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ANALYSIS OF PERFORMANCE OF TOP 5 E-COMMERCE PLATFORMS IN SOUTHEAST ASIA (SEA) REGION USING GOOGLE LIGHTHOUSE

1.0 INTRODUCTION

At the height of the pandemic, e-commerce platforms experienced a surge in visitor numbers, with a study by Jensen et al. (2020) showing that of 1,558 US households, more than half (55%) of the respondents shopped online, and 58 percent said they would continue to shop online in the future [2]. This study accurately predicted future trends. The US e-commerce industry is projected to have a revenue of 1,498.94 billion dollars in 2026 according to a Statista report [8]. With its booming popularity, many e-commerce platforms have popped up, and accompanying them are e-commerce websites. From Fig. 1., we can see that the top 5 e-commerce websites across this region are Shopee, Lazada, Tokopedia, Blibli and Orami, ordered by most to least sessions in 2024 [7]. The top 5 e-commerce sites accumulated a total of 858.92 million web sessions, with Shopee accounting for around 65% of the statistic. After Shopee, Lazada reported 140 million web sessions, and Tokopedia is 30 million shy of that number. Blibli and Orami reported 27.2 and 21.72 million web sessions respectively.

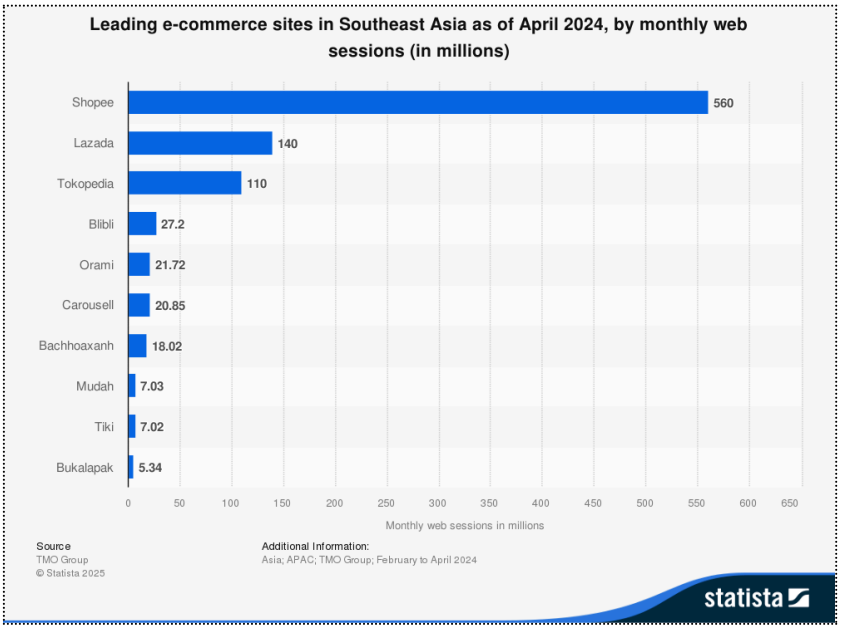

Fig. 1. Leading e-commerce sites in Southeast Asia as of April 2024.

While price, risk, and subjective norms do affect users' preference for online shopping and e-commerce sites [1], we cannot neglect the importance of having usable interfaces for shoppers. Through his research, Lee et al. studied participants navigating an online book store and found that there is a significant correlation between pre-use usability of websites, i.e. users' subjective perceptions on usability, and their preference for the websites [3]. Hence, it can be argued that website usability and performance is as important as its content, and failure to address performance might be harmful to e-commerce companies. A popular tool that can be used to analyze a website's performance is Google's Lighthouse. Lighthouse is a free and open-source tool developed by Google to audit a website's

performance, and can be run as a Chrome or Firefox extension, through Chrome's inspect tool, through a Node module or even through a website [4, 5]. At the end of its audit, Lighthouse will provide an informational report that makes it easy for web developers to improve their website — and e-commerce companies to gain more customers. Through this study, we expect to use Lighthouse results to analyze trends among websites and identify their strengths and weaknesses, as well as provide recommendations for optimization and improvement based on the performance audit report.

2.0 LITERATURE REVIEW

2.1 Website

A website is a group of related web pages accessed through a web browser using a unique URL. It can serve multiple functions, including sharing information, offering entertainment, enabling communication, and supporting online transactions [11]. In today's digital world, websites play an important role in helping businesses expand their reach, build trust, and engage with customers. A properly designed website will not only deliver key information but also helps in brand development and has a strong impact on shaping customer behavior [12].

2.2 E-commerce

E-commerce is a familiar term for people who frequently buy and sell products online. The technical definition of e-commerce or electronic commerce by Amazon is "the trading and selling of goods online" [9]. The invention of e-commerce has allowed everyone with an internet connection to buy and sell products and services, both digital and physical at an increasing amount every year. E-commerce platforms are maintained by the companies that operate them, who own a profit from sellers who use their platform for sales [10].

2.3 Google Lighthouse

Lighthouse is an open-source automated tool that can be used from the command line with Chrome DevTools to help enhance the quality of web pages. It performs a number of audits on the page when a URL is linked to audit [5]. A multiple-report detailing will then be produced to demonstrate the page's performance through recommendations. All of these can be done by installing a Chrome extension within the browser [4].

3.0 METHOD

Lighthouse performs performance audits on five categories, namely: performance, accessibility, search engine optimization (SEO) and best practices. For each of these categories, Lighthouse assigns a score of 0 to 100, where a score of 0 to 49 indicates 'Poor' results, 50 to 89 'Needs Improvement', and 90 to 100 being 'Good' [6]. Fig. 2. represents an example score that might be given by Lighthouse.

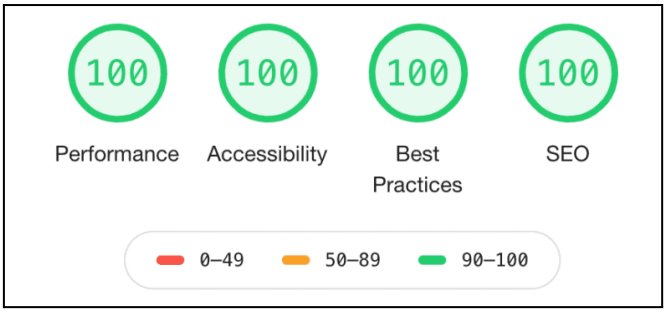

Fig. 2. Lighthouse score view.

To conduct this study, the top 5 websites will be visited and a Lighthouse audit will be conducted either by using the available Lighthouse extension, its website, or the inspector tool on Chrome browsers.

4.0 RESULTS AND DISCUSSION

Based on the results collected, we have uncovered some interesting and significant findings. Table I shows the results from Google Lighthouse's analysis on the top 5 e-commerce websites in the region.

TABLE I
GOOGLE LIGHTHOUSE AUDIT RESULTS OF TOP 5 E-COMMERCE SITES IN SEA

		Google Lighthouse Audit Results			
Num	E-commerce platform	Performance	Accessibility	Best Practices	SEO
1	Shopee	15	77	79	85
2	Lazada	55	45	39	85
3	Tokopedia	46	69	54	92
4	Blibli	53	96	57	92
5	Orami	37	87	75	92

1. Shopee

Across the board, Shopee scores better than other e-commerce platforms on average. A very low score of performance in Shopee shows that it has issues with time responsiveness to load heavy resources which causes lagging. Shopee should reduce putting heavy elements such as images to avoid the user interface looking dense and optimize for better performances. Shopee's accessibility made it relatively easy for users from different ages and backgrounds to view and search the items. One of the best practices is using a strong HSTS (HTTP Strict Transport Security) policy which reduces the risk of downgrading HTTP connections and eavesdropping attacks. Users can expand their searches and wishlist due to

the good of SEO. These reasons might be why Shopee is so popular among SEA online shoppers.

2. **Lazada**

The performance is moderate but still needs to be optimized. One of the reasons why it's better compared among the platforms is because it reduces the unused CSS to decrease byte consumed by network activity. It also has effective SEO practices. At the same time, Lazada should update and optimize the backend code to follow current industry standards, and ensure there are no outdated technologies in use. Lazada's user accessibility is not inclusive and not a friendly-beginner for first time online shopping users. This platform doesn't seem to have good practices such as it doesn't use HTTPS which leads to sensitive data to be handled. Hence, Lazada should emphasize security on the platform so that users can shop online safely.

3. **Tokopedia**

With a moderate score of performance, it needs to pay attention to reducing load times caused by third party codes and large layout shifts to improve server-side performance. Meanwhile, the accessibility is decent, the score can be increased by focusing on ensuring all users can use the site efficiently from different devices. For example, buttons should have an accessible name so that it can be clicked and viewed clearly. Furthermore, the best practices score is moderate, and code still needs to be optimized and adhere to modern web standards by avoiding deprecated APIs, which will eventually be removed from the browser. The platform has a successful HTTP status code that shows that it has an excellent SEO score.

4. **BliBli**

The performance score is moderate, similar to Tokopedia and Lazada. It requires optimization to improve loading times and general user experience by serving images that are appropriately-sized to save cellular data. An excellent accessibility enhanced user's focus is directed to new content added to the page, which shows how easy it is to interact with BliBli. Blibli could still improve its adherence to modern web development standards by avoiding using third party cookies. A great SEO score demonstrates solid search engine optimization.

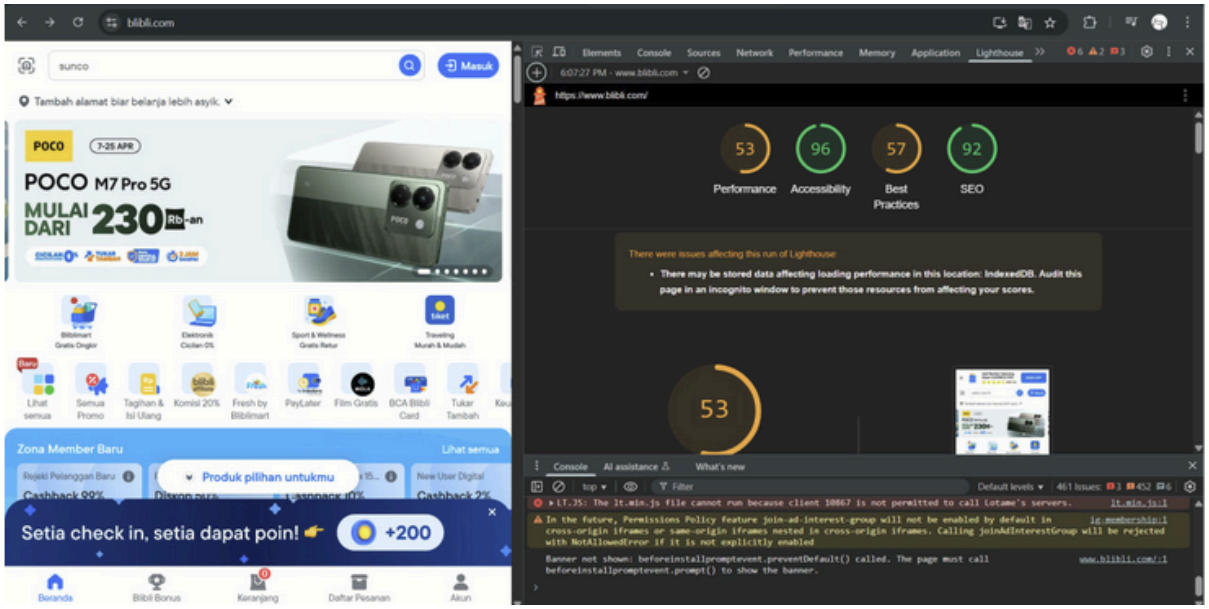

Fig. 3. Blibli's Lighthouse Report.

5. Orami

Orami has the lowest performance score among all the websites. The site likely faces significant issues related to load time and resource management. Total blocking time and speed index is long. When it takes so much time for loading, large network payloads cost users real money. For example, users may have to pay for more cellular data. Orami is fairly accessible to users where interactive elements, such as links and buttons, indicate their state and be distinguishable from non-interactive elements. Orami's best practice is to display images with correct aspect ratio and appropriate resolution to ensure that the design is mobile and desktop-friendly. Orami's SEO score is on par with Tokopedia and Blibli.

5.0 CONCLUSION

In conclusion, there are clear differences between the performance of a website and their scores on Google Lighthouse analysis reports. Clearly, a website's performance affects a user's perception of it and the willingness to use it. Developers of the platform should make use of available tools to improve their site for better performance which would lead to better engagement with the platforms by users. In doing so, the platforms can continue to profit and provide enjoyable user experience to shoppers. We hope that with these findings, developers of the platforms can create better online shopping experiences for their users.

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