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Exploring AI Readiness in Putrajaya's Public Sector Agency

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Abstract

An abstract Artificial Intelligence (AI) is increasingly recognized as a transformative force in the public sector, enhancing service delivery, policy-making, and digital transformation. In Malaysia, initiatives such as the Malaysia Digital Economy Blueprint (MyDIGITAL) and the National Artificial Intelligence Roadmap (2021–2025) highlight the government's commitment to advancing AI integration. Yet, public sector agencies face persistent challenges in achieving readiness, including gaps in infrastructure, human capital, and policy execution. This study explores the challenges and enablers of AI readiness in public sector agencies in Putrajaya, Malaysia. Guided by the Technology–Organization–Environment (TOE) framework a qualitative single case study was conducted involving five key informants through semi-structured interviews. Findings reveal nine key themes. Challenges relate to human capital and competency gaps, organizational and policy barriers, and technological constraints. Enablers include capability development, strategic alignment, and technological readiness. The study concludes that AI readiness depends on the interplay of infrastructure, policy, leadership, and human factors. It contributes to HRD by offering insights for upskilling civil servants and fostering an innovation-oriented culture, while informing theory and policy on embedding sustainable AI strategies in the public sector.

Keywords: AI readiness, public sector, challenges and enablers, digital era, Industry 4.0

1. Introduction

Artificial Intelligence (AI) has rapidly emerged as a transformative force in public administration, reshaping how governments deliver services, make policy decisions, and engage with citizens. Around the world, AI is increasingly integrated into administrative frameworks to enhance efficiency, optimize resources, and anticipate societal needs. Global benchmarks, such as the Government AI Readiness Index (2023), highlight how countries like Singapore and the United Kingdom have advanced by leveraging AI for healthcare, urban planning, public safety, and transparent governance. Beyond operational efficiency, the economic potential of AI is significant, with PwC (2018) projecting its contribution of USD 15.7 trillion to the global economy by 2030. However, successful integration requires not only technological investment but also strong governance structures and continuous workforce development (Wamba-Taguimdje et al., 2020).

Malaysia, too, has positioned AI as a national priority. Policy frameworks such as the Twelfth Malaysia Plan (EPU, 2021), the MyDIGITAL Blueprint (EPU, 2021), the National AI Roadmap 2021–2025 (MOSTI, 2021), and the Public Sector Digitisation Strategic Plan (MAMPU, 2021) emphasize digital transformation, talent development, and ethical AI governance. Practical applications are already visible: the Ministry of Health has used AI for COVID-19 diagnostics, the Royal Malaysia Police has adopted AI-driven predictive analytics for crime prevention, and agencies such as the Inland Revenue Board and Bank Negara Malaysia are leveraging AI for compliance and fraud detection. These developments signal Malaysia's ambition to establish itself as a digital innovation hub.

Despite such progress, AI adoption in the Malaysian public sector remains uneven. According to the Government AI Readiness Index (Oxford Insights, 2023), Malaysia ranks 23rd globally, a respectable position but one that still lags behind leading nations. The Cisco AI Readiness Index (2024) similarly reports that only 14% of Malaysian organizations are fully prepared to scale AI, citing weaknesses in infrastructure, data maturity, and organizational culture. Challenges are particularly acute within public agencies, where rigid procedures, fragmented systems, and limited digital skills persist (Khazanah Research Institute, 2023). These findings reveal a critical gap between national-level policy ambitions and agency-level implementation.

The academic literature mirrors this imbalance. While research on AI adoption has expanded considerably, much of it remains focused on technological innovation, economic outcomes, or private sector contexts (Dwivedi et al., 2021). Studies examining AI readiness within the public sector are relatively sparse, with Marques and Ferreira (2020) noting that less than 10% of reviewed studies addressed governmental contexts. Moreover, existing studies often emphasize infrastructure and policy factors while overlooking organizational dynamics such as leadership, institutional culture, and employee trust (Oliveira & Martins, 2011; Wirtz et al., 2019). In emerging economies, including Malaysia, empirical insights remain limited, despite calls from international bodies like the OECD (2023) and UNESCO (2022) for more context-specific investigations.

Recent systematic reviews in Southeast Asia highlight that while AI adoption is accelerating, its integration remains uneven and competency development underexplored. Four core domains identified: technological, cognitive, social-emotional, and change management underscoring the enduring importance of adaptability, emotional intelligence, and critical thinking despite automation (Baki et al., 2023a). Complementing this, another extended study by Baki et al., (2023b) emphasizes the dual nature of AI adoption: it enhances efficiency through bias reduction, cost savings, and improved engagement, yet raises issues of high implementation costs, employee resistance, diminished human interaction, and ethical concerns. The study calls for a holistic integration strategy where HR professionals and AI experts collaborate under structured change management frameworks to mitigate mistrust and cultural resistance (Baki, 2023b).

While these reviews provide important regional insights, the specific dynamics within Malaysia's public sector remain underexplored. Importantly, employee perceptions are increasingly recognized as a decisive factor in AI readiness. Positive attitudes toward AI grounded in trust, understanding of benefits, and digital competence—facilitate adoption, whereas fear, misconceptions, and low digital literacy foster resistance (Venkatesh et al., 2020; Dwivedi et al., 2021). In the Malaysian public sector, where accountability and transparency are central, employee perceptions can critically shape the success or failure of AI initiatives. Yet, empirical research capturing these perceptions within agency settings remains scarce.

Against this backdrop, this study explores the challenges and enablers of AI readiness in public sector agencies in Putrajaya, Malaysia's administrative capital. Drawing on the Technology–Organization–Environment (TOE) framework, the study adopts a qualitative single case study approach. It examines not only structural and policy dimensions but also employee perceptions, thereby addressing a crucial research gap. Based on the research objectives, the following research questions are formulated:

a) What are the key challenges in achieving AI readiness, faced by public sector agencies in Putrajaya, Malaysia?
b) What are the enablers that facilitate AI readiness in public sector agencies in Putrajaya, Malaysia?

2. Literature Review

This section explains the key concepts and theoretical foundations underpinning the study, focusing on the TOE framework AI readiness, challenges and enablers of AI adoption, and the role of employee perceptions. Together, these perspectives provide a comprehensive lens to examine how structural, organizational, and human factors interact to shape AI readiness in Malaysia's public sector agencies

2.1 TOE Framework

The Technology–Organization–Environment (TOE) framework, introduced by Tornatzky and Fleischer (1990), was originally developed to explain the determinants of technological innovation adoption within organizations. Designed to guide firms in adapting to emerging

technologies systematically, it has since become one of the most widely applied models in innovation and information systems research (Oliveira & Martins, 2011). While initially developed for private enterprises, its flexibility has enabled application across diverse sectors such as healthcare, education, and public administration (Baker, 2012).

Over time, the framework has been valued for its ability to integrate both internal organizational dynamics and external environmental pressures. This dual focus makes it particularly useful for analyzing technological readiness in complex, dynamic contexts such as public sector organizations. Its relevance in developing countries, including Malaysia, has been highlighted in studies that examine how socio-economic diversity and resource constraints shape technology adoption (Hossain et al., 2016).

The TOE framework is structured around three dimensions. The technological context includes internal and external technologies relevant to the organization, encompassing factors such as relative advantage, compatibility, and complexity (Chong & Ooi, 2008). The organizational context refers to internal features such as leadership support, resource availability, human capital, and digital competence. Strong managerial commitment, flexible decision-making structures, and robust IT capabilities are consistently associated with higher readiness for innovation (Baker, 2012; Zhu et al., 2006). In Malaysia's public sector, organizational capacity is particularly significant given the varied digital maturity levels across agencies. Finally, the environmental context captures external pressures such as regulatory requirements, public expectations, inter-agency collaboration, and partnerships with technology providers or academic institutions. National initiatives such as the MyDIGITAL Blueprint (EPU, 2021) and the National AI Roadmap (MOSTI, 2021) exemplify the supportive policy environment shaping AI adoption in Malaysia.

For this study, the TOE framework provides a comprehensive analytical lens to examine AI readiness in Putrajaya's public sector agencies. It aligns with the study's focus on challenges, enablers, and employee perceptions by recognizing that technology adoption is not a purely technical decision but an institutional process influenced by structural, cultural, and environmental factors. In particular, the framework is useful for unpacking the disparities between centrally driven digital strategies and their operationalization at the agency level, where issues of strategic alignment, leadership engagement, and inter-agency collaboration become most apparent.

2.2 AI Readiness Phenomenon

AI readiness refers to an organization's overall capability to adopt, implement, and integrate AI technologies effectively into its operations. It extends beyond technological infrastructure to include leadership commitment, governance mechanisms, ethical safeguards, and workforce competencies (Sun & Medaglia, 2019). In the public sector, readiness is further defined by alignment with principles of transparency, accountability, citizen trust, and ethical governance (Wirtz et al., 2019).

Jöhnk et al. (2021) identify strategic alignment, mature infrastructure, robust data governance, a positive organizational culture, and workforce competency as core elements of AI readiness.

Similarly, the Cisco AI Readiness Index (2023) outlines six pillars: strategy, infrastructure, data quality, governance, digital culture, and talent development. At the national level, Oxford Insights (2023) emphasize that successful AI adoption requires a balanced combination of technical and institutional capacities. Public agencies that demonstrate such readiness are more likely to streamline operations, enhance decision-making, and deliver citizen-centric services (Wirtz et al., 2019).

However, persistent barriers remain. Studies highlight that bureaucratic rigidity, low digital literacy, and employee scepticism often constrain public sector AI initiatives (Wirtz et al., 2019; Marques & Ferreira, 2020). Jöhnk et al. (2021) argue that targeted interventions such as digital upskilling, ethical AI training, and leadership development are crucial for bridging readiness gaps. In Malaysia, policy frameworks such as Vision 2030, MyDIGITAL, and the PSPSA 2021–2025 have positioned AI readiness as a cornerstone of national transformation. Yet, infrastructural limitations, workforce shortages, and uneven execution remain pressing challenges (Oxford Insights, 2023; Sallehudin et al., 2024). These realities suggest that AI readiness is shaped by a complex interplay of policy ambition, organizational behaviour, and human capacity, requiring holistic approaches that integrate infrastructure, innovation culture, digital skills, and ethics.

2.2.1 Challenges to AI Readiness

Despite its potential, AI readiness in the public sector is constrained by multiple institutional, technical, and governance barriers (Zuiderwijk et al., 2021). Cisco Systems (2023) note that fragmented strategies and misaligned governance structures often prevent coherent AI deployment. A key technical barrier lies in legacy systems, which lack interoperability and the real-time data exchange necessary for machine learning (Klievink et al., 2017). Such systems create data silos and inconsistencies, reducing the reliability of datasets for AI applications (Janssen et al., 2020) and limiting predictive analytics in critical domains like healthcare and urban planning (Mikalef et al., 2018). Weak data governance further compounds risks of breaches and misuse (Sun & Medaglia, 2019).

Skill shortages are another major challenge. Many public agencies lack personnel trained in data science, machine learning, and AI policy, forcing them to outsource critical functions (Bughin et al., 2018; Wamba et al., 2021). This reliance raises concerns over long-term sustainability and dependence on external vendors. Furthermore, disparities in training availability across ministries have created uneven levels of readiness (Henriksen et al., 2019; Baki et al., 2023b). Cultural barriers also play a role. Public sector organizations are often characterized by compliance-driven, risk-averse cultures that inhibit experimentation (World Bank, 2021). Without strong leadership advocacy, AI projects risk stagnation (Vogl et al., 2020). Resistance intensifies when change processes are poorly communicated or disconnected from performance outcomes (Dwivedi et al., 2023).

Unresolved ethical and regulatory issues further hinder adoption. The absence of comprehensive AI legislation creates legal ambiguity (Gasser & Almeida, 2017), while concerns about algorithmic bias and fairness discourage experimentation (Mittelstadt, 2019). UNESCO (2022) stresses that the lack of ethical safeguards risks eroding public trust in AI,

while the European Commission (2020) warns of potential rights violations without robust oversight. Finally, financial constraints remain significant. AI projects demand considerable investment in infrastructure, talent, and cybersecurity, which many agencies struggle to justify within limited budgets (Chui et al., 2018). Fragmented funding and short-term political priorities also undermine long-term capability building (Janssen & Kuk, 2016; Mergel et al., 2019).

2.2.2 Enablers of AI Readiness

Enablers of AI readiness refer to the institutional capacities, resources, and mechanisms that facilitate effective adoption and sustained use of AI technologies. OECD (2023) stresses that without enablers such as robust infrastructure, skilled human capital, and ethical governance, AI projects often remain confined to pilot stages. Interoperable data ecosystems, secure platforms, and cloud capabilities provide the technical foundation for AI integration (Sun & Medaglia, 2019).

Leadership commitment is consistently cited as a critical enabler. Strong managerial advocacy fosters an innovation-oriented culture, mobilizes resources, and drives organizational change management (Wirtz et al., 2019). In its absence, initiatives often encounter inertia and fragmentation. Equally important is workforce competency. Continuous professional development in data analysis, AI literacy, and ethical awareness ensures employees can confidently use AI systems and reduces fears of technological displacement (Jöhnk et al., 2021).

Cross-agency collaboration and ecosystem partnerships further strengthen readiness. OECD (2023) highlights the value of coordinated strategies that promote interoperability, knowledge sharing, and collaboration with academia and industry. Such partnerships accelerate innovation and resource mobilization. Finally, ethical and regulatory frameworks are indispensable. UNESCO (2022) underscores the importance of transparency, accountability, and fairness in fostering public trust. For Malaysia, enhancing these enablers is essential for fulfilling the ambitions of MyDIGITAL and the National AI Roadmap, ensuring that AI adoption contributes to inclusive, efficient, and citizen-centred public services.

2.2.3 Employee Perceptions on AI

Employee perceptions are pivotal to AI readiness, as they shape attitudes toward adoption and influence organizational outcomes. Perceptions encompass trust, acceptance, and emotional responses to AI technologies (Heavin & Power, 2018). In the public sector, where decisions carry significant implications for citizens, employee trust in AI systems is especially critical. Trust is built when AI systems are transparent, explainable, and aligned with organizational goals. Employees are more likely to engage with AI when systems demonstrate fairness and accountability (Binns, 2018; Zou & Schiebinger, 2018). Conversely, biases or opaque decision-making processes can erode confidence.

Organizational culture also shapes openness to technological change. Conservative, hierarchical environments often discourage experimentation (Henriksen et al., 2019). Transparent communication about AI's potential to reduce repetitive tasks and enhance

productivity, however, can foster greater acceptance (Jöhnk et al., 2021). Digital competency and training access are further determinants. Without adequate skills, employees may resist AI adoption due to fear of displacement or lack of confidence (Wamba et al., 2021). Training that incorporates ethical awareness, legal considerations, and practical applications can mitigate such concerns.

Participation in AI initiatives enhances ownership and acceptance. Involving employees in design and implementation ensures alignment with operational realities and reinforces perceptions of AI as a supportive tool rather than a disruptive force (Vogl et al., 2020). Nonetheless, poor communication, weak leadership advocacy, and unclear policies continue to undermine employee trust and engagement (OECD, 2019). Overall, employee perceptions remain a decisive but underexplored factor in public sector AI readiness. Addressing concerns through transparent communication, capacity building, and inclusive strategies is essential for sustainable AI integration.

3. Method

3.1 Research Design

An exploratory single-case study design was employed to investigate AI readiness within its real-life context. Case studies are particularly valuable when addressing "how" and "why" questions, especially in situations where the boundaries between the phenomenon and its context are not clearly defined (Yin, 2012, 2018). The selected case is the Public Service Department of Malaysia (Jabatan Perkhidmatan Awam, JPA), which serves as the central agency responsible for workforce management, human capital development, and digital policy implementation across the public sector. Within this case, embedded sub-units include different departments and professional roles involved in AI-related initiatives. JPA was chosen because of its strategic mandate in overseeing digital transformation and AI integration in Malaysia's civil service, making it an appropriate site for examining readiness. The single-case design emphasizes depth rather than breadth, allowing for thick description and nuanced interpretation of organizational practices and employee experiences. While this approach limits generalizability, it offers deep contextual insights that may inform broader public sector transformation efforts.

Purposive sampling was employed to select participants who possessed relevant knowledge and experience with AI-related initiatives in the public sector. This approach is particularly effective in qualitative studies where the aim is to gather in-depth insights from information-rich cases (Patton, 2015; Merriam & Tisdell, 2016). Participants were drawn from JPA's management and professional group (Grade 9–14), as these individuals are directly involved in operationalizing digital transformation policies and bridging the gap between top management's strategic vision and frontline implementation. To ensure the suitability of participants, inclusion criteria required that individuals (a) belong to the management and professional group, (b) have at least one year of service in JPA to ensure familiarity with organizational culture and AI-related initiatives, (c) be directly engaged in AI, digital transformation projects, or related policy development, and (d) provide voluntary consent to participate. Exclusion criteria applied to (a) recent hires with less than one year of

service, due to limited organizational exposure, and (b) part-time, temporary, or contractual staff, given their limited involvement in long-term initiatives.

3.2 Data Collection Procedure

Data collection was conducted in three phases: a preliminary study, in-depth interviews, and the review of secondary sources, supported by field observations to provide contextual depth. A preliminary study was first conducted with two purposively selected participants whose backgrounds closely matched the main study criteria. The pilot interviews, lasting 25–40 minutes each, were used to refine the interview protocol, improve question clarity, and assess the flow and duration of the sessions. Adjustments included the addition of probing questions and a revised introduction script to enhance participant comfort.

The primary method of data collection was semi-structured in-depth interviews with five participants from JPA's management and professional group (Grade 9–14), selected for their direct involvement in digital transformation and AI initiatives. The interview protocol was developed based on the TOE framework, ensuring alignment with the study objectives: (a) to identify challenges to AI readiness, (b) to examine enablers that facilitate readiness, and (c) to explore employee perceptions. Each interview lasted between 30 to 75 minutes and was audio-recorded with participant consent. Open-ended questions and probing techniques were used to encourage detailed reflection, while ethical principles including confidentiality, informed consent, and pseudonyms were strictly observed.

To triangulate and validate findings, document analysis was also undertaken. Internal materials (e.g., AI strategy reports, training modules, change management guidelines) and national policy documents (e.g., Malaysia Digital Economy Blueprint, Twelfth Malaysia Plan, National AI Roadmap) were examined. These sources provided insights into strategic priorities, organizational communication, training efforts, and indicators of AI readiness.

Finally, non-participatory field observations were conducted during site visits to capture real-time evidence of digital practices and organizational culture. Attention was given to employee interactions with systems such as HRMIS, biometric devices, and digitization platforms, as well as visible indicators of transformation (e.g., digital dashboards, posters). Observations were systematically documented in field notes and analyzed alongside interview and document data. This process provided contextual validation and enriched the thematic analysis, strengthening the credibility and trustworthiness of the study.

3.3 Trustworthiness, Validity and Reliability

Ensuring trustworthiness in qualitative research requires demonstrating that the findings are credible, dependable, confirmable, and transferable. Creswell and Creswell (2018) distinguish qualitative validity as the accuracy of findings and qualitative reliability as consistency across methods and stages. Similarly, Merriam and Tisdell (2016) emphasize that careful attention to data collection, interpretation, and presentation is essential for maintaining research integrity.

In this study, several strategies were employed to enhance methodological rigor. First,

triangulation was used to corroborate evidence from different sources, including semi-structured interviews, document analysis, and non-participatory field observations. Interviews with officers directly involved in AI initiatives were complemented by the review of policy documents, circulars, and strategic frameworks, as well as observations of digital practices in the workplace. This integration of multiple data sources allowed for consistency checks, reduced bias, and provided a more holistic understanding of AI readiness in the Malaysian public sector.

Second, member checking was carried out to validate the accuracy of participants' perspectives. Transcribed interviews and preliminary thematic summaries were returned to participants via email and WhatsApp for verification. This process enabled them to review, clarify, or amend interpretations, while some provided additional elaborations that were incorporated into the findings. Such iterative feedback reinforced the authenticity of the study and ensured that conclusions were grounded in participants' lived experiences.

Third, peer debriefing with the research supervisor was conducted throughout the research process. Regular supervisory meetings provided opportunities to discuss interview design, coding accuracy, theme refinement, and analytical consistency. Following Lincoln and Guba's (1985) guidance, the supervisor acted as a critical reviewer, challenging assumptions and helping the researcher to remain reflexive and analytically sound.

Finally, an audit trail was systematically maintained to strengthen dependability and transparency. This included documentation such as approval letters, consent forms, interview protocols, raw transcripts, coding files, field notes, and reflective memos. All materials were securely stored and chronologically organized. A reflective log was also kept to record methodological decisions and challenges, providing a rationale for the development of themes. Periodic reviews of the audit trail by the supervisor further ensured analytical consistency and accountability.

Together, these strategies enhanced the credibility, reliability, and overall trustworthiness of the study. By integrating triangulation, member validation, supervisory critique, and a transparent record of decisions, the research establishes a strong foundation for interpreting the enablers, challenges, and employee perceptions shaping AI readiness in Malaysia's public sector.

4. Findings

4.1 Profiles of the Participants

This study involved five participants from different departments within JPA, all with at least five years of public service experience and direct involvement in digital initiatives or exposure to AI-related tools. Table 1 summarizes their demographic details.

Table 1. Demographic Profile

Respondent	Gender	Education	Role	Designation	Tenure (Years)
SAG	Female	Master of Information Technology	IT Policy, HRMIS Training	Assistant Director	5
RT	Male	Master of Technology & Innovation Management	HR, Administrative	Principal Asst. Director	3
SFZ	Female	Master of Chemical Engineering	HRMIS Change Management	Assistant Director	5
MI	Male	Bachelor of Information Technology	IT Program Development/ Support	Assistant Director	6
SFN	Female	Master of Business Administration	HR	Assistant Director	5

i) **SAG**: With over 20 years in public service, SAG leads HRMIS training and digital initiatives. She highlighted systemic barriers such as infrastructural gaps and skill disparities, stressing the importance of leadership and structured training in advancing AI adoption.

ii) **RT**: A senior officer with nearly two decades of experience, RT identified challenges like bureaucratic inertia and siloed systems but emphasized the role of leadership commitment and digital KPIs in cultivating an innovation-driven culture.

iii) **MI**: An IT specialist, MI reported technical challenges including fragmented data and outdated infrastructure, while also noting the benefits of partnerships with vendors and universities in driving technological experimentation.

iv) **SFN**: From a policy perspective, SFN raised concerns about governance, ethics, and job security. She argued that while frameworks are crucial, they must be responsive to employee needs and organizational realities.

v) **SFZ**: As the youngest participant, SFZ reflected frontline anxieties around AI literacy and generational gaps. She underscored peer support, targeted training, and the role of younger officers in promoting adoption

4.2 RQ1: What are the key challenges in achieving AI readiness?

This section explores the second research question, which seeks to identify the challenges that hinder AI readiness within Malaysian public sector agencies, specifically in the administrative capital of Putrajaya. Thematic analysis of participant responses revealed three overarching themes that represent the core barriers to AI readiness: human capital and competency, organizational and policy barriers, and technology and data infrastructure. These themes are further illustrated through their associated categories:

Table 2. Key Challenges of AI Readiness

Theme	Category
Human Capital and Competency	Organizational culture and perceptions
	Human capital limitations
	Digital readiness disparities
	Psychological and ethical concerns
	Job security anxiety
Organizational and Policy Barriers	Financial constraints
	Organizational limitations
	Policy and procedural constraints
	Leadership engagement
Technology and Data Infrastructure	Data governance
	Technological limitations
	Process and system limitations
	Outdated infrastructure

4.2.1 Theme 1: Human Capital and Competency

Human capital emerged as the most critical barrier to AI readiness, encompassing limited expertise, uneven digital literacy, resistance to change, and fears of job displacement and ethical misuse. Respondents consistently highlighted the dual challenge of skills and mindset. As SAG explained, *"The mindset should be accomplished to build up your digital talent… challenges on change management and user acceptance."*

While AI is often assumed to fall within IT departments, RT noted that *"even the IT team may not have deep knowledge or experience in AI specifically."* This over-reliance on consultants undermines sustainability, as MI emphasized: *"The number one gap… is the human capital. Meaning, the people or experts who really understand AI."* Without in-house champions, long-term adoption remains fragile.

Generational divides further complicate readiness, with younger officers exploring generative AI tools while senior staff remain reliant on legacy systems. As RT observed, *"Some explore Canva or ChatGPT… but senior officers still rely on traditional software."* Uneven digital fluency and continued reliance on manual processes slow organizational integration, a concern echoed by MI who noted that some staff "*still use manual processes."*

Beyond skills, psychological concerns particularly job security anxiety and mistrust of AI outputs were evident. SFN expressed, *"We are afraid that AI will replace us… uncertainty about the accuracy in decision making."* Similarly, RT cautioned about "*data misuse and ethical implication.*" These concerns highlight the need for transparent governance, ethical safeguards, and targeted communication to position AI as an augmentation tool rather than a threat.

4.2.2 Theme 2: Organizational and Policy Barriers

Organizational and policy barriers were consistently identified as structural impediments to AI readiness. Respondents described Malaysia's bureaucratic rigidity, siloed operations, and fragmented inter-agency collaboration as slowing innovation and creating inertia. As SAG noted, *"Agencies must break down silos and work in collaboration."* Strict SOPs and audit requirements often frame experimentation as a risk, discouraging agile adoption of emerging technologies.

Policy uncertainty further compounds hesitation. While national strategies such as the Malaysia AI Roadmap (2021–2025) provide direction, their translation into agency-level practice remains uneven. Respondents highlighted the absence of clear AI governance frameworks on data ethics, procurement, and transparency, which contributes to organizational reluctance. As SAG emphasized, *"It is not easy to develop and enforce guidelines and governance."*

Budget constraints were another recurring issue. Annual planning processes rarely prioritize AI-specific allocations, leaving departments dependent on limited or free versions of tools. RT reflected that "AI wasn't always included as a serious item" in budget cycles, while MI noted reliance on *"free ones, trials, and limited features."* Leadership support, though gradually improving, was perceived as inconsistent and cautious. SFN observed, *"Securing support from leadership has been a gradual process,"* underscoring the need for stronger top-down commitment.

Overall, organizational and policy barriers reflect deep-rooted structural limitations, bureaucratic procedures, siloed operations, weak inter-agency collaboration, insufficient funding, and hesitant leadership that collectively undermine AI readiness. These findings suggest that institutional inertia often outweighs technological potential in Malaysia's public sector.

4.2.3 Theme 3: Technology and Data Infrastructure

Technological and infrastructural constraints emerged as another major obstacle. Respondents emphasized outdated legacy systems, often more than a decade old, that do not integrate with modern AI tools. As SAG explained, *"We still rely on the legacy system… how to implement AI in the new legacy system is still a challenge."* RT added that such systems *"don't integrate well with new AI tools,"* creating structural incompatibilities that hinder adoption.

Data governance was identified as a critical weakness. Fragmented databases, unstructured records, and unclear data-sharing policies undermine the quality and availability of datasets for AI. SFN highlighted that *"some departments still have data… in paper form,"* while SAG stressed concerns about privacy and cybersecurity. Without reliable and standardized data, predictive modelling and analytics cannot function effectively.

Infrastructure limitations, including insufficient computing power and high costs for upgrading IT assets, also restrict deployment. SAG pointed out that advanced AI requires significant computing resources, while agencies often lack the capital investment needed for

high-performance systems. These gaps exacerbate reliance on centralized infrastructure that is underfunded and slow to adapt.

Finally, process integration remains underdeveloped. Even when digital tools are available, workflows are not designed to leverage AI insights. As SFZ noted, *"In the current system, we have difficulty in integration and unclear strategy"*. This disconnect means that AI's analytical potential often goes unused in decision-making. Together, outdated systems, weak data governance, inadequate infrastructure, and poor integration highlight how technology-related gaps constrain AI readiness in the Malaysian public sector.

4.3 RQ2: What are the enablers that facilitate AI readiness?

This section explores the second research question, which seeks to identify the enablers that support AI readiness within Malaysian public sector agencies, specifically in the administrative capital of Putrajaya. Thematic analysis of participant responses revealed three overarching themes that serve as critical enablers of AI readiness: workforce capacity building, organizational alignment and strategy, and technological and innovation readiness. These themes are further illustrated through their associated categories:

Table 3. Enablers Facilitating AI Readiness

Theme	**Category**
Workforce Capacity Building	Digital skills and competency growth
	Leadership capacity and workforce readiness
Strategic and Organizational Alignment	Collaborative networks and external engagement
	Governance structures and strategic alignment
Technology and Innovation Readiness	Digital infrastructure and preparedness
	Innovation culture and adaptive adoption

4.3.1 Theme 1: Workforce Capacity Building

Workforce capacity building emerged as a central enabler of AI readiness in Malaysian public sector agencies. Participants emphasized the importance of structured training, leadership-driven initiatives, and practical exposure to AI tools as critical elements in building digital confidence and reducing resistance. Strengthening competencies was seen not only as a matter of technical proficiency but also as a process of cultivating a workforce mindset open to innovation.

Respondents highlighted that training efforts were increasingly linked with direct access to AI tools. SAG explained, *"AI at Work 2.0 is one of the key initiatives… public officers get access to generative AI tools, and also receive proper training on how to use them."* Her account illustrates deliberate institutional efforts to align tool accessibility with capacity building, echoing broader national priorities under the Public Sector Digitalisation Strategic Plan (2021–2025). Similarly, MI noted that he had participated in updates on generative AI tools such as ChatGPT, Gemini, and Canva, underscoring how hands-on exposure fosters

experimentation and confidence. SFN further stressed the value of function-specific training, particularly in domains like examination automation, which aligns AI use with daily administrative practices.

Beyond skills acquisition, respondents repeatedly underlined the importance of leadership support in shaping AI readiness. Leaders were perceived as catalysts who set priorities, allocate resources, and model openness to change. RT emphasized that "*key success factors include strong leadership support and good cooperation with technology partners*," while MI described being encouraged to attend both domestic and international training programmes, including an overseas course in India. These examples highlight how leadership engagement extends beyond rhetoric to tangible investments in workforce development and global learning opportunities.

4.3.2 Theme 2: Strategic and Organizational Alignment

Strategic and organizational alignment emerged as a critical enabler of AI readiness in Malaysian public sector agencies. Findings underscore that AI adoption is not merely a technical undertaking but a systemic challenge requiring coherence across policies, institutions, and leadership directives. Effective alignment ensures that organizational structures, national strategies, and inter-agency collaborations converge to facilitate AI integration in public administration.

Collaborative networks were repeatedly cited as essential in bridging gaps in resources, expertise, and implementation. SAG emphasized partnerships with external providers, noting that *"we have access to advanced tools and also collaborative platform with the partnership with Google Cloud."* This reflects how public–private partnerships enhance technological access while mitigating internal infrastructure limitations. Respondents also highlighted multi-stakeholder engagement, including workshops with ministries, universities, and public agencies, as vital to co-developing practical AI guidelines. RT described collaborations with agencies such as Immigration, Statistics, and *Jabatan Digital Negara*, pointing to the role of inter-agency cooperation in harmonizing digital standards and fostering interoperability. Similarly, SFZ stressed that workforce shortages often necessitate working closely with vendors, reinforcing the importance of collaborative ecosystems in sustaining AI initiatives.

Equally important are governance structures and strategic alignment, which provide the institutional scaffolding for AI adoption. Leadership at the national and agency levels was identified as a decisive factor. SAG referred to Malaysia's political leadership, stating that *"our Prime Minister… actively championing AI aggression as the key element of good governance, economic competitiveness, and also digital transformation."* Such top-level endorsement aligns with national frameworks like RMKe-12 and direct budget allocations, including the RM10 million provision for the National AI Office in Budget 2025. These signals of political commitment translate into resource prioritization and policy coherence. At the agency level, RT observed that *"anything related to information technology or AI must be clearly included in the agency's strategic plan… Once this is in place, it will be easier for us to justify the budget request and secure funding."*

Respondents consistently reinforced leadership's role in embedding AI within organizational culture and ensuring institutional buy-in. As SFN explained, *"leadership has been a key in supporting AI because they provide us resources and also set clear goals and force the culture of innovation."* This sentiment was echoed by SFZ, who emphasized the hierarchical nature of Malaysia's public service: *"in the government sector… top management's role in encouraging the public servants is very important, especially to spread clear goals and strategies."* Leadership thus functions both as a directive and an enabling force, shaping not only policy alignment but also workplace culture and innovation capacity.

Overall, strategic and organizational alignment was found to be a cornerstone of AI readiness. Public–private partnerships, inter-agency cooperation, and inclusive stakeholder engagement create collaborative networks that sustain innovation, while governance structures and strategic direction secure resources, coherence, and institutional legitimacy. Together, these mechanisms ensure that AI adoption in Malaysia's public sector supports not only technological integration but also broader goals of administrative reform and public service excellence.

4.3.3 Theme 3: Technology and Innovation Readiness

Technology and innovation readiness emerged as a critical enabler of AI adoption, reflecting the importance of robust infrastructure, integrated systems, and an innovation-oriented culture. In Malaysia's public sector, these factors provide the structural and cultural foundation that allows agencies to experiment with and eventually integrate AI into everyday administrative processes. This theme highlights how access to scalable digital platforms, the presence of skilled IT personnel, and organizational openness to innovation collectively create conditions conducive to AI readiness.

Participants repeatedly stressed the role of digital infrastructure in supporting scalable AI applications. SAG emphasized that *"the comprehensive digital infrastructure and the integration of cloud computing allows us to scale our computing resources as needed for AI projects."* This statement reflects how platforms such as MyGovCloud, established under the *MyDigital Blueprint*, are beginning to provide agencies with the computing power necessary to process large datasets and operate AI models effectively. Similarly, SFN described her agency's use of AI to automate core functions, such as online examinations for scheduling and monitoring, demonstrating how cloud-enabled infrastructure can facilitate tangible improvements in service delivery. These examples show that infrastructure is not an abstract enabler but a concrete driver of operational innovation.

The presence of experienced IT personnel and established systems further strengthens readiness. SFZ explained that her agency's digital orientation and workforce capacity made AI adoption less daunting: *"Currently since I am in the digital department, our strength might be the IT workers… and also existing IT systems like HRMIS. So it will be a lot easier to adapt to AI."* Such comments reveal how institutional memory and familiarity with existing platforms create smoother transitions toward AI-enhanced systems. MI reinforced this point, noting his agency's pioneering role in adopting digital tools and highlighting an internal culture open to experimentation: *"Because of that, we are in a good position to*

explore and adopt new technologies like AI. We already have some systems in place, and our staff are used to handling digital tools."

Equally important is the cultural dimension of innovation. RT observed that his agency's interest in exploring new solutions is often linked to alignment with national priorities: *"There's a clearer interest in exploring new solutions, especially when they are aligned with national digital strategies."* This suggests that Malaysia's hierarchical bureaucratic structure often requires top-down endorsement before innovation can thrive. National strategies such as the *Twelfth Malaysia Plan (RMKe-12)* and the *MyDigital Blueprint* therefore serve not only as technical roadmaps but also as cultural signals legitimizing experimentation at the agency level. Respondents viewed this alignment as essential for reducing resistance and fostering an innovation-friendly environment.

Finally, effective governance and internal policies provide the structural assurance needed to manage AI responsibly. SFN highlighted her agency's strong data management practices and HR policies as foundations for integrating AI tools into existing systems. Her account demonstrates that mature digital governance frameworks reduce uncertainty, enhance trust, and position agencies to adopt AI more seamlessly. Collectively, these findings show that Malaysia's public sector agencies with strong infrastructure, skilled IT teams, supportive governance, and an openness to innovation are significantly better positioned to achieve AI readiness. Sustaining this readiness, however, will require not only technological upgrades but also the cultivation of cultures that value experimentation and continuous learning.

4. Discussion

This study examined the dynamics of AI readiness in the Malaysian public sector and found that readiness is shaped not only by technology but also by people, policies, and institutional culture. Respondents highlighted persistent barriers particularly in human capital, organizational structures, and infrastructure, while also pointing to enablers such as workforce development, leadership support, and collaborative networks. These findings mirror international evidence that public sector AI adoption is a multidimensional process influenced by technical, organizational, and environmental contexts (Wirtz et al., 2019; Oxford Insights, 2023).

The first challenge concerns human capital and competency gaps. Respondents repeatedly emphasized the lack of internal AI expertise, uneven digital literacy, and generational skill disparities within the civil service. These findings echo Oxford Insights' (2023) *AI Readiness Index*, which identifies "People and Skills" as a core pillar of readiness, and align with the emphasis on capacity-building found in the Twelfth Malaysia Plan (EPU, 2021). Psychological barriers also emerged, with officers voicing fears of job displacement, ethical misuse, and reduced human judgment in decision-making. Similar concerns have been documented in the AI ethics literature, which warns about techno-scepticism and algorithmic mistrust (Floridi et al., 2018; OECD, 2019; Dwivedi et al., 2021). Without comprehensive change management that integrates communication, training, and support, technical upskilling may be insufficient to overcome resistance.

The second set of barriers relates to organizational and policy structures. Bureaucratic rigidity, slow approval processes, and siloed agencies were seen as major impediments to AI integration. These findings confirm earlier work showing that rigid administrative procedures hinder innovation in Malaysia's public administration (MAMPU, 2021; Wirtz et al., 2019). Budget constraints and the absence of AI-specific strategies further complicate adoption, reflecting the importance of organizational alignment highlighted in the TOE framework (Tornatzky & Fleischer, 1990). Inter-agency collaboration was limited, even though AI requires integrated data systems and shared governance structures (OECD, 2023; World Bank, 2021). The absence of clear AI guidelines and ethical protocols also creates uncertainty, a problem noted in both OECD's AI Principles and the EU's AI Act (European Commission, 2020; OECD, 2023).

A third major barrier is technology and data infrastructure. Respondents described reliance on outdated legacy systems, poor data governance, and insufficient computing power as key obstacles. These concerns echo international findings, where infrastructure readiness is consistently identified as a determinant of AI adoption in government (World Bank, 2021; European Commission, 2020; Oxford Insights, 2023). Fragmented and unstructured data remain a persistent challenge, impeding algorithmic training and model accuracy. Similar patterns have been reported in studies of AI in public administration, where lack of data interoperability reduces decision-making efficiency (Janssen et al., 2020; Mikalef et al., 2018; Baki, 2023b). Cybersecurity and privacy issues compound the problem, particularly given Malaysia's Personal Data Protection Act, which does not yet address AI-specific risks (Sun & Medaglia, 2019; OECD, 2023; UNESCO, 2022). Limited access to advanced computational tools and overreliance on trial software were also mentioned, highlighting how budgetary limitations restrict experimentation and scaling.

Despite these barriers, the study also identified important enablers of AI readiness. The first is workforce capacity building, which includes both digital skills training and leadership-driven support. Initiatives such as *AI at Work 2.0* expose civil servants to generative AI tools while embedding training in national priorities (EPU, 2021; Oxford Insights, 2023; Jöhnk et al., 2021). Respondents noted that early adopters often act as internal champions, emphasis on facilitating conditions and social influence (Wirtz et al., 2019; Dwivedi et al., 2021). These findings suggest that human capital development must go beyond technical training to include mindset shifts, peer learning, and confidence-building, echoing broader HRD perspectives on digital transformation.

The second enabler is strategic and organizational alignment. Leadership was repeatedly described as central in mobilizing resources, providing direction, and embedding AI into organizational culture. This supports findings from TOE research, which highlight the role of leadership in shaping expectations and facilitating adoption (Tornatzky & Fleischer, 1990; Wirtz et al., 2019). Respondents also emphasized the importance of cross-agency collaboration and public–private partnerships, such as those with Google Cloud and Jabatan Digital Negara, which provide access to tools and expertise (OECD, 2023; World Bank, 2021; Oxford Insights, 2023). Alignment with national policies including *MyDIGITAL*, Budget 2025, and the National AI Roadmap was cited as crucial for securing funding and legitimacy,

reflecting how governance frameworks can enable coherent and sustainable AI integration.

The third enabler is technological and innovation readiness, encompassing infrastructure, digital platforms, and an organizational culture open to experimentation. Respondents noted that agencies with prior digital systems, such as online examination platforms or HRMIS, found it easier to adapt to AI. This is consistent with the OECD's principle of "digital by design" and Oxford Insights' emphasis on infrastructure as a readiness pillar (OECD, 2023; Oxford Insights, 2023; World Bank, 2021). Innovation culture was also highlighted, where pilot projects, sandbox approaches, and iterative learning reduced resistance and built confidence. Such practices align with research showing that public sector AI success depends on adaptability and continuous learning (Wirtz et al., 2019; Dwivedi et al., 2021; Rodrigues, 2025). Agencies that combine digital infrastructure with a risk-tolerant culture are better placed to sustain long-term transformation.

5. Conclusion, Implication and Recommendation

This study investigated the challenges and enablers of AI readiness in Malaysia's public sector, focusing on agencies in Putrajaya. The findings confirm that readiness is shaped by a complex interplay of workforce capacity, organizational structures, leadership commitment, and technological infrastructure. While Malaysia's national frameworks such as *MyDIGITAL*, the National AI Roadmap (2021–2025), and the Public Sector Digitisation Strategic Plan provide strategic direction, their translation into practice remains uneven. Limited AI expertise, bureaucratic rigidity, fragmented data systems, and ethical concerns persist as significant barriers. At the same time, training programs, leadership support, inter-agency collaborations, and early investments in cloud and digital systems demonstrate that important enabling conditions are in place.

The implications of these findings are threefold. First, AI readiness must be understood as both a technological and human challenge, requiring equal attention to infrastructure and workforce preparedness. Second, policy coherence and leadership advocacy are vital to ensuring that strategic ambitions are translated into operational practice. Third, organizational culture and trust play a critical role, as resistance to change and job insecurity can undermine even well-funded digital initiatives.

Based on these insights, several recommendations are proposed. For practice, the government should develop a national AI competency framework for civil servants, providing clear benchmarks for skills at different levels. A central coordinating body, such as a strengthened National AI Office, should be empowered to set standards, monitor implementation, and promote inter-agency data sharing. Finally, investment in digital infrastructure must be paired with innovation culture, ensuring that technological upgrades are accompanied by pilot projects, safe experimentation, and change management initiatives.

For future research, several directions are suggested. Comparative studies across ministries could provide a more granular understanding of readiness disparities within Malaysia's public sector. Cross-national research would be valuable in positioning Malaysia's experience alongside other middle-income countries pursuing AI-driven governance. Further inquiry

into employee perceptions and trust in AI particularly across generational and professional groups would also deepen understanding of adoption dynamics. Finally, longitudinal studies are needed to assess how policy frameworks, such as the National AI Roadmap, evolve in practice and influence long-term institutional capacity.

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