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Accessibility of Information on Marketplace Websites for Consumers with Disabilities

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Abstract
The need for information accessibility for people with disabilities is to access website-based information. However, until now, several websites still do not have an optimal level of accessibility, including marketplace websites in Indonesia. The purpose of this research is producing information about the evaluation results of the marketplace platform website as a consideration to make steps to increase website accessibility more effective. The method of this research is evaluative, it was conducted using the accessibility evaluation of several tools. The results of the evaluation of the accessibility of the most visited marketplace website in Indonesia show that there are still violations of certain standards in the WCAG guidelines. There are accessibility barriers at various levels and types of issues that users with disabilities will face when visiting the website. A number of recommendations are presented to improve the quality of accessibility for users with disabilities.
Keywords: Information, Accessibility, Website, Marketplace, Users with disabilities.

Introduction

Communication technology cannot be separated from all aspects of modern society, including in marketing communications. The company carries out marketing activities by distributing product information through the website, one of which is through the marketplace company. Marketplace companies are constantly looking for ways to meet customer needs, to ensure that visitors will make return visits and win customer loyalty (Goodrich & Ramsey, 2012). One effort made is by providing digital technology-based services that the public can access, as part of Corporate Digital Responsibility.

Corporate Digital Responsibility (CDR), is a new initiative in social responsibility. CDR means awareness of the duties that direct the organization to be active in the field of technology development and use technology to provide services to the public (Suchacka, 2020), including the people with disabilities.

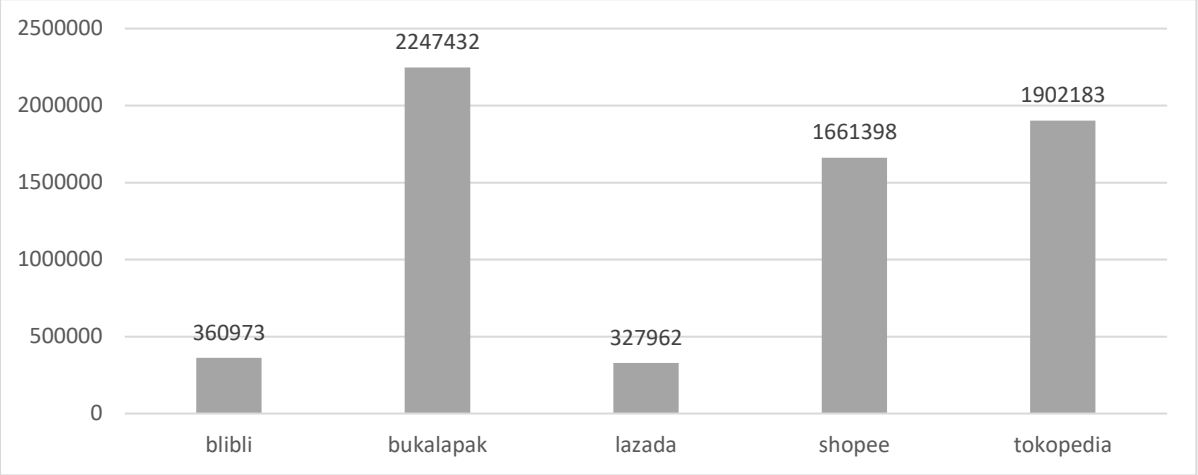
National Socio-Economic Survey data in 2018 states that the Indonesian population with disabilities is 30.38 million people or 14.2% (Ansori, 2020). The large number of people with disabilities in Indonesia has led to an increase in the need for information accessibility from various digital media. Especially the need for persons with visual impairments to access information such as websites. However, currently most websites available in Indonesia do not yet have an optimal level of accessibility, including marketplace websites. Even though the marketplace can open economic opportunities for people with disabilities with disabilities to become sellers, buyers, or as players in the economy of other creative industries.

Based on a report from the World Health Organization (WHO), people with disabilities are more at risk of being unemployed than people without disabilities. Global data shows that the employment rate of men with disabilities (53%) and women with disabilities (20%) is lower than men without disabilities (65%) and women without disabilities (30%). In OECD countries, the differences are even bigger, with 44% people with disabilities and 75% people with disabilities (Koesno, 2020)**.** On the other hand, in the same report it was stated that people with disabilities can live and take part in society through appropriate services and support, so that people with disabilities can obtain the same information rights in society as people without

disabilities. Including the right to be able to access information in order to increase opportunities for economic independence.

Dimas P. Muharam, founder of Kartunet.com, said that in today's digital era, he helps people with disabilities to work and develop themselves. Unfortunately, so far there are still many websites and applications that are not friendly to people with disabilities. He said that what needs attention is support so that all website and application developers provide standard accessibility features for people with disabilities (Sandy, 2019). Various training related to digitization is needed to help people with disabilities adapt to technology and compete in the world of work. Industry 4.0 is an excellent opportunity for people with disabilities to work as long as website managers and developers who ensure the accessibility of the site support it.

In Indonesia, there are several marketplaces with the highest number of visitors. Websites from the following marketplaces are visited by hundreds of thousands to millions of users. Fig 1 shows the 5 marketplaces with the highest number of daily visitors. Marketplace names are arranged in alphabetical order.



(source: https://www.statshow.com/ on 25/07/2021)
Fig 1. Daily Visitor

The data in Fig 1 shows the high number of visitors to those marketplace websites. The high number of visits shows the public's interest and need for the information contained on the website. The marketplace's websites should be able to meet the website accessibility score so that all users can have access to information without gaps. Therefore, researchers consider it important to check the marketplace's website.

Usability and accessibility are an important part of designing a marketplace website. There are many ways by which to evaluate the accessibility and usability of a website. To evaluate the accessibility of a website, many tools can be used, such as AChecker, WAVE, TAW, lighthouse, Sa11y,Tenon.io, GTMetrics, aXe, etc. This tool can assist HCI technicians in using accessibility guideline to evaluate various aspects of the website. Accessibility is a measure of the extent to which certain users can use the product to achieve certain goals. The specific goals are effectiveness, efficiency, and satisfaction for certain purposes. As far as the success of web-based application systems is concerned, usability is one of the important quality standards (Lestari et al., 2017). If web-based applications have higher usability, then the effectiveness, efficiency and user satisfaction during web participation will increase.

At the beginning of its development, we based website development on text media. However, when it was used as a commercial space, visual appearance, accessibility and design became important (Acosta-Vargas et al., 2018). In the process of website development, most

designers and managers have not implemented the right design for accessibility that is universal and inclusive. Therefore, people with disabilities visit websites less often.

In recent years, the public has realized this problem, and the term "web accessibility" has become a fundamental issue. Accessibility errors found in website evaluations make it difficult for users to access other pages of the website, especially for people with hearing, vision, and movement impairments. Therefore, it is very important for website developers to adhere to website accessibility guidelines and application standards in website design.

Research on the accessibility of websites in Indonesia has been carried out on various websites of different institutions, one of which is the evaluation of the accessibility of Higher Education Websites in Indonesia which concluded that High percentage of websites among the top-ranked universities in Indonesia failed to meet the accessibility standards based on WCAG. 2.0 compliance (Arini, 2020). Problems that often arise occur in points of alternative text, info and relationships, keyboard, three flashes or below threshold, block bypass, link purpose, label or instruction, use of color, contrast (enhanced) and contrast (minimum) (Frandini et al., 2018)

Another study was conducted on the websites of Ministries and State Institutions in Indonesia, which shows that there is still a need to improve the quality of the website, especially in terms of accessibility. Based on the WCAG 2.0 guidelines, it shows that some websites have shown zero accessibility errors, but some websites still have top levels of accessibility errors (Masyhur, 2015)

As for the research on evaluating the usability and accessibility level of marketplace websites, there is research conducted in Pakistan, and the findings show that many e-commerce websites in Pakistan are violating usability heuristics and web content accessibility guidelines (WCAG 2.0) (Hamid et al., 2020). People with visual impairment faces many problems during the shopping process (Elgendy et al., 2019). People with visual impairments have to shop with social help and learn about visual effects to overcome difficulties caused by insufficient product description and visual appropriateness cognition (Liu et al., 2019).

Evaluation of the accessibility of marketplace websites in Indonesia is needed to ensure that all users can access the information available on the website. So far, there has been no research on the accessibility of some of the top marketplace applications in Indonesia using multiple checking tools at once. Website accessibility in the marketplace refers to the extent to which all people (including people with disabilities) can access information on the website and can access it as a seller or buyer. If all users, including people with disabilities, can easily access the website, then the principle of accessibility can be achieved. If people with disabilities can carry the accessibility of information and digital transactions through the marketplace website out, it will influence increasing the opportunities for their economic independence.

This study produces the latest information about the evaluation results of the marketplace platform website as a consideration for website developers in Indonesia to make steps to increase website accessibility more effectively. The results are expected to contribute to increasing the participation of people with disabilities in the economy and industry 4.0 in Indonesia, as well as increasing corporate digital responsibility among marketplace business managers.

Method

Based on data, there are several marketplace websites in Indonesia, which have the most daily visitors. Researchers determine 5 marketplaces that fall into this category. This determination is based on the premise that accessibility has positive effect on customer satisfaction (Ahmad & Al-Zu'bi, 2011).

Referring to previous research, the researchers used various accessibility standards, such as the Stanca Act (Gambino et al., 2014), WCAG 1.0 (Akgul, 2017), WCAG 2.0 (Acosta-Vargas et al., 2018), till research that compares several standards (Ismail et al., 2017). This study uses WCAG 2.0 as the evaluation standard for AChecker, and WCAG 2.1 as the

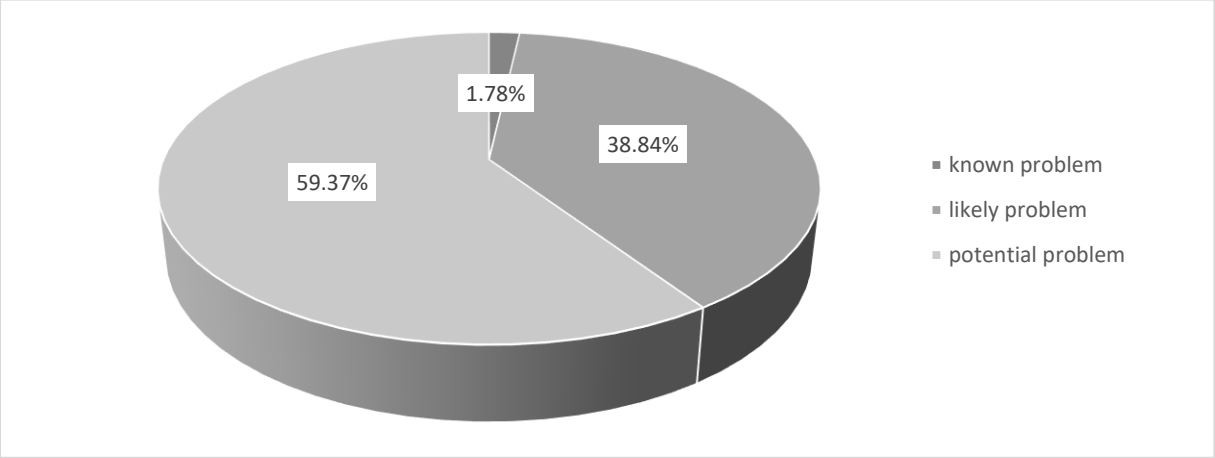
evaluation standard for Sa11y. The selection of this standard refers to research results showing that WCAG 2.0 is a standard that is widely used for accessibility research and often appears as keywords (Ahmi & Mohamad, 2019). In other hands, WCAG 2.1 serves to grow the existing rules to way better serve those who were not satisfactorily considered within the existing guidelines and to require under consideration unused utilize designs, especially related to mobile gadgets (Spina, 2019).

This study uses several accessibility evaluation tools, “AChecker”, "Sa11y", “Lighthouse”, and "aXe". The reason for choosing these tools refers to several studies using AChecker (Alshamari, 2016), Lighthouse is the highest number of users of automated tools according to Chrome Web Store (Frazão & Duarte, 2020), and aXe is a rule-based evaluation tool. However this tool is flexible and easy to extend, as the requirement to implement new automated accessibility tests is to apply some new rules (Rubano & Vitali, 2020). The evaluation process for the website carried out on April-July, 2021.

Results and Discussions

Web accessibility assessment evaluation is a procedure used to find accessibility issues and possibly assess the level of availability of the website. Problems found could arise from policy violations, failure modes, flaws, or user performance indicators showing low availability. Automated testing involves evaluators using the Automatic Accessibility Tool to validate web pages against accessibility policies.

This study uses several analytical tools that provide different results with different quality levels. The tools have been used for aim compliance checks of the marketplace website. An automated evaluation tool was used to assist researchers in reviewing guidelines by automatically detecting and reporting ergonomic deviations from the guidelines and providing suggestions for correcting them. This study presents the results of the assessment of the most visited marketplace websites in Indonesia by examining the formal representation of these guidelines on the website to overcome the main shortcomings of existing tools when accessed by users and people with disabilities. The results of the first tool assessment on table 1:



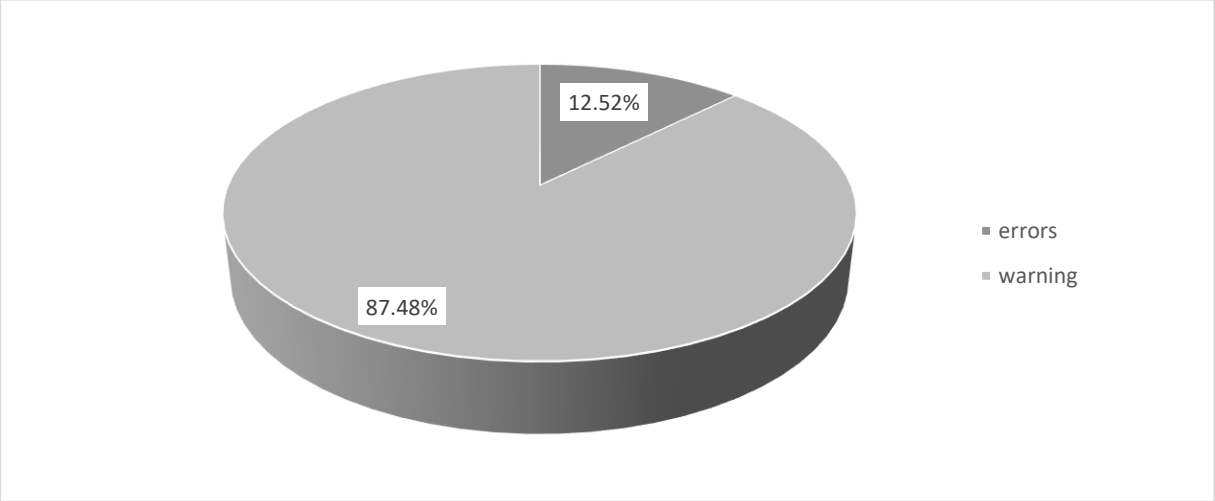
(source: https://achecker.achecks.ca/)

Fig 2. Result obtained with AChecker

There are 71 known problems, 1547 likely problems, and 2347 potential problems. Known problems mean there are issues that have been distinguished with certainty as availability obstructions. Developers must alter the page to settle these problems. Likely problems mean there are issues that have been recognized as plausible boundaries, but require a human to form a decision. Developers may likely have to be adjust the page to fix these

problems. Potential problems mean there are issues that AChecker cannot distinguish, that require a human decision. Developers will got to adjust the page for these issues, but in numerous cases developers will fair have to be affirm that the issue depicted isn't show[1].

Overall, the percentage of known problems is 1.78%, likely problems 38.84%, and potential problems 59.37%. Therefore, it is recommended that developers from each website prioritize improvements detected as known problems in order to reduce accessibility barriers that will be experienced by users with disabilities.



(source: https://ryersondmp.github.io/sa11y)

Fig 3. Result obtained with Sa11y

There are 92 errors and 643 warnings. Errors mean Sa11y detected accessibility and usability issues by using WCAG 2.1 Level A and AA accessibility issues. Warnings mean Sa11y detected potential accessibility or usability issues, and prompts to manually review an element[2].

Overall, the percentage of known problems is 1.78%, likely problems 38.84%, and potential problems 59.37%. Therefore, it is recommended that developers from each website prioritize improvements detected as known problems in order to reduce accessibility barriers that will be experienced by users with disabilities.

Tabel 1. Result obtained with Lighthouse

Item	Accessibility score	Passed audit	Not applicable
Mean	77	14,4	24,4

(Source: https://googlechrome.github.io/lighthouse)

The results of checking using Lighthouse show that the average score of the website samples is 77. While the range for accessibility score is 68-88, the range Passed audit is 12-17, and the range for Not applicable is 21-29. Accessibility score shows a weighted average of all accessibility audits.

[1] https://achecker.achecks.ca
[2] https://ryersondmp.github.io/sa11y/

Furthermore, based on an examination using aXe, a number of issues were identified. Of the 5 websites examined, the Elements aspect must have sufficient color contrast is the issue that most often occurs. Table 5 presents the types of issues that arose.

Table 2. The types of issues

Type of issues	Issues
Elements must have sufficient color contrast	1372
All page content should be contained by landmarks	191
Images must have alternate text	125
Links must have discernible text	88
Elements must only use allowed ARIA attributes	45
Alternative text of images should not be repeated as text	33
Links with the same name have a similar purpose	30
ARIA hidden element must not contain focusable elements	6
Buttons must have discernible text	6
Element must have a language attribute	4
ARIA commands must have an accessible name	4
Ensure interactive controls are not nested	4
Heading levels should only increase by one	4
Document should have one main landmark	3
Ensure that scrollable region has keyboard access	3
id attribute value must be unique	3
ARIA attributes must conform to valid values	2
Elements should not have tab index greater than zero	2
Page should contain a level-one heading	2
Must only directly contain	1
Form elements must have labels	1
Zooming and scaling should not be disabled	1

Based on the examination using aXe, it is known that the Elements aspect must have sufficient color contrast reaching 71% of the total number of detected types of issues. The issue of Elements must have sufficient color contrast often arises. One of the reasons is that sometimes developers use background colors and text that refer to the distinctive colors that become the identity of the institution, as well as aesthetic considerations. Whereas all content components must have adequate differentiate between content within the frontal area and foundation colors behind it. A few individuals with low vision involvement low differentiate, meaning that there aren't exceptionally numerous shinning or dull zones.

Website accessibility is an important aspect for website owners when creating a marketplace website because it can help users to access and provide information correctly through the website and facilitate transactions for users as part of the principles of corporate digital responsibility. In addition, the availability of accessibility on the website can also affect the interest of visitors to continue the transaction or not. The website administrator should always make improvement regarding accessibility to ensure ease of use for users and for people with disabilities. Marketplace websites still violate certain standards in the WCAG guidelines in terms of website accessibility. Accessibility errors are similar on almost any website: non-

text content, information and relationships, page titles, link targets, page language, entries, tags and descriptions, resolution, and name, role and rating standards.

Website accessibility is a type of measurement to find out the extent to which certain users can use a website to achieve certain goals with effectiveness, efficiency and satisfaction for certain applications. Accessibility is one of the important quality criteria in the success's context of a website system. If the website has high accessibility, the level of effectiveness, efficiency and user satisfaction when engaging with the web will also increase (Lestari et al., 2017).

Limited organizational and operational capabilities regarding accessibility services may cause excessive cognitive enhancement (Khan et al., 2018). Therefore, rules, principles, standards and design patterns are made based on the experience of design professionals and scientists by examining the individual characteristics of the environment and the impact of these technologies (Nacheva, 2020).

Accessibility assessments can use tools that scan the mobile app screen based on: content label, touch target size, clickable elements, and text and image contrast. Scoring refers to screen elements which must be large enough to have constant interaction according to WCAG 2.1 principles. Additional manual analysis should be performed, so that the rater performs a full check against the relevant requirements, and reviews any accessibility errors found by automated analysis tools (Acosta-Vargas et al., 2019). Therefore, automated tools will help in the evaluation process, but they should not understand their use as a complete analysis, because each automated analysis tool will have its own features, drawbacks and strengths.

This research shows that there is some non-compliance with WCAG on most visited marketplace websites. Accessibility errors are the most common, which significantly affect people with disabilities using keyboards and screen readers. Overall, all websites reviewed have accessibility errors and have not fully complied with WCAG. We highly recommended that marketplace website developers pay more attention to and use web accessibility standards. Another way to improve website accessibility is to enforce compliance with existing standards through giving appreciation at certain events to increase the company's motive for improving the performance of its website. Some user interaction barriers, such as inappropriate graphic labels and forms, and confusing page layouts, would be relatively easy to solve if programmers focused on improving accessibility efforts (Gonçalves et al., 2018).

In principle, to attract more users and maintain user satisfaction, efforts to increase website accessibility should be further developed (Alshira'H, 2020), Regardless of the user's disability, every digital application and technology should be fully understood by all users (Hussain & Omar, 2020). This is necessary so that people with disabilities can get opportunities and take advantage of information technology like other users. If this gap in communication and information technology can be expected, then we can hope that an inclusive society in communication technology can be realized.

Conclusion

The results of the accessibility evaluation of most visited marketplace websites in Indonesia show that there are still violations of certain standards in the WCAG guidelines in terms of website accessibility. An examination using various accessibility checker tools resulted in the same conclusion, that the most visited marketplace website in Indonesia requires an increase in accessibility quality. Accessibility quality improvement can be done by conducting periodic reviews and fixing them after they are detected.

Similar accessibility issues occur on almost all websites: Elements must have sufficient color contrast. The most common accessibility errors significantly affect people with disabilities especially users with low vision. To increase the awareness of website developers, it can be done through socialization and continuous monitoring by stakeholders. Concern about the

importance of accessibility of marketplace websites for users with disabilities is an important aspect to realize information and economic equality, as well as play a role in creating an inclusive society.

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