Top 5 E-Commerce Performance Analysis Using Google Lighthouse Matrix

Ahmad Adli [1], Titik Wihayanti [2], and Deden Witarsyah [3]

[1,2,3] Telkom University, Bandung, Indonesia
[1] `magisterahmadli@student.telkomuniversity.ac.id`

Abstract. In the rapidly growing digital era, many activities can be conducted through online media such as learning, working, investing, and others. In addition, technology is also expanding in our daily lives, such as in shopping, which can be achieved through direct sales by sellers and buyers. Google Lighthouse is an open-source automated audit tool to improve website quality. This tool provides a clear way to improve website quality by allowing developers to audit performance, accessibility, compatibility with Progressive Web Apps, and more. The results of this study are expected to provide real-world insights based on the matrix defined by Google Lighthouse for future improvements. From the results of the run audit conducted on the Top 5 E-Commerce, it can be seen that in terms of performance, Tokopedia received the highest score, namely 73, and a yellow index, which can be optimized again by minimizing the Total Blocking Time of 1,190ms to make it more optimal in terms of performance. It can be concluded that e-commerce website performance does not have a significant effect; therefore, e-commerce popularity is not only dependent on application performance.

Keywords: E-Commerce, Website, Performance, Analysis.

1   Introduction

In the rapidly growing digital era, many activities can be conducted through online media such as learning, working, investing, and others. In addition, technology is expanding in our daily lives, such as in shopping, which can be achieved through direct sales by sellers and buyers. However, this activity could also be accessed online. Online shopping transactions are facilitated by a platform called e-commerce. Commerce, also known as online shop, is a digital platform that facilitates its users to transactions in goods or services and is a digital platform that provides facilities to carry out social activities for each user. E-Commerce is also a means to socialize with each other and is done online which allows people to interact with each other without being limited by time and place.[1] Based on the data of Indonesia's 5 most popular E-Commerce for Q2 2022 compiled from the Goodstats website [23], e-commerce currently popular in Indonesia are Tokopedia, Shopee, Lazada, Bukalapak and Blibli. Tokopedia ranks first among Indonesia's most visited marketplaces. The number of visitors to Tokopedia has

reached 158 million per month in the 2nd quarter of 2022. This shows the amount of user trust in this e-commerce.
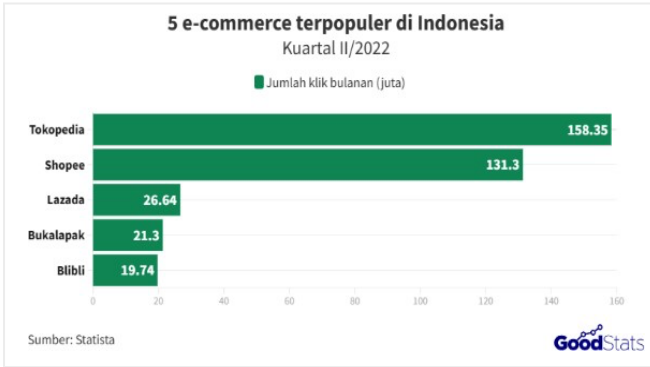

Fig. 1. Top 5 E-Commerce Popular in Indonesia 2022

Referring to data from the website databoks.katadata.com [24], in Q4 2022, there was a shift in champions and Shopee occupied the first position with 179 million visits per month, beating Tokopedia, which was in second place with 139 million visits per month. Despite this shift, the top five e-commerce lists are still occupied by the same lineup of names: Shopee, Tokopedia, Lazada, Bukalapak, and Blibli.
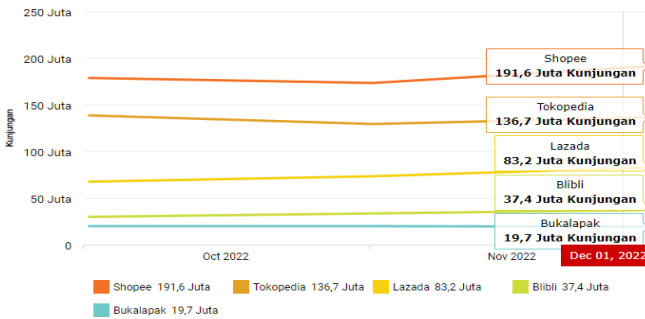

Fig. 2. Five E-Commerce with the Most Site Visits in Indonesia (Q42022)

The popularity of a website so that it can be accessed by millions of visitors is affected by its performance of the website itself. When a website's performance is in the good category, visitors feel comfortable interacting and increasing transactions on the website [2]. One of the tools that can be used to audit the performance of a website is Google Lighthouse. Lighthouse is an open-source automated audit tool to improve quality. This tool provides a clear way to improve website quality by allowing developers to audit performance, accessibility, compatibility with Progressive Web Apps, and more. The results of this study are expected to provide real-world insights based on the matrix defined by Google Lighthouse for future improvements.

2 LITERATURE REVIEW

2.1 Website

A website is a series of web pages that still exist on a domain or subdomain that is located on the World Wide Web (WWW) on the internet. The reason someone visits a website is because of the content available on that website. Examples of websites are Google.com & Facebook.com. Dissemination of news through the website is very fast, covers a wide area, and is not limited by delays and time. Therefore, a website is an important vehicle for obtaining & managing information. Even from experts, the website is a news page that is provided via the internet so that it can be accessed worldwide as long as it is connected using an internet network. Website is a component or a series of components consisting of text, images, sound and animation so that it is interesting to visit [10].

2.2 E-commerce

Social media are interactive technology that facilitate the advent and sharing of information, thoughts, interests, and different kinds of expression via digital groups and networks.[1][2] While demanding situations to the definition of social media arise[3][4] because of the kind of stand-on my own and integrated social media offerings presently available. Users generally get right of entry to social media offerings via the web-primarily based totally apps on computer systems or down load offerings that provide social media capability to their cellular devices (e.g., smartphones and tablets). As customers have interaction with those digital offerings, they devise notably interactive structures in which individuals, groups, and businesses can share, co-create, discuss, participate, and regulate user-generated or self-curated content material published online.

[8][6][1] Additionally, social media are used to file memories, find out about and discover things, put it on the market oneself, and shape friendships together with the boom of thoughts from the advent of blogs, podcasts, videos, and gaming sites.[9] This converting courting among people and era is the point of interest of the rising area of technological self-studies.[10] Some of the maximum famous social media websites, with greater than a hundred million registered customers, consist of Facebook (and its related Facebook Messenger), TikTok, WeChat, ShareChat, Instagram, QZone, Weibo, Twitter, Tumblr, Baidu Tieba, and LinkedIn. Depending on interpretation, different famous structures which can be every now and then called social media offerings consist of YouTube, QQ, Quora, Telegram, WhatsApp, Signal, LINE, Snapchat, Pinterest, Viber, Reddit, Discord, VK, Microsoft Teams, and greater. Wikis are examples of collaborative content material advent.

2.3   Tokopedia

Tokopedia is an e-commerce service founded by William Tanuwijaya and Leontinus Alpha Edison in 2009 with the mission of digital economic equality. During its 13 years of operation, Tokopedia has transformed into one of the most popular e-commerce platforms in Indonesia, and at least 865 million products are currently marketed on the Tokopedia website. Tokopedia also help many MSMEs to market their products online and claim to have empowered 90% of micro- scale sellers during the pandemic.

Tokopedia has several other service innovations, such as Official Stores, a B2C marketplace that serves consumers looking for products from local and international official brands and distributors. Mitra Tokopedia is a service for Warung, grocery stores, and similar businesses that provides access to a wide range of physical and digital products,Tokopedia NOW! is an Instant Commerce service that helpspeople fulfill their daily needs, and staples that can be delivered in less than two hours after payment.[25].

2.4   Lazada

Lazada is a marketplace under the Lazada Group was founded in 2011 by Rocket Internet. Rocket Internet is a German incubator that sets up Amazon-like business model companies that focus on online retail sales.

In Indonesia, Lazada's marketplace service began operations on March 27, 2012, offering a wide range of products in various categories, such as household needs, groceries, fashion, sports equipment, toys, and electronics. Lazada also operates in Southeast Asian countries, such as the Philippines, Singapore, Thailand, and Vietnam. Along with significant business growth, in 2016 Lazada was acquired by Alibaba Group as the majority shareholder.[26]

2.5   Shopee

Shopee is the second most recognized online shopping platform in Indonesia according to the 2019 Online Shopping Behavior Survey conducted by a Research Media. The online shopping platform with the yellow logo is better known by women in the same survey, which states that 86 percent of female shoppers have purchased products on Shopee e-commerce.[27]

Shopee was first launched in 2015 in seven Southeast Asian markets in Singapore, Malaysia, Indonesia, Thailand, Taiwan, Vietnam and the Philippines. Shopee began to be widely recognized through attractive free shipping promos until it became a pioneer of promos, followed by its competing e-commerce. In 2017, this Singapore-headquartered company received the Marketing Award 2017 and an award at the Bright Awards Indonesia 2017 for the Most Memorable Advertisement category.[27]

2.6 Bukalapak

Bukalapak is a local marketplace that was founded by Ahmad Zaky in 2010. In 2017, with 90 million active users, Bukalapak managed to grow rapidly until it became one of the unicorn startup in Indonesia. Along with many marketplace competitors offering similar online shopping services, Bukalapak began to decline in popularity, but continued to innovate by changing its business model. Currently, Bukalapak has build several subsidiaries such as PT Buka Mitra Indonesia which is Bukalapak's B2B platform for physical, virtual, financial and logistics products.PT Buka Pengadaan Indonesia, Bukalapak's business line aims to become a digital procurement partner for corporations, MSMEs and the government, and PT Buka Investasi Bersama, a technology-based financial service company was established on June 12, 2019.[28]

2.7 Blibli

Blibli is a local shopping site established under PT Global Digital Niaga Tbk, a technology issuer owned by the Djarum Group. Blibli was founded in 2011 and pioneered 0% installment services and midnight delivery. Like other e- commerce products offered on the Blibli site are very varied

starting from daily essentials, fashion, furniture to electronic goods. Blibli also innovates by pioneering an omni-channel commerce and lifestyle ecosystem in Indonesia that focuses on consumers and institutions. This omni-channel service has reached more than 27,000 clicks & collect. Then through the Blibli InStore service more than 160,000 Blibli Partners who are micro entrepreneurs and grocery stores have joined.[29]

2.8 Google Lighthouse

Lighthouse is an open source automated auditing tool for improving website quality. This tool provides a clear way to improve website quality by allowing developers to audit their performance, accessibility, compatibility with Progressive Web Applications, and more. Basically, ``This tool will get you out of trouble,'' hence the name Lighthouse. Lighthouse's Her SEO Audit category allows developers and webmasters to run a basic Her SEO Health Check on a web page to identify areas that need improvement. Lighthouse runs locally in your Chrome browser, so you can run his SEO audits on pages in your staging environment, active pages, public pages, and pages that require authentication.

2.9 Matrix Google Lighthouse

Performance is a measure of how fast a browser can render web pages. Lighthouse uses a web browser called Chromium to render pages and run tests at build time. This tool is open source (meaning it's community-maintained and free to use). As you can see

there are four metrics: Performance, accessibility, best practices, and SEO [20] [21] [22].

3   Method

Prior to conducting an investigation, the applicable investigation procedures are shown in Figure 3 below.
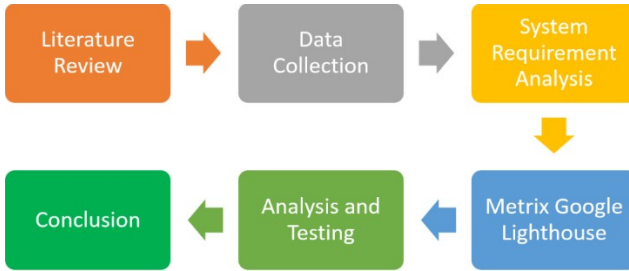

Fig. 3. Research Flowchart

It is understood that this research begins with literature or a study of literature from various sources such as: B. Information about research being conducted from both articles and journals supporting that research.

Data collection is done by entering the website you want to research into Google and checking some metrics that apply to Google Lighthouse. All of these indices are in the range 0-100. A score of 0-49 is incorrect, a score of 50-89 is sufficient, and a score of 90-100 is excellent. After conducting an audit of a given marketplace website, Lighthouse generates reports on 5 different areas.

1. Performance includes factors such as images and resources that slow down your Marketplace page.
2. Accessibility looks at how easily marketplace content is accessible to users, including the use of assistive technology.
3. Best Practices identifies web development elements that do not comply with curre guidelines and best practices.
4. SEO highlights SEO issues even on less comprehensive websites.

It consists of multiple audits such as Performance, Accessibility, Progressive Web Applications, SEO, etc., and runs on any web page, whether hosted on a server or on public services such as Google Pages or GitHub can. Each audit is accompanied by a reference document that explains why the audit is essential and how it can be improved. Lighthouse can be run as a web app from its GitHub repository, but there is also a Chrome extension that can be run on any website. It is used by many front-end developers to analyze performance metrics of various front-end web applications. Available in a variety of easy-to-use workflows, Lighthouse is a must-have tool for webmasters concerned about website speed. An analysis and testing phase is conducted

to find reports from each of the audited e-commerce (Tokopedia, Shoppe, Lazada, Bukalapak, and Blibli in this case). This process includes a run test step that runs over all of the homepage.

4 Result and Discussion

Based on the data collection received on May 12, 2023, we will continue our analysis and testing with the scan results obtained using the obtained Google Lighthouse data.

Table 1. Google Lighthouse Analysis Result Recapitulation of Top 5 E-Commerce

NO	Platform E- Commerce	Google Lighthouse Analysis Result				
		Performance	Accessibility	Best Practices	SEO	PWA
1	Tokopedia	73	86	100	93	V
2	Shopee	10	79	83	93	X
3	Lazada	60	41	92	79	X
4	Bukalapak	30	97	92	89	V
5	Blibli	20	43	75	86	V

From the results of the Run-audit conducted on the Top 5 E-Commerce, it can be seen that in terms of performance, Tokopedia received the highest score, namely 73 and a yellow index, which can be optimized again by minimizing the Total Blocking Time of 1,190ms to make it more optimal in terms of performance. For performance in terms of accessibility, Bukalapak is outperformed with a value of 97 and a green index. This can be improved by optimizing the contrast aspect in this application. In terms of Best Practices, Tokopedia is far superior to the others, with a score of 100 and a green index that shows how good the user's experience is when using this application. For SEO performance, Tokopedia and Shopee occupy the same position as the best of other e-commerce with a score of 93 and a green index. This means that both of these e-commerce sites have passed the checks and ensured that the page has followed basic search engine optimization advice. Finally, for the implementation of progressive web applications, 3 out of 5 e-commerce can do well namely Tokopedia, Bukalapak and Blibli.

5 Conclusion

Based on the analysis and testing carried out in this study using Google Lighthouse on the Top 5 E-Commerce, all were tested based on four metrics namely performance, accessibility, best practice, SEO and PWA. It can be concluded that the performance indicators that have the most significant impact on selling points to users are Best Practices that provide the best user experience. So the reason for Tokopedia's popularity does not only depend on the performance of the application being built. However, from

the results of this study we can see that there are other factors that have a greater influence apart from the performance presented by this e-commerce. From the Top 5 E-commerce, it can be seen that there is still much to be optimized, especially in the area of performance. This should be fixed as soon as possible to get better results and better performance than before.

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