



Top 5 Research University Websites in Malaysia Using Google Lighthouse

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Abstract: The top five research universities in Malaysia are National University of Malaysia (UKM), Science University of Malaysia (USM), University of Malaya (UM), University of Putra Malaysia (UPM), and University of Technology Malaysia (UTM). This report compares their web performance, accessibility, and Search Engine Optimization (SEO). The study aims to provide insights into the strengths and weaknesses of each university's website, identify common patterns or trends, and provide recommendations for improvement using web performance audit tools, primarily Google Lighthouse. By enhancing their online presence and user experience, these institutions can better serve their stakeholders and maintain their competitive edge in the digital landscape.

Keywords - top 5 research universities, web performance, Google Lighthouse, strengths and weaknesses, trends, recommendations

1.0 INTRODUCTION

University websites are vital platforms providing services and information to the public, researchers, teachers, and students in the current digital environment. These websites' performance and reputation depend heavily on how well they create a seamless user experience, guarantee accessibility, and optimize search engine exposure.

The top five research universities in Malaysia are UM, UTM, UKM, USM, and UPM. These highly esteemed universities are recognized for their excellent teaching and learning standards, as well as their contributions to research and innovation.

Their websites are essential for attracting stakeholders and showcasing their accomplishments.

This research uses web performance audit tools, mainly Google Lighthouse, to examine various university websites in-depth. Through performance, accessibility, and SEO optimization evaluations, the research aims to offer insightful information about each institution's online presence. This study aims to help these universities enhance their online exposure, user experience, and diversity by an analysis of performance results, the identification of common patterns or trends, and suggestions for improvement.

2.0 LITERATURE REVIEW

2.1 Website

A website consists of a group of web pages housed within a domain or subdomain on the World Wide Web (WWW), an online resource. A person visits a website because of the content there. Information is disseminated quickly, widely, and without regard to time or space. Owning a website is very important in the field of education, medicine, business and others as each website type has its own role to play in the current market in order to attract a target audience.

2.2 National University of Malaysia (UKM)

UKM is a public research university located in Selangor, Malaysia. There are three branches of campus which are Bandar Baru Bangi, Cheras and Kuala Lumpur. UKM opened its doors to undergraduate and postgraduate students from all around the world. Its website provides easy access to information about academic programs, research, and campus life. Through its user-friendly interface, visitors can easily navigate various sections, including admissions, faculties, and news updates. [1]

2.3 Science University of Malaysia (USM)

USM, a public research university in Malaysia with three campuses, which are on the island of Penang, Kelantan, and Nibong Tebal. The main attractive aspect of USM is it is the only Accelerated Programs for Excellence (APEX) government-funded autonomous university in Malaysia. The website offers easy access to information about academic programs, research endeavors, and campus activities and highlights USM's commitment to excellence in education and research, showcasing its achievements and contributions to society. [2]

2.4 University of Malaya (UM)

UM, the oldest and highest ranking public research university located in Kuala Lumpur, Malaysia. Its website provides comprehensive information about the university's academic programs, research initiatives, and campus life. It showcases UM's commitment to academic excellence and innovation, highlighting its achievements and contributions to the local and global community. [14]

2.5 University of Putra Malaysia (UPM)

UPM, a public research university ranked 158th by QS Ranking and located in Serdang, Selangor. The website caters to diverse audiences, including prospective students, current students, faculty, and alumni. It showcases UPM's dedication to excellence in education, research, and community engagement, highlighting its achievements and contributions to society. [15]

2.6 University of Technology Malaysia (UTM)

UTM is a premier Malaysian public research-intensive university ranked 188th in the world by QS University rankings. It has three campuses and the main campus is located at Skudai.

The website showcases UTM's commitment to excellence in education, research, and innovation, highlighting its achievements and impact both nationally and internationally. [16]

2.7 Google Lighthouse

Google Lighthouse is a crucial open-source tool for evaluating and enhancing web page quality, covering areas such as performance, accessibility, and progressive web applications (PWAs). Initially tailored for PWAs, Lighthouse has expanded its scope to include SEO assessments, providing users with comprehensive insights into their website's overall performance and optimization.

2.8 Metrix Google Lighthouse

The measurement of a browser's performance focuses on how quickly it can create web pages. Lighthouse renders the website and tests it while it is being built using a web browser known as Chromium. This tool is free to use and open-source, which means it is run by the community. There are four measures, which are SEO, Best Practices, Performance and Accessibility.

3.0 METHODOLOGY

The overall research steps can be seen in Figure 1 below:

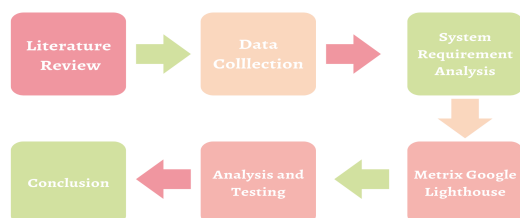


Figure 1: Research Flowchart

The research begins with an extensive study of literature from various sources, including articles and

journals to gather information supporting the research topic. Data collection is done by entering the website to be researched in Google and checking relevant metrics using Google Lighthouse. Metrics are scored on a scale of 0-100, where 0-49 indicates poor performance, 50-89 indicates satisfactory performance, and 90-100 indicates excellent performance. After conducting the audit, Google Lighthouse generates reports on different areas:

1. Performance includes factors that slow down the marketplace page such as images and resources
2. Accessibility that shows how easily marketplace content is accessible to users
3. Best Practices that identify the web development elements that do not comply with current guidelines and best practices.
4. SEO highlights the SEO issues with webpages that are not comprehensive.

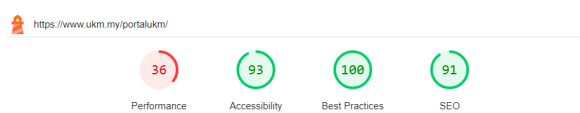
Google Lighthouse offers multiple audits such as Performance, Accessibility, Progressive Web Applications, SEO, etc., and can be run on any webpage whether hosted on a server or public services like Google Pages or GitHub. Each audit is accompanied by a reference document explaining its significance and providing guidance on improvement. Google Lighthouse is available as a web app from its GitHub repository and as a Chrome extension, widely used by front-end developers to analyze performance metrics of various front-end web applications.

The stages of analysis and testing are carried out to find reports from each university website, like the official website portal of UKM, USM, UM, UPM, and UTM. This process include a run test step that runs over all of the homepage.

4.0 RESULT AND DISCUSSION

University	Google Lighthouse Analysis Result					Total
	Performance	Accessibility	Best Practices	SEO	PWA	
National University of Malaysia	36	93	100	91	N/A	320
Science University of Malaysia	54	87	78	90	N/A	309
University of Malaya	29	73	100	90	N/A	292
University of Putra Malaysia	57	79	93	73	N/A	302
University of Technology Malaysia	27	82	96	75	N/A	280

Sample of Result from Google Lighthouse



The comparative evaluation of the top five research universities in Malaysia using Google Lighthouse reveals a range of performance, accessibility, and Search Engine Optimization (SEO) scores. Below, we discuss the results, highlighting strengths, weaknesses, and common patterns among the websites:

When comparing the total scores, the National University of Malaysia (UKM) emerges as the leader with a total score of 320, followed closely by the Science University of Malaysia (USM) with a

score of 309. University of Malaya (UM) and University of Putra Malaysia (UPM) rank closely with scores of 292 and 302, respectively, while University of Technology Malaysia (UTM) trails with a total score of 280.

The National University of Malaysia (UKM) stands out with exceptional scores in accessibility (93) and best practices (100), indicating a strong commitment to inclusive web design and adherence to industry standards. At the same time, the University of Malaya (UM) achieves a perfect score in best practices (100), demonstrating a high level of adherence to web development best practices. University of Putra Malaysia (UPM) and University of Technology Malaysia (UTM) also exhibit strengths in best practices and accessibility, with scores above 90 in both categories.

Performance is a common weakness among all universities, with scores ranging from 27 to 57. This indicates room for improvement in optimizing website loading times and overall responsiveness. Accessibility scores, while generally high, show variation across the universities, with the University of Malaya (UM) and University of Technology Malaysia (UTM) scoring lower than others. Search Engine Optimization (SEO) scores also demonstrate room for improvement, particularly for the University of Malaya (UM) and the University of Technology Malaysia (UTM), both scoring below 80 in this category.

All universities adhere strongly to best practices, with scores ranging from 93 to 100. This indicates a commitment to implementing industry standards and guidelines for web development. Accessibility scores show relatively consistent performance across universities, ranging from 73 to 93. While most universities demonstrate a strong

commitment to accessibility, there is room for improvement to ensure inclusivity for all users. Performance and SEO scores exhibit more significant variation among the universities, indicating areas where targeted improvements can enhance website performance and visibility in search engine results.

There are some recommendations for improvement and optimization for each website. For UKM, it can be seen that the value of performance is only 36 which is far lower than the others in comparison. The UKM official website can implement strategies to optimize website performance, for instance compressing images, minimizing render-blocking resources and leveraging browser caching. Besides, the UKM official portal also may consider implementing lazy loading for images to improve loading times.

For the USM website, the performance, accessibility, best practices, and SEO show strong performance metrics. USM could enhance accessibility features by improving keyboard navigation, ensuring proper labeling of form fields and buttons, and providing alternative text for images to enhance accessibility for all users.

The biggest weakness of UM is performance optimization compared to other universities which can be improved by conducting regular audits to monitor progress and identify areas for further improvement.

For the UPM official portal website, although it performed well overall, there is room for improvement in SEO optimization. UPM may prioritize SEO optimization efforts by optimizing meta tags, improving page titles, and resolving any crawl errors.

UTM shows weakness in performance which can be resolved by taking a holistic approach

to address the issues. UTM can implement strategies to improve website loading times, such as optimizing images and resources.

Overall, while each university demonstrates strengths in certain areas, such as best practices and accessibility, there are clear opportunities for improvement in performance optimization and SEO.

5.0 CONCLUSION

The comparative evaluation sheds light on the digital landscape of Malaysia's top five research universities, offering valuable insights into web performance, accessibility, and SEO. Each institution presents distinct strengths: UKM excels in accessibility and best practices, USM showcases impressive performance metrics, UM demonstrates SEO optimization prowess, UPM delivers well-rounded performance and adherence to best practices, and UTM prioritizes accessibility and best practices.

Despite these strengths, areas for improvement are evident, including website speed, accessibility features, and search engine optimization. However, common trends emerge, indicating a shared dedication to providing a seamless user experience and maximizing online visibility.

To address these shortcomings, recommendations for improvement are proposed, aiming to enhance online presence, user experience, and inclusivity. Continuous enhancement is emphasized to remain competitive and responsive to evolving user expectations in the digital sphere.

In summary, leveraging the insights from this evaluation offers the opportunity for Malaysia's top research universities to bolster their online visibility, user experience, and inclusivity.

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