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AI and Public Governance in Malaysia: A Literature Review on Ethical, Legal, and Operational Challenges

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Abstract: This literature review intends to explore how artificial intelligence (AI) has affected governance in the public sector, focusing on Malaysia with comparison to various global perspectives. AI is increasingly perceived to be a tool for enhancing efficiency in the processes of governance and decision-making, thereby enhancing transparency and accountability. Its adoption, however, is far from problem-free. Issues that have remained in debates are data privacy, biased algorithms, outdated legal frameworks, and the need for more inclusive and transparent AI systems. By comprehending the studies from 2019 to 2024, this review dives into both the opportunities and challenges of AI in governance, examining its ethical and regulatory implications. A review of the several studies in the current literature highlights several trends, points out deficiencies in the methodologies applied, and indicates the directions of further research. This review demonstrates how AI can change the art of governance but also underlines the urgent need for a robust legal framework, rigorous ethical overview, and measures to ensure data protection for citizens.

Keywords: Artificial intelligence, Governance, Public sector, Challenges, AI

1 Introduction

The adoption of artificial intelligence (AI) technologies has changed the way most of the operations are performed, and public sector institutions are increasingly employing AI technologies in these operations in order to enhance decision-making and efficiency in public service delivery. In Malaysia, where digital transformation has taken place, AI incorporation in governance processes has become highly relevant. Other key areas involving urban design, healthcare, and resource management have also resorted to the use of AI tools which, in turn, helped in better management and enhanced operation of public services [1]. This trend also goes in combination with the general trend in the world for digital governance, where many countries, like Singapore and the United Kingdom (UK), use AI in public sector applications to change the way service delivery is done and ensure better utilisation of available resources [2].

AI adoption across the public sector in Malaysia has spanned from automating administration to predictive analytics on resource allocations and the management of public health. It analyses huge sets of data and generates real-time insights, hence facilitating more empirically informed and data-driven decisions by the government [3]. A characteristic feature, particularly in cities, is traffic regulation between areas. AI has been applied to monitor and control traffic jams in large cities like Kuala Lumpur.

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However, the incorporation of AI into government poses several serious challenges. Issues regarding data privacy, algorithm transparency, and biased AI decision-making bring along several questions related to ethical and legal implications when AI is introduced to governance systems. Nonetheless, Malaysia, like many other countries, faces challenges on how to harness the transformational role of AI while keeping its utilisation and implementation in an ethical manner [4]. This is where, with ongoing absorption of this technology into various aspects of governance, the need for strong regulatory frameworks, particularly in respect of data protection and accountability of AI systems, becomes increasingly necessary.

This literature review gives a detailed look into the use of AI in the public sector governance system of Malaysia while focusing on finding main trends, challenges, and future research areas in this field. The review focuses on recent studies from 2019 to 2024. Precisely, it is going to cover the usage of AI in public governance, challenges in using it, and the ethical and legal rules necessary for its responsible usage. This study targeted AI governance efforts in Malaysia within the wider global setting. The aim is to support the public in being better equipped to understand both the opportunities and challenges that AI brings to public governance. The novelty of this study can be viewed in context as it being one of the early comprehensive reviews of AI in Malaysia's governance system which addresses some prior works that have been done such as MyDigital blueprint and the National AI framework. It also addresses some ethical challenges which are unique to Malaysia, such as in Islamic ethics for example, AI decision vs syariah compliance in healthcare/finance and multicultural equity, which emphasises bias in AI-driven welfare allocation for B40 and indigenous groups.

2 Methodology

To conduct this literature review, a systematic approach was used to gather and analyse relevant academic articles, reports, and conference papers published between 2019 and 2024. Databases like Google Scholar, IEEE Xplore, Scopus, and ResearchGate were utilised to source literature, ensuring a comprehensive collection of studies that address AI's role in public sector governance. A search was done using relevant keywords: "AI in governance of the public sector", "AI governance in Malaysia", "ethical AI in governance", and "AI regulation in governance".

The inclusion criteria of this review target article that precisely address the application of AI in public governance, especially focusing on studies conducted in Malaysia and similar cases worldwide. The review included research related to aspects of AI use in governance, for example, in decision-making, transparency, accountability, data governance, and ethics. The only exclusions were studies that had purely technical content or were not directly relevant to governance and functions related to the public sector.

A total of 8 studies were selected for full review, grouped into four key thematic areas, including (1) AI in decision-making and governance structures; (2) transparency, efficiency, and accountability through AI; (3) challenges in AI governance adoption; and (4) ethical and data privacy concerns in AI-driven governance. These guided the review to ensure comprehensiveness and relevance to the research objectives. These include the comparative analyses from countries such as Singapore, the UK, and others to provide an expanded perspective with the view of the global implications of AI governance.

3 Results

Among all the functions of AI in governance, the biggest function is the opportunity to improve the process of decision-making. These AI technologies enable governmental bodies to extract insights from immensely large information sets that will help make the delivery of public services efficient and effective. AI has been applied in Malaysia in many fields, from planning an urban space to managing its resources, by making data-driven decisions that lead to better optimisation of public assets [1]. For

instance, the integration of AI into Malaysia's urban traffic management system has significantly reduced congestion in major cities by optimising traffic flow patterns and improving road infrastructure planning. In addition, the Malaysian government has initiated efforts to integrate AI across multiple sectors, especially in urban services, through programmess such as the National Transformation Programme (NTP) [9]. This effort is designed to improve public service delivery by showcasing how AI can optimise processes and foster better public interaction.

Globally, AI-driven decision-making is being used to improve public service delivery. Currently, Singapore leads in the use of artificial intelligence in governance to achieve faster, effective and efficient healthcare, movement of people in the public transport system and, most importantly, efficient allocation of resources [2]. The social application of AI in the UK includes tools for deciding on patients' medical resources needed in emergency situations in a state, such as the COVID-19 pandemic [4].

Although the use of AI in Malaysia's public service delivery is not as efficient as in Singapore, its execution is growing steadily, driven by the country's digital transformation initiatives, such as the Digital Economy Blueprint (MyDigital) and the National Artificial Intelligence Roadmap (AI-RMAP). AI has been applied in numerous domains to improve responsiveness and transparency in government services [10]. Introduced by the Malaysian government, MyDigital acts as a blueprint which presents a detailed roadmap for digitising key economic sectors. The plan seeks to establish Malaysia as a frontrunner in the regional digital economy by leveraging AI to enable data-driven decision-making. AI-RMAP underscores the importance of strategic alignment in public sector projects by enhancing government service capabilities such as initiating pilot projects while addressing ethical and regulatory considerations through AI technologies [11].

The integration of AI into public delivery services in Malaysia can be seen in several sectors, such as smart city initiatives, where AI has been applied in cities like Kuala Lumpur, Cyberjaya and Iskandar Puteri in traffic management (real-time monitoring and smart traffic lights), waste management and public safety (CCTV surveillance with facial recognition and predictive policing). [12].

In terms of digital government services, the application of AI has been implemented into online service portals to automate tasks and enhance user experience. For example, the system used by the Public Service Department (JPA) and Malaysian Administrative Modernization and Management Planning Unit (MAMPU) are using AI-powered virtual assistants to handle citizens' queries about permits, pensions, etc. The integration of AI into these services signifies a substantial step toward improving efficiency and citizen engagement within the public sector. Improvements in terms of efficiency can be seen as it reduces the waiting period for citizens to get feedback from their queries, as the virtual assistant can provide support 24/7, facilitating an assistant beyond office hours, which is essential in today's fast-paced society [13].

In the public health sector, the use of AI can help the government in identifying public health trends, optimising resource distribution and enhancing law enforcement techniques through accurate data analysis [14]. For example, hospital workflow automation using AI can give benefits in terms of optimising bed allocation among patients, staff scheduling and supply chain management. In addition, AI-driven predictive analysis can reduce patient waiting time by categorising patients and their treatment's urgency. The integration of AI into Malaysia's public health sector has the potential to significantly overcome fraud detection capabilities by providing solutions in identifying and mitigating all the risks in the system. This can be done by applying fraud detection mechanisms and algorithmic analysis such as Artificial Neural Network (ANN), Convolutional Neural Network (CNN) and Long Short-Term Memory (LSTM) in capturing the diverse nature of healthcare claims data [15].

Despite its potential, AI-driven decision-making poses several challenges. One big problem is the nature of many AI algorithms, which can act as a barrier, as civil servants and other officials and stakeholders cannot see how the decision is being made. Such confusion makes people sceptical about

the use of AI systems, especially in areas where decisions imply outcomes for individuals, for example, in determining who gets what or policy decisions made by governments [4]. There is an urgent need for explainable AI (XAI) frameworks that ensure transparency and accountability in AI decision-making processes.

AI's ability to improve transparency, efficiency, and accountability in public governance is one of its most promising applications. In Malaysia, AI has been deployed to monitor public sector projects, providing real-time data on the progress of infrastructure projects, budget allocations, and service delivery [5]. This has not only helped in enhancing the efficiency of the implementation of projects, but together with it, has diminished space for corruption, as there is more scrutiny possible leading to enhanced transparency.

Around the world, with the help of artificial intelligence attempts to optimise services for people by delegating many administrative processes to AI are being actively made, and public servants can devote their time to more important tasks [6]. New AI portals were constructed in the past few months in the UK as well as Singapore to remove the bureaucratic implementation technique and to improve the flow of the resources that are available for public services [2].

However, the use of AI in governance also raises important questions about accountability. Often the integrative algorithms being used in AI are complicated, and it may be challenging to identify how decisions are arrived at, and therefore who is accountable in the event of negative consequences of AI results [7]. Addressing this issue will require the development of regulatory frameworks that ensure accountability and provide mechanisms for auditing AI systems to ensure they are functioning as intended.

The question, therefore, for Malaysia is what obstacles hinder the use of AI in the enhancement of governance despite the prospect it offers. One of the most apparent problems is data confidentiality. AI systems depend on considerable amounts of data, and most of this data is of a personal nature and may be considered sensitive. Malaysia also experienced some major data breach incidents in the recent years in the healthcare and telecommunications sectors; hence, the security of AI-based systems [4]. Currently, there is this need to call for the strengthening of data protection laws and enforcement systems to match the growing deployment of AI solutions.

Second, as an Islamic country, there are several debates on integrating AI, especially in the health and finance sectors. The evolution of public health and finance should consider incorporating ethical and social considerations, especially for Muslim citizens [16]. Concerning that matter, a collaborative initiative led by Universiti Teknologi Petronas (UTP), in partnership with Universiti Teknologi MARA (UiTM), Institute of Islamic Understanding Malaysia (IKIM) and Universiti Kuala Lumpur (UniKL), developed a comprehensive Shariah Compliance Framework, which aims to guide healthcare providers in delivering services that are both medically effective and aligned with Islamic ethical principles.

Another challenge is the lack of AI literacy among public sector officials. Many government employees do not have the technical expertise required to effectively implement and manage AI systems [7]. These skills gaps not only limit the effective use of AI tools but also increase the risk of improper implementation, which can lead to other smaller problems or even system failures. Addressing this issue will require substantial investment in training programmes and skill development initiatives.

AI for governance has many ethical considerations, and therefore opportunities should be taken to ensure that AI is used appropriately. The first is related to how AI models might simply replicate other sources of bias if trained on other biased sources. In Malaysia specifically, there is increasing awareness of the need to review AI-utilised models at regular intervals to point out bias before it affects the decision of the public [8].

In addition to bias, data privacy is a major concern in AI governance. Due to their functionality, AI systems need to contain highly sensitive personal information, which makes privacy more vulnerable if these systems are not well protected [4]. To address these concerns, Malaysia has begun the process of updating the current data protection frameworks whereby much work is still being done to ensure that the current AI systems meet international standards, including that of the General Data Protection Regulation (GDPR) [3].

4 Discussion

The adoption of AI into Malaysia's public sector governance equally offers hope and a mix of uncertain outcomes. The success observed from this review indicates how the application of AI technologies could increase decision-making, transparency, and accountability several magnitudes at an amazingly high degree. To achieve better results, several challenges need to be addressed.

Another benefit of AI in governance is that it improves decision-making processes. Having AI-driven tools is a vast advantage for governments because it enables them to perform complex data analysis and provide real-time data processing and outcomes prediction compared to traditional ways [1]. This capability has been particularly useful in Malaysia, for the application of AI has been made in urban planning and in health care in order to enhance service and allocation of resources [4]. Internationally, including in Singapore, AI has been efficiently adopted within the governance arrangements as a way to facilitate public administration and enhance the efficiency of resource utilisation [5].

However, AI adoption also brings some issues. The biggest concern in its operation is in the area of data protection. The systems that support AI work with large volumes of data sets that, should they be mishandled, could cause serious privacy violations [4]. Alarmed by recent experiences of data breaches in the Malaysian Healthcare and Telecommunication industries, there is agreement on the need for enhanced data protection provisions and better standards of implementation [4].

Another serious obstacle is the fact that many members of the public sector remain lacking in AI literacy. This means that the AI's utilisation may be imperfect or implemented wrongfully due to the lack of the required technical skills of the government workers [8]. Addressing this skills gap will require investment in training programmes and interdisciplinary collaboration between technologists and policymakers.

It is also necessary to discuss ethical issues present in AI in governance as well. That is why AI systems need to be transparent, with clear accountability, and free from any bias [8]. The process of designing XAI frameworks that seek to address the issue of AI interpretability will be important in people's acceptance of AI within governance [3].

Around the world, global examples like Singapore have shown that through the adoption of AI technology, public services can be made efficient through the automation of every work and service rendered in the distribution of resources [5]. Malaysia should follow these examples by ensuring that people have access to AI literacy as well as the set-down rules that should be followed when implementing AI in governance. More so, there is a shortage of empirical literature about the effects of AI on governance in the long-run and future solutions to the risks of AI usage.

5 Conclusion

In conclusion, AI offers a way to improve public sector governance in Malaysia by helping make efficient, well-informed decisions, reducing corruption, and promoting transparency in decision-making. But AI governance for lasting success requires overcoming several challenges, such as data privacy issues, lack of skilled human resources among officials, and proper regulation to support AI.

The following ethical consideration must follow the use of AI in governance: The governance of AI has to be made through the following considerations [8].

The findings from this review indicate that while AI has already been integrated into various aspects of Malaysia's public sector, significant work remains to be done to ensure its responsible and effective use. Future studies should focus on finding the best ways to regulate AI in governance, considering both its benefits and ethical issues [7]. Addressing these challenges, Malaysia can further advance the use of AI as a tool, enhancing the result of governance and making sure that citizens' rights and their interests are protected at the same time.

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Conflict of Interest Statement

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

References

[1] F. I. S. Shastrie, "Dynamic Convergence Exploring AI's Impact on Social Science in Malaysia," Social Science Research Network, 2024. [Online]. Available: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4805996.

[2] N. A. Siddiquee, "E-Government and Innovations in Service Delivery: The Malaysian Experience," *International Journal of Public Administration*, vol. 31, no. 3, pp. 324-343, 2008, doi: 10.1080/01900690802153053.

[3] S. S. Maidin and N. H. Arshad, "Information Technology Governance Practices in Malaysian Public Sector," in *Proceedings of the 2010 International Conference on Future Technology and Engineering (ICFTE)*, Kuala Lumpur, Malaysia, 2010, pp. 281-285, doi: 10.1109/ICFTE.2010.5499381.

[4] S. Kamaruddin, M. M. Ismail, Z. H. Adnan, and M. I. Mohd Zain, "Compliance to GDPR Data Protection and Privacy in Artificial Intelligence Technology: Legal and Ethical Ramifications in Malaysia," in *2023 11th International Conference on Cyber and IT Service Management (CITSM)*, Bandung, Indonesia, 2023, pp. 1-6, doi: 10.1109/CITSM57319.2023.10150615.

[5] N. Zabidi, M. M. Ismail, Z. H. Adnan, and M. I. M. Zain, "Poverty Governance System in The Public Sector Administration Affairs in Malaysia," *International Journal of Academic Research in Business and Social Sciences*, vol. 12, no. 10, pp. 738-754, 2022, doi: 10.6007/IJARBSS/v12-i10/15209.

[6] S. S. Maidin and N. H. Arshad, "Information Technology Governance Practices in Malaysian Public Sector," in *Proceedings of the 2010 International Conference on Future Technology and Engineering (ICFTE)*, Kuala Lumpur, Malaysia, 2010, pp. 281-285, doi: 10.1109/ICFTE.2010.5499381. (Duplicate of [3], but with hyperlink if kept separately).

[7] F. Veerankutty and N. A. Ali, "Information Technology Governance on Public Sector Audit Performance," *Journal of Strategic and Sustainable Accounting Development*, vol. 5, no. 2, pp. 45-59, 2015. [Online]. Available: https://typeset.io/papers/information-technology-governance-on-public-sector-audit-4l0n816wpb.

[8] N. A. Siddiquee and M. Z. Mohamed, "Paradox of Public Sector Reforms in Malaysia: A Good Governance Perspective," *Public Administration Quarterly*, vol. 31, no. 3, pp. 284-312, 2007. [Online]. Available: https://typeset.io/papers/paradox-of-public-sector-reforms-in-malaysia-a-good-4l6bafbx6m.

[9] M. S. Samsurijan, A. Ebekozien, N. A. N. Azazi, M. M. Shaed, and R. B. R. Firdaus, "Artificial intelligence in urban services in Malaysia: a review," *PSU Research Review*, vol. 8, no. 2, pp. 321-340, 2022, doi: 10.1108/prr-07-2021-0034.

[10] U. Techanamurthy, M. S. Iqbal, and Z. Abdul Rahim, "Industry 4.0 readiness and strategic plan failures in SMEs: a comprehensive analysis," *PLOS One*, vol. 20, no. 5, pp. e0324052, 2025, doi: 10.1371/journal.pone.0324052.

[11] M. Samsurijan, A. Ebekozien, N. Azazi, M. Shaed, and R. Firdaus, "Artificial intelligence in urban services in Malaysia: a review," *Psu Research Review*, vol. 8, no. 2, pp. 321-340, 2022, doi: 10.1108/prr-07-2021-0034. (Duplicate of [9], but with hyperlink if kept separately).

[12] H. Hamirul and N. Elsyra, "The role of artificial intelligence in government services: a systematic literature review," *Open Access Indonesia Journal of Social Sciences*, vol. 6, no. 3, pp. 998-1003, 2023, doi: 10.37275/oaijss.v6i3.163.

[13] S. Kim, Z. Tang, D. Kim, and H. Ahn, "Exploring the impact of perceived convenience, autonomy, and satisfaction on citizens' continuance with government chatbots," in *Proceedings of the 2024 Hawaii International Conference on System Sciences (HICSS)*, 2024, doi: 10.24251/hicss.2024.059.

[14] T. Yiğitcanlar, K. Desouza, L. Butler, and F. Roozkhosh, "Contributions and risks of artificial intelligence (ai) in building smarter cities: insights from a systematic review of the literature," *Energies*, vol. 13, no. 6, pp. 1473, 2020, doi: 10.3390/en13061473.

[15] P. S. Shungube, T. Bokaba, P. Ndayizigamiye, S. Mhlongo, and E. Dogo, "A Deep Learning Approach for Healthcare Insurance Fraud Detection," ResearchGate, 2024, doi: 10.21203/rs.3.rs-5453482/v1.

[16] M. N. M. Nasir and S. F. Ahmad, "Islamic Bioethics in Health Technology Assessment: A Review of Key Ethical Frameworks," *International Journal of Research and Innovation in Social Science (IJRISS)*, vol. 8, no. 10, 2024. [Online]. Available: https://rsisinternational.org/journals/ijriss/articles/islamic-bioethics-in-health-technology-assessment-a-review-of-key-ethical-frameworks/.