Towards a Responsible AI Governance Framework-Lessons from Policy Implementation in Malaysia

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Abstract

The rapid integration of Artificial Intelligence (AI) technologies across public and private sectors has underscored the urgent need for governance frameworks that ensure ethical, transparent, and accountable deployment. AI's economic contribution is projected to reach RM 480 billion by 2030 in Malaysia. This study employed a qualitative analysis approach to capture diverse perspectives from government agencies, private sectors, and academia. The study examines the Malaysia's AI governance readiness across five critical dimensions: country governance and regulation, education and research innovation, talent development, cultural sustainability, and facilities management. The McKinsey 7S framework was used to analyze the readiness of AI deployment in the Malaysia's, highlighting the interconnectivity of 7 McKinsey elements which are strategy, structure, system, shared values, skill, style, and staff and additional elements which are stakeholders & ecosystem, all of which collectively influence the nation's AI preparedness. Findings reveal that, in Malaysia, the regulatory ambiguity remains a major challenge leading to inconsistent enforcement and compliance gaps. Stakeholder engagement is further complicated by conflicting interests and a lack of shared understanding of AI ethics and risks. Ethical considerations are paramount throughout the research process. A significant strength in institutional readiness, including investment in education, talent pools initiatives and ICT related infrastructure was identified. However, weak AI deployment observed in heritage and cultural protection efforts and limited environmental protection initiatives remain barriers, requiring tailored capacity-building programs and cross-sector collaboration. The study calls for strengthened international cooperation, risk management practices, and inclusive stakeholder engagement to ensure ethical and accountable AI deployment in diverse national socio-economic sectors in Malaysia.

Key Words: AI governance; Responsible AI; Malaysia; Policy implementation; Mc Kinsey 7S

1. INTRODUCTION

Rapid adoption of artificial intelligence (AI) has significantly transformed various industries such as manufacturing, healthcare, and public governance from manual operation into autonomous and semi-autonomous systems operation, to streamline processes, reduce costs and improve operational efficiency. However, this emerging technology simultaneously raising concerns about ethics, accountability, and social impact. National and international organizations have responded to these concerns by developing and expert committees on AI, developing AI ethics guidelines, ethical requirements, technical standards, and best practices to ensure responsible AI technology is used with safety, human rights, and inclusivity (UNESCO, 2021; OECD, 2019). However, their implementation especially in emerging economies faces significant hurdles such as regulatory inexperience, fragmented institutions, and uneven digital infrastructure, which challenge the practical adoption with global standards.

In India, the National Strategy for AI, emphasizes on ethical AI deployment but faces implementation hurdles due to fragmented ai regulatory policies, limited data protection infrastructure, weak enforcement and institutional coordination, limited ai literacy and talent gaps, unclear liability and accountability (Balla et al., 2024; Singhania & Co, 2025). Similarly, the Brazilian Strategy for Artificial Intelligence (EBIA) which leverages the country's strengths in technology, innovation, and entrepreneurship to address Brazil's challenges and create new opportunities for citizens in the innovation ecosystem. This strategy also promotes responsible AI in but struggles with regulatory harmonization across sectors, unbalancing between innovation and regulation, and limited technical capacity (Tome et al., 2022).

Indonesia, through National Strategy for Artificial Intelligence (Stranas KA) for 2020–2045 and AI Roadmap (2025), aims to align AI development with national values and Pancasila ethics, though coordination across ministries and capabilities in AI is not sufficiently developed, remains a significant obstacle (Antara, 2023).

For Malaysia, as a digitally ambitious middle-income nation, Malaysia government has launched several national initiatives to promote responsible AI adoption. The National AI Roadmap (AI-RMap) 2021–2025 that was launched on December 2021, aims to create an ecosystem for responsible AI innovation and adoption. This roadmap aligns with UNESCO's Recommendation on the Ethics of AI and other integrates policies such as the Malaysia Digital Economy Blueprint and the National Policy on Science, Technology, and Innovation (DSTIN 2021–2030). It emphasizes a quadruple helix collaboration among government, academia, industry, and society to ensure inclusive and sustainable AI development. Malaysia's strengths in education, ICT infrastructure, and industry growth provide a solid foundation for advancing AI readiness. The country boasts robust educational systems with significant investments in AI training programs, including Technical and Vocational Education and Training (TVET), which equip workers with skills aligned to emerging labor market demands. ICT infrastructure metrics are equally strong, with internet usage at 97.7%, mobile broadband penetration at 129%, and broadband speeds averaging 120.8 Mbps (World Bank, 2025; Statista, 2025; MCMC 2023). These factors position Malaysia as a regional digital hub capable of scaling AI implementation effectively.

However, gaps remain in areas such as regulation fragmentation, ethics, limited public awareness, gaps in cross-sectoral coordination and environmental policies (KRI, 2025). While the National Guidelines on AI Governance and Ethics (AIGE), launched in 2024 (MOSTI, 2024) provide voluntary guidance for responsible AI practices, there is a need for comprehensive regulatory frameworks to address challenges such as data privacy, cybersecurity, and ethical compliance. Environmental policies also lack focus on leveraging AI for conservation efforts or addressing climate change risks. Weak enforcement mechanisms further exacerbate these gaps. Thus, this study is carried out to critically examine and analyze the current legal, regulatory, strategic instruments policy implementation landscape of AI governance in Malaysia.

2. METHODOLOGY

This study employs a qualitative research design to explore five critical dimensions: country governance and regulation, education and research innovation, talent development, cultural sustainability, and facilities management. A systematic review of published documents from various sources serves as the primary method for data collection, enabling an in-depth examination of existing literature and practices relevant to each dimension. For the dimension of governance and regulation, the study focuses on reviewing governmental reports, policy frameworks, and international governance indices to assess the effectiveness of regulatory systems. For education and research innovation dimension, the analysis centers on academic literature and institutional reports that highlight innovative practices and their impacts on educational outcomes. Talent development is explored through frameworks and case studies that illustrate successful strategies for cultivating a skilled workforce across various sectors. Cultural sustainability is examined by analyzing articles and reports discussing culturally sustaining pedagogies, particularly in indigenous education and community engagement. Finally, facilities management is reviewed through studies focusing on the location and management of facilities especially for infrastructures, internet accessibility and data centers management.

The readiness level then being analyse using the McKinsey 7S framework to analyze Malaysia's AI landscape, focusing on the interconnected elements of Strategy, Structure, Systems, Shared Values, Style, Staff, and Skills. This approach provides a thorough understanding of the strengths, gaps, and readiness levels across these dimensions. McKinsey's 7S Framework holistic approach can provide valuable structure when adapted carefully for evaluating the readiness and adoption level of AI at a national scale. However, to suit the complexity of a nation-level AI landscape - involving diverse stakeholders, public infrastructure, governance models, and citizen engagement, an additional element on Stakeholders & Ecosystem were added.

3. RESULT AND DISCUSSIONS

For evaluating AI readiness at a national level,

the adoption of 7S approach that is divided into two categories: tangible (hard) and intangible (soft) elements, provides a balanced view — not just of the technical infrastructure or policies (the hard S's) but also of the softer, more human-centric factors (the soft S's) that often become the real barriers or enablers of adoption. Both categories offer essential insights but address different dimensions of readiness. The hard elements of 7S are Strategy, Structure, and System, while the soft elements are Shared Values, Skill, Style, and Staff.

The tangible or hard elements refer to structural and visible aspects of a nation's AI readiness, which are relatively easier to observe and measure. The element Strategy focuses on the existence of a clear and actionable national AI policy or roadmap. This includes well-defined strategic goals, identification of priority sectors for AI adoption, ethical frameworks, and a long-term vision that guides AI's role in economic and social development. The element of Structure, relates to the governance mechanisms that facilitate AI deployment. It considers the presence of dedicated government agencies, regulatory bodies, decision-making hierarchies, and public-private partnership structures that drive AI-related initiatives. The third element, Systems, encompasses the technological and operational infrastructure necessary to support AI adoption. This includes factors such as data infrastructure readiness, availability of digital platforms, interoperability standards, cybersecurity frameworks, and sustainable funding mechanisms for AI projects.

In contrast, the intangible or soft elements are more challenging to quantify, as they revolve around cultural, human, and relational factors that play a critical role in ensuring sustainable AI adoption. The first of these, Shared Values, reflects the overall cultural mindset and societal attitudes towards AI, including public trust in AI technologies, acceptance of AI-driven change, and the degree to which ethical considerations are integrated into AI development and use. The second element, Skills, examines the availability of talent and expertise within the nation. This includes the strength of the AI education pipeline, reskilling initiatives for the existing workforce, and the general level of AI literacy among both professionals and the public. The next element, Style, captures the leadership approach and the national culture of innovation. It evaluates how government leaders and industry players role-model AI adoption, foster innovation, and communicate the vision of AI transformation across sectors. Lastly, the Staff element goes

beyond just numbers to assess the capability and readiness of key stakeholders, including government agencies, industry practitioners, academia, and the broader public sector workforce, in understanding, adopting, and managing AI technologies effectively.

These tangible and intangible elements offer a comprehensive framework for analyzing not just the technical readiness of a nation for AI adoption, but also the cultural and human factors that often determine the real success or failure of AI deployment at scale. The application of the McKinsey 7S framework reveals that Malaysia demonstrates significant strengths in strategy (AI Roadmap), systems (ICT infrastructure), staff (workforce development), and skills (industry growth and talent development). However, gaps remain in shared values (cultural sustainability), structure (governance by sector), and systems (act and regulation).

3.1 Strategy

Malaysia's strategic approach towards AI deployment is anchored in the National Artificial Intelligence Roadmap (AI-RMap) 2021-2025, reflecting a structured plan to integrate AI across multiple socio-economic sectors. In addition, the National Fourth Industrial Revolution (4IR) Policy covering AI as one of its five foundational 4IR technologies and emphasizing that the significance of the technology is comparable to the "electricity" that powers the 4IR (KRI, 2025). These documents show the Malaysia government commitment in harnessing AI for economic and social development. In order to ensure the Malaysia's commitment to responsible AI, the National Guidelines on AI Governance and Ethics (AIGE) was launched in September 2024, which has integrated the seven AI principles of the UNESCO Recommendation on the Ethics of AI.

The strategy is backed by substantial tangible investments, including RM64.2 billion allocated for education whereases RM50 millions of it is allocate only for R&D in AI related field in the 2025 budget, RM114.7 billion investments in data centres and cloud service between 2021 to 2023 and international investments from tech-giants like Google, Microsoft, and Nvidia (Said and Nabilah, 2024; Borneo Post, 2024). The tangible infrastructure readiness and policy planning are evident in the adoption of AI in

ten sectors under the 10-10 MySTIE Framework. However, intangibly, the strategy faces gaps in comprehensive regulatory frameworks and environmental policies. Although ethical AI governance is emphasized through Malaysia's adherence to the UNESCO AI Ethics Recommendation, the lack of explicit environmental considerations within AI policies signals a need for holistic strategic expansion.

3.2 Structure

As previously discuss, the Structure element refers to the systems and organizations that support AI implementation, which include government agencies, regulators, decision-makers, and partnerships between the public and private sectors. Since the launch of the AI-RMap in 2022, MOSTI has been responsible for implementing strategic plans related to Responsible AI governance. MOSTI also established an AI Governance Structure, consisting of a Steering Committee, a Technical Committee, and five (5) Working Committee on Governance, Legal and Ethics (Working Group 1), Collaboration, Enabler and Innovation Hub (Working Group 2), Talent Development (Working Group 3), Research, Innovation and Data Sharing (Working Group 4) and Acculturation and Communication (Working Group 5). The Steering Committee's progress is monitored by the National Digital Economy and Fourth Industrial Revolution Council (MED4IRN), chaired by the Prime Minister.

However, intangibly, the absence of a centralized regulatory framework for AI governance creates fragmentation across agencies. Thus, on August 28, 2024, the National AI Office (NAIO) under the Ministry of Digital (MD) was establish, aims to unify efforts and strengthen coordination among the stakeholders to enhance Malaysia's competitiveness, drive sustainable growth, and position the nation as a regional AI leader. To support the implementation of digital functions, two departments and six agencies are placed under the MD, namely the National Digital Department (NDD), the Department of Personal Data Protection (DPDP), the Malaysia Digital Economy Corporation (MDEC), MyDIGITAL Corporation, CyberSecurity Malaysia (CSM), Digital Nasional Berhad (DNB), and MYNIC Berhad. But, these NAIO still at early stages of implementation.

3.3 System

System elements encompass the technological and operational infrastructure necessary to support AI adoption. This includes factors such as data infrastructure readiness, availability of digital platforms, interoperability standards, cybersecurity frameworks, and sustainable funding mechanisms for AI projects. Overall, the readiness of ICT infrastructure to accommodate AI technology adoption and scaling among Malaysia organizations is increased (CISCO, 2024). Malaysia has initiated several tangible systems supporting AI in various sectors which are as follows:

a. Governance and regulation

The system of governance also includes ethical guidelines through the National Guidelines on AI Governance and Ethics (AIGE, 2024). The AIGE outline seven responsible AI principles to guide the responsible development and deployment of AI which are (a) fairness, (b) Reliability, Safety, and Control, (c) Privacy and Security, (d) Inclusiveness, (e) Transparency, (f) Accountability, (g) Pursuit of Human Benefit and Happiness.

In term of cybersecurity, the backbone of Malaysia's cybersecurity and data protection framework in Malaysia includes Electronic Commerce Act 2006, which governs electronic transactions, and the Consumer Protection Act 1999, which ensures marketplace safeguards. Data protection and privacy are addressed through the Personal Data Protection Act (PDPA) 2010, while cybercrimes are tackled under the Computer Crimes Act 1997. In order to improve to improve with evolving global standards and stakeholder needs, the PDPA 2010 was amend and new act namely. The Personal Data Protection (Amendment) Act 2024 was officially been gazetted on the 17th October 2024.

Malaysia has demonstrated significant strides in embracing open data practices. A notable example is the Open Data Portal managed by the NDD, which provides public access to diverse datasets across sectors, fostering a data-driven society. This initiative also aligns with broader national policies, such as the Malaysia Digital Economy Blueprint (MyDIGITAL), which emphasizes data-driven transformation. The National Data Sharing Policy, established by the Malaysian Communications and Multimedia Commission (MCMC) in 2022 is complemented by a Data Sharing Framework that outlines principles, methods, and risk management protocols for data collection, storage, and dissemination

b. Education and Research Innovation

Malaysia has introduced several policies to integrate AI and digital tools into its education system. The Ministry of Education (MOE) launched the Digital Education Policy (DEP) in November 2023, aimed at enhancing digital literacy among students, educators, and educational leaders. The Malaysian Education Blueprint (MEB) 2013–2025 highlights the importance of using technology. In 2019, MOE established a digital learning platform as DELIMa, that provide an inclusive and dynamic digital learning environment for all Malaysia teachers, students and school administrators to access various sources of materials, for example digital textbooks and learning applications. The Ministry of Higher Education (MOHE) has developed the Humanising Higher Education for Future-Proof Talents: 4.0-Action Plan to capture how Malaysia higher education addresses the impact and challenges of the 4IR.

In term of educational infrastructure, Malaysia has made significant progress in providing schools with access to internet and computers. It is estimated that 100% of primary schools in Malaysia have internet access for pedagogical purposes (UNESCO, 2024). The educational curriculum content from the primary, secondary, and tertiary education also improves with additional courses related to AI, machine learning, and data science. Regarding the research and innovation sector, the government budget allocations for R&D on AI-related funding is up to RM 483 million in 2024, illustrates Malaysia's commitment to advancing AI in alignment with broader R&D expenditure goals and ambitions to become a key player in AI innovation.

c. Talent development

Malaysia has implemented various strategies and programs to develop digital competencies within the public sector as part of its broader efforts to advance the digital economy and enhance public service delivery. Key initiatives include the Malaysia Digital Economy Blueprint (MDEB), AI Talent Roadmap 2024-2033, the Public Sector ICT Strategic Plan, Public Sector AI Adaptation Guidelines and National Talent Framework. Additional digital skill training opportunities also available in the country such as:

1. *Malaysia digital workforce training directory:* This directory offers a range of endorsed digital technology courses. These cover key areas such as artificial intelligence, cybersecurity, cloud computing, data science, and fintech, equipping public sector employees with in-demand digital skills. This directory is managed by MDEC.

2. *Mydigitalmaker movement:* This initiative primary aimed for young people towards fostering digital creators within the economy. The focus on skills like coding, robotics, and app development indirectly benefits the public sector by nurturing a pipeline of digitally skilled talent entering the workforce.

3. *Digital skills training directory:* This additional resource provides curated courses reviewed by industry experts, enabling public sector employees to address specific career needs in line with Malaysia's digital transformation goals. In addition to this, NDD is working with Public Services Department (JPA) for Accelerated Course for Competency Excellence Programme (ACE) for AI related courses.

d. Cultural sustainability

Malaysia does not currently have a specific policy dedicated to the use of AI for the preservation of the national cultural heritage. However, the National Cultural Policy highlights the integration of digital technologies, including AI, as tools to document, safeguard, and promote Malaysia's rich cultural assets. The Ministry of Tourism, Arts, and Culture (MOTAC) has developed the Strategic Digitalisation Plan 2022–2026 to address the digitization of the tourism and cultural sectors. Overall, there is limited publicly available information on structured evaluations or assessments of policies related to cultural heritage and language preservation using AI

Overall, there are various system available to promote AI adoption in various sector, intangibly, however, enforcement mechanisms for ethical AI practices remain limited, and the systems integrating AI into environmental conservation and cultural preservation are underdeveloped. Systems for AI data governance are still fragmented despite efforts to establish a national cloud computing policy.

3.4 Shared Values

Malaysia's shared values are deeply embedded in fostering innovation, inclusive education, and responsible AI practices. Tangibly, this is shown through AI adoption in education,

digital healthcare, and skills development programs. The intangible aspects emphasize ethical AI, inclusiveness, and data privacy aligned with UNESCO's ethical AI principles. However, there is a growing need to expand these values to emphasize environmental stewardship and cultural sustainability explicitly within AI policies.

3.5 Style

Style element refers to the leadership approach, cultural norms, and management behavior that shape how strategies are implemented within an organization or system. In Malaysia's AI governance landscape, leadership style is characterized by collaborative, consultative, and top-down policy direction. The leadership style in AI governance in Malaysia is largely proactive and top-down, evident through the establishment of the NAIO and AI Governance Structure.

Tangibly, Malaysia demonstrates leadership through policy launches, partnerships, and funding. Intangibly, leadership inclusivity and participatory engagement with diverse stakeholders need enhancement. The adoption of a participatory style could help bridge existing gaps, especially in regulatory enforcement and AI's socio-environmental impact.

3.6 Staff

Staff element referring to people, their roles, recruitment approaches, development strategies, and how they are managed and retained. The development of AI-related staff capacity, particularly in the public sector, is seen as a critical enabler of national digital transformation. To support this, the Ministry of Digital, through the NDD, has introduced targeted programs aimed at equipping civil servants with AI-related knowledge and competencies. The Public Sector AI Adaptation Guidelines launched in February 2025 also outline the roles and responsibilities of staff in AI governance and deployment (JDN, 2025). Additionally, the formation of Digital Talent Groups within the civil service, including a Data Science and AI Talent Cluster, reflects a structured approach to identifying and nurturing specialized AI talent in government agencies (JDN, 2024). The current workforce development is promising but needs broader coverage to nurture AI competencies across sectors.

3.7 Skill

The "Skill" element refers to the capabilities and competencies present within an organization. For Malaysia, building AI-related skills is a national priority, as the country aspires to become a regional leader in AI in the region. For instance, under the AI Roadmap 2021–2025, the government promotes AI reskilling and upskilling (AI-RUS) to ensure that the workforce is equipped to meet evolving technological demands. Additionally, the MDEC supports digital skills training through the MyDigitalWorkforce initiative and the Malaysia Digital Workforce Training Directory, which offers certified courses in AI, cloud computing, data analytics, and machine learning.

Moreover, public-private partnerships provide significant contributing building capacity. For example, Microsoft's commitment to train 300,000 Malaysians in AI and digital skills demonstrates industry roles in strengthening national competencies (Ministry of Digital, 2024). In education, the MOE and MOHE have incorporated AI into the national curriculum and technical education programs, including AI-focused TVET courses, and public universities ensuring that the younger generation gains relevant and practical AI competencies. Notable universities in Malaysia also leading in research producing AI professionals. Research centres and departments addressing AI and ethics in Malaysia include (Said and Nabilah, 2024):

- Faculty of AI (FAI) at Universiti Teknologi Malaysia (UTM)
- The Centre for Artificial Intelligence and Robotics (CAIRO) at Universiti Teknologi Malaysia (UTM)
- The Artificial Intelligence Research Unit (AiRU) at Universiti Malaysia Sabah (UMS),
- Malaya Artificial Intelligence Research (MALAYA AIR) at the Universiti Malaya (UM)
- The Artificial Intelligence and Applications Research Team at the University of Nottingham Malaysia
- The Artificial Intelligence Research Group at Universiti Malaysia Sarawak (UNIMAS).

Additionally, Malaysia has made significant strides in enhancing public access to AI education, offering a range of programs designed for different participants. These initiatives focus on building AI literacy, practical skills, and awareness of ethical consideration. For instance, programs listed under MyMAHIR platform are designed to

enhance skills, and acquire new competencies in AI sector.

However, intangibly, there remains a gap in specialized AI skills such as ethical AI design, AI for environmental sustainability, and AI for cultural preservation. Closing these gaps will require strategic collaborations with international bodies and targeted training programs.

3.8 Stakeholders

Stakeholder engagement in Malaysia's AI ecosystem is framed by the Quadruple Helix Model involving AI governance, AI industry, AI Talent, and AI Socio economic drivers (Fig. 1). Table 1 shows key government stakeholders in Malaysia AI ecosystem (KRI, 2024). The establishment of the NAIO and multiple stakeholders working groups under MOSTI reflects a participative approach to AI policy design and execution. Tangible outcomes of this engagement include multi-sectoral collaborations in AI adoption, ethical guideline development, and public-private partnerships. Intangibly, while public awareness campaigns and workshops are increasing, the depth of stakeholder engagement in policy co-creation and regulatory design remains limited. Expanding stakeholder roles beyond consultation to active participation could foster a more inclusive and trusted AI ecosystem.
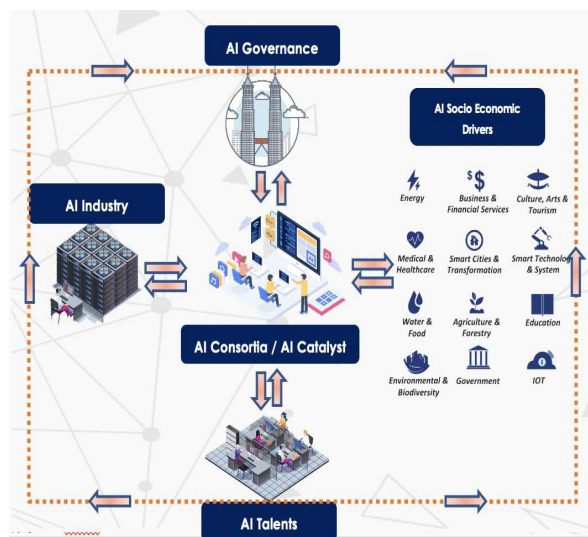

Fig. 1*: Malaysia's AI ecosystem (AiGE, 2024)*

Table 1: *Key government agencies in Malaysia's ecosystem*

Segment	Key Government Agencies
Main ministries	Ministry of Communication (K-KOMM)
	Ministry of Digital (KD)
	Ministry of Science, Technology and Innovation (MOSTI)
Main agencies	CyberSecurity Malaysia
	Department of Personal Data Protection (JPDP)
	Department of Standards Malaysia (JSM)
	Malaysian Communications and Multimedia Commission (MCMC)
	Malaysia Digital Economic Corporation (MDEC)
	MIMOS
	MyDigital Corporation
	National Cybersecurity Agency (NACSA)
	National Digital Department (JDN)
	SIRIM
Sectoral players	Bank Negara Malaysia (BNM)
	Ministry of Education (MOE)
	Ministry of Health (MOH)
	Ministry of Human Resources (KESUMA)
	Ministry of Investment, Trade and Industry (MITI)
	Securities Commission Malaysia (SC)

4. CONCLUSIONS

Malaysia's experience in developing a responsible AI governance framework offers valuable insights for emerging economies seeking to align technological advancement with ethical and inclusive practices. Through the adoption of the McKinsey 7S Framework, this study highlights that while Malaysia exhibits strong strategic direction, robust ICT infrastructure, and significant investment in talent development, challenges persist in areas such as environmental integration, cultural sustainability, and regulatory enforcement. However, gaps in stakeholder engagement, fragmented legal frameworks, and limited emphasis on AI's societal and environmental

impact must be addressed to ensure holistic readiness. To move forward, Malaysia should strengthen coordination, improve legal frameworks, and promote inclusive, cross-sector collaboration. These actions will support ethical, accountable, and sustainable AI development. The Malaysian experience shows that combining strong systems with human values is essential for responsible AI adoption, offering a useful model for other countries in similar stages of digital transformation.

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