAUVE, EvalAccess and Functional Assessment Evaluation 2.0. The study concluded that selected websites have navigation errors, readability errors, HTML errors, and input assistance and timing errors. Moreover, they suggested some recommendation and pointed out that involvement of experts in evaluation can give better results.

Many other studies on web accessibility were also conducted by Solomon Adelowo Adepoju et al. [17], J. Mankoff et. al [18], Basel Al Mourad et al. [19], Gibson et al. [20], S. Hong et al. [21], J. Kuzma [22], J. Kuzma et al. [23, 24], R. Cullen and C. Houghton [25], Choudrie et al. [26], I. Basdekis et al. [27], S. H. Kurniawan and J. Zaphiris [28], M. Bakhsh and A. Mehmood [29], Aidi Ahmi et al [30], Humaira Nazar et al. [31] and Addulmoheesen et al [32]. All the above studies evaluated the websites and provided the recommendation to improve the web accessibility.

### 3. WEB CONTENT ACCESSIBILITY GUIDELINES

World Wide Web Consortium establishes the Web Accessibility Initiative (WAI) in 1997 to design web accessibility guidelines. In 1999, they

finalised and recommended to use Web Content Accessibility Guidelines (WCAG 1.0) to design websites [33]. At the end of 2008, WCAG-2.0 published that applies broadly to more advanced technologies [34]. WCAG 2.0 contains 12 guidelines based on four main principles; 1) perceivable 2) operable 3) understandable and 4) robust. These guidelines are shown in Table 1 below. The goal of these guidelines is to promote and achieve web accessibility for people suffering from different kind of disabilities.

WCAG 2.0 encompasses a series of checkpoints under 12 guidelines. The W3C working group assigned priority levels to each checkpoint on bases of its impact on accessibility. Total three priority level was defined and for each there are numbers of checkpoints those need to be satisfied to achieve corresponding conformance level [34] which are listed in the figure 1.

Table 1: Principles of Web Content Accessibility Guideline 2.0

Principles	Guidelines
Principle 1: Perceivable	<ul style="list-style-type: none"> <li>The website should provide the alternative text for all non-text contents.</li> <li>If there is any multimedia file in the website then web designer must include the caption for those files.</li> <li>Website contents should be presented in such a way that if someone uses assistive technology then the meaning of contents not loose.</li> <li>All the information which is available on the website should be very easy to read and hear.</li> </ul>
Principle 2: Operable	<ul style="list-style-type: none"> <li>It should be possible that user can perform all available operations in website using keyboard.</li> <li>Website did not have any data or contents which can be the reason of seizures.</li> <li>Help should be available for users to search different contents in website and to navigate different available pages in website.</li> </ul>
Principle 3: Understandable	<ul style="list-style-type: none"> <li>All available contents in website must be readable and easily understandable for all different type of users.</li> <li>All website contents should appear and operate in predictable way.</li> <li>Support should be available for users to avoid making mistakes and if mistakes are done from user than there should be mechanism to</li> </ul>

	correct them.
Principle 4: Robust	<ul style="list-style-type: none"> <li>All designed website should have compatibility to run on different type of browsers and also different assistive tools can be used.</li> </ul>

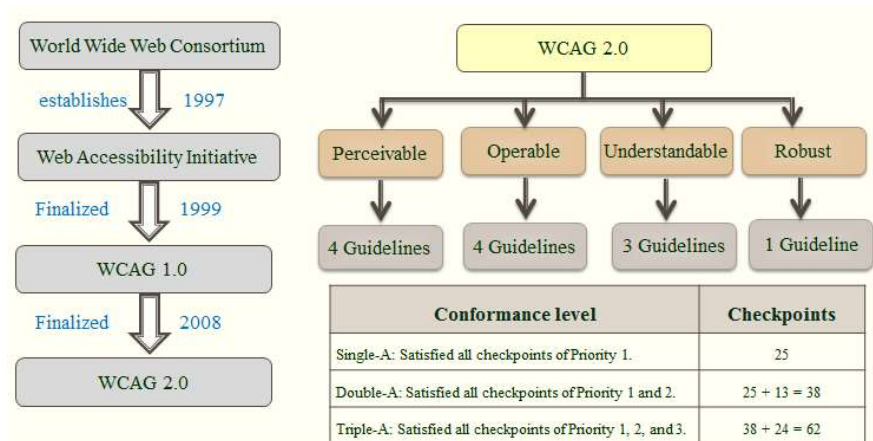


Figure 1: Principles of WCAG 2.0 and checkpoints

#### 4. AUTOMATIC TOOLS FOR WEB ACCESSIBILITY

Compliance level of any website can be checked by using automatic web accessibility evaluation tools. These automatic tools are available in the form of software programs or online services to ensure that the websites are designed and implemented by following the web content accessibility guidelines. Many web accessibility evaluation tools are available freely or for commercial purpose such as Accessibility Valet, AChecker, Cynthia Says, EvalAccess, FAE (Functional accessibility evaluator), MAGENTA (Multi analysis of guidelines by an enhanced tool for accessibility), OCAWA (Operational control and analysis for web accessibility), TAW, WAVE 3.5, Bobby, Torquemada, AccMonitor etc. [35, 36, 37]. A complete list of web accessibility tools list is available on the website of W3C [38]. All listed tools are beneficial for web developers and programmers to validate their sites against web content accessibility guidelines. If web developers properly use these tools during website design and implementation phase then it will affect to improve the quality and websites, moreover many accessibility barriers can be prevented which may be encountered by target users.

In this study, we will use three automatic web accessibility evaluation tools such as AChecker, TAW and WAVE. AChecker will be used to check

the compliance level of websites with WCAG 1.0 and WCAG 2.0. TAW will be used to find out the problems and warnings in websites. It is needed to fix the problems but warning needs a review. WAVE accessibility evaluation tool will be used to determine errors, alerts, features, structural elements, HTML 5 and ARIA and contrast errors in target website. These tools can be used freely to evaluate any website, are well known, easy to use and generate the evaluation results quickly.

#### 5. METHODOLOGY

In this study, 15 Saudi government official websites are selected to evaluate the validity of HTML and CSS and web accessibility. Arabic version of the home page of each chosen web portal was analysed to determine the accessibility issues. As homepage considered a gateway to any website and homepage was evaluated with believing that if homepage has accessibility barriers, then it will be difficult for a disabled user to access other pages in website. Moreover, Arabic version is selected for web accessibility evaluation because most of the users in Saudi Arabia prefer to use the Arabic website and only few of them are using English version of website.

##### 5.1 The Validity of HTML and CSS

According to the W3C [39], "Validating Web documents is an important step which can dramatically help to improve and to ensure their quality, and it can save a lot of time and money".



HTML and CSS validity of selected governmental websites has been evaluated by using two automatic tools: Markup validation service and CSS validation service. Markup validation service [40] is a free service which is provided by W3C to evaluate the markup validity of web documents in HTML, XHTML, SMIL, MathML etc. Evaluation results presented in the form of errors and warnings. CSS Validation Service [41] is also a free service provided by W3C to evaluate the CSS validity of the website. CSS evaluation results are presented in form CSS errors and CSS warnings in websites. This online service is not only limited to CSS validation but also compliance of web page style sheets with W3C open standards and specification of CSS.

### 5.2 Evaluation of Web Accessibility

In this study, three automatic web accessibility evaluation tools have been used (i.e. AChecker, TAW and WAVE) to evaluate the websites for compliance with WCAG 1.0 and WCAG 2.0. We decided to evaluate the same web page by using three different web accessibility tools to get more authentic and accurate results.

AChecker [42] is an open source and free web accessibility evaluation tool which is used to check the single HTML page at a time for conformance with web content accessibility guidelines. The purpose of this tool is to ensure that web contents are accessible for everyone including the disabled people. AChecker provides the facility to check the web page against guidelines WCAG 1.0 (Level A, AA, AAA), WCAG 2.0 (Level A, AA, AAA), Section 508, BITV 1.0 (Level 2) and Stanca Act. AChecker divides the encountered accessibility problems into known problems, likely problems and potential problems. Known problems are classified as a barriers to access the web page, likely problems are a probable barrier which requires human to make a decision and potential problems also need human to make the decision. TAW [35][43] is an online free service developed by CTIC Centro Technologies to evaluate the website to check the compliance with WCAG 1.0 and 2.0. TAW divides the violation in website into two main categories: Error (need to correct) and Warnings (need review by an expert). WAVE [44] is another automatic accessibility tool available online and as add-on developed by WebAIM to report the accessibility violation in the website. WAVE divides the accessibility violation in website into six main categories: errors, alerts, features, structural elements, HTML 5 and ARIA and contrast errors in target website. If WAVE used for web accessibility evaluation then human involvement is essential

because WAVE did not adequately report that webpage is accessible or not.

## 6. RESULTS

### 6.1 The Validity of HTML and CSS

Evaluation of HTML and CSS validation in selected websites done by using automatic tools, Markup validation service and CSS validation service. Evaluation results are summarized in table 2; column 1 and 2 shows the HTML errors, and HTML warnings found the home page of government websites. Column 3 and 4 report the CSS errors and warnings in the home page. Website of the ministry of civil service considered best in term of HTML validation errors with only 1 error. Four other websites also have less number of HTML errors: ministry of agriculture, ministry of defense, ministry of finance and ministry of health with 2, 3, 7 and 9 HTML errors respectively. Ministry of culture and information reported with the highest number of HTML errors. In term of HTML warning, ministry of finance website found best with zero warnings and ministry of justice with the highest number of warnings. Moreover, ministry of civil services and ministry of finance found with zero CSS errors followed by ministry of commerce and investment and ministry of health with less number of CSS errors. The overall evaluation shows that ministry of finance and ministry of civil services are best in term of HTML and CSS errors.

Table 2: HTML and CSS validation errors

Ministry Websites	HTML Errors	HTML Warns	CSS Errors	CSS Warns
Ministry of Agriculture	2	46	10	1368
Ministry of Civil Service	1	56	0	459
Ministry of Commerce and Investment	41	31	2	365
Ministry of Islamic Affairs, Dawah and Guidance	30	52	10	953
Ministry of Culture and Information	184	2	4	463

Ministry of Education	96	67	19	1117
Ministry of Finance	7	0	0	3
Ministry of Foreign Affairs	18	28	9	604
Ministry of Health	9	32	3	132
Ministry of Interior	57	33	72	242
Ministry of Justice	43	67	12	1103
Ministry of Labor and Social Affairs	117	62	11	1074
Ministry of Defense	3	12	1	76
Saudi Electricity	185	69	28	888
Ministry of Haj and Umrah	144	9	11	901

the web content accessibility guidelines and having many accessibility barriers which hinder the disabled users to benefit the services provided by the government website.

Results generated by AChecker are presented in table 3, figure 2 (problems found by applying WCAG 1.0) and figure 3 (problems found by applying WCAG 2.0). Arabic version of home page evaluated for both versions of web content accessibility guidelines (WCAG 1.0 and WCAG 2.0) for priority level AAA. Accessibility problems are categorized into known problems, likely problems and potential problems. For WCAG 1.0, the ministry of culture and ministry of the interior website found lowest number accessibility issues with four and five known problems. Ministry of defence and the ministry of health is also having less number of known accessibility problems, but the ministry of justice reported the highest number of known errors in website home page. For WCAG 2.0, the ministry of finance having only one known problem for level AAA evaluation but the ministry of justice having the highest number of known problems. All known problems are the core issues which prevent the disabled users from accessing the web contents. All these problems need to fix so that disabled users can also have full access to these websites. Likely and potential problems also reported for WCAG 1.0 and WCAG 2.0 which require human participation in decision making to fix the problems.

## 6.2 Web accessibility Evaluation using Automatic Web Accessibility Tools

Three automatic accessibility evaluation tools used for accessibility evaluation, and results are presented in table 3, table 4 and table 5. Unfortunately, no website is completely following

Table 3: Problems found by automatic web accessibility tool: AChecker

Ministry Websites	AChecker					
	WCAG 1.0 (Level AAA)			WCAG 2.0 (Level AAA)		
	Known Problems	Likely Problems	Potential Problems	Known Problems	Likely Problems	Potential Problems
Ministry of Agriculture	34	108	236	39	5	459
Ministry of Civil Service	40	193	324	67	0	523
Ministry of Commerce and Investment	53	197	328	6	0	550
Ministry of Islamic Affairs, Dawah and Guidance	25	214	457	37	2	706
Ministry of Culture and Information	4	16	186	9	0	333
Ministry of Education	38	341	651	34	0	1008
Ministry of Finance	18	94	115	1	1	323
Ministry of Foreign Affairs	20	94	204	50	1	349

Ministry of Health	12	8	15	5	2	25
Ministry of Interior	5	10	23	6	1	49
Ministry of Justice	57	322	595	96	0	934
Ministry of Labor and Social Affairs	39	187	155	46	2	385
Ministry of Defense	16	20	44	19	0	148
Saudi Electricity	26	177	323	22	0	485
Ministry of Haj and Umrah	14	159	124	14	0	258

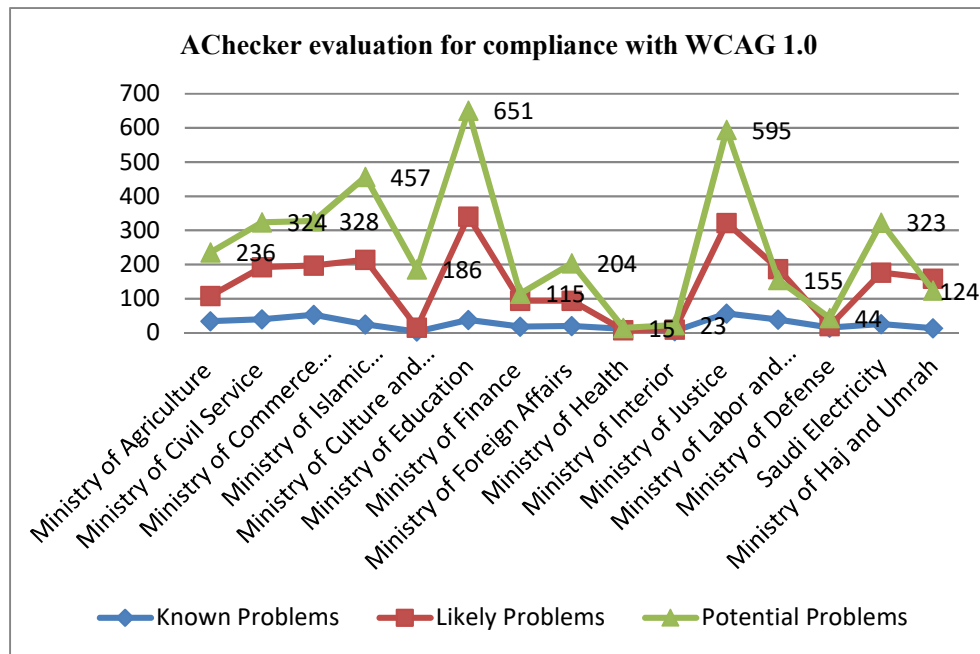


Figure 2: Known, likely and potential problems found the ministry websites against WCAG 1.0

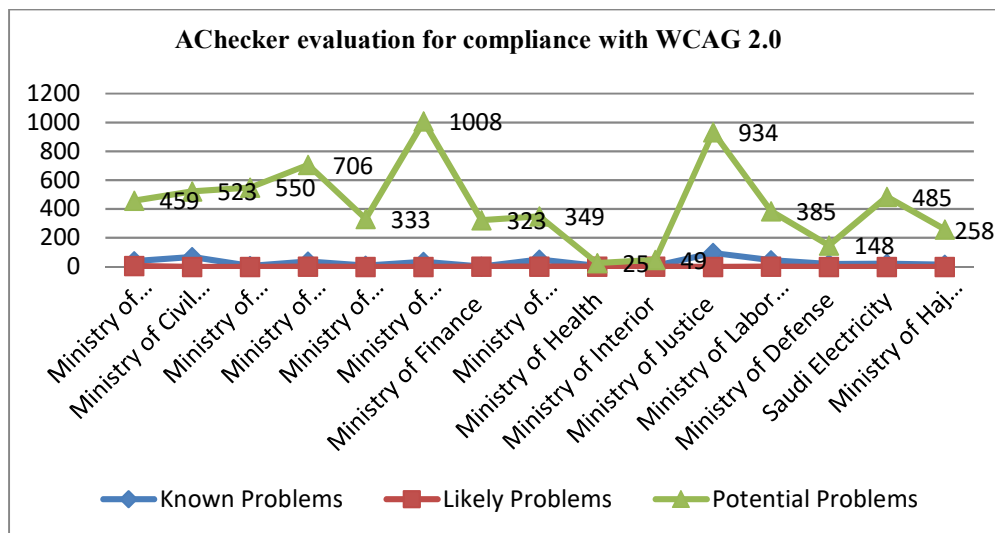


Figure 3: Known, likely and potential problems found the ministry websites against WCAG 2.0

Accessibility evaluation results generated by TAW are presented in table 4, figure 4 and figure 5. TAW results are reported for accessibility problems and warnings found on the home page of the website for four principles of WCAG 1.0 and WCAG 2.0. Accessibility evaluation result shows that ministry of the interior webpage is best regarding problems and warnings generated by TAW. Homepage of the ministry of interior website reported with only one

problem in the first principle (perceivable) and third principle (understandable) and zero accessibility issues in the second principle (operable) and fourth principle (robust). The homepage of the ministry of the health website also found with less number of problems. On the other hand ministry of education and ministry of justice, website have major accessibility issues. It is essential to fix the problems found in website to make them more accessible.

Table 4: Problems and warnings found by automatic web accessibility tool: TAW

Ministry Websites	TAW							
	Problems (Corrections are needed)				Warnings (A human review is needed)			
	Perceivable	Operable	Understandable	Robust	Perceivable	Operable	Understandable	Robust
Ministry of Agriculture	29	14	9	109	167	29	5	17
Ministry of Civil Service	17	4	3	46	391	70	6	247
Ministry of Commerce and Investment	15	12	2	229	88	66	6	2
Ministry of Islamic Affairs, Dawah and Guidance	26	18	6	145	87	35	8	25
Ministry of Culture and Information	39	14	7	8	59	66	6	1
Ministry of Education	40	48	5	105	78	47	7	45
Ministry of Finance	16	6	8	241	199	23	6	0
Ministry of Foreign Affairs	45	14	2	41	68	26	6	288
Ministry of Health	1	1	1	3	0	1	0	0
Ministry of Interior	1	0	1	0	0	2	0	0
Ministry of Justice	38	69	3	66	131	68	7	86
Ministry of Labor and Social Development	29	31	7	19	122	31	5	8
Ministry of Defense	18	14	2	22	108	27	6	0
Saudi Electricity	31	15	8	17	97	25	5	9
Ministry of Haj and Umrah	15	9	4	12	48	19	8	2



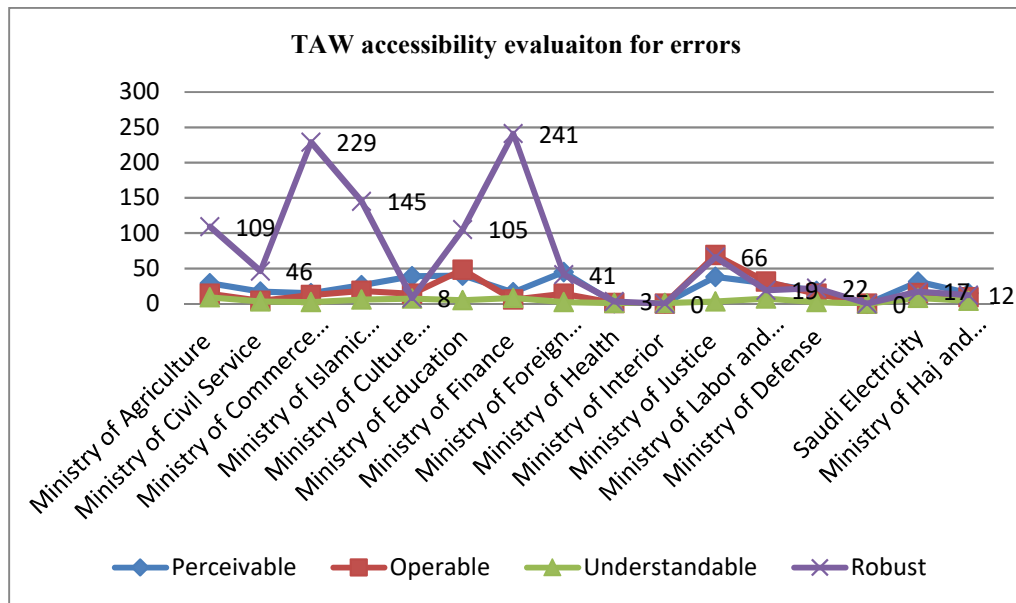


Figure 4: Errors generated by TAW, which are violating the WCAG 2.0 four principles

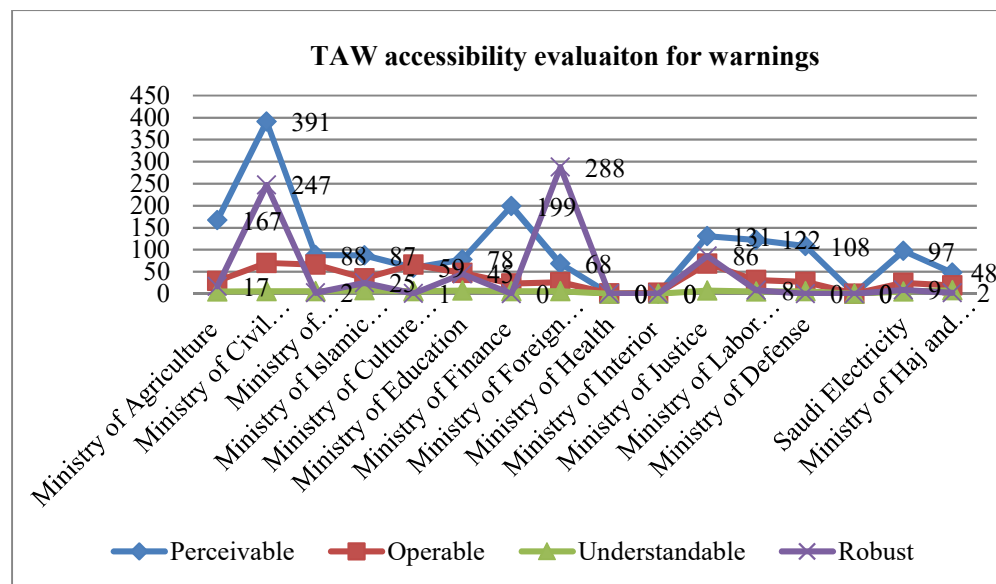


Figure 5: Warnings generated by TAW, which are violating the WCAG 2.0 four principles

Accessibility evaluation results generated by WAVE are presented in table 5. Column 1 presents the accessibility errors found on the homepage of websites. It can be seen that ministry of culture and ministry of interior having only one accessibility error on the home page of their websites. Followed by the ministry of finance and ministry of health with three and five errors respectively. Moreover, ministry of justice and ministry of civil services are

worst in term of accessibility errors. Column 2 presents are alerts generated by WAVE, ministry of commerce and ministry of culture website having less number of alerts but ministry of civil services have the highest number of alerts. As shown in table 4, WAVE also reported other issues like features, structural elements, HTML 5 and ARIA and contrast errors

Table 5: Problems found by automatic web accessibility tool: WAVE

Ministry Websites	WAVE					
	Errors	Alerts	Features	Structural Elements	HTML5 and ARIA	Contrast Errors
Ministry of Agriculture	15	87	57	45	62	25
Ministry of Civil Service	51	323	420	81	606	124
Ministry of Commerce and Investment	10	4	28	42	2	17
Ministry of Islamic Affairs, Dawah and Guidance	25	104	57	116	173	80
Ministry of Culture and Information	1	4	6	15	0	3
Ministry of Education	30	113	81	54	43	29
Ministry of Finance	3	18	43	9	3	2
Ministry of Foreign Affairs	32	38	12	47	87	32
Ministry of Health	5	8	2	0	2	9
Ministry of Interior	1	6	4	0	1	10
Ministry of Justice	52	33	49	63	6	38
Ministry of Labor and Social Affairs	45	29	4	58	9	18
Ministry of Defense	11	9	19	6	3	4
Saudi Electricity	23	15	13	24	6	2
Ministry of Haj and Umrah	50	33	8	36	107	8

In general, it is unfortunate that the home page of all ministry websites having accessibility problems which prevent disabled users from accessing the web pages fully. Overall analysis shows that the ministry of interior and ministry of health websites are best and having less number of accessibility issues. Moreover, the ministry of education and ministry of justice having the highest number of accessibility issues on their websites.

## 7. LIMITATIONS OF STUDY

One of the main limitations of this study is that accessibility evaluation is limited only on assessment of the homepage of targeted websites. To get more accurate results, it is required to perform the accessibility evaluation on all other web pages of websites.

Furthermore, this study is only relying on three automatic accessibility tools for accessibility evaluation. Many other tools are available which can be used can be used to get more detailed and

accurate accessibility analysis of web pages and for comparison of results. Vigo et al. [45] performed the analysis of six web accessibility analysis tools and compared the properties by analysing the coverage of evaluation tool, completeness and correctness of tool for the conformance of WCAG 2.0. Vigo et al. concluded that relying only on one tool may not provide accurate results. Therefore, to get more precise and reliable results, it is needed to use multiple automatic web accessibility tools to check the accessibility of websites. Moreover, actual user testing of web accessibility and expert opinion is also necessary to improve the web accessibility and quality of websites. Automatic tools cannot report some issues found by users because it is difficult for accessibility analysis tools to understand the way web contents interact with assistive technologies used by disabled users.

## 8. CONCLUSION AND FUTURE WORK

Web accessibility is an essential property to assessing the quality of any website, and if websites are not correctly designed and implemented by

following web content accessibility guidelines, then many disable users will not be able to get the full benefit from the e-services provided by the government. Most of the governmental services are available online to its citizens in Saudi Arabia so web accessibility should be a priority issue to address appropriately.

In this paper, we have evaluated the web accessibility of home page of 15 Saudi government websites by using automatic web accessibility tools. The validity of HTML and CSS was checked by HTML and CSS validator provided by W3C and web content accessibility was evaluated by AChecker, TAW and WAVE. It is concluded that all ministry websites are having accessibility issues which prevent the disabled users to fully benefit from the services provided by the official government website. Different accessibility tools reported a different type of errors, but overall analysis shows that ministry of interior and ministry of health websites are best and having less number of accessibility issues. Moreover, the ministry of education and ministry of justice having the highest number of accessibility issues on their websites.

Outcome of this paper is advancement in the existing knowledge to know the current accessibility status of Saudi Ministry websites. These results will be helpful for accessibility researchers, web developers and policy makers in Saudi Arabia to recognize the current accessibility situation and the importance and need of improvement in accessibility for Ministry websites.

Moreover, this paper provides a strong foundation for future work to evaluate the accessibility of all other web pages of government website by using multiple automatic web accessibility tools and to involve the disable users to get more conclusive accessibility results.

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