The Effect of Web Accessibility and Usability on User Preference and Search Engine Ranking

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Abstract

With the increase need of using the Internet in most domains, and the increasing number of users whom use it, the need of accessible and usable sites also increased for both users with or without disabilities. Also, due to the high competitive rivalry between search engines in ranking results and disparity of ranking techniques, webmasters should know about search engine guidelines related to them. In this paper we evaluated accessibility, usability, and search issues for the most 10 popular web sites in three different Arab countries (Egypt, Saudi Arabia, and Jordan). A total of 30 websites evaluated using Sort Site tool, to find the effect of web accessibility and usability on user preference and search engine ranking. The results showed that there is a strong relationship between these issues. Therefore, webmasters should apply: accessibility, usability, and webmaster search guidelines.

Keywords: accessibility guidelines; usability guideline; webmaster search guidelines; usable sites; Search Engine Ranking.

1. Introduction

With the rapid growth of the Internet and people who use it, the task of designing accessible and usable web sites become a very vital task especially for users with disabilities. According to the United Nations (UN) estimation of world’s population, approximately 10% are with disabilities (over 650 million people) and 80% of them live in developed countries [1,2]. Despite this the W3C estimated that more than 90% of all sites on the WWW are inaccessible to disabled users [3, 4]. To evaluate the WWW web sites accessibility there is only one measure of accessibility provided by the Web accessibility Guidelines from W3C. The W3C Web Accessibility Initiatives (WAI) states that accessibility enables people with disabilities to interact with the Web in order to be able to participate and contribute effectively in the national socioeconomic development [5]. Usability is developed to provide principles for usable interface and interaction development [6]. Web developers who wish to create accessible web pages can use many tools and resources, which are available online for free. Despite the availability of these resources, many web developers continue to produce inaccessible web sites [7]. So disabled users use diverse forms of assistive technology (hardware and software such as screen readers, voice recognition, alternative pointing devices, alternate keyboards, and refreshable Braille displays) to allow them to browse the Web [8]. Accessibility and usability are important for both disabled users and for increase high page rank calculation in different search engines (such as Google, Yahoo, and Bing). Many search engines have guidelines related with accessibility and usability, so the web developers have to apply these guidelines in order to obtain high rank for their pages or sites.

In this paper the most 10 visited web sites in Egypt, Saudi Arabia, and Jordan have been evaluated. The evaluation is carried out according to accessibility, usability, and search engine guidelines. We choose this domain in order to know how much effect the accessibility and usability have in user preference and search engine ranking. The evaluation process includes testing each site automatically using SortSite evaluation tool.

This paper is organized as follows: section 2 presents related work, section 3 describes web accessibility guidelines, web usability guidelines and web search guidelines, section 4 shows the methodology. Section 5 shows the experimental results, and finally section 6 concludes the paper.

2. Related Work

In [1] the researchers show that many worldwide government sites are not accessible and not usable to disabled users, and few government Web sites marginally pass disability testing guidelines or legal mandates. In [3] e-government websites evaluated in three main areas. Firstly, website accessibility guidelines; secondly, website accessibility tools. Thirdly the implication of human factors in the process of implementing successful e-government websites of Saudi Arabia and Oman by adapting the ‘W3C Web Content Accessibility Guidelines’. Finally this research presents recommendations for improvement of e-government website accessibility.

Accessibility and usability are important for users and must be evaluated. In [9] different usability evaluation methods of web sites were presented, heuristic evaluation method conducted by experts was discussed and used for the assessment of educational website. This approach revealed
various usability problems most of which were not previously detected.
On the other hand the usability evaluation is important for e-commerce websites. In [2] the usability evaluation of B2C e-commerce website in China is described and evaluated. The evaluation is based on a comprehensive set of usability guidelines developed by Microsoft.
In [5] they evaluate 27 central Nepal's government websites using "Bobby" tool, the evaluation is based on the Web Content Accessibility guidelines (WCAG) provided by the World Wide Web Consortium (W3C). They discuss the importance of Web accessibility, and recommendations for improvement are highlighted.
In [10] four different sites evaluated to identify the potential usability problems of Web mapping sites, the evaluated sites are: Google Maps, MSN Maps & Directions, MapQuest, and Multimap. They suggest some design guidelines for Web mapping sites based on the problems identified.
In [11] they describe the strengths and weaknesses of two usability assessment methods. These methods are Heuristic Evaluation and Laboratory Testing. The discussion compares the two methods, and discusses how an effective usability process can combine them, and applying the methods at different times during site development.
In [6] the accessibility and usability in web-based visualization are introduced, they found that although many webmasters try to improve the accessibility and usability of their web sites, there is still much to be done to ensure the universal design.
There are many accessibility and usability methods compared in [4] to determine the most effective accessibility evaluation method to determine web accessibility, they conclude that a fully integrated approach (combining automated and manual evaluation, and accessibility testing) is the best approach.
According to reports in the popular press, typically report that 95% or more of all Web sites are inaccessible to users with disabilities. The question here is what are the barriers to use content accessibility and usability in the most popular web sites? [12].
The accessibility play important role in educational websites domain because there are a large number of students with disabilities. So the universities web sites that are not accessible may exclude people with disabilities from participation in educational activities. In [7] they evaluate the top international universities web sites, and found that many of these sites continue to have accessibility problems. The researcher in [8] tries to evaluate the accessibility of three hundred twenty-four of Chinese local government web sites. He tries to find out how accessible those web sites according to the Web Content Accessibility Guidelines 1.0 (WCAG) published by the World Wide Web Consortium (W3C). They found that all the surveyed Chinese e-government Web sites failed on achieving W3C’s accessibility measures and thus many disabled Chinese people may have substantial problems to access them. The same result appears in [13], which evaluates the accessibility and usability of Alabama government Web sites.
To enhance the usability of e-Government websites David, L [14] suggests a content-analysis methodology utilizing Guttman-type scales, wherever through enhanced usability benchmarks, to stimulate the organizational dynamics that drive performance improvement.
Since the web accessibility is important, the need to check website accessibility has amplified. There are some tools available for this purpose. In [15] the researchers present new tool (MAGENTA) for supporting inspection-based evaluation of accessibility and usability guidelines.
The e-commerce websites need the accessibility and usability more than other websites, because they are concerned with user preferences to convert their visitors to customers. In [16] the study examines the relationships among perceived usability before actual use, task completion time, preference, and the effects of design attributes on user preference for e-commerce web sites. They conclude that the usability and accessibility have large effect in user preference.
In [17] three sets of web guidelines are compared: the Research-Based Web Design & Usability Guidelines (published by U.S. Department of Health and Human Services), a set of guidelines being developed for an ISO standard, and guidelines for academic web sites (produced in the UK). Each set of guidelines discuss different areas.

3. Guidelines
In the following subsections an overview of the guidelines investigated in this paper is given. Subsection 3.1 discusses the web accessibility guidelines and subsection 3.2 discusses Website usability guidelines. The last subsection explains Search engines guidelines.

3.1 Web Accessibility Guidelines
Since the internet started, web accessibility has been an important development factor for the World Wide Web Consortium (W3C), an international organization which ensures compatibility of standards among industry and government groups. The W3C has developed a series of accessibility standards to help disabled persons use the internet. A subgroup of the W3C, the Web Content Accessibility Guidelines Working Group (WCAG) was found. The WCAG is developed through the W3C process in cooperation with individuals and organizations around the world. The WCAG goal is to prove a single shared standard for web content accessibility that meets the needs of individuals, organizations, and governments internationally. The WCAG documents explain how to make web content more accessible to people with disabilities. Web "content" generally refers to the information in a web page or application, including [18]:
• natural information such as text, images, and sounds
• code or markup that defines structure, presentation, etc.

WCAG is primarily intended for:

• Web content developers (page authors, site designers, etc.)
• Web authoring tool developers
• Web accessibility evaluation tool developers
• Others who want or need a standard for web accessibility

WCAG developed the first accessibility standard, WCAG 1.0, and now develops the second accessibility standard WCAG 2.0. This standard comprises a series of guidelines, which aim to explain to Web developers/designers the ways to make Web content accessible for people with and without disabilities. Each guideline has one or more checkpoints which are the basis for conformance to meeting the needs of those with disabilities. Each checkpoint is assigned a priority to determine the impact on accessibility, with the following three levels [1]:

Priority 1 Web content MUST satisfy this checkpoint.
Priority 2 Web content SHOULD satisfy this checkpoint.
Priority 3 Web content MAY address this checkpoint.

The W3C also defines three levels of Conformance to the WCAG

• Level “A”: all priority 1 checkpoints are satisfied.
• Level “AA”: all priority 1 & 2 checkpoints are satisfied.
• Level “AAA”: all priority 1, 2 & 3 checkpoints are satisfied [5]

Designers should try to meet at least Priority 1 requirements, although they should realize that if they do not also address Priority 2 and 3 checkpoints, they do not address features critical for accessibility across all disabilities [1].

3.2 Website Usability Guidelines

The Usability Guidelines were developed by the U.S. Department of Health and Human Services (HHS), in partnership with the U.S. General Services Administration. These Guidelines consist from the original set of 187 guidelines, and adds 22 new ones. There are now 209 guidelines. The Guidelines are particularly relevant to the design of information-oriented sites, but can be applied across the wide spectrum of Web sites. These guidelines developed because the quality of existing web design and usability guidelines tend to be uneven. Thus, making it difficult to tell which guidelines are most important, which have the most research to support them, and even what some of them mean [19]. The following are examples of Website usability guidelines related to search usability guidelines:

• The default search is intuitive to configure (no Boolean operators).
• The search results page shows the user what was searched for and it is easy to edit and resubmit the search.
• Search results are clear, useful and ranked by relevance.
• The search results page makes it clear how many results were retrieved, and the number of results per page can be configured by the user.
• If no results are returned, the system offers ideas or options for improving the query based on identifiable problems with the user's input.
• The search engine handles empty queries gracefully.
• The most common queries (as reflected in the site log) produce useful results.
• The search engine includes templates, examples or hints on how to use it effectively.
• The site includes a more powerful search interface available to help users refine their searches (preferably named "revise search" or "refine search", not "advanced search").
• The search results page does not show duplicate results (either perceived duplicates or actual duplicates).
• The search box is long enough to handle common query lengths.
• Searches cover the entire web site, not a portion of it.
• If the site allows users to set up a complex search, these searches can be saved and executed on a regular basis (so users can keep up-to-date with dynamic content).
• The search interface is located where users will expect to find it (top right of page).
• The search box and its controls are clearly labeled (multiple search boxes can be confusing).
• The site includes a more powerful search interface available to help users refine their searches (preferably named "revise search" or "refine search", not "advanced search").
• The search results page displays useful meta-information, such as the size of the document, the date that the document was created and the file type (Word, pdf etc.).
• The search engine provides automatic spell checking and looks for plurals and synonyms.
• The search engine provides an option for similarity search ("more like this").
3.3 Search Engines Guidelines

Search engines develop set of guidelines for webmasters to help search engines to find, index, and rank of their sites. In this paper we evaluate the search issue for websites according to Google, Yahoo, and Bing webmaster guidelines [20]. If the webmaster does not implement any of these suggestions, which Google strongly encourage webmasters to pay very close attention to the "Quality Guidelines," which outline some of the illicit practices that may lead to a site being removed entirely from the Google index, or otherwise penalized. If a site has been penalized, it may no longer show up in results on Google.com or on any of Google's partner sites [21]. Yahoo! develops its own Search Content Quality Guidelines, to ensure that poor-quality pages do not degrade the user experience in any way. As with other Yahoo! guidelines, Yahoo! reserves the right, at its sole discretion, to take any or all action it deems appropriate to ensure the quality of its search index. Bing developed recommendations that might help Bing's MSNBot (The Bing web crawler) effectively index and rank your website. Bing has also provided a list of techniques to avoid in order to make sure your website is indexed [22].

4. The Methodology

Several sets of specific usability and accessibility guidelines should be applied in order to improve web interaction for different typologies of users. This requires a lot of work by developers who have to handle page code and many sets of guidelines. Moreover, Web sites often require an increasingly large number of pages to create and maintain. For all these reasons, the evaluation of accessibility and usability is very important to web developers to simplify their work by presenting some advices to improve their websites.

In this paper about 30 websites evaluated, these websites were the top 10 most visited websites in Saudi Arabia, Egypt, and Jordan. We evaluate the accessibility, usability, and search issues, to find out if these websites violate the accessibility, usability, and search engines guidelines. Also we want to know if there exist any relation between the quality of web pages and web user’s preference. The evaluation is also intended to know the effect of usability and accessibility in search engine optimization. All these issues are evaluated using Sort Site tool, which check the accessibility, usability, and search guidelines including search engine optimization [23].

5 Experiments and Results

In this paper we evaluated 30 websites which are the top 10 most visited web sites in Saudi Arabia, Egypt, and Jordan using Sort Site tool. We evaluated the accessibility, usability and search engine guidelines. The tool used in this evaluation process check against 450+ standards based checkpoints for each page. In our experiment we considered only the following check points [18]:

- Accessibility - Checks include:
  - Section 508 - 34 checkpoints covering 15 guidelines
  - WCAG 1 Priority A - 31 checkpoints covering 17 guidelines
  - WCAG 1 Priority AA - 32 checkpoints covering 23 guidelines
  - WCAG 1 Priority AAA - 11 checkpoints covering 10 guidelines
  - WCAG 2 - 106 checkpoints covering A,AA and AAA guidelines

- Search - check include:
  - Google search guidelines
  - MSN search guidelines
  - Yahoo search guidelines
  - SEO best practice guidelines
  - Check for your keywords in titles, headings and highlighted text.

- Usability - check include:
  - US Federal Usability.gov guidelines
  - W3C usability guidelines
  - Wikipedia usability guidelines

![Figure 1. Accessibility Evaluation](image)

Figures (1), (2), and (3) show the result of accessibility, usability and search evaluation respectively for 10 web sites for each country. Sort Site tool evaluates about 100 pages for each site. We note that few pages in each site violate the guidelines, which means disabled users can use these websites. However, most of these sites have some pages that violate priority “A” which is mandatory to achieve.
The experimental result showed the relationship between accessibility and, usability, and user preference. These web sites are the most popular in different countries, and the accessibility and usability are high. So we can conclude that the usability and accessibility have affect in popularity of websites. On the other hand when the sites did not violate many search engine webmaster guidelines, the search engine can see them and therefore index and rank them. Finally, the webmasters must be aware and give more attention to web accessibility, usability, and search guidelines to increase the rank or popularity of their websites and to give opportunity for disabled users to participate in internet interactions.

6 Conclusion
Since the fast growth of internet and commonly base for interaction environment in most domains such as governments, education, and e-commerce websites, the need for usability and accessibility in all websites increased and became a very important task to users with or without disabilities.

In this evaluation process we evaluated the accessibility, usability, and search issues for the most 10 visited websites for each of Egypt, Saudi Arabia, and Jordan, totally about 30 websites. The evaluation is done by using Sort Site tool. We tried in this paper to find relationships between accessibility and usability, and user preference and search ranking.

We conclude that these sites which have high popularity and high rank are also having high accessibility and usability. From this conclusion the web masters must be aware of web accessibility, usability, and search engines guidelines, to make their websites in high ranking, and to give chance for disabled user to use the internet. More web sites can be included in the evaluation process and also more guidelines of the three types could be evaluated in future.

7 References


