

The Importance of Web Accessibility in Business to-Consumer (B2C) Websites

Osama Sohaib

Faculty of Engineering & IT
University of Technology, Sydney
osama.sohaib@uts.edu.au

Kyeong Kang

Faculty of Engineering & IT
University of Technology, Sydney
kyoeng.kang@uts.edu.au

Abstract—The number of online shoppers accessing the internet has grown tremendously. Due to the rapid growth of technology, companies also continuing to extend the functionalities of their e-business websites. Web accessibility is also an important element. In particular, in Business-to-Consumer (B2C) web design. It is important for B2C websites to adopt web design guidelines such as the Web Content Accessibility Guidelines (WCAG 2.0) to increase user satisfaction of all ages. This study analysed five B2C websites in accordance to Web Content Accessibility Guidelines using an online tool “A-Checker”. In general, the result shows that B2C websites are not paying attention to web accessibility. However, there is need for web accessibility in B2C websites. This study concludes by describing our further research.

Keywords— E-commerce; B2C, web accessibility; WCAG;

I. INTRODUCTION

The combination of technology and people in Information systems is an essential part of modern society which can enable a wide range of economic benefits. In Particular, the emerging growth of Business-to-Consumer (B2C) websites allows everyone to put up their own commerce online, locally or globally. The B2C websites provides the customers with instant online access to products without physical barriers. In order to get the most out of revenue from online trade, companies must focus on an accessible B2C e-commerce websites which should also give a real and convenient shopping experience for customers for all ages and in particular with disabilities such as, colour blindness. Because of the Internet availability, online shops provide people the ease of buying and selling products. However, the required technological infrastructure is either insufficient or does not exist in terms of web accessibility guidelines. The Web Content Accessibility Guidelines (WCAG 2.0) developed by World Wide Web Consortium (W3C) helps to make the website accessible for users of all ages and with disabilities such as colour blindness, deaf users, age related vision problems.

The study analyses the web accessibility using an online tool “A-Checker” [1] by comparing five B2C e-commerce websites in accordance to Web Content Accessibility Guidelines (WCAG 2.0). Top five B2C websites in term of generating revenue according to “2012 Research on International Market” [2] are selected. Three North and Latin

American B2C websites (amazon.com, apple.com and staples.com) and two Australian B2C website (Oo.com.au, Myer.com.au) are analyzed, that to what extent they follow the web accessibility (WCAG 2.0). The purpose of this research-in-progress study is to determine accessibility errors in B2C websites to determine that web accessibility (WCAG 2.0) plays a significant role in online purchasing. This study concludes by describing our further research.

The work is organized as. The next section provides introduction to the problem and web accessibility. Section 3 presents some related research. Sections 4 presents the approach and Section 5 provide some interpretations. Finally, the study is concluded and leaves the future work.

II. BACKGROUND

A. Introduction to the Problem

In a worldwide context, web development is now growing for e-business. From a human computer interaction viewpoint, accessible websites are becoming ever more important. The web technology creates new opportunities for modern organization but as well as challenges. Companies invest in e-business since the web has become the platform to perform business efficiently and effectively. Many business models are applied to attract and engage users to revisit their websites more and more.

However, the presentation of web design features are not conveyed through web accessibility guidelines to the global user’s perception. According to [4] customers of e-commerce websites are suffering from “technological Tourette’s syndrome” throughout the world. Real Tourette’s syndrome sufferers have a compulsion to swear, twitch and shout. E-commerce websites users often act the same way [25]. The purpose of web accessibility is to help make the web pages operable for users of all ages and with disabilities such as colour blindness [9]. For-example, a colour blind user making online purchase will not differentiate the red font highlighting the discounted prices. Web based applications should be internationalize in a way that can be easily adopted to any cultural group [5]. Therefore, E-commerce websites must also follow web accessibility by law [6-7].

According to “2009 Australian Bureau of Statistics (ABS) Survey of Disability, Ageing and Carers” (SDAC) found that 18.5% of Australians had a disability (Sight 30%, Hearing 10%) [10]. According to 2010 United States Census Bureau [11] “approximately 56.7 million people (18.7%) living in the United States had some kind of disability”. Eight million have difficulty in hearing and 8 million with a vision difficulty for the people aged 15 or older. The common disabilities are related to sight and hearing that affects the web accessibility. According to Dolson [12] “The physical disabilities of a merchant’s visitors are a factor that he or she should consider”.

The aim of this study is to understand and bring awareness of web accessibility in B2C websites by determining the accessibility errors recorded by online evaluation tool.

B. Web Accessibility

The significance of web accessibility standards in e-commerce has been known around the world [3][6-7][17][19-20]. There are varieties of web accessibility guidelines but the most relevant ones are ISO 9241-151, Section 508 and Web Content Accessibility Guidelines (WCAG 2.0). In this paper our focus is on WCAG 2.0 developed by the World Wide Web Consortium (W3C) [9]. The purpose of WCAG 2.0 guideline is to facilitate all the users in general. These guidelines also make web access to old age people and to people with disabilities. The guidelines covered by WCAG 2.0 are [9, 25]: Perceivable, Operable, Understandable and Robust. The aim of “Perceivable” is to direct the user to perceive the user interface components. The “Operable” guides the users that how the interface should be operating and how to navigate. The “Understandable” means the web contents should be understandable by all users. The “Robust” describes that the information should be interpreted by the variety of users in the same way. Testable success criteria are provided for each guideline to determine whether a webpage has met or failed the level of conformance. The three level of conformance are Level A, Level AA and Level AAA. Level A is the minimum level of conformance and Level AAA is the highest level for the webpage to help make accessible to users of all ages and with disabilities.

III. RELATED WORK

According to [13] “As public organizations and private businesses rely more on web based technologies for online shopping, information, and service delivery they must implement strategies to ensure all users can fully access web content”. For that reason, the author proposes a web accessibility model to benefit all public organizations and private businesses.

As noted by Purwati [14] there are lack of standard features in e-commerce website interface. According to the author “e-commerce sites lose up to 50% of potential online sales because users cannot find what they want”. Therefore, there is a need to conduct research in this area that how technology can be most effective across cultures and languages [15].

According to [16], a usable website provides a satisfying experience to end-users thus increasing sales and revenue for seller. However, usability challenges for web based applications are not kept in mind by implementing various web accessibility guidelines [17].

Sutcliffe [18] defines usability as a trade-off between user’s exploration and purchasing in e-commerce. The author proposes a three-phase model for evaluating e-commerce website based on attractiveness, navigation and transaction.

Maswera [19] analysed usability and accessibility errors of African e-commerce websites compared to Europe using an automated tools. In [20] The authors recommends to put their own accessibility guidelines for African countries to ensure accessibility for all user.

IV. APPROACH

The purpose of this work is to investigate whether the five different B2C websites meets the Web Content Accessibility Guidelines (WCAG 2.0) and to what level it may be successful. We analyzed three North and Latin American B2C websites (Amazon, apple and staples) and two Australian B2C websites (Oo and Myer). According to 2012 Research on International Market [2] these websites are the top online shops in their regions. An online web accessibility checker (A-Checker) [1] is used to test the web pages for conformance to web content accessibility guideline (WCAG 2.0). The tool is developed by a research group in University of Toronto [21]. The three level of conformance are Level A, Level AA and Level AAA is checked against each website. The online evaluation tool “A-Checker” identifies three types of problems [22]:

- **Known Problems (KP):** These are problems that must be fixed and have been identified as accessibility barriers.
- **Likely Problems (LP):** These are problems that are likely to be fixed and have been identified as probable barriers.
- **Potential Problems (PP):** These are problems that require a human decision for modifying or not to modify your webpage.

V. FINDINGS

In most e-business research specific product has taken into account, but this study does not focus on any specific type of product. The main focus is on comparing the presence or absence of web content accessibility guidelines (WCAG 2.0). Table 1 shows the accessibility testing run on five different B2C websites in September 2012. The columns in Table 1, “KP” are Known Problems, “LP” is Likely Problems and “PP” refers to Potential Problems as explained in Section IV. The same terms are used in Figures 1, 2 and 3.

| B2C websites | Table 1: WCAG 2.0 Success Criteria | | | | | | | | |
|------------------------|------------------------------------|----|------|----------|----|------|-----------|----|------|
| | Level A | | | Level AA | | | Level AAA | | |
| | KP | LP | PP | KP | LP | PP | KP | LP | PP |
| Website A, amazon.com | 10 | 09 | 325 | 114 | 09 | 331 | 120 | 00 | 345 |
| Website B, apple.com | 01 | 00 | 150 | 01 | 00 | 159 | 02 | 00 | 168 |
| Website C, staples.com | 21 | 05 | 1656 | 27 | 05 | 1682 | 27 | 00 | 1707 |
| Website D, oo.com.au | 53 | 01 | 1575 | 53 | 01 | 1615 | 53 | 01 | 1570 |
| Website E, myer.com.au | 09 | 00 | 856 | 22 | 00 | 928 | 49 | 00 | 958 |

Level A: Website B has only one known problem (KP) that needs to be fixed, followed by nine in website E and ten in website A. The most number of known problems are reported in website D are 53 followed by 21 in website C. All websites have quite a high number of (Level A) potential problems (PP) that require human decision to fix (Figure 1).

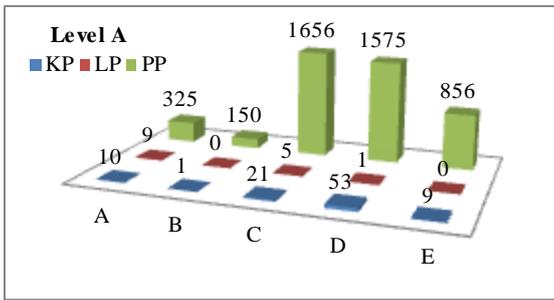


Figure 1: Level A Success

Level AA: Website B also did well in Level AA conformance with only one known problem (KP). The most number of known problems are 144 in website A that must be fixed. The most number of potential problem (PP) are found in website C with 1682 errors followed by website D with 1615 errors (Figure 2).

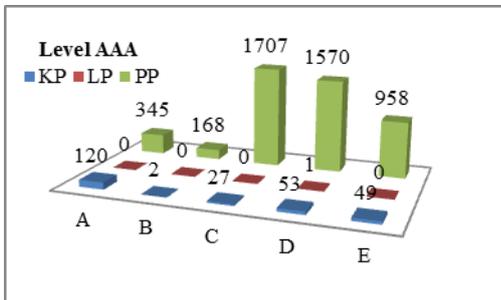


Figure 2: Level AA Success

Level AAA: The minimum numbers of known problems (KP) are two found in website B. The highest numbers of potential problems (PP) are in website C with 1707 errors (Figure 3).

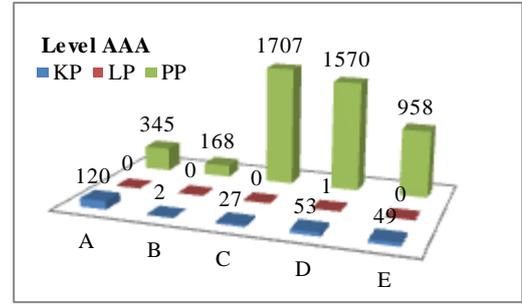


Figure 3: Level AAA Success

The results show that none of the B2C website meets the minimum success criteria of Web Content Accessibility Guidelines (WCAG 2.0). Although the selected websites are top online shops [2] but shows poor success criteria except website B (apple.com). Therefore, there is a need of quality measurement criteria such as accessibility for e-commerce [8]. Achieving the levels of web accessibility success criteria is the responsibility of both the individual company as well as web designer. B2C e-commerce web development has the potential to make the online shopping tasks easier, but isn't expected to do so in the near future. Roggio [6] believes that getting more loyal customers and avoid legal challenges are the other two reasons to design for accessibility.

It is well known that information on the e-commerce websites varies in quality. To the extent that buyers perceive that e-commerce website presents quality information they are more expected to have confidence and will perceive the e-merchant as trustworthy [23]. If the buyer gets the relevant information then the trustworthiness of the website is increased and hence leads to higher purchase intention [24].

VI. CONCLUSION AND FUTURE WORK

Web content accessibility is about designing websites for user of all ages. Effective accessibility is an important element for the design of B2C websites. In Particular, it gives the opportunity to disabled people to use websites. Web accessibility for B2C websites is important from legal and a business reasons point of view. It is also helpful to increase serviceability of B2C to engage online buyers of all ages and to increase company reputation and revenue. In general, it is analyzed that US based website B (apple.com) is paying some attention on web accessibility (WCAG 2.0). This study has a limitation, the B2C websites are selected from two regions, America and Australia, which may affect the generalization of the study to other country specific B2C websites.

The objectives of our further research are:

- To propose a framework based on the key characteristics found in the literature, such as web accessibility to examine the influence on buyer trust and subsequently buyer intention of online purchasing in B2C e-commerce in two cultural groups, Individualistic and Collectivistic.
- To empirically test the proposed model using cross-cultural data.

- To provide some insights to the academics, e-commerce practitioners and business firms.

We expect that the results of our study will confirm our hypothesis.

REFERENCES

- [1] A-Checker, "Web Accessibility Checker," 2006 Available: <http://achecker.ca/checker/index.php>, [Accessed: September 2012]
- [2] Research on International Market, "Top 2000 Global Online Shops 2012," 2012.
- [3] T. Krunić and L. Ružić-Dimitrijević, "Condition of Web Accessibility in Practice and Suggestions for Its Improvement," *Informing Science Journal*, vol. 10, 2007.
- [4] D. Travis. "E-Commerce Usability: Tools and Techniques to Perfect the On-Line Experience," 2003, Taylor & Francis, New York, NY
- [5] T. Berners-Lee. "Accessibility," 2012. Available: <http://www.w3.org/standards/webdesign/accessibility>, [Accessed: September 2012]
- [6] A. Roggio, "The Importance of Web Accessibility for Ecommerce," 2008, Available: <http://www.getelastic.com/the-importance-of-web-accessibility-for-ecommerce/>. [Accessed: September 2012]
- [7] W. Smallman, "Should e-commerce websites support Web Accessibility by law?" 2006, Available: <http://www.blahblahtech.com/2006/11/should-e-commerce-websites-support-web-accessibility-by-law.html>. [Accessed: September 2012]
- [8] L. Hasan and E. Abuelrub, "Assessing the quality of web sites," *Applied Computing and Informatics*, vol. 9, 2011, pp. 11-29.
- [9] W3C, "Introduction to Web Accessibility," 2005 Available: <http://www.w3.org/WAI/intro/accessibility.php> [Accessed: 18 May 2012]
- [10] Australian Bureau stats, "Disability, Ageing and Carers, Australia: Summary of Findings," Available: http://www.abs.gov.au/AUSSTATS/abs@.nsf/Latestproducts/4430_0Media%20Release12009?opendocument&tabname=Summary&rodno=4430.0&issue=2009&num=&view= [Accessed: September 2012]
- [11] M. W. Brault, "Americans with Disabilities: 2010," 2012.
- [12] J. C. Dolson. "Accessibility: How Many Disabled Web Users Are There?" 2009, Available: <http://www.practicalecommerce.com/articles/1417-Accessibility-How-Many-Disabled-Web-Users-Are-There-> [Accessed: September 2012]
- [13] P. A. McLellan, "Web Accessibility," 2011.
- [14] Y. Purwati, "Standard features of e-commerce user interface for the web," *Journal of Arts, Science & Commerce*, vol. 2, 2011, pp. 77-87.
- [15] T. R. Lituchy and R. A. Barra, "International issues of the design and usage of websites for e-commerce: Hotel and airline examples," *J. Eng. Technol. Manag.*, vol. 25, 2008, pp. 93-111
- [16] E. Chelule, "E-commerce usability: Do we need guidelines for emerging economics?" in *IADIS International Interfaces and Human Computer Interaction 2010*, 2010, pp. 19-26.
- [17] O. Sohaib, W. Hussain, and K. Badini, "User Experience (UX) and the Web Accessibility Standards," *IJCSI International Journal of Computer Science Issues*, vol. 8, 2011, pp. 584-587.
- [18] A. Sutcliffe, "Assessing the Reliability of Heuristic Evaluation for Website Attractiveness and Usability," presented at the Proceedings of the 35th Annual Hawaii International Conference on System Sciences (HICSS'02)-Volume 5 - Volume 5, 2002.
- [19] T. Maswera, R. Dawson, and J. Edwards, "Analysis of Usability and Accessibility Errors of E-Commerce Websites of Tourist Organisations in Four African Countries," in *Information and Communication Technologies in Tourism 2005*, A. Frew, Ed., ed: Springer Vienna, 2005, pp. 531-542.
- [20] T. Maswera, J. Edwards, and R. Dawson, "Recommendations for e-commerce systems in the tourism industry of sub-Saharan Africa," *Telematics and Informatics*, vol. 26, 2009, pp. 12-19.
- [21] W3C, "Complete List of Web Accessibility Evaluation Tools," 2012 Available: <http://www.w3.org/WAI/ER/tools/complete> [Accessed: September 2012]
- [22] AChecker, "Web Accessibility Checker," 2012, Available: <http://achecker.ca/checker/index.php> [Accessed: September 2012]
- [23] D.J. Kim, D. L. Ferrin and H.R. Rao, "A trust-based consumer decision-making model in electronic commerce: The role of trust, perceived risk, and their antecedents," *Decis. Support Syst.*, vol. 44, no. 2, 2008, pp. 544-564.
- [24] B. Ganguly, S.B. Dash and D. Cyr, "The effects of website design on purchase intention in online shopping: the mediating role of trust and the moderating role of culture," *Int. J. Electronic Business*, vol. 8, no. 4/5, 2010, pp. 302-329.
- [25] O. Sohaib, W. Hussain, I. A. Ismaili and A. H. S. Bukhari, "Exploring the Relationship between Web Usability and the Web Accessibility Guidelines," *Sindh University Research Journal (Science Series)*, Vol. 44(2), 2012, pp. 275-280.