

Usability and Accessibility of Romanian Online News Websites

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ABSTRACT

The usability and accessibility of online news websites seem to have been neglected in the last decade. Few studies exist that check the accessibility for blind and visually impaired people, and even fewer the usability of online news websites. The objective of this paper is twofold. First, it is to explore the usability of online news websites using a feature-based approach. The second is to analyze accessibility against WCAG 2.0 using a tool-based approach. Three accessibility checking tools have been used: Wave, AChecker, and TAW. The sample consisted of 18 Romanian online news websites. The evaluation results show many usability issues and low web accessibility.

Keywords

Online news websites, usability, accessibility, WCAG2, and checking tools.

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INTRODUCTION

In the last two decades, there has been an expansion of online news websites. Besides publishing online versions of traditional newspapers, television launched websites with online news sections. The desire to enlarge the audience by taking advantage of Internet channels and the commercial benefits brought by advertising stimulated these developments.

The run for commercial gain had many bad consequences for the usability of online news websites. The screen space became a critical resource for newspapers, especially on the front page. Advertising, which may take aggressive forms, is not beloved by users. As Nielsen pointed out [20], few developers are paying attention to how users perceive the advertising techniques.

Although studies targeting the news sections of various websites exist, a quick survey of the literature shows relatively few papers aimed at analyzing the usability of websites dedicated to online news. There are even fewer studies that analyze the accessibility for the blind and visually impaired people (BIP) of these kinds of websites. The explanation is that, stimulated by recent regulations at the European and national levels, the literature of the last decade has focused on the usability and accessibility of public sector websites.

This work aims to fill this gap by reporting on two studies. The first study targets the usability of online news websites in a feature-based approach. The second study analyzes the accessibility against WCAG 2.0. The approach is based on

automated evaluation with three accessibility checking tools: Wave, AChecker, and TAW. Both studies are using the same sample of 18 websites dedicated to online news.

The next two sections present the main regulations and some related work regarding the usability and accessibility evaluation of online news websites. Then the methodology is outlined, and the evaluation results are presented and discussed.

WEB ACCESSIBILITY

European regulations on accessibility

Following the Convention on the Rights of Persons with disabilities [32] and the European disability strategy [6], European legislation outlined by Directive No. 2016/2102 extended accessibility requirements for public sector websites to include mobile applications. Compliance with WCAG 2 is mandatory.

The European Accessibility Act (EAA) was approved in 2019 and should take effect starting from 2025. Apart from a large variety of ICT devices, EAA covers e-commerce, banking, and ticketing. Member states should transpose it into national law by June 28. In Romania, Law 232/2023 in Romania transposed the Directive (EU) 2016/2102 on web accessibility. EAA aims to make Europe “a more inclusive society by improving access to products and services for people with disabilities” [8].

Web accessibility recommendations

Following the Web Accessibility Initiative [34], the Web Content Accessibility Guidelines (WCAG) define three levels of conformance (A - lowest, AA, and AAA - highest) [36]. The accessibility model of WCAG 2 is based on four principles: perceivable, operable, understandable, and robust. For each accessibility guideline, several success criteria have been defined that guide developers to meet and evaluators to check accessibility. For each success criterion, several techniques have been mentioned by WCAG to give specific guidance.

Accessibility evaluation tools are software programs or online services for checking the content against the WCAG 2 recommendations by using various techniques. There are many differences between evaluation tools concerning accessibility guidelines used, techniques tested, error classification and reporting, and supported technologies.

RELATED WORK

Online newspapers usability

First studies on the usability of online newspapers focused on page length and navigation as main determinants of the time on task [16, 22]. Then, further studies analyzed the main factors contributing to better usability, gradually shifting the focus to specific issues of online news websites.

The study of Abdullah and Wei [1] comparatively analyzed four Malaysian online newspapers based on four usability criteria: content & organization, navigation, user interface design, and performance & effectiveness.

Santos-Goncalves et al. [29] investigated the usability for mobile device users of the local online press in Portugal. The evaluation was based on guidelines and focused on design and content issues. The analysis of five case studies revealed both usability and accessibility issues.

The study of Gibbs and Bernas [9] used eye-tracking to analyze the visual attention in online newspapers versus TV-oriented news websites. They found that text link groupings should be placed consistently across the website since they direct the visual attention. Another finding was that at the beginning, attention is focused on the upper part of the page, which helps with orientation and gives navigation cues.

Jeong & Jung Han [10] investigated the usability of newspapers on mobile devices with a focus on space usage for content and identified bad practices of wasting space on the front page. In a similar vein, the study of Nebeling et al. [18] analyzed how the area of the screen is used and found that the spatial distribution of content does not scale well and leads to a waste of space.

Lu et al. [15] analyzed design requirements for online news websites across three devices by testing with 15 users. They recommended less space for advertising, a search box in a prominent place, and avoiding horizontal scrolling.

Rohrer & Boyd [28], then Nielsen [20] analyzed the bad impact of online advertising on user experience. Since the online advertising has to be accepted as a “design constraint”, both studies advocated for avoiding the worst advertising techniques, such as pop-ups, covering what the user wants to see, and/or large areas on the screen, a lack of a close button, blinking, or floating across the screen.

Also, Arany & Schaik [4] went beyond the pragmatic value by investigating the main factors leading to a better user experience (UX). Their extended adoption model includes three constructs related to artifact characteristics (aesthetics, adequacy of information, and disorientation), five to UX components, and three to UX outcomes (beauty, behavioral intention, and goodness). The results showed that both pragmatic and hedonic qualities significantly predicted the intention to use. Adequacy of information was an important predictor of content usefulness, while disorientation was negatively correlated with usability.

Jiang et al. [11] elaborated a user-centred design strategy aimed at meeting the needs of elderly people when using online news on mobile devices. Based on a factor analysis, they found that three key factors influence the user

experience: usability and navigation, visual presentation, and readability.

Online newspapers accessibility

An early study on the accessibility of online advertising for BIP was carried out by Thompson [31]. The analysis of banner ad images showed that in three out of four cases, the alternative text was missing,

Barbara Leporini highlighted that reading news is always a challenging task for blind and visually impaired people [14]. Her study evaluated the usability and accessibility of the Google News website for BIP, and she concluded with several recommendations: a clear structure for website sections and guidelines to quickly provide an overview of topics, descriptive titles, clear references for links, and agile navigation via keyboard.

Ochoa & Crovi [21] evaluated the accessibility of Mexican cybermedia by using TAW. Based on the four types of errors, they elaborated a Mexican Accessibility Index and found an acceptable level with an average of 94%.

The study of Yazid et al. [37] analyzed the accessibility of four Malaysian online news websites in a tool-based approach using AChecker and Wave. The results showed that none of the websites complies with WCAG 2.0. The most frequent error was the lack of a text alternative for nontext content.

Movar et al. [17] studied the news consumption practices of BIP in India. Their work was based on semi-structured interviews with 17 participants, and they identified specific challenges for usability and accessibility. The main barriers mentioned by participants were the advertisements, the digitalization of local language newspapers, and the lack of assistance for navigation.

The accessibility study of Putri et al. [27] on 41 cybermedia websites in Indonesia showed a large number of WCAG 2 errors identified by AChecker. The most violated success criterion was the lack of a text alternative for nontext content.

In another recent study, Pinto [23] discussed information architecture as an important feature of online newspapers that influences navigation, content organization, and user experience. The study highlights the importance of an intuitive structure of the home page as a starting point in navigation.

Yeung et al. [38] took a mixed-method approach to accessibility evaluation of online ads, by combining guidelines-based evaluation (against WCAG 2) with semi-structured interviews. The sample consisted of 90 websites, and the results highlighted the most frequent accessibility issues: lack of alternative text, lack of link description, lack of disclosure in ads, and ads with more than 15 interactive elements.

A similar methodological approach has been taken by AlSaeed et al. [3] for the accessibility evaluation of Arabic news websites. They used TAW for tool-based evaluation and semi-structured interviews with six users. The results showed that 40% of errors are related to links and navigation, and 31% to the lack of text alternatives. The main accessibility barriers identified by interviews were the

presence of CAPTCHA (Completely Automated Public Turing test to tell Computers and Humans Apart), poor website organization, scrolling banners, and pop-up ads.

METHOD AND TOOLS

The sample includes 18 online news websites in Romania, out of which 8 are traditional online newspapers (Adevarul, Libertatea, Curierul National, Jurnalul National, Gandul, Evenimentul Zilei, Romania Libera, Cotidianul) and 3 are online news agencies (Agerpres, Mediafax, Stiri pe Surse). The rest are oriented to business & finance (Capitalul, Saptamana Financiara, Financiarul), sports (Prosport, Gazeta Sporturilor), and social life (Click, Cancan).

The evaluation was conducted in April and May 2025.

Usability

Several methods for usability evaluation exist, which could be grouped into methods with or without users [5, 7]. Inspection methods are carried on by experts who utilize various forms of design knowledge, such as heuristics, ergonomic criteria, and guidelines. Typical tasks for online news websites include reading articles, submitting comments, searching the news website, and contacting the article author or the journal editor. These tasks require good orientation and fast navigation.

The online news websites were evaluated by proposing a feature-based approach, which focuses on information architecture (sections, columns), page length, space usage, navigation (menus, links), search facilities, article readability, contacting facilities, and advertising techniques. These features are related to typical usability problems found in online news websites, as highlighted in the previous section.

Usability problems have been defined as any difficulties the user has concerning ease of use, time needed to accomplish a goal, and satisfaction [19]. Depending on the effect, usability problems are classified as major (user is not able to accomplish the task's goal or important loss of data or time), moderate, or minor.

Usability problems were discussed based on a small set of usability heuristics tapping on four general ergonomic criteria: user guidance, user effort, user control and freedom, and user support [26].

Accessibility

For each website, the front-page accessibility was analyzed against WCAG 2AA with three free checking tools: Wave, AChecker, and TAW.

Wave (Web Accessibility Assessment Tool) is provided by Web Accessibility In Mind (WebAIM) [35] at Utah State University. It reports the results (errors, contrast errors, and alerts) using a color-coding system in a two-pane view. The left pane includes a summary, detailed information, and references. Clicking on an error in the left pane highlights the error on the webpage in the right pane.

AChecker is a web accessibility checker [2] that reports the results (known problems, likely problems, and potential problems) in an online report that could be ordered by guideline or by line number. The report includes guidelines, success criteria, check identifiers, and HTML references.

TAW (Web Accessibility Test) is provided by CTIC Foundation Technology Centre [30]. It reports a summary of results (errors, warnings, and problems needing review) ordered by guidelines and success criteria. More detailed information, including the line number and checking technique, could be given by email.

Since each tool has strengths and weaknesses, using more than one tool increases the reliability of results [23, 25]. Accessibility errors have been analyzed and discussed by conformance level (A/AA), accessibility principle, and guideline.

USABILITY EVALUATION RESULTS

Summary

The evaluation focused on the front page, which is the starting point for reading the news. Based on the severity of usability problems, websites' features were classified as poor (major usability problems), acceptable (moderate usability problems), and good (minor usability problems).

Since the websites are in the private sector, the results were analyzed statistically, without mentioning the names of the websites in each category. A summary is presented in Table 1, which shows the number of websites in each category.

Table 1. Websites on the usability of the main features

Main feature	Poor	Acceptable	Good
Information architecture	7	4	7
Space usage	7	6	5
Page length	7	6	5
Menus	4	6	8
Search facilities	3	5	10
Article readability	15	0	3
Contact info	3	12	3
Feedback facilities	4	12	2
Advertising techniques	11	5	2

Most online news websites feature poor article readability and bad advertising techniques. Other worst-rated features are information architecture, space used, and page length.

User guidance

Good user guidance refers to clear information architecture, prompting, feedback, and grouping/distinction. Evaluation revealed usability problems related to poor distinction of headings and messy organization of the webpage as regards the columns and placement of sections, thus making the page structure unclear.

Another problem that makes it difficult for the user to get oriented is the disorganized placement of advertising. Poor article readability is a typical problem, since few websites display the beginning of the article below the title to give a hint to the user if it is worth reading.

User effort

User effort is related to consistency, workload, and minimal actions. Two websites had headings inconsistent with the menu. A usability problem encountered in 8 websites is the

fact that the menu disappears at scrolling, thus requiring a return to the top of the page. Page length is another problem, since most websites have very long pages that require scrolling.

Also, too much advertising intertwined with text leads to poor article readability and the spreading of content, thus requiring extra user actions.

There are several usability problems related to unnecessary clicks, like the link to contact at the bottom of the page, which requires a click instead of displaying the contact info. Similar problems are due to the poor space usage (columns leaving unused space, too big photos), which leads to additional user actions.

Search facilities help navigation and are a widespread feature of websites. Only on 10 websites is the search button well-placed and prominent. Two websites don't have a search button, and in another one, the search button is not visible.

User control and freedom

User control and freedom refer to explicit user actions, flexibility, and control. Usability problems violating the principle of explicit user actions are related to horizontal scrolling, animation (one website), and pop-up advertising (websites). Two websites have advertising without a close button.

User support

User support heuristics refer to compatibility with the user, task guidance, error management, and help. In this case. The main usability problems are related to contacting facilities and usability for the BIP. On one website, the contact link is broken, and on the other two, there is no contact information. Making a comment or contacting the author of an article is difficult since most websites require registration.

Although many images have an alternative text description, these repeat the title instead of describing the image. In other words, the alternative text is used as a cue for sighted users.

ACCESSIBILITY EVALUATION RESULTS

Summary

A summary of validation results detected by each tool is presented in Table 2. The total number of WCAG2 errors per website varies from 0 to 320.

Table 2. Summary of WCAG 2 validation errors

Tool	Errors	Min	Max	M	SD
Wave	2009	2	320	111.61	96.97
AChecker	1173	0	301	65.17	82.24
TAW	1217	2	180	67.61	52.82

Averaging data obtained with all tools results in a mean of 1466 errors (SD=470), out of which 814 are WCAG 2A errors. This means an average of 81 errors (SD=67) per website, out of which 45 are WCAG 2A errors. Table 3 presents the grouping of websites by error number.

According to the TAW evaluation results, all websites have errors, while Wave found one, and AChecker found four websites with no WCAG 2 errors. Overall, the accessibility of online news websites is low.

Table 3: Grouping of websites by error number

No err/level	Wave		AC		TAW	
	A	AA	A	AA	A	AA
none	1	1	4	7	0	18
1-10	6	5	5	3	2	0
11-20	4	1	2	1	3	0
21-50	3	4	3	3	3	0
51-100	1	1	2	2	6	0
>100	3	6	2	2	4	0
Total	18	18	18	18	18	18

Accessibility problems

Most frequent accessibility issues detected by each tool are presented in Table 4, that are structured by conformity level and accessibility guideline.

Table 4. Errors on accessibility issues

Guideline	Wave	AChecker	TAW
alternative text	259	361	258
labels	14	43	103
headings	1	0	32
link description	340	137	744
names and IDs	2	6	36
Other A	21	41	44
Total A	637	588	1217
contrast	1338	5	0
resize text	0	564	0
headings	34	16	0
other AA	0	0	0
Total AA	1372	585	0
TOTAL	2009	1173	1217

Lack of link description (guideline 2.4.4) and lack of a text alternative for an image (1.1.1) were detected in almost all websites. Together, these two level A violations account on average for more than 85% of the total number of level A errors. Other frequent errors are related to info and relationship (guideline 1.3.1), and compatibility (guidelines 4.1.1, 4.1.2).

There are many differences in the number of errors detected by each tool. Wave detected 637 violations of the level A compliance, AChecker 588, and TAW 1217. The number of level AA violations detected by Wave (1372, out of which 1338 are contrast errors) is much larger than by AChecker (585) or TAW (none).

Although the differences are large, it is clear that using only one tool may lead to more optimistic results.

DISCUSSION

The main contribution of this work is a feature-based approach focusing on specific usability issues of online news websites. This is the first study targeting the usability and accessibility of Romanian online news websites.

Given the fact that these websites are in the private sector, and it is not the aim of this paper to promote or blame one or another, the evaluation does not relate the names of the websites to a given category of results (worse, acceptable, or good) nor to major usability problems. Despite not being informative in this respect, it gives an overall picture of the usability and accessibility of online news websites.

Worst-rated features of the analyzed websites were article readability, information architecture, page length, space usage, and advertising techniques. In turn, the design of these features has several bad effects, especially on the user guidance and effort.

Poor page organization and inefficient use of space lead to cognitive overload. The prevalence of interfaces requiring intense scrolling and the disappearance of scrolling menus suggest that fundamental usability principles, such as user control and freedom of navigation and information access, are frequently disregarded.

The results corroborate previous research, which has demonstrated that aggressive advertising strategies negatively impact the reading experience and violate fundamental usability principles [12, 26]. News websites are often designed with commercial interests in mind, to the detriment of user experience [20]. The findings are also consistent with those of other studies [11], which found a lack of user guidance and inconsistent navigation structures.

The accessibility analysis revealed serious and systematic non-compliance with WCAG 2.0 standards. The most common issues were the absence of descriptions for links (2.4.4) and textual alternatives for images (1.1.1), both of which are critical for navigation by visually impaired users. These issues directly impact the WCAG principle of perceivability [34, 36].

The significant differences in the number of errors detected by each assessment tool confirm the findings of previous studies [23, 25], which recommended using several tools simultaneously to obtain a comprehensive overview. Wave, for example, identified numerous contrast errors (level AA) that the other two tools did not report, suggesting that assessments based on a single tool may be overly optimistic.

The frequency of level A errors, i.e., the most basic, is alarming. Although some sites performed better, only one was found to be fully compliant with all tools. This suggests that news sites remain largely inaccessible to people with disabilities, despite regulatory pressure.

Although using more than one tool increases the reliability of results, tool-based accessibility evaluation has inherent limitations [33]. The second limitation is that only the front page has been checked for accessibility conformance. A third limitation is related to the small sample size, which includes only 18 online news websites.

CONCLUSION

Romanian online news websites suffer from significant usability and accessibility issues, which negatively impact the user experience and exclude people with disabilities. These issues are exacerbated by commercial priorities that favor advertising over user-centred design.

Non-compliance with WCAG 2.0 standards is systematic and widespread. The most common errors are the absence of alternative text for images and descriptions for links. Using a single assessment tool is insufficient; a multi-tool approach is essential for rigorous assessment.

Although Law 232/2023 in Romania transposes Directive (EU) 2016/2102 on web accessibility, it only applies to public institutions. Therefore, online media websites are not legally required to adhere to WCAG 2.0 standards, which partly explains the current level of non-compliance. However, moral obligations require respect for new regulations on private digital content providers as well.

In the absence of a legal obligation, accessibility remains neglected in the private sector, such as in newsrooms. However, the imminent adoption of the European Accessibility Act will extend the legal framework to this sector, providing a compelling reason for the urgent implementation of inclusive design practices.

REFERENCES

1. Abdullah, R., & Wei, K. T. (2008). Usability measurement of Malaysian online news websites. *International Journal of Computer Science and Network Security*, 8(5), 159-165.
2. AChecker: *Web Accessibility Checker*. Inclusive Design Institute. Available at: <https://achecks.org/checker/index.php>
3. AlSaeed, D., Alotaibi, H., Al-Khalifa, H. et al. (2024). Accessibility barriers in Arabic news websites for visually impaired users: a mixed-method evaluation approach. *Universal Access in Information Society*, doi:10.1007/s10209-024-01140-z
4. Aranyi, G., & Van Schaik, P. (2016). Testing a model of user experience with news websites. *Journal of the Association for Information Science and Technology*, 67(7), 1555-1575, doi:10.1002/asi.23462
5. Cockton, G., Lavery, D., Woolrych, A. (2003). Inspection-based evaluation. Jacko, J.A., Sears, A. (Eds.), *The Human-Computer Interaction Handbook*. LEA, 273-292.
6. COM (2010) 636 final. *European Disability Strategy 2010-2020. A Renewed Commitment to a Barrier-Free Europe*.
7. Dumas, J. S., Redish, J. C., 1993, *A Practical Guide To Usability Testing* (Norwood: Ablex).
8. EAA (2025) *European Accessibility Act*. Directive 2019/882/EU.
9. Gibbs, W. J., & Bernas, R. S. (2009). Visual attention in newspaper versus TV-oriented news websites. *Journal of Usability Studies*, 4(4), 147-165.
10. Jeong, W. and Jung Han, H. (2012), Usability study on newspaper mobile websites, *OCLC Systems & Services: International digital library perspectives*, 28(4), 180-198. doi:10.1108/10650751211279120

11. Jiang, Q., Deng, L., Zhang, J., & Pengbo, Y. (2024). User-Centered Design Strategies for Age-Friendly Mobile News Apps. *SAGE Open*, 14(4), 21582440241285393.
12. Lazar, J., Goldstein, D.F., & Taylor, A. (2015). *Ensuring Digital Accessibility through Process and Policy*. Morgan Kaufmann.
13. Law. 232/2023 regarding the accessibility of websites and mobile apps in the public sector. *Monitorul Oficial* nr. 711 din 3 august 2023.
14. Leporini, B. (2011). Google News: How user-friendly is it for the blind?. *ACM International Conference on Design of Communication*, 241-248, doi:10.1145/2038476.2038523.
15. Lu, Y., Wang, X., & Ma, Y. (2013). Comparing user experience in a news website across three devices: iPhone, iPad, and desktop. *Proceedings of the American Society for Information Science and Technology*, 50(1), 1-4, doi:10.1002/meet..14505001141
16. Mariage, C., & Vanderdonckt, J. (2001). A comparative usability study of electronic newspapers. *Tools for Working with Guidelines: Annual Meeting of the Special Interest Group*, 325-337. London: Springer London.
17. Mowar, P., Gupta, M., & Jain, M. (2024). Breaking the News Barrier: Towards Understanding News Consumption Practices among BVI Individuals in India. *Proceedings of the 26th International ACM SIGACCESS Conference on Computers and Accessibility*, 1-11, doi:10.1145/3663548.3675608
18. Nebeling, M., Matulic, F., & Norrie, M. C. (2011). Metrics for the evaluation of news site content layout in large-screen contexts. *Proceedings of the SIGCHI conference on human factors in computing systems*, 1511-1520. doi:10.1145/1978942.197916
19. Nielsen, J. (1993). *Usability Engineering*. Academic Press, New York.
20. Nielsen, J. (2004). The most hated advertising techniques, <https://www.nngroup.com/articles/most-hated-advertising-techniques/>, NN/g.
21. Ochoa, R. L., & Crovi, D. M. (2019). Evaluation of accessibility in Mexican cybermedia. *Universal Access in the Information Society*, 18, 413-422, doi:10.1007/s10209-018-0613-9
22. van Oostendorp, H., & Van Nimwegen, C. (1998). Locating information in an online newspaper. *Journal of Computer-Mediated Communication*, 4(1), JCMC411.
23. Padure M, Pribeanu C (2019). Exploring the differences between five accessibility evaluation tools. *Proceedings of RoCHI 2019 Conference*, Bucharest, Romania, 17-18 October, 87-90.
24. Pinto, J. C. (2024). Information architecture as an element of online newspaper graphic design. *Proc. of GARI Multidisciplinary Conference*, 1-2 June, Cluj-Napoca, Romania, 60-64.
25. Pool, J. R. (2023). Accessibility Metatesting: Comparing Nine Testing Tools. *Proceedings of the 20th International Web for All Conference (W4A'23'23)*. ACM, 1-4. doi:10.1145/3587281.3587282
26. Pribeanu, C. (2017). A revised set of usability heuristics for the evaluation of interactive systems. *Informatica Economica* 21(3), 31-38. doi: 10.12948/issn14531305/21.3.2017.03
27. Putri, A.S., Hafiar, H., Priyatna, C.C. (2024). Corporate Digital Responsibility in Practice: A Study of Accessibility on Indonesian Cyber Media Websites. *Journal of Communication and Management*, 3(4), 295-302. doi: 10.58966/JCM2024343
28. Rohrer, C. & Boyd, J. (2004). The rise of intrusive online advertising and the response of user experience research at Yahoo! *CHI '04 Extended Abstracts on Human Factors in Computing Systems*. 1085-1086, doi:10.1145/985921.985992
29. Santos Gonçalves, T., Ivars-Nicolás, B., & Martínez-Cano, F. J. (2021). Mobile applications accessibility: An evaluation of the local Portuguese press. *Informatics*, 8(3), doi:10.3390/informatics8030052.
30. TAW. CTIT Technology Centre, Available at <http://www.tawdis.net>
31. Thompson, D., & Wassmuth, B. (2001). Accessibility of online advertising: A content analysis of alternative text for banner ad images in online newspapers. *Disability Studies Quarterly*, 21(2), doi:10.18061/dsq.v21i2.281
32. United Nations (2006). *Convention On The Rights Of Persons With Disabilities (CRPD)* - Article 9 – Accessibility. <https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities/article-9-accessibility.html>
33. Vigo, M., Brajnik, G. (2011). Automatic web accessibility metrics: Where we are and where we can go. *Interacting with Computers* 23, 137-155.
34. WAI (1997) *Web Accessibility Initiative*, W3C. Available at: <http://www.w3.org/WAI/>
35. Wave. WebAIM. Available at: <http://wave.webaim.org>
36. WCAG2 (2008) *Web Content Accessibility Guidelines 2.0*, W3C, 2008. Available at: <http://www.w3.org/TR/WCAG20/>
37. Yazid, M. A., Jantan, A. H., Abd Ghani, A. A., Kamaruddin, A., & Admodisastro, N. (2018). Accessibility design issues with Malaysian news websites: a case study using a checker and WAVE. *International Journal of Engineering & Technology*, 7(4), 69-73. doi: 10.14419/ijet.v7i4.31.23344
38. Yeung, C., Kohno, T. & Roesner, F. (2024). Analyzing the (In) Accessibility of Online Advertisements. *Proceedings of the 2024 ACM on Internet Measurement Conference*. doi:10.1145/3646547.3688427.