Comparative Evaluation of Malaysia Government Websites Using Google Lighthouse Matrix

Universiti Teknologi Malaysia

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Topics Covered in This Report:

- Introduction and Background Study
- Literature Review
- Methodology
- Finding and Analysis
- Conclusion and Recommendations

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1.0 Introduction and Background Study

As digital platforms become the primary way for people to access information and services, the quality of government websites has become more critical than ever. In Malaysia, official government websites serve as vital communication tools, offering the public access to essential services, news, and government initiatives in a timely and efficient manner.

A good government website should be fast, user-friendly, and accessible to all users, including those with disabilities or slower internet connections. If a site takes too long to load, is difficult to navigate, or performs poorly on search engines, it can frustrate users and reduce trust in public services. These issues are particularly important as the country advances its digital ambitions under the *MyDIGITAL* initiative, which aims to position Malaysia as a digitally-driven, high-income nation (Economic Planning Unit, 2021). One of the key goals outlined in the *Malaysia Digital Economy Blueprint* is to make public services more accessible, efficient and user-friendly through technology.

To support these goals, it is essential for government websites to meet modern web standards and prioritize performance, accessibility, and visibility. Tools like Google Lighthouse have become important in achieving this. Lighthouse is a free and widely used audit tool that evaluates websites based on key aspects such as Performance, Accessibility, and Search Engine Optimization (SEO). It generates clear scores and recommendations that help identify strengths and areas for improvement.

In this project, five official Malaysian government websites are evaluated using Google Lighthouse. The aim is to highlight their current performance levels, identify usability and accessibility gaps. Then, we also will suggest some practical improvements that can enhance the overall quality of digital public services in Malaysia.

2.0 Literature Review

2.1 Website

A website is a collection of related web pages that are accessible through the internet and typically hosted under a common domain name. It serves as a digital interface for sharing information, delivering services, and facilitating interaction between users and organizations. It comes in a variety of shapes and sizes, from small sites put together by teenagers to huge sites which are updated everyday by a team of web designers as well as writers (Anniss, 2014). An effective website emphasizes usability, performance, and accessibility to meet the diverse needs of its users. In the context of public services, websites must be easy to navigate, quick to load, mobile-friendly, and accessible to all users, including individuals with disabilities.

2.2 Government

The government is responsible for managing the country, enforcing laws, and delivering public services. In today's digital age, many governments are using technology to improve how they work and connect with the public. This has led to the development of e-Government, where digital platforms such as websites are used to provide services and information more efficiently.

Government websites are not only used to share information, but also to make services easier to access and to encourage communication between the public and government agencies (Ahmad, Nilwana, & Hamid, 2021). In Malaysia, these websites play an important role in supporting the country's digital goals by helping citizens get the information and services they need quickly and conveniently. The quality of these websites directly influences public trust, user satisfaction, and the overall effectiveness of service delivery.

2.3 Matrix Google LightHouse

Google Lighthouse is an open-source tool widely used in both academic and professional settings to evaluate website performance, accessibility, and SEO which provides not only performance scores but also actionable insights to help improve website quality and user experience (Heričko et al., 2021). Lighthouse presents audit scores as numerical values ranging from 0 to 100 across each evaluated category. These scores are color-coded to represent different performance levels: scores between 0 and 49 are marked in red (Poor), 50 to 89 in orange (Needs Improvement), and 90 to 100 in green (Good).

This scoring matrix enables a quick and visual comparison of website quality, making it easier to identify areas that require improvement. In this study, the matrix is used to compare and interpret the audit results for the five selected Malaysian government websites.

3.0 Methodology

3.1 Tools and Metrics

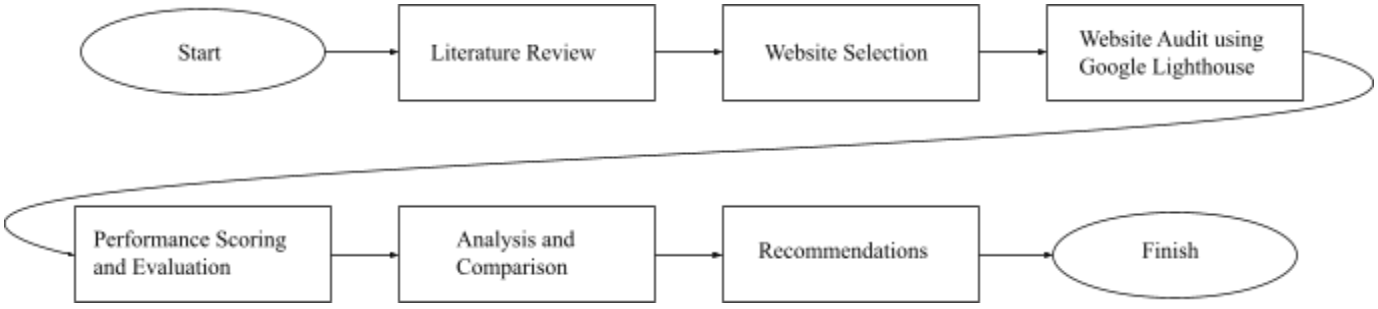


Figure 1: Website Evaluation Process Flow Using Google Lighthouse

This project uses Google Lighthouse, an open-source auditing tool by Google, to evaluate five Malaysian government websites. Lighthouse is accessed via Chrome DevTools and is widely used to assess website quality based on modern web standards.

Each website was audited in desktop mode under the same system and browser environment to ensure consistent results. The evaluation focuses on three key metrics:

1. Performance: It measures how fast a website loads and responds to user interactions. Key indicators include First Contentful Paint (FCP) and Time to Interactive (TTI).
2. Accessibility: It assesses the website's usability for all users, including those with disabilities. Besides, it also checks for alt text, contrast ratios, labels, and keyboard navigation.
3. Search Engine Optimization (SEO): It evaluates how well the site follows best practices to be discoverable on search engines including meta tags, mobile compatibility, and structured data.

Each metric is scored from 0 to 100 and color-coded for clarity:

- 90–100 (Green): Good
- 50–89 (Orange): Needs Improvement
- 0–49 (Red): Poor

These metrics offer a structured, objective basis to compare the selected websites and identify areas for improvement.

3.2 Website Selection

This evaluation focuses on five official Malaysian government websites that reflect different aspects of public service. The selected websites cover important areas such as immigration, education, youth development, digital governance, and general citizen access to online services, offering a well-rounded view of how government agencies present and manage their digital platforms.

Table 1: List of Selected Malaysian Government Websites for Evaluation

No.	Website Name	URL	Purpose
1	Jabatan Imigresen Malaysia	https://www.imi.gov.my	Provides immigration-related services, including visa applications and passport inquiries.
2	Kementerian Belia dan Sukan	https://www.kbs.gov.my	Focuses on youth development, sports initiatives, and community engagement.

3	MyGOV (Official Government Portal)	https://www.malaysia.gov.my	Centralized portal linking users to services and information across various ministries.
4	Kementerian Pendidikan Malaysia	https://www.moe.gov.my	Offers information on educational policies, school programs, and academic resources.
5	Jabatan Digital Negara	https://www.jdn.gov.my	Provides information on Malaysia's national digital economy initiatives and ICT development strategies.

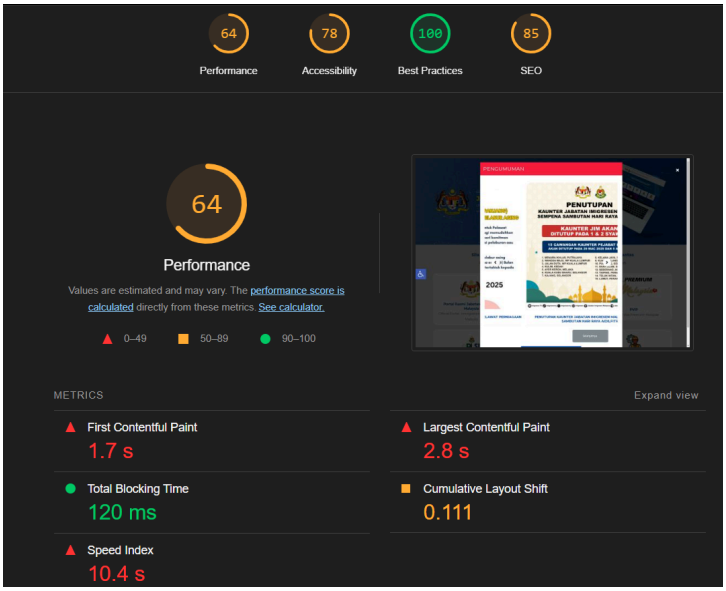
These websites were chosen to reflect a range of user needs and to assess the overall quality of digital public service delivery in Malaysia.

4.0 Finding and Analysis

4.1 Website Audit Results

Based on the data collected, the analysis continues with the audit results generated using Google Lighthouse:

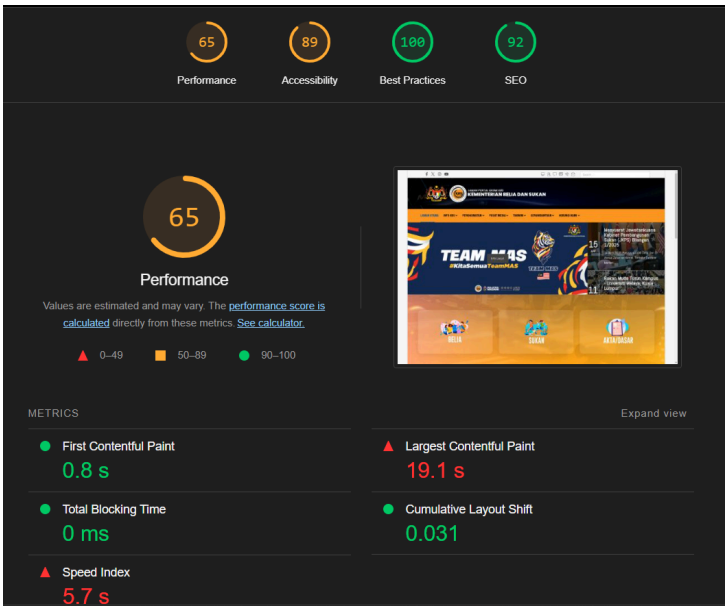
1. Jabatan Imigresen Malaysia (imi.gov.my)



The Lighthouse audit for Jabatan Imigresen Malaysia resulted in a performance score of 64, reflecting moderate efficiency. While the First Contentful Paint of 1.7 seconds and Largest

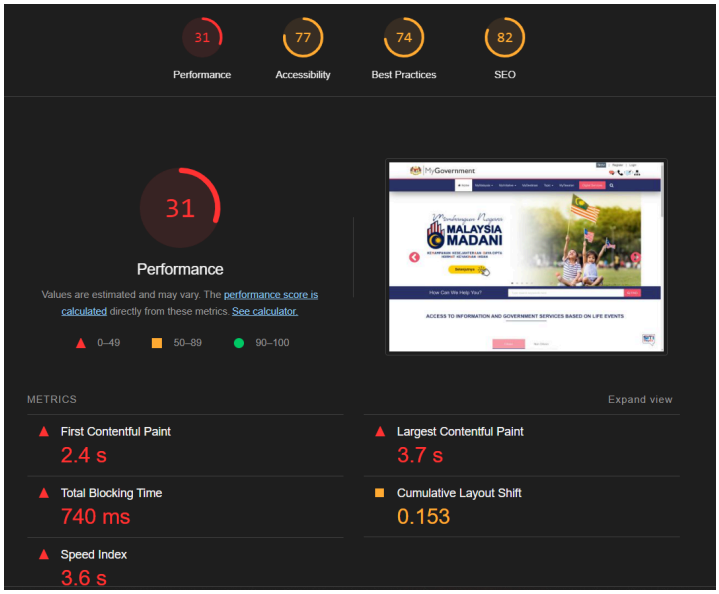
Contentful Paint of 2.8 seconds were within reasonable limits, the high Speed Index of 10.4 seconds suggests that visual content takes longer than expected to fully load. This delay is likely caused by unoptimized images, render-blocking resources and unused JavaScript. Next, the website's accessibility score of 78 indicates some areas for improvement, particularly in text contrast, missing ARIA roles, skip links that are not focusable, and heading structures that may confuse users relying on assistive technologies. On the SEO front, the website scored 85, which shows generally good optimization practices, although the lack of a meta description and issues with the robots.txt file may reduce the site's visibility on search engines.

2. Kementerian Belia dan Sukan (kbs.gov.my)



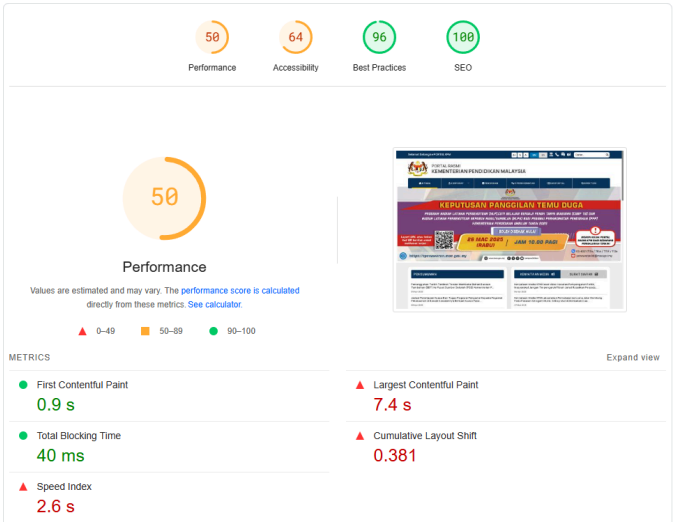
The website for Kementerian Belia dan Sukan achieved a performance score of 65, indicating moderate overall efficiency. It performed well in early load stages, with a fast First Contentful Paint of 0.8 seconds and a Total Blocking Time of 0 milliseconds. However, the Largest Contentful Paint was significantly delayed at 19.1 seconds, and the Speed Index of 5.7 seconds suggests that visual elements took longer to fully load. These delays are likely due to large image files, render-blocking resources, and unused CSS, as highlighted in the diagnostics. Then the website received an accessibility score of 89, though several issues were present, including ARIA-hidden elements that were not crawlable, low contrast text and links without proper labels, that could affect users with accessibility needs. Finally, the SEO score of 92 reflects strong optimization overall, but the presence of uncrawlable links may limit search engine visibility and should be addressed to improve discoverability.

3. MyGOV Portal (malaysia.gov.my)



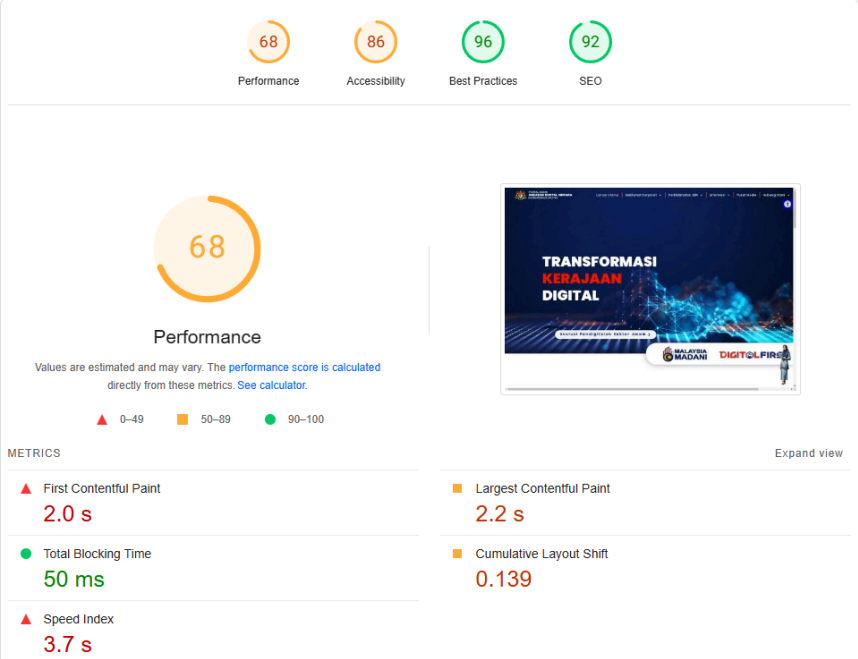
From the evaluation, the MyGOV website recorded a low performance score of 31, indicating considerable room for improvement. Contributing factors included a First Contentful Paint of 2.4 seconds, a high Total Blocking Time of 740 milliseconds, and a Speed Index of 3.6 seconds, suggesting that the page takes time to become fully interactive. The Largest Contentful Paint measured at 3.7 seconds, while a Cumulative Layout Shift of 0.153 points to some visual instability during loading. The audit also flagged excessive JavaScript usage, large layout shifts as well as significant render-blocking resources as key issues. Besides, accessibility score was 77, with common problems such as missing labels for buttons, iframes and links as well as low text contrast and disorganized heading structure whereby all of which can hinder usability for assistive technology users. Lastly, the website achieved an SEO score of 82, reflecting fair optimization, though non-crawlable links and missing descriptive text that could negatively impact its visibility on search engines.

4. Kementerian Pendidikan Malaysia (moe.gov.my)



To begin with, the website for Kementerian Pendidikan Malaysia achieved a performance score of 50. While it benefits from a quick First Contentful Paint of 0.9 seconds and minimal blocking time at 40 milliseconds, its overall performance is affected by a high Largest Contentful Paint of 7.4 seconds and a noticeable Cumulative Layout Shift of 0.381, which may cause elements on the page to move unexpectedly during loading. The Speed Index of 2.6 seconds also suggests that the visual content takes time to fully appear, likely due to large images and render-blocking resources. In terms of accessibility, the website scored 64, mainly due to missing labels on buttons and forms, poor color contrast, and links without proper names, which can make navigation difficult for users relying on assistive tools. On a positive note, the site earned a perfect SEO score of 100, showing strong alignment with search engine optimization standards such as structured data and crawlability. However, improvements in both layout stability and accessibility would help create a more user-friendly experience.

5. Jabatan Digital Negara (jdn.gov.my)



The website for Jabatan Digital Negara recorded a performance score of 68, with First Contentful Paint at 2.0 seconds and Largest Contentful Paint at 2.2 seconds, both within acceptable limits. However, a Cumulative Layout Shift of 0.139 and a Speed Index of 3.7 seconds indicate some visual instability and delayed content rendering. Performance was further impacted by a large DOM size, significant main-thread activity (3.8s) and multiple layout shifts, suggesting the need for optimization in areas such as unused CSS, render-blocking resources, and text compression. Then, the website scored 86 in accessibility, though several issues were noted, including low contrast text, missing ARIA roles, non-focusable skip links and improper heading hierarchy that can affect users relying on assistive technologies. Lastly, the SEO score of

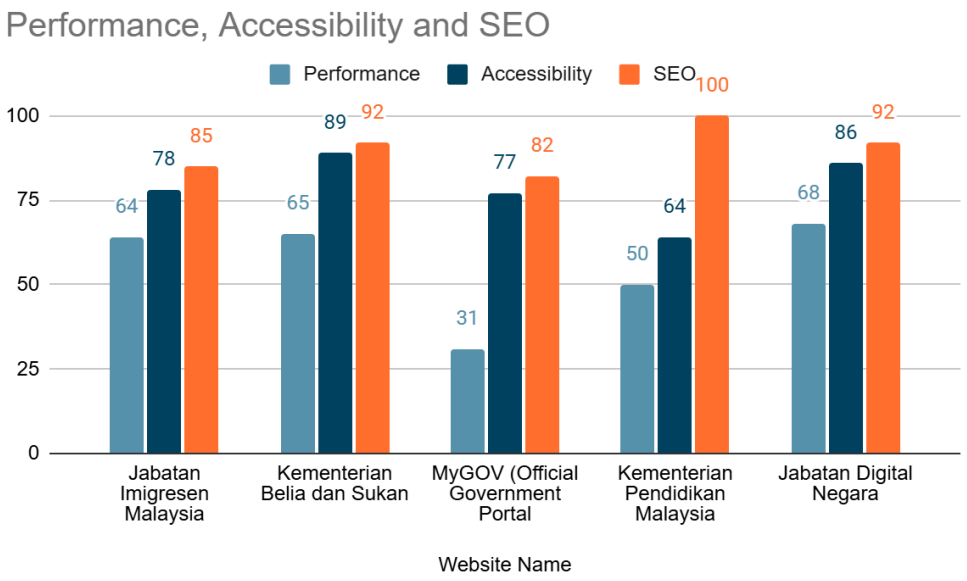
92 reflects strong optimization overall, although the absence of a meta description could affect how the site appears in search engine results. Overall, the site performs well but would benefit from improvements in both performance efficiency and accessibility support.

From the results of the comparative analysis of the five government websites in this evaluation, the summary is presented in Table 2:

Table 2: Google Lighthouse Scores for All Evaluated Websites

Website Name	Performance	Accessibility	SEO
Jabatan Imigresen Malaysia	64	78	85
Kementerian Belia dan Sukan	65	89	92
MyGOV (Official Government Portal)	31	77	82
Kementerian Pendidikan Malaysia	50	64	100
Jabatan Digital Negara	68	86	92

4.2 Individual Metric Comparison



Interpretation:

1. Performance:
Among the five websites, MyGOV (Official Government Portal) recorded the lowest performance score at 31, indicating critical delays in load speed and responsiveness. In contrast,

Jabatan Digital Negara (68) demonstrated the highest performance scores which suggest relatively smoother initial loading experiences. Besides, Kementerian Belia dan Sukan (65), Jabatan Imigresen Malaysia (64) and Kementerian Pendidikan Malaysia (50) performed moderately, though still showed areas needing improvement such as render-blocking resources and layout shifts.

2. Accessibility:
Kementerian Belia dan Sukan achieved the highest accessibility score of 89, reflecting better compliance with assistive standards. Then, Jabatan Digital Negara (86) and Jabatan Imigresen Malaysia (78) also performed well, though they still exhibited issues like low contrast text and missing labels. Not to forget, MyGOV scored 77, revealing more notable accessibility gaps. The lowest was Kementerian Pendidikan Malaysia at 64, mainly due to issues affecting screen reader navigation and semantic structure.

3. SEO:
Suprisingly, Kementerian Pendidikan Malaysia stood out with a perfect SEO score of 100, showing full adherence to search optimization standards. The score was then followed by Jabatan Digital Negara (92) and Kementerian Belia dan Sukan (92) which indicate strong visibility practices with minor gaps. After that, Jabatan Imigresen Malaysia scored 85, while MyGOV left slightly behind at 82 impacted by crawlability issues and missing descriptive elements.

5.0 Conclusion and Recommendations

This evaluation which based on a Google Lighthouse audit of five Malaysian government websites, reveals the clear differences in how each site performs in terms of performance, accessibility, and search engine optimization (SEO). While all the websites follow some aspects of modern web standards, there are still issues that affect how easy they are to use, how easily they can be found online and how well they serve users of different needs and abilities.

The analysis found that Kementerian Pendidikan Malaysia excelled in SEO with a perfect score of 100, ensuring high visibility on search engines. However, it fell behind in both performance and accessibility. Jabatan Digital Negara offered a more balanced experience across all three metrics, while MyGOV recorded the lowest performance score indicating critical inefficiencies in loading speed and responsiveness. Then, Kementerian Belia dan Sukan emerged as the most accessible platform and last but not least, Jabatan Imigresen Malaysia showed moderate consistency, though still presented areas for improvement.

To improve the overall quality and effectiveness of these platforms, the following recommendations are proposed:

- Improve Website Speed: Reduce elements that slow down the site, such as unused code or large images, and use modern formats to make pages load faster.
- Make Sites More Accessible: Fix issues like low-contrast text, missing labels on buttons and forms and confusing page structures to make the sites easier to use for everyone with support on assistive technologies.
- Strengthen SEO Practices: Add proper meta descriptions by making sure all of the content can be found and indexed by search engines as well as use structured data to improve visibility online.
- Perform Regular Website Checks: Run consistent audits using tools like Google Lighthouse to monitor the website quality and stay updated with best practices as web standards evolve.

By applying these improvements, government websites in Malaysia can offer a more efficient, accessible, and user-friendly experience that benefits all users, regardless of their background or abilities.

References

Economic Planning Unit. (2021). *Malaysia Digital Economy Blueprint*. Government of Malaysia. https://www.ekonomi.gov.my/sites/default/files/2021-02/malaysia-digital-economy-blueprint.pdf

Anniss, M. (2014). *What Is a Website and How Do I Use It?*. Britannica Educational Publishing. https://books.google.com.my/books?id=SH-KAwAAQBAJ&pg=PA5

Ahmad, J., Nilwana, A., & Hamid, H. (2021, March). Digitalization era: website based e-government. In *IOP Conference Series: Earth and Environmental Science* (Vol. 717, No. 1, p. 012047). IOP Publishing. https://iopscience.iop.org/article/10.1088/1755-1315/717/1/012047/pdf

Heričko, T., Šumak, B., & Brdnik, S. (2021). Towards representative web performance measurements with Google Lighthouse. In *Proceedings of the 2021 7th Student Computer Science Research Conference (StuCoSReC)* (pp. 39–46). University of Maribor Press. https://doi.org/10.18690/978-961-286-516-0.9

Immigration Department of Malaysia. (n.d.). *Jabatan Imigresen Malaysia*. https://www.imi.gov.my

Ministry of Education Malaysia. (n.d.). *Kementerian Pendidikan Malaysia*. https://www.moe.gov.my

Ministry of Youth and Sports. (n.d.). *Kementerian Belia dan Sukan*. https://www.kbs.gov.my

Government of Malaysia. (n.d.). *MyGOV - Official Portal of the Malaysian Government*. https://www.malaysia.gov.my

Department of Digital Malaysia. (n.d.). *Jabatan Digital Negara*. https://www.jdn.gov.my