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Website Performance Analysis of Leading Tech Brand Websites Using Google Lighthouse

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ABSTRACT

This study presents a comparative performance analysis of six leading tech brand websites which are Apple, Samsung, Razer, Microsoft, Sony and ASUS using Google Lighthouse, an open-source, automated tool developed by Google to audit the quality of web pages. Each site was evaluated based on 4 core performance metrics: performance, accessibility, best practices and SEO. This research provides insights into how major digital platforms can optimize user experience and technical efficiency. The findings can guide developers, designers and business in implementing data-driven improvements that enhance usability and ensure competitiveness in an increasingly performance-sensitive digital landscape.

KEYWORDS

Web Performance Analysis, Tech Brand Websites, Google Lighthouse, User Experience Metrics

1. Introduction

In today's digital era, a company's website is essential for communicating with users, reflecting its brand, and engaging people. This is particularly important for global technology companies, whose websites need to show creativity, deliver high performance, and ensure easy accessibility for a wide and diverse users [1]. Web performance refers to both the measurable aspects and the perceived user's experience related to a website's load time and its responsiveness. It involves how quickly a site loads, how soon it becomes interactive and responsive to user inputs, and how smoothly the content behaves during user interactions.

This report provides a comparative analysis of the performance of six leading tech brand websites that we chose which are Apple, Samsung, Razer, Microsoft, Sony, and ASUS. We chose these tech brands due to their global influence, strong market presence, and relevance in the consumer electronics industry. The assessment makes use of Google Lighthouse, an open source auditing tool that analyses a website's performance, accessibility, best practices and Search Engine Optimization (SEO). [2]

2. Methodology

In this report, we obtained relevant information from a variety of internet sources like websites. The websites were chosen from six major tech brands, selected for their global impact, online visibility, and market share.

Brand & Website URL

1. Apple - https://www.apple.com/
2. Samsung - https://www.samsung.com/my/
3. Razer - https://www.razer.com/
4. Microsoft - https://www.microsoft.com/en-my/
5. Sony - https://www.sony.com/en/
6. ASUS - https://www.asus.com/

We used Google Lighthouse, a web performance audit tool integrated into the Google Chrome browser, to assess the performance of the chosen tech brand websites. This application offers automated assessments for several important areas including Performance, Accessibility, Best Practices, and Search Engine Optimization (SEO).

In Google Lighthouse report, the colors usually represent performance levels based on scores. The score ranging from (90 - 100), which is in green, denotes good performance that satisfies the suggested criteria. Next, orange (50 - 89) indicates moderate performance that needs improvement. Lastly, red (0 - 49) indicates significant problems affecting the user experience and draws attention to poor performance. These colors help quickly identify which areas of a website that require work and those that are optimized.[3]

3. Results and Analysis

In this section, we analyze the detailed Lighthouse performance metrics of each selected website. We focused on five key indicators that directly affect the user experience and page load efficiency as shown in the figures below:

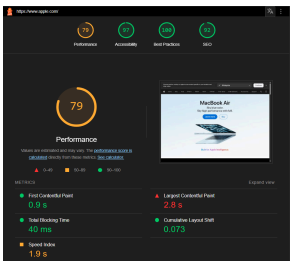

Figure 1: Apple

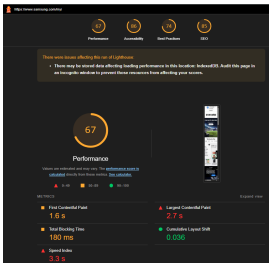

Figure 2: Samsung

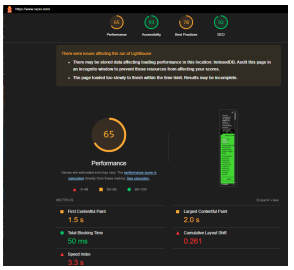

Figure 3: Razer

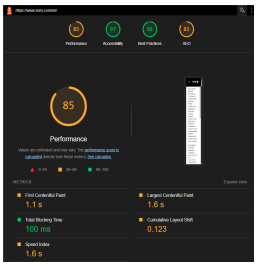

Figure 4: Sony

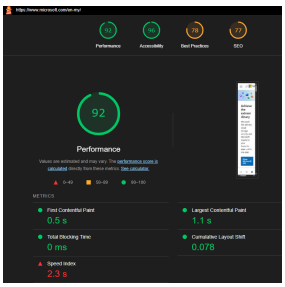

Figure 5: Microsoft

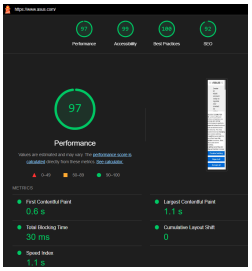

Figure 6: ASUS

Based on the Lighthouse analysis, Microsoft and ASUS had the highest performance scores. Both were firmly in the green zone with rapid First Contentful Paint (FCP) which is 0.6s for ASUS and 0.5s for Microsoft and similarly low Largest Contentful Paint (LCP) which is 1.1s. Additionally, ASUS achieved a perfect score of 0 for Cumulative Layout Shift (CLS) and low Total Blocking Time (TBT). This suggests user experiences that are quick, smooth and reliable.

In comparison, the other four brands, Apple, Samsung, Razer, and Sony showed mixed results. Although Apple had a low TBT and an excellent FCP of 0.9s, its total performance was negatively impacted by its LCP of 2.8s. Sony did rather well, however it lagged behind ASUS and Microsoft due to its 100 ms TBT and somewhat higher CLS. Samsung's performance was mostly in the orange zone, with a slower FCP (1.6s), a higher TBT (180ms), and a slower Speed Index. Razer also had trouble ,especially with a red CLS of 0.261 that indicated poor layout stability. These variations demonstrate how, out of the six brands, ASUS and Microsoft provide the best user experience.

4. Comparison and Discussion

Brands	Performance	Accessibility	Best Practices	SEO
Apple	79	97	100	92
Samsung	67	86	74	85
Razor	65	93	78	92
Microsoft	92	96	78	77
Sony	85	97	96	83
Asus	97	99	100	92

Table 1

Apple

Apple's site demonstrates excellent compliance with accessibility guidelines and best practice, with high scores of 97 and 100 respectively. Its performance score of 79, however, reveals a substantial deficit relative to highest-scoring sites in this study. While Apple possesses a similarly fast First Contentful Paint (FCP) of 0.9 seconds and low Total Blocking Time (TBT), Largest Contentful Paint (LCP) is 2.8 seconds, the highest among the six websites. This means that while the page loads quickly from the beginning, loading of significant visible elements is sluggish, impacting perceived as opposed to actual loading performance on behalf of users, especially on slower networks.

Samsung

Samsung's website scored one of the lowest performance scores in the test with a score of 67 but good accessibility and SEO scores of 86 and 85 respectively. That its FCP is slower at 1.6 seconds, with a high Total Blocking Time of 180 ms, and a bad Speed Index indicates that users experience high delay before they are able to interact with the page content. While the brand identity of Samsung is evident in the site's modern appearance and design, the technical optimization appears to be missing, suggesting too much scripting or non optimized assets may be contributing to a sluggish user experience compared with other leading tech brands.

Razer

One of the lowest performance scores was on Razer's site, with a score of 65. While its accessibility and SEO scores were both healthy at 93 and 92, the website was beset by layout instability issues, as evidenced by a Cumulative Layout Shift (CLS) score of 0.261 which is the highest instability on all six websites. This can be annoying to navigate, especially where content is suddenly toggled on and off while a user interacts with the page. Performance was also affected by moderate

Total Blocking Time and loading delays, suggesting the need for layout, image, and third-party script optimization.

Microsoft

Microsoft's website was one of the top-scoring sites in this test, with a performance score of 92 and a very fast FCP of 0.5 seconds, the fastest of all the sites tested. 1.1-second LCP and negligible Total Blocking Time suggest a smooth, heavily optimized user interface. Despite such remarkable technical strengths, Microsoft's search engine optimization ranking was sadly lower than expected at 77. It would signal better best practices of search engine optimization in the form of higher meta descriptions, headings hierarchies, and marked-up data to meet its amazing technical as well as design benchmarks.

Sony

Sony's website was well-balanced in terms of performance and compliance with web standards, scoring 85 for performance and 97 for Accessibility and 96 for Best Practices. The website delivers a good and interactive user experience, albeit slightly less than ASUS and Microsoft due to a moderate Total Blocking Time (100ms) and a non-zero CLS, indicating small layout adjustments on load. While these issues are not extreme, further script optimization and layout resource optimization would render the site even more uniform and offer an even smoother user experience.

ASUS

ASUS was the performance-leading site on the review with a top performance score of 97, excellent Accessibility (99), and perfect Best Practices score of 100. Its tech efficacy is seen through an extremely fast First Contentful Paint of 0.6 seconds, low LCP of 1.1 seconds, and perfect 0.0 CLS score for stability in layout at page load. The only area with little room for improvement was SEO, which scored 92, and this shows that while technical site optimization is good, occasional meta tags checking, structured data, and links management could drive its visibility even higher.

5. Recommendations

Apple

Apple's website exhibits superb accessibility and great web best practice compliance, but its performance has been undermined by an unnecessarily inflated Largest Contentful Paint (LCP) of 2.8 seconds, which affects how fast the main content loads for users. Apple can do better on this by improving image optimization, especially for huge hero images, by using new formats like WebP or AVIF and using good compression algorithms. Moreover, preloading of required resources such as fonts and important images can reduce delays during rendering, while lazy loading of offscreen content will yield smoother and faster page loads, especially on mobile.

Samsung

Samsung's website has an excellent-looking user interface but shows performance problems, with particularly slow First Contentful Paint (1.6s) and elevated Total Blocking Time (TBT) of 180 ms. Samsung can address these by attempting to decrease JavaScript execution time through deferring or loading non-essential scripts asynchronously and limiting excessive third-party content. Server-side rendering or caching implementations can also increase page speed, especially for regular visitors. Besides, asset compression and optimization of CSS and JavaScript files will help deliver a faster and smoother experience across various devices.

Razer

Razer's website offers a strong brand experience with decent accessibility and decent SEO, but the poor Cumulative Layout Shift (CLS) score of 0.261 suggests layout instability on page load. To solve this, Razer would be well advised to reserve space for images, ads, and dynamically added content using size attributes or CSS aspect ratios. Additionally, verifying and optimizing third-party script position and load order can prevent unexpected content shifts. Improved lazy-load management and image size optimization will enhance the layout stability, resulting in a more

seamless and user-friendly experience.

Microsoft

Microsoft's website boasts excellent performance and fast loads, with standout features being the 0.5-second First Contentful Paint and low LCP of 1.1 seconds. Its SEO score (77) shows that there is still room for improvement regarding search engine optimization best practices. To strengthen this section, Microsoft should audit its meta tags, utilize consistent and descriptive alt text for images, and apply structured data markup (Schema.org) to enable search engines to more easily interpret the content of the website. Clarifying heading hierarchies and eliminating duplicate metadata can also boost discoverability and visibility in search engine results.

Sony

Sony's website performs well in accessibility and best practices, but it is moderately laid out with instability and has a high Total Blocking Time of 100 milliseconds. To enhance performance, Sony can optimize long JavaScript actions and reduce third-party script blocking the main thread. Preloading important assets, such as fonts, and applying new asynchronous script loading methods can further reduce blocking times. Additionally, applying font-display: swap to web fonts and leaving enough space for interactive elements can assist in reducing subtle layout shift issues and improve overall visual stability.

ASUS

ASUS takes the top spot with superb performance, ranking close to perfect in every Lighthouse category but one, and a perfect CLS of 0.0. Its SEO score of 92, however, suggests that search optimization can be better. ASUS must focus on improving meta descriptions, ensuring page titles are descriptive and unique, and having healthy internal linking. Regular verifications of broken links, the use of structured data for improved search engine understanding, and frequent sitemap submissions will further enhance ASUS's already strong web presence and keep its pages current in search results.

6. Conclusion

The results of this comparative study of website performance highlight the importance of optimization in guaranteeing technical superiority and user satisfaction. For global tech brands, a website may be the first point of contact with consumers, where speed and effortless browsing have a direct impact on brand perception and engagement. ASUS and Microsoft fared the best with superior performance on key metrics like First Contentful Paint (FCP), Largest Contentful Paint (LCP), and Total Blocking Time (TBT), and good accessibility and best practices adherence. Apple, Sony, Samsung, and Razer did have some weaknesses, i.e., layout instability, render-blocking time, and inefficient usage of resources, which can impact user experience and ranking in search.This study highlights the importance of continuous performance monitoring and proactive optimization, including asset compression, script optimization, stability in layout, and SEO optimization, to maintain compliance with modern web standards and growing user expectations. Continuous refinement allows for a seamless, accessible, and competitive web presence for any brand.

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