RESPONSIBLE AI IN SOUTHEAST ASIA: TRACKING PROGRESS AND BENCHMARKING IMPACT

RESEARCH BRIEF

FEBRUARY 2024

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ACKNOWLEDGEMENTS

This research brief is the product of an 18-month collaborative effort between DAI, the United States Agency for International Development (USAID), Access Partnership, and the ASEAN Secretariat (ASEC).

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Invaluable input was provided by a wide range of Southeast Asian experts, stakeholders, and representatives, including researchers, industry professionals, non-governmental organizations, and government officials from across the ASEAN region.

ACRONYMS & ABBREVIATIONS

3G	Third Generation Wireless Mobile Network
4G	Fourth Generation Wireless Mobile Network
4IR	Fourth Industrial Revolution
5G	Fifth Generation Wireless Mobile Network
AAP	Analytics Association of the Philippines
ABAC	APEC Business Advisory Council
ADB	Asian Development Bank
ADGMIN	ASEAN Digital Ministers' Meeting
ADM	Automated Decision-Making
AI	Artificial Intelligence
AIAPI	AI Asia Pacific Institute
AIDA	Artificial Intelligence and Data Analytics
AIHG	Artificial Intelligence in Healthcare Guidelines
AIMS	Artificial Intelligence Management System
AIRI	AI Readiness Index
AITC	Artificial Intelligence Technical Committee
AITI	Authority for Info-communications Technology Industry
AMS	ASEAN Member State
APAC	Asia–Pacific
APEC	Asia-Pacific Economic Cooperation
APRU	Association of Pacific Rim Universities
ARISE	ASEAN Regional Integration Support by the EU
ASCC	ASEAN Socio Cultural Community
ASEAN	Association of Southeast Asian Nations
ASEC	ASEAN Secretariat
AWARE	Association of Women for Action and Research
AWS	Amazon Web Services
BERT	Bidirectional Encoder Representations from Transformers
BI	Business Intelligence
BIICF	Brunei Darussalam ICT Industry Competency Framework
BIL	Brunei Darussalam Innovation Lab
BOI	Thailand Board of Investment
BPO	Business Process Outsourcing
BRIN	Badan Riset dan Inovasi Nasional (Indonesia's National Research and Innovation Agency)
CAGR	Compound Annual Growth Rate
CAIDP	Center for AI and Digital Policy
CAIFI	Centre of Artificial Intelligence for Future Industry

CEAI	Centre for AI Innovation
CHED	Commission on Higher Education
COE	Council of Europe
COSTI	Committee on Science, Technology, and Innovation
COVID-19	Coronavirus Disease 2019
CRADLE	Collaborative Research and Development to Leverage the Philippine Economy
CSO	Civil Society Organization
DALL-E	Decoder-Only Autoregressive Language and Image Synthesis
DDC	Department of Disease Control
DEDC	Digital Economy Development Committee
DEFA	ASEAN Digital Economy Framework Agreement
DEPA	Digital Economy Promotion Agency
DFTZ	Digital Free Trade Zone
DGA	Digital Government Development Agency
DICT	Department of Information and Communications Technology
DIFAP	ASEAN Digital Integration Framework Action Plan
DIS	Draft International Standard
DLA	Digital Leadership Academy
DMS	Driver Monitoring System
DOLE	Department of Labor and Employment
DOST	Department of Science and Technology
DSL	Digital Services Laboratory
DT4D	Disruptive Technologies for Development
DTI	Department of Trade and Industry
DTS	Digital Talent Scholarship
EC	European Commission
EEF	Equitable Education Fund
EGNC	E-Government National Centre
ERIA	Economic Research Institute for ASEAN and East Asia
ESG	Environmental, Social, and Governance
EU	European Union
EV	Electric Vehicle
FACETS	Fairness, Accountability, Confidentiality, Ethics, Transparency, and Safety
FEAT	Fairness, Ethics, Accountability, and Transparency
FPT	Financing and Promoting Technology
G20	Group of 20
G7	Group of 7
GDP	Gross Domestic Product
GDPR	General Data Protection Regulation

GII	Global Innovation Index
GMV	Gross Merchandise Value
GNLD	National Movement of Digital Literacy
GPA	Global Privacy Assembly
GPAI	Global Partnership on Artificial Intelligence
GPT	Generative Pre-trained Transformer
GWG	Global Working Group
HAI	Human-Centered Artificial Intelligence
HIMS	Health Information and Management System
HLEG	High-Level Expert Group
HOPE	Helping Our People Everyday
HUST	Hanoi University of Science and Technology
IAWG	Inter-Agency Working Group on Artificial Intelligence
ICT	Information and communication technology
IEAI	Institute for Ethics in Artificial Intelligence
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IMD	Institute for Management Development
IMDA	Infocomm Media Development Authority
IP	Intellectual Property
ISO	International Organization for Standardization
IT	Information Technology
ITSC	Information Technology Standards Committee
ITU	International Telecommunication Union
IVR	Interactive Voice Response
JSC	Jakarta Smart City
JTC	Joint Technical Committee
KA	Kecerdasan Artifisial (Artificial Intelligence)
KOMINFO	Kementerian Komunikasi dan Informatika (Indonesia's Ministry of Communications and Informatics)
KORIKA	Kerja Sama Riset dan Inovasi Industri Kecerdasan Buatan (Indonesian Artificial Intelligence Industry Research and Innovation Collaboration)
KPI	Key Performance Indicators
LANIC	Lao National Internet Center
LLM	Large Language Model
MAS	Monetary Authority of Singapore
MDEC	Malaysia Digital Economy Corporation
MDES	Ministry of Digital Economy and Society
MED4IR	National Council of Digital Economy and Fourth Industrial Revolution
MIC	Ministry of Information and Communications

MICT	Ministry of Information and Communication Technology
MIDL	Information and Digital Literacy
MIMOS	Malaysian Institute of Microelectronic Systems
MISTI	Ministry of Industry, Science, Technology, and Innovation
ML	Machine Learning
MOE	Ministry of Education
MOH	Ministry of Health
MOST	Ministry of Science and Technology
MOSTI	Ministry of Science, Technology, and Innovation
MOTC	Ministry of Transport & Communications
MPI	Ministry of Planning and Investment
MSME	Micro, small, and medium enterprise
MTC	Ministry of Technology and Communications
MTIC	Ministry of Transport and Infocommunications
NAIS	National AI Strategy
NCAIR	National Center for AI Research
NECTEC	National Electronics and Computer Technology Center
NGDC	National Government Data Centre
NGO	Non-Governmental Organization
NHCS	National Heart Centre Singapore
NIA	National Innovation Agency
NICP	National ICT Confederation of the Philippines
NIEF	National ICT Ecosystem Framework
NLP	Natural Language Processing
NLU	Natural Language Understanding
NP	New Project
NSEDP	National Socio-Economic Development Plan
NXPO	Office of National Higher Education, Science, Research, and Innovation Policy Council
OECD	Organization for Economic Co-operation and Development
PC	Per Capita
PCIEERD	Philippine Council for Industry, Energy and Emerging Technology Research and Development
PERPRES	Peraturan Presiden (Presidential Decree)
PIDS	Philippine Institute for Development Studies
PSC	Penang Science Cluster
PUE	Power Usage Effectiveness
RAII	Responsible AI Institute
RAM	Readiness Assessment Methodology
SC	Sub-Committee

SCATS	Sydney Coordinated Adaptive Traffic System
SDP	Strategic Development Plan
SEA	Southeast Asia
SEARP	Southeast Asia Regional Program
SELENA+	Singapore Eye Lesion Analyser Plus
SME	Small and medium-sized Enterprise
SOMED	Senior Officials of Education
STEM	Science, Technology, Engineering, and Mathematics
TAFIC	Tiered AI Framework for International Collaboration
TC	Technical Committee
TPMAP	Thai People Map and Analytic Platform
TUM	Technische Universität München
UAE	United Arab Emirates
UK	United Kingdom
UNDP	United Nations Development Program
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
UNN	Unified National Networks
US	United States
USAID	United States Agency for International Development
USD	United States Dollar
VAIPE	Intelligent Healthcare System for Vietnamese People
VAIS	Vietnamese Voice Into Text
VC	Venture Capital
VICA	Virtual Intelligent Chat Assistant
VND	Vietnamese Dong
VPN	Virtual Private Network
WEF	World Economic Forum
WIPO	World Intellectual Property Organization
WISE	Workforce for an Innovation and Start-up Ecosystem
XAI	Explainable AI

EXECUTIVE SUMMARY

The last few years have seen artificial intelligence (AI) begin to impact many facets of day-to-day life: students use *ChatGPT* to write essays;[1] content creators leverage *Midjourney* and *DALL-E* to create digital art;[2] researchers use *Bard* to summarize and review scientific papers in batches;[3] and scientists train machine learning (ML) models to develop life-saving medicine.[4]

With the rise of ChatGPT, generative AI has been a particular topic of interest for policymakers keen to leverage it for economic growth. According to a recent McKinsey study, generative AI could add the equivalent of USD 2.6 trillion to USD 4.4 trillion in economic benefits annually across 63 use cases.[5] And this may just be the tip of the iceberg; as all types of AI such as robotic intelligence, intelligent automation, and natural language processing continue to be embedded into all manner of devices, services, and platforms, there is no telling how far-reaching its impact will be.

In short, AI is already transforming many aspects of our lives, and we have yet to fully grasp the extent of that transformation. As such, it is no surprise that these unknowns are increasingly raising questions; given the wide range of possible unforeseen applications and interactions, some facets of AI can be seen as potentially challenging or risky. Issues such as discriminatory decision-making, personal privacy violations, intellectual property infringements, and even job displacements have become the center of discussions and debates.

In this context, it is important to examine, assess, and frame the responsible operationalization of AI.

It is important for businesses to understand how ready they truly are to grow and evolve thanks to AI—not just in terms of efficiency and productivity gains, but also in terms of cultivating sustainable and stakeholder-driven growth.[6] It is equally important for governments to not just understand how they can leverage AI to make their programs and services more impactful, but also create enabling conditions for responsible AI to emerge as a driver of equitable and inclusive economic growth.

And it is especially important for Southeast Asia (SEA), a region with a young, dynamic, and tech-savvy population with a marked appetite for digital innovation, but whose economic aspirations are hindered by yawning disparities in income, education levels, health outcomes, and economic opportunities.

To fully realize its digital potential through AI, the Association of Southeast Asian Nations (ASEAN) should effectively harness the disruptive and pervasive nature of increasingly complex, sophisticated, and inter-connected digital technologies. To do so, policymakers in SEA should address emerging policy and regulatory challenges, and the cross-cutting factors that contribute to the region's pervasive digital divide.

[1] The Hill (2023) ChatGPT sends shockwaves across college campuses, https://thehill.com/homenews/education/3905672-chatgpt-sends-shockwaves-across-college-campuses
[2] Forbes (2023) Midjourney 5.1 Arrives - And It's Another Leap Forward For AI Art, www.forbes.com/sites/barrycollins/2023/05/03/midjourney-51-arrivesand-its-another-leap-forward-for-ai-art/?sh=5ff94e5077cd
[3] Zapier (2023) How to use Google Bard as a research tool, https://zapier.com/blog/how-to-use-google-bard
[4] The Guardian (2023) Scientists use AI to discover new antibiotic to treat deadly superbug, www.theguardian.com/technology/2023/may/25/artificial-intelligence-antibiotic-deadly-superbug-hospita
[5] McKinsey (2023) The economic potential of generative AI: The next productivity frontier, www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier#introduction
[6] VentureBeat (2021) How stakeholder capitalism and AI ethics go hand in hand, https://venturebeat.com/ai/how-stakeholder-capitalism-and-ai-ethics-go-hand-in-hand

LANDSCAPE OVERVIEW OF RESPONSIBLE AI TRENDS AND DYNAMICS IN SEA

The landscape overview of AI in SEA involved consultations with a wide range of stakeholders, leveraged an extensive literature review, and utilized desk research to provide a comprehensive and comparative analysis.

Our research reveals that SEA governments are fully cognizant of the challenges posed by the rise of AI, and the urgency with which they should address these challenges through effective governance and regulatory frameworks. This is evidenced by the fact that responsible AI is slowly—but surely—making its way to the top of national and regional agendas in SEA.

Across the region, governments are taking concrete steps to advance AI deployment and adoption, despite having largely different priorities and approaches to AI. At the national level, six of the 11 SEA economies covered in this report have national AI plans, policies, and strategies in place—the majority of which explicitly recognize the importance of developing and adopting AI in a fair, ethical, and trustworthy manner.

From principles, guidelines, and standards that promote algorithmic transparency, unbiased datasets[7], and ethical practices to laws, policies, and regulations specifically developed to drive and frame AI adoption, SEA governments are developing and implementing a wide range of measures to ensure AI contributes to helping people, solving problems, and improving lives.

At the regional level, the 3rd ASEAN Digital Ministers' Meeting (ADGMIN)[8] has prioritized the *ASEAN Guide on AI Governance and Ethics*,[9] demonstrating the region's commitment to ramping up coordinated responses to issues that are already impacting all levels of society.

Recently published in February 2024, the Guide provides regional best practice guidance on AI governance and ethics, definitions for key AI-related concepts, an AI risk impact assessment template, and a set of national-level and regional-level recommendations for AMS to implement AI systems responsibly. Most notably, the Guide proposes the creation of an ASEAN Working Group on AI Governance, which will be solely devoted to leading the technical and operational implementation of AI governance action plans in the region.[10]

In addition to the Guide, the ASEAN Committee on Science, Technology and Innovation (COSTI) has started identifying the most urgent policy, legal, and regulatory gaps related to the implementation of generative AI implementation in ASEAN, with a view to provide recommendations to best address them.[11] These efforts will culminate in a *Discussion Paper on the Responsible Development and Use of Generative AI in ASEAN* to enhance the governance and adoption of generative AI in the region, with an aimed completion in early 2024.[12]

Despite these promising developments, the on-the-ground sentiment is that most SEA economies are not equally ready or equipped to turn these high-level aspirations into action. There is clear recognition

[7] An unbiased dataset is a dataset that accurately represents the real-world distribution of data without any intentional or unintentional favoritism towards specific groups or outcomes. Ensuring data bias is minimized or eliminated is crucial in the development and training of AI models to produce fair and equitable results. Emilio Ferrara (2023) Fairness and Bias in Artificial Intelligence: A Brief Survey of Sources, Impacts, And Mitigation Strategies, https://arxiv.org/ftp/arxiv/papers/2304/2304.07683.pdf
[8] ADGMIN is chaired by the Philippines in 2023 and by Singapore in 2024.
[9] ASEAN (2024) ASEAN Guide on AI Governance and Ethics, https://asean.org/book/asean-guide-on-ai-governance-and-ethics/
[10] ASEAN (2024) ASEAN Guide on AI Governance and Ethics, https://asean.org/book/asean-guide-on-ai-governance-and-ethics/
[11] AI Asia Pacific Institute (2023) Responsible Development and Use of Generative AI in ASEAN: Workshop Pre-Read Material, draft shared by the AI Asia Pacific Institute in December 2023.
[12] AI Asia Pacific Institute (2023) Responsible Development and Use of Generative AI in ASEAN: Workshop Pre-Read Material, draft shared by the AI Asia Pacific Institute in December 2023.

of the many benefits of operationalizing AI responsibly, and there are many initiatives at both the national and regional levels to create the ideal conditions for responsible AI to flourish. But these initiatives tend to falter in several ways.

First, several organizational barriers hinder the effective and consistent implementation of AI initiatives. In some cases, it is due to a lack of coordination on plans and initiatives, which results in overlapping efforts or contradicting measures. Unclear mandates for AI agencies are also an issue, as there tends to be confusion over the scope and scale of their mission. Lastly, considering that most national AI strategies in the region were launched in 2021, it may just be that responsible AI initiatives are too recent or too broad to have a substantial impact.

Second, responsible AI initiatives tend to be lower in priority as compared to policies that maximize profit-driven Venture Capital (VC)-attracting AI projects. Indeed, AI in the region is still largely seen and used as a cost-savings tool to maximize productivity and efficiency in profit-driven activities—as opposed to a multi-faceted agent of change that can drive and deliver a wide range of long-term, non-monetary benefits over time, especially when designed and deployed responsibly.

Most importantly, SEA economies are at vastly different degrees of digital transformation, which makes it difficult to overcome complex and deeply seated issues. From digital literacy and skills to ICT infrastructure and access to training and education, there are large disparities between and within SEA countries that limit the scope and scale of many digital economy policies in the region—effectively limiting the impact of SEA economies' efforts to grow into regional technology hubs.[13]

As this report demonstrates, a "responsible" approach to AI is not incompatible with SEA's prioritization of leveraging AI for economic growth and development. In fact, operationalizing responsible AI through supportive governance frameworks and enabling business environments can lead to untapped social and economic impact—which translates to both tangible and intangible benefits for people, businesses, and governments alike.

BENCHMARKING FRAMEWORK FOR RESPONSIBLE AI ADVANCEMENT IN SEA

Our study of the responsible AI landscape in SEA suggests that there are wide differences in the way economies in the region are able to enable or leverage responsible AI–despite a great shared appetite to harness its full potential. From unreliable digital infrastructure and uncoordinated institutions to lack of investment and shortage of digital skills, there are many obstacles in the way of SEA economies emerging as champions of responsible AI.

In this context, a one-size-fits-all approach is not the best way to put responsible AI at the top of SEA countries' digitalization agendas. Our discussions with AI experts in the region show that top-down, normative approaches seldom deliver results in SEA, as there are too many varying variables to control (namely, the fact that SEA is characterized by divergent financial, institutional, organizational, technical, and political preferences and priorities).

To this end, we have developed a benchmarking framework that aims to empower SEA economies to achieve two distinct but interconnected objectives: 1) Create a conducive and enabling policy and

[13] Portulans Institute (2022) Reviewing the state of Southeast Asia's digital transformation and opportunities for the region moving forward, https://networkreadinessindex.org/reviewing-the-state-of-southeast-asias-digital-transformation-and-opportunities-for-the-region-moving-forward

regulatory environment that allows a responsible AI ecosystem to emerge; and 2) operationalize responsible AI across society, government, and the economy at their own pace and in their own manner.

Through 40 benchmarking criteria organized under four main pillars, we consolidate the fundamental building blocks that together make a country's socioeconomic environment conducive for responsible and sustainable AI to flourish.

The four pillars are:

- Pillar 1: All national AI laws, policies, and regulations—including AI-enabling measures and AI-adjacent initiatives—that enable the rise of data- and algorithm-driven technologies. This encompasses the formation of national bodies/agencies devoted to the enablement and operationalization of AI in general.
- Pillar 2: Principles, guidelines, and standards that ensure AI is developed and leveraged in a fair, ethical, unbiased, inclusive, and sustainable manner—i.e., all mechanisms designed to make AI development and use responsible.
- Pillar 3: The entrepreneurial and educational environment that equips the labor force with the skills, capabilities, and knowledge to develop and deploy AI responsibly—thus enabling investment and innovation around the responsible use of AI.
- Pillar 4: The wide range of stakeholders and organizations—including the private sector, academics, non-governmental organizations (NGOs), civil society organizations (CSOs), and not-for-profits—that contribute to mitigating risks and biases, and minimizing harm from AI.

Using these benchmarking criteria, SEA governments can understand where they stand in operationalizing responsible AI. This gives them a concrete starting point, while indicating the areas to prioritize in terms of time, effort, and resources.

To this end, three levels of maturity have been identified:

- Emerging: An up-and-coming AI ecosystem that still requires a number of foundational building blocks to effectively operationalize AI in a fair, ethical, and responsible manner. If these challenges can be overcome, responsible AI can be leveraged to both catch up with more mature ecosystems and further improve lives and livelihoods.
- Promising: A generally conducive AI ecosystem that supports and drives the development and deployment of responsible AI across a wide range of socioeconomic use cases. The main challenge is the ability to effectively coordinate and consolidate institutional and organizational efforts—a barrier that hinders the sustained operationalization of responsible AI.
- Advanced: A largely mature and enabling AI ecosystem that harnesses the transformative potential of fair, ethical, and responsible AI. This is underpinned by a multitude of enablers, including governance frameworks geared at promoting a safe, principled, and human-centered usage of AI, and forward-looking plans and mechanisms aimed at keeping policy and regulatory responses nimble and adaptive.

Our framework attempts to overcome many of the pitfalls observed in the wide range of existing AI readiness and maturity assessment frameworks. Indeed, some of them are too complex or convoluted, requiring the intervention of independent consultants or research organizations to make the metrics

and their methodologies usable. Others put responsible AI at the margins of their methodology, approaching fair and ethical AI as an unintended by-product of digital transformation rather than as its main objective. Others still, focus on businesses looking to pivot towards AI-enabled business models, not towards policymakers and regulators looking to harness the transformative power of AI while safeguarding the interests and well-being of citizens and consumers alike. Most importantly, none of them are specifically designed to fit SEA economies' needs, priorities, and capabilities.

In this sense, our benchmarking framework aims to put the people of SEA and their well-being at the center of all AI-enabling processes and mechanisms.

RECOMMENDATIONS

Our benchmarking framework gives policymakers in SEA an evidence-based way forward for their policy and regulatory framing of responsible AI.

We have turned this evidence into a set of general and targeted recommendations that should help SEA economies turn broad, high-level aspirations into action for responsible AI to be effectively operationalized—setting the stage for the different steps towards achieving responsible AI policymaking that will be covered in the forthcoming *ASEAN Responsible AI Roadmap*.[14]

Our general recommendations are based on the insights and findings from the landscape overview—the drivers, barriers, trends, and dynamics that determine whether an economy is more or less conducive for responsible AI to be prioritized. These include:

1. Support regional efforts and commitments on responsible AI: The *ASEAN Guide on AI Governance and Ethics* represents a significant milestone in SEA's approach to prioritizing ethical considerations in AI policymaking. In alignment with the initiatives outlined in the Guide, the upcoming *ASEAN Responsible AI Roadmap* will provide actionable steps for ASEAN policymakers and stakeholders to operationalize responsible AI adoption and innovation within the region. Together, both documents offer a comprehensive framework and action plan for policymakers to drive responsible AI adoption in the region.
2. Promote responsible AI practices as a gateway to economic growth and competitiveness: As this report demonstrates, responsible AI is not incompatible with national priorities that promote economic growth and dynamism across SEA. As AI becomes a central feature of SEA digital economies, national policymakers should prioritize responsible AI as a key steppingstone to realizing sustainable and inclusive economic growth in the long term.
3. Actively participate in discussions on international AI standards-setting and implement where standards are available: International standards-setting brings together diverse stakeholders with different levels of expertise. Thanks to this diversity, the process can nimbly respond to technological, business, or regulatory changes. SEA governments should actively participate in these discussions, and shape the development of international AI standards.
4. Drive responsible and sustainable investment in AI: The lack of investment and dominance of Big Tech has hindered the growth of locally relevant AI ecosystems that enable greater AI use cases and innovation in SEA. The private sector, academia, and civil society are crucial in driving

[14] The *ASEAN Responsible AI Roadmap* will be the culmination of this research project, providing ASEAN governments practical and tailored guidance for them to go from abstract principles and guidelines on responsible AI to concrete, tangible outcomes. Case studies and best practices derived from more mature AI markets will be included to demonstrate the way such issues and situations have been approached in other countries.

responsible AI investment, innovation, and research that is fit for purpose for SEA's unique needs.

5. Expand resources dedicated to promoting digital skills and literacy: To leverage responsible AI as an economic driver, SEA economies should promote an entrepreneurial and educational environment that equips the labor force with responsible AI skills and knowledge.
6. Prioritize national and regional digital inclusivity: SEA economies should work towards translating the hype and excitement around AI into actionable plans and sustainable approaches that tackle some of the region's unique challenges, with connectivity playing a significant role in this.
7. Adopt multi-stakeholder processes to drive the emergence of a human-centered approach to AI: To effectively address the challenges posed by AI, policymakers in SEA should continue to develop guiding principles, voluntary frameworks, and standards and certifications while engaging with stakeholders and participating in international discussions.
8. Implement AI risk and impact assessment frameworks to determine harms: AI impact assessments are recommended by experts as they provide a concrete evaluation premise to establish the likelihood of negative impacts on populations or organizations. SEA economies should work together to determine how this assessment-driven approach will be adopted in practice.
9. Proactively tackle the impact of AI on minority groups and climate change: The lack of diversity in AI systems poses significant challenges in general but is especially problematic for the long-term sustainability of AI in the SEA region given the region's unique diversity. In this context, Singapore's efforts to develop the National Multimodal LLM Program to cater to SEA's diverse cultures and languages should be supported at the regional and multilateral level.[15] At the same time, responsible AI should go beyond the notion of responsibility towards humans and adopt a broader perspective that encompasses both the impact of AI on the environment (animals, plants, biodiversity, natural resources, and habitats) and the ways in which AI can be leveraged to alleviate the hardships of those most vulnerable to the effects of climate change.
10. Align ASEAN's AI plans and initiatives with wider developments and frameworks: ASEAN should carve its own path towards harnessing and operationalizing responsible AI, but this should be done while considering global trends, issues, and dynamics, such as the impact of the EU's *AI Act* and ASEAN's collective digital integration goals, as outlined in the *Digital Economy Framework Agreement (DEFA)*.

In addition, we propose a set of tier recommendations based on the different levels of maturity that our benchmarking framework identifies: Emerging, Promising, or Advanced.

1. Emerging
    - Develop a comprehensive, overarching national AI strategy: Developing a national AI plan, policy, or strategy is crucial as it provides a clear roadmap for guiding AI development.

[15] GovInsider (2023) Singapore to channel US$52 million into building capacities for SEA's first regional LLM, https://govinsider.asia/intl-en/article/singapore-to-channel-usdollar52-million-into-building-capacities-for-seas-first-regional-llm

- Centralize coordination of AI national strategy implementation: For emerging AI economies, a broader national AI strategy should be actionable through an implementation plan.
- Ensure strategies and implementation functions are sufficiently resourced: National AI strategies and the national AI bodies driving them should have the necessary institutional and organizational resources, support, and buy-in to function and get things done.
- Build AI awareness and skills through education and training: AI education and upskilling is a foundational building block that emerging economies should prioritize to ensure that they can remain relevant and competitive in the AI wave and the rise of the digital economy.
- Prioritize the improvement of ICT infrastructure and connectivity as an enabler of data-driven economic growth: Improving ICT infrastructure and digital connectivity requires investing in accessible and affordable broadband networks and data centers, as well as strengthening public-private partnerships in infrastructure development.

2. Promising

- Prioritize responsible and ethical AI: Promising AI economies should position responsible and ethical AI as a central focus of all AI-related efforts and initiatives, prioritizing transparency, fairness, and accountability.
- Strengthen intra- and inter-government coordination: To create a thriving AI ecosystem, policymakers should strengthen inter-governmental coordination and cooperation while streamlining bureaucratic processes.
- Educate and upskill to meet market demand: Policymakers should collaborate with academia and the private sector to strengthen ties and ensure that AI-driven initiatives effectively address specific labor market needs and priorities.

3. Advanced

- Drive human-centered AI adoption: There is an opportunity to set global standards of inclusive AI systems by pursuing AI initiatives that benefit all societal groups, with the ambition to ensure that the rapid digitalization of society leaves no one behind.
- Advance and support multi-stakeholder knowledge sharing: Advanced AI economies should use their unique position to drive and support the emergence of responsible and ethical AI governance in less mature digital economies.
- Foster an agile approach to AI policymaking and regulation: Looking at the scope and pace of AI advancement, it is important that AI policies can keep pace; they should be regularly updated based on emerging trends and advancements.

ABOUT THIS RESEARCH BRIEF

This research brief is a first step in the development of an actionable *ASEAN Responsible AI Roadmap* that will complement and enhance the *ASEAN Guide on AI Governance and Ethics*, and support ASEAN Member States (AMS) as they develop and drive responsible AI in the region.[16]

Section 1 provides a landscape overview (trends, dynamics, barriers, opportunities) of the way responsible AI is taking shape within key SEA economies. It does so by examining the unique dynamics that are shaping AI ecosystems within and across SEA economies.

Section 2 develops a benchmarking framework that captures the key elements that each SEA economy can track in its journey towards making its business and policy environments conducive for responsible AI to be prioritized and operationalized.

[16] Set to be published in the first quarter of 2024, this Roadmap will define goals, objectives, milestones, and success metrics that can be adapted to each ASEAN economy's needs, priorities, and capabilities towards responsible AI. It will also provide actionable steps for ASEAN policymakers and stakeholders to leverage responsible AI in a meaningful, impactful, and sustainable manner.

Box 1. Defining "AI" and "Responsible AI"

There is no single, universally accepted definition of AI. A complex, ever-changing field, there are as many definitions as there are potential applications and uses. For the purposes of this report, we have defined "AI" and "Responsible AI" below.

Our definition of "AI"

"AI" is defined as "all data-driven, algorithmic-based systems that can reason, learn, and act in response to what they sense and perceive; this encompasses everything from machine learning programs and intelligent algorithms to predictive analytics, autonomous devices, and automated systems."

Our definition of "Responsible AI"

"Responsible AI" is defined as "data-driven, algorithmic-based systems that are developed in a fair, ethical, safe, trustworthy, and unbiased manner and implemented in a transparent, reliable, accountable, and inclusive manner, following national, regional, and international best practices, standards, and principles."

Our focus on Responsible AI

This report focuses on how SEA governments can operationalize responsible AI in the region—responsible AI governance is a crucial priority area in ensuring that AI is developed and leveraged in a fair, ethical, unbiased, and sustainable manner. This is important not only because operationalizing responsible AI can unlock significant social and economic benefits, but also, and more importantly, because it can mitigate the potential harms and risks associated with unregulated and unchecked AI advancements on society and humanity.

INTRODUCTION

Digital technologies are reshaping communities, organizations, and industries across ASEAN, and AI is at the forefront of this socioeconomic transformation. It enables innovation in areas that can improve the lives and livelihoods of millions of people, while driving investments that can make digital economies dynamic and competitive.

For example, the healthcare sector is increasingly using AI-powered systems to improve service provision as well as patient outcomes. In Thailand, the overburdened public healthcare system was able to navigate the worst of the COVID-19 crisis thanks to AI-driven solutions that simplified processes and optimized resource allocation.[17] In Singapore, the National Heart Centre Singapore (NHCS) leverages AI to analyze medical images, aiding in the early detection of cardiovascular diseases.[18]

AI is also driving innovation and productivity across SEA; many AI start-ups are changing the way people work and businesses operate. In Indonesia, Advotics helps e-commerce companies overcome the country's highly fragmented logistics industry by leveraging AI to optimize supply chain operations, improve inventory management, and reduce costs.[19] In Malaysia, Synapse Innovation utilizes AI-driven solutions to automate repetitive tasks and streamline business processes—helping a wide range of SMEs boost their overall productivity.[20]

Despite these promising advancements, a number of challenges make the widespread adoption of AI a complicated endeavor.

There is the issue of defining "AI", as different definitions have different implications for the way AI is used and governed. Indeed, depending on whether "AI" is seen as a "data-driven pattern-recognition model", considered a form of "autonomous algorithmic decision-making", or elevated to "machine-replicated human thinking and reasoning", there are major ramifications for the way AI governance and regulatory frameworks are designed and applied.

There are also concerns around maximizing the benefits of AI while mitigating its potential risks. AI has much to contribute to economic growth and development in SEA, and it has much to offer in helping the region address longstanding challenges such as climate change, natural disasters, hunger, and poverty. But AI systems can also be used for a wide range of nefarious or criminal purposes (deepfakes, disinformation, discrimination, scams, bots, malware, breach of human rights, such as privacy, access to information, and freedom of expression, etc.)—a range of practices that pose risks to online security and trust. This is also true for ASEAN, a region that is particularly vulnerable to cybersecurity attacks[21] and disinformation campaigns.[22]

There is also the mounting pressure that the AI community (policymakers, regulators, entrepreneurs, civil society, and academia alike) faces to ensure AI is developed and deployed in an ethical, inclusive, and sustainable manner. This means making AI responsible 'by design'—i.e., considering the needs and priorities of diverse voices, cultures, and communities at every stage of development, as opposed to

[17] YCP Solidiance (2021) How AI Technology is Helping Thailand's Fight Against COVID-19, https://ycpsolidiance.com/article/how-ai-technology-is-helping-thailands-fight-against-covid-19nbsp

[18] Axis (2022) Singapore Welcomes AI-Driven Cardiac Imaging Laboratory, https://axisimagingnews.com/imaging-news/facility-news/singapore-ai-cardiac-imaging-laboratory

[19] Tech Crunch (2021) Indonesian supply chain startup Advotics raises $2.75M led by East Ventures, https://techcrunch.com/2021/03/02/indonesian-supply-chain-startup-advotics-raises-2-75m-led-by-east-ventures

[20] Crunchbase (2022) Synapse Innovation profile, www.crunchbase.com/organization/synapse-innovation-078a

[21] Tech Wire Asia (2022) Cybersecurity is still challenging for ASEAN businesses, https://techwireasia.com/2021/11/cybersecurity-are-challenging-asean-businesses

[22] The Diplomat (2023) Deepfakes and Disinformation Pose a Growing Threat in Asia, https://thediplomat.com/2023/03/deepfakes-and-disinformation-pose-a-growing-threat-in-asia

'after the fact'. It also means having mechanisms in place to effectively mitigate the potential side effects of AI—building policy and regulatory environments that make it so that AI cannot cause harm nor leave anyone behind.

DEFINING AI

There is no single, universally accepted definition of AI. A complex, ever-changing field, there are as many definitions as there are potential applications and uses. There is, for example, AI that uses datasets to improve its pattern-recognition capabilities; AI that automates, repeats, and streamlines decision-making processes; and AI that leverages algorithms to emulate human thought and reasoning.

This diversity will only increase as AI becomes more advanced, transforming not only the way humans and machines interact, but also the way intellectual property, data protection and privacy, competition, and cybersecurity frameworks are effectively designed and implemented.

NATIONAL DEFINITIONS OF AI

At the national level, most SEA economies that have AI-specific plans, policies, and strategies have their own take on AI.

Table 1 shows the wide range of definitions that SEA economies have adopted; some define AI by the way it attempts to mimic, replicate, or surpass human abilities (Malaysia, The Philippines, Singapore, and Thailand), while others define it by what it can do or achieve for the economy (Viet Nam). Others, still, recognize that having a clear and comprehensive definition of AI is a key strategic objective but do not provide such a definition (Indonesia).

Table 1. AI definitions within national plans, policies, and strategies in SEA

SEA ECONOMY	NATIONAL AI PLAN / POLICY / STRATEGY	AI DEFINITION
Brunei Darussalam	*None*	*None*
Cambodia	*None*	*None*
Indonesia	National AI Strategy 2020-2045 (*Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045*)[23]	*None*
Lao PDR	*None*	*None*
Malaysia	National Artificial Intelligence Roadmap 2021-2025 (AI-Rmap)[24]	A suite of technologies that enable machines to demonstrate intelligence, the ability to adapt with new circumstances, and used to amplify human ingenuity and intellectual capabilities through collective intelligence across a broad range of challenges.
Myanmar	*None*	*None*

[23] Badan Pengkajian dan Penerapan Teknologi (2021) Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045 (machine translation), www.ai-innovation.id/server/static/ebook/stranas-ka.pdf

[24] Ministry of Science, Technology & Innovation (2021) National Artificial Intelligence Roadmap 2021-2025 (AI-Rmap), https://airmap.my

The Philippines	National AI Strategy for the Philippines[25]	The capability of machines to simulate how humans think and perform tasks, which involves learning from data.
Singapore	National AI Strategy 2.0[26]	The capability to simulate intelligent, human-like behavior in computer systems.
Thailand	National AI Strategy and Action Plan (2022–2027)[27]	Technology that gives machines and computers the intelligence to leverage data and algorithms to imitate complex human abilities, including the ability to learn autonomously.
Timor-Leste	*None*	*None*
Viet Nam	National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QD-TTg)[28]	The background technology of the Fourth Industrial Revolution, making an important contribution to creating a breakthrough in production capacity and improving national competitiveness, promoting sustainable economic growth.

Source: Access Partnership research

REGIONAL DEFINITIONS OF AI

Since 2018, the Association of Southeast Asian Nations (ASEAN) has developed and implemented several data-focused initiatives that recognize the importance of AI for technology-focused and data-driven economic growth.

The *Master Plan on ASEAN Connectivity 2025*,[29] the *ASEAN Economic Community (AEC) Blueprint 2025*,[30] the *ASEAN Smart Cities Network (ASCN)*,[31] the *ASEAN Agreement on E-Commerce*,[32] the *ASEAN Framework for Personal Data Protection*,[33] the *ASEAN Digital Data Governance Framework*,[34] and the *ASEAN Strategic Action Plan for SME Development 2016-2025*[35] all mention AI, though none define it clearly.

Specifically on AI, ASEAN has published the *ASEAN Guide on AI Governance and Ethics*, and is in the process of drafting a *Discussion Paper on the Responsible Development and Use of Generative AI in ASEAN*[36] and an *ASEAN Strategic Guidance on Artificial Intelligence and Digital Workforce*.[37] Published in February 2024, the Guide contains a Definitions section that defines AI as "an engineered or machine-

[25] DTI (2021) National AI Strategy for the Philippines, https://innovate.dti.gov.ph/wp-content/uploads/2021/05/National-AI-Strategy-Roadmap-May-2021.pdf
[26] Smart Nation (2023) National AI Strategy 2.0, www.smartnation.gov.sg/nais
[27] AI Thailand (2022) Thailand National AI Strategy and Action Plan (2022-2027) (machine translation), https://ai.in.th/wp-content/uploads/2022/12/20220726-AI.pdf
[28] MOF (2021) National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QĐ-TTg), https://mof.gov.vn/webcenter/portal/cdso/pages_l/ctt?dDocName=MOFUCM237749
[29] ASEAN (2016) Master Plan on ASEAN Connectivity, https://asean.org/wp-content/uploads/2016/09/Master-Plan-on-ASEAN-Connectivity-20251.pdf
[30] ASEAN (2015) ASEAN Economic Community Blueprint 2025, www.asean.org/storage/2016/03/AECBP_2025r_FINAL.pdf
[31] ASEAN (2018) ASEAN Smart Cities Network, https://asean.org/asean/asean-smart-cities-network
[32] Ministry of Trade and Industry (MTI) (2018) ASEAN Agreement on Electronic Commerce, www.mti.gov.sg/-/media/MTI/Newsroom/Press-Releases/2018/11/17th-AECC/Annex-A-Factsheet-on-ASEAN-Agreement-on-e-Commerce.pdf
[33] ASEAN (2012) Framework on Personal Data Protection, https://asean.org/storage/2012/05/10-ASEAN-Framework-on-PDP.pdf
[34] ASEAN (2012) Framework on Digital Data Governance, https://asean.org/storage/2012/05/6B-ASEAN-Framework-on-Digital-Data-Governance_Endorsed.pdf
[35] ASEAN (2015) ASEAN Strategic Action Plan for SME Development 2016-2025, https://asean.org/?static_post=asean-strategic-action-plan-for-sme-development-2016-2025-2
[36] AI Asia Pacific Institute (2023) Responsible Development and Use of Generative AI in ASEAN: Workshop Pre-Read Material, draft shared by the AI Asia Pacific Institute in December 2023.
[37] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

based system that can, for a given set of objectives, generate outputs such as predictions, recommendations, or decisions influencing real or virtual environments".[38]

Beyond helping SEA economies align on the way they frame and approach AI, this very broad definition leaves room for nuance and interpretation based on each country's specific needs and priorities, serving as a practical starting point for those economies that do not yet have national AI plans and strategies in place.

INTERNATIONAL DEFINITIONS OF AI

AI definitions vary even more when examined at the international and multilateral level.

Table 2 shows that some organizations define it according to the set of tasks or functions it can undertake (ABAC, ISO, OECD, UNESCO), while others define it more by the ideological or humanistic ideals they seek to imbue into all manner of data-driven systems to ensure they contribute to the betterment of society (EC, ITU).

Table 2. AI definitions in international and multilateral organizations

ORGANIZATION	AI DEFINITION
Asia-Pacific Economic Cooperation (APEC) Business Advisory Council (ABAC)[39]	AI is the general term used for computing systems that emulate human cognitive functions, such as identifying patterns to solve problems.
European Commission (EC)[40]	AI comprises systems that display intelligent behavior by analyzing their environment and taking actions—with some degree of autonomy—to achieve specific goals.
International Organization for Standardization (ISO)[41]	Engineered system that generates outputs such as content, forecasts, recommendations, or decisions for a given set of human-defined objectives.
International Telecommunication Union (ITU)[42]	AI refers to the ability of a computer or a computer-enabled robotic system to process information and produce outcomes in a manner similar to the thought process of humans in learning, decision-making, and problem-solving. In a way, the goal of AI systems is to develop systems capable of tackling complex problems in ways similar to human logic and reasoning.
Organization for Economic Cooperation and Development (OECD)[43]	AI is a machine-based system that can, for a given set of human-defined objectives, make predictions, recommendations, or decisions influencing real or virtual environments. When applied, AI has seven different use cases, also known as patterns, that can co-exist in parallel within the same AI system.
United Nations Educational, Scientific, and Cultural Organization (UNESCO)[44]	AI systems are systems which have the capacity to process data and information in a way that resembles intelligent behavior, and typically include aspects of reasoning, learning, perception, prediction, planning, or control.

Source: Access Partnership research

[38] ASEAN (2024) ASEAN Guide on AI Governance and Ethics, https://asean.org/book/asean-guide-on-ai-governance-and-ethics/
[39] ABAC (2020) Artificial Intelligence in APEC, Overview of the state of AI in APEC economies and the enabling initiatives that will further drive adoption, https://ncapec.org/wp-content/uploads/2020/11/ABAC-AI-Report.pdf
[40] European Commission (2018) Communication Artificial Intelligence for Europe, https://digital-strategy.ec.europa.eu/en/library/communication-artificial-intelligence-europe
[41] ISO (2021) ISO/IEC DIS 22989, www.iso.org/standard/74296.html
[42] ITU (2018) Policy Considerations for AI Governance, www.itu.int/en/ITU-T/studygroups/2017-2020/03/Documents/Shailendra%20Hajela_Presentation.pdf
[43] OECD (2019) Artificial intelligence and responsible business conduct, https://mneguidelines.oecd.org/RBC-and-artificial-intelligence.pdf
[44] UNESCO (2021) Recommendation on the Ethics of Artificial Intelligence, https://unesdoc.unesco.org/ark:/48223/pf0000381137

Despite these different approaches, it is possible to establish a definition that encapsulates as many facets of AI as possible—regardless of function, purpose, or complexity. For the purposes of this report, "AI" designates "all data-driven, algorithmic-based systems that can reason, learn, and act in response to what they sense and perceive; this encompasses everything from machine learning programs and intelligent algorithms to predictive analytics, autonomous devices, and automated systems."

DEFINING RESPONSIBLE AI

Responsible AI is much more difficult to capture in a broad, catch-all definition, as the very notion of "responsibility" is closely tied to broader digital ecosystems and the social and political contexts in which AI tools operate and evolve. Indeed, the concept of "responsibility" varies over time (as AI evolves, so does the idea of how it could/should behave) and across laws, regulations, cultures, and systems of governance.

Consequently, a rich but dizzying tapestry of initiatives, measures, and mechanisms has emerged specifically to systemize the responsible and ethical advancement of AI through principles, guidelines, standards, and frameworks aimed at mitigating any potential unintended consequences of AI.

INTERNATIONAL DEFINITIONS OF RESPONSIBLE AI

According to a recent report by the Berkman Klein Center for Internet & Society, there are now hundreds of principles, guidelines, and frameworks specifically devoted to enabling ethical and responsible AI. From governments and intergovernmental organizations to companies and professional associations, each set of principles serves the same basic purpose: to present a vision for the ethical and responsible governance of AI.[45]

Analyzing the contents of 36 prominent AI principles documents, the study finds that some of these focus on making AI fair and inclusive by ensuring the data used to train AI algorithms is unbiased and representative. For others, it is more about ensuring that the wide applications of AI have a positive impact on people and communities; setting safeguards that ensure AI is developed with the express purpose of improving lives and livelihoods. Others, still, have broader ethical aspirations for the role AI plays in society and culture—defining general principles that will enable innovation in the field while minimizing negative side effects.

The study also finds that despite their differences in objective and approach, all consulted documents tend to cover some form of eight main themes, suggesting that the conversation around principled AI is beginning to converge, at least among the communities responsible for the development of these documents.

While these themes do not constitute a definition in the strictest sense, they do represent a "normative core" of what a principle-based approach to AI ethics and governance should encapsulate: 1) Privacy, 2) Accountability, 3) Safety and Security, 4) Transparency and Explainability, 5) Fairness and Non-Discrimination, 6) Human Control of Technology, 7) Professional Responsibility, and 8) Promotion of Human Values.[46]

[45] Berkman Klein Center for Internet & Society (2020) Principled Artificial Intelligence: Mapping Consensus in Ethical and Rights-based Approaches to Principles for AI, https://cyber.harvard.edu/publication/2020/principled-ai

[46] Berkman Klein Center for Internet & Society (2020) Principled Artificial Intelligence: Mapping Consensus in Ethical and Rights-based Approaches to Principles for AI, https://cyber.harvard.edu/publication/2020/principled-ai

ASEAN'S DEFINITION OF RESPONSIBLE AI

At the ASEAN level, the *ASEAN Guide on AI Governance and Ethics* comprises seven guiding principles that AMS can use to build trust in AI and ensure AI systems are developed ethically.[47] These principles are largely in line with the various international approaches described above:

1. Transparency and Explainability: AI actors are responsible for clearly disclosing the implementation of AI solutions to stakeholders, and fostering general awareness of the solution. AI actors and organizations deploying AI should also strive to foster general understanding of how AI works with simple explanations on how AI reaches its outcomes.
2. Fairness & Equity: The organization should ensure that algorithmic decisions do not create discriminatory or unjust impacts across different demographics, and the use and development of AI should not result in unfair biasness or discrimination. AI actors should also recognize and make adjustments to rectify imbalances to ensure equity.
3. Security and Safety: AI systems should be safe and secure and not used to deceive or threaten humans and/or human society. A risk-prevention approach should be adopted, and precautions should be put in place so that humans can intervene to prevent harm in the event an AI system makes unsafe decisions.
4. Human-centricity: AI systems should respect human-centered values and pursue benefits for human society, including human beings' well-being, happiness, etc. Human rights, freedom, and benefits should be respected and protected in the design, development, and deployment of AI systems.
5. Privacy and Data Governance: AI solutions should have proper mechanisms in place to ensure data privacy and protection, and maintain and protect quality and integrity of data throughout their entire lifecycle. Data protocols need to be set up to govern who can access data and when data can be accessed.
6. Accountability and Integrity: AI actors should be accountable for decisions made by AI systems and for their compliance with laws and AI ethics and principles. AI actors should also act with integrity when developing AI systems.
7. Robustness and Reliability: AI systems should perform consistently as designed, minimize accidental and unexpected hazards, and not be vulnerable to being tampered with or compromised. AI systems should have reproducible results and work reliably for a range of inputs and situations.

[47] ASEAN (2024) ASEAN Guide on AI Governance and Ethics, https://asean.org/book/asean-guide-on-ai-governance-and-ethics/

LANDSCAPE OVERVIEW

This section provides a landscape overview of the AI dynamics (trends, challenges, opportunities) taking shape within SEA economies, as well as the enabling factors of responsible AI ecosystems in SEA. Our analytical and comparative work focuses on 11 SEA economies: Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, and Viet Nam.

Through a combination of desk-based research, on-the-ground interviews, and stakeholder consultations, we examine the unique dynamics that are shaping discussions, approaches, and responses to responsible AI within and across SEA economies.

Four main pillars emerge from our findings:

- Pillar 1: All national AI laws, policies, and regulations—including AI-enabling measures and AI-adjacent initiatives—that enable the rise of data- and algorithm-driven technologies. This encompasses the formation of national bodies/agencies devoted to the enablement and operationalization of AI in general.
- Pillar 2: Principles, guidelines, and standards that ensure AI is developed and leveraged in a fair, ethical, unbiased, inclusive, and sustainable manner—i.e., all mechanisms designed to make AI development and use responsible.
- Pillar 3: The entrepreneurial and educational environment that equips the labor force with the skills, capabilities, and knowledge to develop and deploy AI responsibly—thus enabling investment and innovation around the responsible use of AI.
- Pillar 4: The wide range of stakeholders and organizations—including the private sector, academics, non-governmental organizations (NGOs), civil society organizations (CSOs), and not-for-profit organizations—that contribute to mitigating risks and biases, and minimizing harm from AI.

PILLAR 1: NATIONAL LAWS, POLICIES, STRATEGIES, AND REGULATIONS THAT ENABLE THE RISE OF AI IN GENERAL

SEA's digital economies have grown rapidly in the past five years thanks to a fast-expanding internet user base and rising digital adoption.[48]

From e-commerce platforms and digital payment solutions to ride-hailing and food delivery services, the rise of digital products and services has turned the region into a hotbed for digital innovation and entrepreneurship—attracting investments, creating job opportunities, and driving economic development in the region.

These rising levels of digitalization are raising awareness and interest in AI across the SEA region, with marked excitement and optimism around the impact it can have on people's lives and livelihoods. But the AI landscape varies within and between countries, even as most of them effectively build their AI capabilities and promote the adoption of AI technologies.

Countries such as Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam are at the forefront, fostering AI research centers, innovation hubs, and start-ups. They are embracing AI technologies across various sectors—including healthcare, finance, manufacturing, and transportation—and leveraging public-private partnerships where possible.

Examples include the collaboration between Singapore's National Office for AI and Google Cloud to enhance AI capabilities in the public sector,[49] and the support provided by Nodeflux, a Jakarta-based AI start-up, to the provincial government in Jakarta to intelligently monitor flooding risks and facilitate crowd and traffic management through facial recognition technology.[50]

At the same time, countries such as Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Timor-Leste are in the very early stages of developing their AI ecosystems, prioritizing the building of foundational blocks: reliable and even connectivity, skills development for local AI talent to emerge, increasing funding and investment in research and development, and developing supportive policy and regulatory frameworks specific to AI.

This section provides an overview of the broad approaches to AI that can be found around the region, with a focus on the various challenges that national and regional strategies should address for SEA economies to build conducive environments for responsible AI.

GOVERNMENTS' AI READINESS IN SEA

According to Oxford Insights' *Government AI Readiness Index 2022* report, SEA governments are generally well prepared to harness the many potential benefits of AI, but the wide range of scores suggests that only some of them are ready to take a holistic approach to AI operationalization—meaning that while many of them have AI strategies and roadmaps in place, these do not systematically translate into actual capability to harness or leverage AI to its full potential.

[48] Google (2022) e-Conomy SEA report, https://services.google.com/fh/files/misc/e_conomy_sea_2022_report.pdf
[49] Smart Nation (2022) SNDGG Partners with Google Cloud to Enhance AI Innovation in Singapore, www.smartnation.gov.sg/media-hub/press-releases/23082022
[50] Jakarta Smart City (2020) Jakarta X Nodeflux: Creating a Smarter City Through Vision AI, https://corona.jakarta.go.id/en/artikel/jakarta-x-nodeflux-membangun-kota-cerdas-bervisi-ai

Most notably, the report highlights that there remains great unevenness in terms of reliable connectivity, viable ICT infrastructure, and public-sector efficiency within and across SEA countries.[51]

Table 3. Government AI Readiness Index 2022 scores for SEA economies (out of 100)

SEA ECONOMY	TOTAL SCORE	GOVERNMENT PILLAR	TECHNOLOGY SECTOR PILLAR	DATA AND INFRASTRUCTURE PILLAR
Singapore	84.1	89.7	68.5	94.2
Malaysia	67.4	77.7	50.3	74.2
Thailand	64.6	76.8	38.7	78.4
Indonesia	60.9	73.8	41.5	67.3
Philippines	55.4	65.0	36.3	64.9
Viet Nam	54.0	66.8	39.2	55.9
Brunei Darussalam	48.1	37.8	42.6	63.7
Myanmar	32.4	24.3	25.9	47.2
Lao PDR	31.7	29.6	21.5	44.1
Cambodia	31.2	28.0	21.1	44.4
Timor-Leste	30.9	25.5	21.9	45.2

Source: Oxford Insights (2022) Government AI Readiness Index 2022, www.oxfordinsights.com/government-ai-readiness-index-2022

Ranking second out of 180 countries, just behind the United States, Singapore stands out in the overall index due to its strong performance, particularly in the Government pillar. The country's digital government approach, coupled with a favorable legislative environment for businesses, contributes to its success.

The report highlights Singapore's effective public-private partnerships as a major driver of innovation in the public sector. For example, since 2022, Singapore's National Office for AI has worked with Google Cloud to enhance the government's AI capabilities and provide AI and Machine Learning training to public-sector officials.[52]

The report also notes that it is increasingly urgent for all countries in the region to define and consolidate national and regional approaches to AI governance. Indeed, within the Government pillar of the index, the dimension of Governance & Ethics emerges as the weakest for all AMS, with almost all AMS scoring well under the global average.[53]

According to the report, the COVID-19 pandemic demonstrated the value of many innovative AI-powered solutions, but it also brought to light a number of governance issues, such as the adequacy of privacy safeguards when the government deploys citizen's personal data for public health tracking

[51] Oxford Insights (2022) Government AI Readiness Index 2022, www.oxfordinsights.com/government-ai-readiness-index-2022
[52] Smart Nation (2022) SNDGG Partners with Google Cloud to Enhance AI Innovation in Singapore, www.smartnation.gov.sg/media-hub/press-releases/23082022
[53] Oxford Insights (2022) Government AI Readiness Index 2022, www.oxfordinsights.com/government-ai-readiness-index-2022

and monitoring.[54] Additionally, the 2019-2021 period saw the implementation of several laws combating disinformation, a trend that raised concerns as these could also be used to censor online discourse and content.[55]

Box 2. The importance of AI governance frameworks

AI governance refers to the policies, practices, and processes designed to ensure responsible and ethical development, use, and management of AI systems. It encompasses a variety of activities, such as setting standards and guidelines for AI development and use, establishing ethical decision-making protocols, and creating oversight and accountability mechanisms. The objective of AI governance is to maximize AI's societal benefits while minimizing potential negative consequences, including bias, discrimination, and technology misuse.

AI governance is crucial for SEA countries; if not properly designed or implemented, it can negate the numerous benefits AI has to offer, potentially leading to risks and challenges like algorithmic bias, discrimination, and disinformation. SEA countries will need to create AI governance frameworks tailored to their specific needs and situations to tackle these challenges and optimize AI's advantages.

This could involve formulating strategies and policies that encourage responsible AI development and use, implementing oversight and accountability mechanisms, and enhancing AI governance capacity and expertise. Collaborating with international partners and organizations to share AI governance knowledge and expertise is also beneficial for SEA countries.

A major obstacle for SEA economies to operationalize AI governance frameworks as described above is the prevalence of a misalignment between the broad policy/regulatory environment and AI-enabling measures. In Thailand, for example, there are many government-driven initiatives to grow a local AI ecosystem. But these efforts are in contradiction with the many laws controlling what can be done and said on digital platforms (Lèse-majesté laws, content control on social media, etc.).[56]

Likewise in Indonesia, the government's enabling initiatives around AI are hindered by its many controls on data storage and governance (namely, data localization and cross-border data flow restrictions).[57]

AI GOVERNANCE IN SEA

The Oxford Insights study is largely aligned with our findings; there is a big appetite for all things AI in SEA, but AI governance frameworks are still nascent in the region—creating organizational, operational, and regulatory challenges for the effective operationalization of responsible AI.

Across the board, domestic AI initiatives largely remain tied to SEA countries' own needs, priorities, and capabilities. For example, some countries in the region have developed national policies specifically devoted to strengthening overarching AI capabilities, ensuring AI is enabled across different levels of government and within key economic sectors. This is the case for Indonesia, Malaysia, Singapore, the Philippines, Thailand, and Viet Nam. Some of these same countries have created national AI agencies specifically devoted to centralizing and coordinating nationwide AI measures and efforts, with strong mandates to push AI higher in public- and private-sector organizations' digital agendas.

In other cases, countries have not established a defined/concerted approach to AI yet, but they do have many initiatives aimed at using AI to dynamize, diversify, or solidify the digital economy. This is the case for Brunei Darussalam, Cambodia, Lao PDR, Myanmar, and Timor-Leste.

[54] SSRC (2021) Use of Personal Data in Tackling Covid-19 in East Asia: Establishing Robust and Reliable Data Governance for the Social Good, https://items.ssrc.org/covid-19-and-the-social-sciences/covid-19-in-east-asia/use-of-personal-data-in-tackling-covid-19-in-east-asia

[55] East Asia Forum (2019) 'Fake news', the law and self-censorship in Southeast Asia, www.eastasiaforum.org/2019/08/02/fake-news-the-law-and-self-censorship-in-southeast-asia

[56] The Diplomat (2021) Thailand's Creeping Digital Authoritarianism, https://thediplomat.com/2021/02/thailands-creeping-digital-authoritarianism

[57] East Asia Forum (2022) Indonesia won't go with the flow on data, www.eastasiaforum.org/2022/08/10/indonesia-wont-go-with-the-flow-on-data

Table 4 provides a summary of the main, overarching national AI plans and bodies in SEA:

Table 4. National AI plans and bodies in SEA

SEA ECONOMY	NATIONAL AI PLAN/ POLICY/ STRATEGY	COORDINATING AI BODY
Brunei Darussalam	None for AI	None for AI, the Ministry of Finance and Economy is the main coordinator
Cambodia	None for AI	None for AI, the Ministry of Industry, Science, Technology & Innovation (MISTI) is the main coordinator
Indonesia	National AI Strategy 2020-2045 (Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045)[58]	None for AI, Ministry of Communication and Information (KOMINFO) is the main coordinator, with support from the Indonesian Artificial Intelligence Industry Research and Innovation Collaboration (KORIKA)
Lao PDR	None for AI	None for AI, the Ministry of Technology and Communications (MTC) is the main coordinator for digital economy initiatives
Malaysia	National Artificial Intelligence Roadmap 2021-2025 (AI-Rmap)[59]	None for AI, the Ministry of Science, Technology, and Innovation (MOSTI) is the main coordinator for digital economy initiatives, with support from the Malaysia Digital Economy Corporation (MDEC)
Myanmar	None for AI	None for AI, the Ministry of Transport & Communications (MOTC) is the main coordinator for digital economy initiatives, with support from the Digital Economy Development Committee (DEDC)
The Philippines	National AI Strategy for the Philippines[60]	None for AI, the Department of Trade and Industry (DTI) is the main coordinator
Singapore	National AI Strategy 2.0[61]	AI Singapore and National AI Office (coordinated/supported by the Infocomm Media Development Authority, IMDA)
Thailand	National AI Strategy and Action Plan (2022–2027)[62]	Thailand National AI Strategy Working Committee (coordinated/supported by the National Electronics and Computer Technology Center, NECTEC)
Timor-Leste	None for AI	None for AI, the Ministry of Transport and Communications (MOTC) is the main coordinator for digital economy initiatives
Viet Nam	National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QD-TTg)[63]	None for AI, the Ministry of Science and Technology (MOST) is the main coordinator for digital economy initiatives, with support from VietAI

Source: Access Partnership research

[58] Badan Pengkajian dan Penerapan Teknologi (BPPT) (2021) Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045 (machine translation), www.ai-innovation.id/server/static/ebook/stranas-ka.pdf
[59] Ministry of Science, Technology & Innovation (2021) National Artificial Intelligence Roadmap 2021-2025 (AI-Rmap), https://airmap.my
[60] DTI (2021) National AI Strategy for the Philippines, https://innovate.dti.gov.ph/wp-content/uploads/2021/05/National-AI-Strategy-Roadmap-May-2021.pdf
[61] Smart Nation (2023) National AI Strategy 2.0, www.smartnation.gov.sg/nais
[62] AI Thailand (2022) Thailand National AI Strategy and Action Plan (2022-2027) (machine translation), https://ai.in.th/wp-content/uploads/2022/12/20220726-AI.pdf
[63] MOF (2021) National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QĐ-TTg), https://mof.gov.vn/webcenter/portal/cdso/pages_l/ctt?dDocName=MOFUCM237749

According to AI experts in the region, having a national AI policy or agency in place does not automatically lead to better or more effective AI operationalization. Indeed, even if a country sets out a national AI strategy/framework or sets up an AI government body, there is still the challenge of the framework and the agency having the mandate, authority, legitimacy, budget, and resources to implement. This is not always possible in SEA, where it is not uncommon for various government agencies to have overlapping or contradicting agendas.[64]

In this sense, enacting an AI strategy or setting up an AI agency is not the culmination of efforts aimed at governing AI; these are only the first steps in what is a much more complex endeavor that should be sustained over time.

According to our research, a key challenge for SEA governments is not the design of AI policies *per se*, but the implementation of AI governance frameworks.[65] In this context, for responsible AI to be prioritized in the region, governments should go beyond drafting frameworks and setting up agencies—they should create the conditions for agencies to turn plans into action.

RESPONSIBLE AI IN SEA

Encouragingly, responsible, and ethical AI is making its way into SEA governments' AI agendas; it may not always be at the top of these agendas, but it is present, nonetheless.

We find that where AI policies and strategies exist in the region, references to the meaningful and impactful usage of AI are almost always part of the conversation. We have assessed this by examining whether keywords such as "fair", "ethical", "trustworthy", and "responsible" (along with their variants) appear in some form or another in the region's national AI initiatives (see Table 5). We recognize that this keyword approach serves as an approximation of whether responsible AI is considered and is meant to be illustrative.

It is worth noting that out of the six SEA digital economies that have a national AI strategy in place, only Viet Nam has no mention of any of the key concepts and notions typically attributed to the responsible use of AI.[66]

[64] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[65] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[66] It is worth highlighting that official English translations were not available for the legal documents consulted for this exercise; as such, unofficial translations by reputable Vietnamese sources were used.

Table 5. Mentions of responsible AI concepts and notions in SEA national plans, policies, and strategies

SEA ECONOMY	NATIONAL AI PLAN/ POLICY/ STRATEGY	"FAIR", "FAIRNESS", "UNFAIR"	"BIAS", "UNBIASED"	"INCLUSIVE", "DIVERSE", "SUSTAINABLE"	"RESPONSIBLE", "RESPONSIBILITY", "ACCOUNTABILITY"	"ETHICS", "ETHICAL", "UNETHICAL"	"TRUST", "TRUSTWORTHY"
Indonesia *	National AI Strategy 2020-2045 (*Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045*)[67]	✓	✓	✓	✓	✓	✓
Thailand **	Thailand National AI Strategy and Action Plan (2022–2027)[68]	✓	✓	✓	✓	✓	✓
Singapore **	National AI Strategy 2.0[69]	✓	✓	✓	✓	✓	✓
Malaysia **	National Artificial Intelligence Roadmap 2021-2025 (AI-Roadmap)[70]	✓	—	✓	✓	✓	✓
The Philippines **	National AI Strategy for the Philippines[71]	✓	✓	✓	✓	✓	—
Viet Nam **	National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QD-TTg)[72]	—	—	—	✓	—	—
Brunei Darussalam	*None*	—	—	—	—	—	—
Cambodia	*None*	—	—	—	—	—	—
Lao PDR	*None*	—	—	—	—	—	—
Myanmar	*None*	—	—	—	—	—	—
Timor-Leste	*None*	—	—	—	—	—	—

Legend: — The word/concept does not appear, ✓ The word/concept appears
*Notes: * is a machine-translated document, ** is an officially translated document*
Source: Access Partnership research

[67] Badan Pengkajian dan Penerapan Teknologi (BPPT) (2021) Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045 (machine translation), https://ai-innovation.id/images/gallery/ebook/stranas-ka.pdf
[68] AI Thailand (2022) Thailand National AI Strategy and Action Plan (2022-2027) (machine translation), https://ai.in.th/wp-content/uploads/2022/12/20220726-AI.pdf; AI Thailand (2022) About AI Thailand, https://ai.in.th/en/about-ai-thailand/
[69] Smart Nation (2023) National AI Strategy, www.smartnation.gov.sg/nais
[70] Ministry of Science, Technology & Innovation (2021) National Artificial Intelligence Roadmap 2021-2025 (AI-Rmap), https://airmap.my
[71] DTI (2021) National AI Strategy for the Philippines, https://innovate.dti.gov.ph/wp-content/uploads/2021/05/National-AI-Strategy-Roadmap-May-2021.pdf
[72] Socialist Republic of Viet Nam Government news (2021) National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QĐ-TTg), https://en.baochinhphu.vn/national-strategy-on-rd-and-application-of-artificial-intelligence-11140663.htm

While responsible AI is making its way into SEA governments' AI agendas, the on-the-ground sentiment is that concerns around the ethical risks and implications of AI may be increasingly recognized and discussed at the policymaking level, but more intricate ethical considerations around AI are not top-of-mind for the general population—including for business leaders and civil servants.[73]

Indeed, the rapid growth of the region's digital economies over the past decade is in large part due to business-friendly measures aimed at giving digital businesses access to transaction data to fuel their rapid growth.[74] This has kept data governance discussions in the region focused on finding the right balance between keeping data flowing while addressing citizens' and consumers' maturing concerns over privacy and security.[75] This is especially pertinent in the context of AI given the heavy reliance on data for training AI models, as well as the pertinent need to foster trust in both consumers and businesses.

By extension, AI discussions in the region have traditionally been centered around the best ways to effectively leverage AI for commercial and operational efficiencies (marketing, e-commerce, super-apps),[76] and less so around emerging ethical considerations and their wider implications for the future of data-driven business models.

In this sense, the *ASEAN Guide on AI Governance and Ethics* (published in February 2024),[77] *Discussion Paper on the Responsible Development and Use of Generative AI in ASEAN*,[78] and *ASEAN Strategic Guidance on Artificial Intelligence and Digital Workforce* (the latter two are expected to be published by early 2024)[79] mark a turning point for SEA's approach to putting ethical considerations to the foreground of AI policymaking.

All three documents are set to provide a comprehensive governance framework to facilitate the ethical and responsible advancement of AI across a wide range of use cases. At the same time, the documents will put the region on the map in terms of multilateral and inter-jurisdictional approaches to AI. In order to stand out as useful and impactful for SEA, the documents will need to avoid mixing and matching AI governance concepts and mechanisms from the European Union, the United States, or China; they will have to reflect what responsible AI means and looks like in the context of SEA's varying priorities and capabilities—potentially serving as an example for other emerging economies.[80]

At the same time, several SEA countries are signatories to various international AI agreements (UNESCO, OECD/G20). Chief among these is UNESCO's *Recommendation on the Ethics of Artificial Intelligence*,[81] which defines ethical AI, outlines key principles, and presents everything that makes for an enabling environment for ethical AI to emerge. Most importantly, this is currently the only global standard on AI, vetted and agreed upon by 193 member countries—including all 11 SEA economies

[73] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[74] ZD Net (2022) Data will play key role in sustaining SEA digital economy growth, www.zdnet.com/article/data-will-play-key-role-in-sustaining-sea-digital-economy-growth
[75] EU-ASEAN Business Council (2020) Data Governance in ASEAN: From Rhetoric to Reality, www.eu-asean.eu/wp-content/uploads/2022/02/DATA-GOVERNANCE-IN-ASEAN-FROM-RHETORIC-TO-REALITY-2020.pdf
[76] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[77] ASEAN (2024) ASEAN Guide on AI Governance and Ethics, https://asean.org/book/asean-guide-on-ai-governance-and-ethics/
[78] AI Asia Pacific Institute (2023) Responsible Development and Use of Generative AI in ASEAN: Workshop Pre-Read Material, draft shared by the AI Asia Pacific Institute in December 2023.
[79] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[80] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[81] UNESCO (2021) Recommendation on the Ethics of Artificial Intelligence, https://unesdoc.unesco.org/ark:/48223/pf0000381137

covered in this report.[82] For the *OECD/G20 Principles on Artificial Intelligence*, Singapore is an adherent.[83] Meanwhile, Indonesia, as part of the G20, is a signatory to the *G20 AI Principles* set out in 2019.[84]

REGULATORY CHALLENGES AROUND RESPONSIBLE AI

Despite many promising advancements, a number of challenges remain for SEA. There are regulatory obstacles that all governments—not just the ones in SEA—are facing when it comes to operationalizing AI in general. There are also more systemic challenges that are specific to SEA's approach to AI, as well as issues specific to the way responsible AI can be prioritized and enabled.

GENERAL REGULATORY CHALLENGES

On the regulatory front, challenges include: a lack of clear and consistent regulations, the potential for AI to be used for harmful or malicious purposes, bias and fairness, and data governance (data protection, data privacy, and cybersecurity).

- Lack of clear and consistent regulations around AI: Some countries, such as those in the European Union and the United Kingdom, have begun to develop regulations specifically for AI. In many other places, including some SEA economies, AI remains bundled with other emerging technologies under pre-existing laws and regulations, which may not be well-suited to address the new and unique challenges it entails. The lack of targeted regulations can make it difficult and costly for AI companies to navigate the legal landscape, all while complicating regulators' mission to balance conducive business environments and ethical uses of AI.
- The potential for AI to be used for harmful or malicious purposes: AI-powered facial recognition technology has raised concerns about privacy and civil liberties, as well as the potential for the technology to be used for mass surveillance. Similarly, AI-powered autonomous weapons systems have raised concerns about the potential for these systems to be used in ways that violate international law. These issues may lead to increased regulatory scrutiny of AI-related technologies, which could make it more difficult for SEA businesses to bring new products and services to market.
- Bias and fairness in AI systems: As AI systems are trained on data, any biases present in the data are likely to be learned and reproduced by the system, which can lead to unfair or discriminatory outcomes. This is a complex issue that organizations leveraging AI will need to address proactively to ensure that their AI systems are fair and unbiased.
- Data protection, data privacy, and cybersecurity: AI systems rely on large amounts of data to function, and this data can be sensitive and personal. If it is not properly secured, it can be vulnerable to breaches, theft, or misuse. This is a concern not only for AI businesses, whose livelihoods depend on consumers' trust that their data is well handled and protected, but also for governments and regulators, who are responsible for designing policies and regulations that strike a balance between addressing valid privacy and security concerns and enabling the movement of data to keep their economies dynamic, competitive, and relevant in the digital age.

[82] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[83] OECD (n.d.) Recommendation of the Council on Artificial Intelligence, https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0449#adherents
[84] OECD (2019) G20 AI Principles, https://oecd.ai/en/wonk/documents/g20-ai-principles

SYSTEMIC CHALLENGES FOR SEA

Looking more specifically at the SEA region, four additional challenges stand out in terms of wide AI adoption and usage:

- Large disparities between and within SEA: Poor infrastructure, limited connectivity, and under-skilled workforces limit the potential growth of AI in many SEA economies, even in those that strongly adhere to its transformative potential. Strong infrastructural and institutional foundations are a fundamental prerequisite for both people and organizations to access and use AI-powered platforms, as well as to contribute to the wider digital economy.
- More regional competition than collaboration: Several SEA economies are positioning themselves as regional AI hubs, attracting foreign talent and investment through AI-enabling incentives and policies. As beneficial as this may be for national AI ecosystems, they remain too inward-facing for the region to realize its full AI potential; if SEA economies compete with each other for a piece of a lucrative but finite AI pie, bigger AI players (China, South Korea) risk overtaking them.
- Lack of regional integration on AI: SEA has a unified guide on ethical AI in the making, but these are likely to be kept very broad to make it easier for ASEAN Member States to evaluate their unique context before formulating and implementing AI regulations at their own pace and in their own manner. Combined with the resolutely non-binding nature of ASEAN initiatives, this may lead to a wide spectrum of approaches to AI governance that will only have overarching goals and principles in common. This lack of concrete direction can lead to regulatory gaps, overlaps, contradictions, and incompatibilities that risk affecting the region's dynamism and competitiveness.
- Absence of framework to track/measure AI progress: A key challenge for policymakers across SEA is gauging the actual impact their policies and regulations are having on the ground. This is especially true when it comes to measures aimed at framing the development and use of digital technologies, which by their very nature evolve faster than governments' supervisory processes and widen the scope of regulatory boundaries.

CHALLENGES SPECIFIC TO RESPONSIBLE AI IN SEA

Looking at responsible AI in SEA, several other challenges stand out in addition to effectively translating the hype and excitement around AI into actionable plans and sustainable approaches that leave no one behind:

- Driving innovation: Governments in SEA need to strike a balance between incubating and regulating AI developments in different capacities, playing an active role in the responsible appropriation of AI technologies, and in providing their citizens with tools to respond to the harms they face in the process.
- Uncoordinated approaches: While organizations like the OECD or UNESCO can set out universal principles on AI ethics, national governments are ultimately the ones enforcing the regulations. The

general dynamic in SEA is that of misalignment between the broader policy/regulatory environment and localized AI-enabling measures erected by the national governments.[85]

- Bureaucratic complexity: Many SEA countries suffer from a lack of coordination between government bodies working on AI (no centralization of efforts/resources). Very few countries have a government body/agency specifically devoted to AI; most AI missions and activities are distributed among various entities with agendas, priorities, and mandates that can clash or compete.

- Competition for talent and investment: According to AI stakeholders across the region, SEA's AI ecosystems cannot grow as rapidly nor as widely as they could due to big tech companies (local and international ones) hoarding AI investment and AI-skilled workers.[86] AI talents tend to be attracted to recognizable brands and competitive salaries, which means both the public sector and smaller AI start-ups find it difficult to attract and retain AI specialists—ultimately limiting the scope of AI experimentation and innovation despite a rise in the number of enabling policy measures being implemented.[87]

- Lack of localization: For now, AI in SEA is largely focused on natural language processing (NLP) activities, which refer to the use of AI to give computers the ability to understand human language in text and spoken forms, and to apply that ability to use cases such as chatbots.[88] This is not necessarily by choice; many local AI companies would like to innovate in other areas, but before they do so they should develop their own training datasets. This is difficult because the datasets used to train AI are largely Western-centric and English-driven, which is not necessarily useful nor impactful for the region's needs. Encouragingly, Singapore has just announced the development of an AI model trained to understand and generate human language in a way that incorporates the diverse cultures and languages of SEA. This large language model (LLM) could eventually be used as the basis of various text-to-speech or text-to-image generative programs without relying on models trained exclusively with Western-focused datasets.[89]

- International/global influence: Another major challenge for SEA digital economies is their lack of weight in the global AI discourse. Most of the debates and decisions on global AI governance happen in the European Union, the United States, and China—this risks leaving SEA with the role of rule-taker (aligning with the rules made by forerunners) as opposed to the one of rule-maker (setting the pace and the momentum of rules and norms in the making).

- Addressing local needs and priorities: The *ASEAN Guide on AI Governance and Ethics* is a major step in the right direction for SEA economies' path towards operationalizing responsible AI. But it remains to be seen how and when policymakers in the region will operationalize some of the broader aspects of "responsible AI" that experts increasingly think should be covered if AI is to be made to improve people's and communities' lives in the region. Major issues include the digital divide (the way AI can be used to close the digital divide by empowering students, workers, and industry leaders for the

[85] In Thailand, for example, there are many government-driven initiatives to grow a local AI ecosystem. But these efforts are in contradiction with the many laws controlling what can be done and said on digital platforms (Lèse-majesté laws, content control on social media, etc.). Likewise in Indonesia, the governments enabling initiatives around AI are hindered by its many controls on data storage and governance (data localization and cross-border data flows restrictions).
[86] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[87] Wall Street Journal (2023) These Tech Workers Say They Were Hired to Do Nothing, www.wsj.com/articles/these-tech-workers-say-they-were-hired-to-do-nothing-762ff158
[88] IBM (n.d.) What is natural language processing?, www.ibm.com/topics/natural-language-processing
[89] The Business Times (2023) S$70 million Singapore AI initiative to develop first large language model with South-east Asian context, www.businesstimes.com.sg/startups-tech/startups/s70-million-singapore-ai-initiative-develop-first-large-language-model-south

digital future of work and education, effectively lifting people out of poverty by providing future-proof knowledge, skills, and tools); minority rights (the way AI can contribute to systemizing the protection of indigenous languages, cultures, and memories through fit-for-purpose data governance and data sovereignty policies); and the environment (the way AI can be made to both respect the environment by specifically not contributing further to climate change, and mitigate the ongoing and upcoming effects of climate change).[90]

[90] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

PILLAR 2: PRINCIPLES, GUIDELINES, AND STANDARDS THAT SPECIFICALLY ENABLE FAIR AND RESPONSIBLE AI PRACTICES AND INITIATIVES

AI is generally characterized by its ability to function with minimal to no human intervention. Yet it is this very autonomy that is the greatest cause of concern regarding the potential misuse or misapplication of AI.

Indeed, while AI presents a host of new opportunities, these will only come to fruition if people, businesses, and governments are comfortable adopting and using the AI-enabled products and services that are made available—i.e., if they trust that AI is working for and with them to perform tasks effectively, safely, and ethically.

Thus, trust plays a pivotal role in the emergence and growth of AI ecosystems, particularly when it comes to AI being developed and deployed in a responsible and ethical manner. Indeed, building reliable AI systems requires trust in the accuracy, ethical sourcing,[91] and secure handling of data, with users confident that their personal information is protected and used responsibly. Trust is also essential in AI decision-making processes and their outcomes, as unbiased and explainable AI decisions facilitate wider acceptance and adoption of AI systems—especially when it comes to sensitive issues that require confidence in the fairness, transparency, and accountability of algorithms.

In short, trust is a fundamental element that permeates the design of all the principles, guidelines, and standards that ensure AI is developed and leveraged in a fair, ethical, unbiased, inclusive, and sustainable manner.

This section examines the way AI governance frameworks developed and implemented by SEA countries contribute to making their AI ecosystems more trustworthy, and thus more favorable to the advancement of responsible AI.

TOWARDS UNBIASED, TRANSPARENT, AND EXPLAINABLE AI

AI systems can 'learn' bias in different ways and arrive at biased conclusions based on the composition of training data used during its learning process, or the weighting of variables within the model itself.[92]

This becomes especially problematic as AI comes to be used in applications such as human resources and recruiting, personal or financial risk assessments, public decision-making, and law enforcement. This has already led to real-life consequences as in the case of Amazon's use of a recruiting engine which was ultimately abandoned after it displayed a bias against female candidates.[93] In the Netherlands, there were concerns that SyRI, a secret algorithm used by the Dutch government that seeks to detect possible social welfare fraud by cross-referencing personal data in various databases, would unfairly deprive potential beneficiaries of social welfare. This was due to the possibility of biasness and discrimination by applying the algorithm in low-income neighborhoods that are already deemed high-risk, as well as false positives.[94] Inadequate oversight over AI systems that are not carefully

[91] Ethical sourcing in AI refers to the practice of responsibly and transparently acquiring the data used to train and develop AI models. It involves ensuring that the data is obtained in an ethical manner, with proper consent and consideration for privacy and legal regulations. Ethical sourcing aims to avoid biases, discrimination, and potential harm to individuals or communities represented in the data, promoting fairness and equitable outcomes in AI applications. Cloudfactory (2022) The Ethical Sourcing of Training Data, https://blog.cloudfactory.com/ethically-sourced-training-data

[92] Silva and Kenney (2019) Algorithms, Platforms, and Ethnic Bias, www.researchgate.net/profile/Martin-Kenney/publication/336787610_Algorithms_platforms_and_ethnic_bias/links/6035f2534585158939c5b43e/Algorithms-platforms-and-ethnic-bias.pdf

[93] Reuters (2018) Amazon scraps secret AI recruiting tool that showed bias against women, www.reuters.com/article/us-amazon-com-jobs-automation-insight-idUSKCN1MK08G

[94] Algorithm Watch (2020) How Dutch activists got an invasive fraud detection algorithm banned, https://algorithmwatch.org/en/syri-netherlands-algorithm/

configured to counteract bias can lead to hazardous outcomes, from the perpetuation of discriminatory practices to the deepening of racial or economic divides and rising mistrust in public institutions.

The issue of AI bias is also linked to growing concerns around the issue of transparency—or explainable AI. As algorithms become more complex, the logic that leads to a decision can be hard to deconstruct and explain. Concerns have thus arisen regarding the possibility that AI algorithms make decisions affecting people's lives and livelihoods without a clear explanation of why these decisions were made in the first place.

Transparency goes beyond explaining the way algorithms work, as there is a high chance that they will only be understood by more technically trained users; it also extends to the way data may be collected and used—even if the expected outcomes are not clear from the onset. To this extent, policymakers are developing principles and guidelines for transparency and accountability, and regulators are considering means to audit AI-enhanced decision-making in regulated industries such as healthcare and financial services.

PRINCIPLES AND GUIDELINES FOR RESPONSIBLE AND TRUSTWORTHY AI IN SEA

Digital economies in SEA are at different levels of maturity regarding framing, regulating, and enabling trustworthy AI, with national agendas encompassing a wide range of specific needs and priorities. This dynamic is reflected in national and regional approaches to developing principles and guidelines around AI.

Some countries, like Singapore and Malaysia, have a wide range of plans and programs specifically devoted to driving the development and use of AI in a fair, ethical, and responsible manner. Others, like Indonesia, Thailand, and Viet Nam, recognize the need to address the harms of AI but do not provide any guidance on how that may be achieved. Others, still, do not yet see responsible AI as a priority and are more focused on quickly leveraging AI to grow and diversify their digital economy.

RESPONSIBLE AI WITHIN NATIONAL AND INTERNATIONAL FRAMEWORKS

Table 6 shows the initiatives and priorities that each SEA country has launched, supported, or adopted to operationalize ethical principles and guidelines for AI.

Table 6. Ethical principles and guidelines in SEA

SEA ECONOMY	AI PRINCIPLES	AI GUIDELINES
Brunei Darussalam	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	ASEAN Guide on AI Governance and Ethics (published in February 2024)
Cambodia	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	ASEAN Guide on AI Governance and Ethics (published in February 2024)
Indonesia	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) G20 AI Principles (2019)	ASEAN Guide on AI Governance and Ethics (published in February 2024)
Lao PDR	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	ASEAN Guide on AI Governance and Ethics (published in February 2024)
Malaysia	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) Principles for Responsible AI – as part of the Malaysian National AI Roadmap for 2021-2025 (2021)	AI Code of Ethics and Guidelines (planned for 2023-2024) ASEAN Guide on AI Governance and Ethics (published in February 2024)
Myanmar	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	ASEAN Guide on AI Governance and Ethics (published in February 2024)
Philippines	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	ASEAN Guide on AI Governance and Ethics (published in February 2024)
Singapore	OECD Artificial Intelligence (AI) Principles (2019) G20 AI Principles (2019) UNESCO Recommendation on the Ethics of Artificial Intelligence (2021) Fairness, ethics, accountability, and transparency (FEAT) principles (2018)	Model Artificial Intelligence Governance Framework (2020) MOH Artificial Intelligence in Healthcare Guidelines (AIHGle) (2021) Advisory Guidelines on the Use of Personal Data in AI Systems under the Personal Data Protection Act 2012 (proposed in 2023) Model AI Governance Framework for Generative AI (proposed in January 2024) ASEAN Guide on AI Governance and Ethics (published in February 2024)
Thailand	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	AI Ethics Guidelines (2019) ASEAN Guide on AI Governance and Ethics (published in February 2024)
Timor-Leste	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	
Viet Nam	UNESCO Recommendation on the Ethics of Artificial Intelligence (2021)	ASEAN Guide on AI Governance and Ethics (published in February 2024)

Source: Access Partnership research

It is worth noting that all SEA economies covered in this report adhere to at least one international/multilateral AI governance framework by their membership to UNESCO and ASEAN. This means that no matter how they define, approach, or prioritize the idea of "responsible AI", a set of core ethical principles and guidelines can, in theory, be implemented as part of a national plan or policy on AI. As SEA economies formulate and refine their national AI plans, they can refer to these existing international AI principles (including those from the United States, European Union, and United Kingdom, among others) to ensure the development of ethical and responsible AI while promoting interoperability. As trade agreements are increasingly including considerations on AI, developing principles in line with internationally recognized frameworks is also important for countries seeking digital economy agreements.

OPERATIONALIZING TRUST THROUGH RESPONSIBLE AI STANDARDS

The development and use of internationally recognized AI standards is one way SEA governments can ensure accountable and responsible AI practices while supporting AI innovation and taking their unique socioeconomic circumstances into consideration.

These standards include guidelines for risk management, data governance, and technical documentation that can demonstrate compliance with new legal requirements. International AI standards can also be used to demonstrate compliance with AI regulations, address AI system ethics such as transparency, neutrality, and lack of bias, and achieve maximum global harmonization and interoperability of AI systems.

Several international bodies, such as the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and the Institute of Electrical and Electronics Engineers (IEEE) have worked on developing global standards for AI that encompass both the technical aspects of AI and the ethical and policy dimensions of responsible AI. The international standards developed by these organizations can help ensure that global AI systems are interoperable, ethically sound, robust, and trustworthy; that opportunities from AI are widely distributed; and that standards are technically sound and usable regardless of sector or application.

At the ISO, the ISO/IEC JTC 1/SC 42 Committee is charged with the development of AI-related standards and has produced several technical reports on various aspects of big data architecture and AI development—including considerations of AI ethics such as bias and transparency.[95]

For example, the standard *ISO/IEC TR 24028:2020* on the trustworthiness of AI[96] covers issues like transparency and explainability, while *ISO/IEC TR 24027*[97] addresses bias in AI decision-making—among many other AI-specific standards.[98] Other major initiatives include: *ISO/IEC Draft International Standard (DIS) 24668* on Process Management Frameworks for Big Data Analytics, *ISO/IEC DIS 23053* on a Framework for AI Systems using Machine Learning, and *ISO/IEC New Project (NP) 38507* on Governance Implications of the Use of Artificial Intelligence by Organizations.[99]

[95] ISO (2021) Standards by ISO/IEC JTC 1/SC 42, www.iso.org/committee/6794475/x/catalogue/p/1/u/1/w/0/d/0
[96] ISO (2020) ISO/IEC TR 24028:2020 - Overview of trustworthiness in artificial intelligence, www.iso.org/standard/77608.html
[97] ISO (2021) ISO/IEC TR 24027:2021 - Bias in AI systems and AI aided decision-making, www.iso.org/standard/77607.html
[98] ISO (2023) Catalogue of standards by ISO/IEC JTC 1/SC 42, www.iso.org/committee/6794475/x/catalogue
[99] ISO (2023) ISO/IEC JTC 1/SC 42 Artificial intelligence, www.iso.org/committee/6794475/x/catalogue/p/0/u/1/w/0/d/0

Notably, the ISO recently published the world's first AI management system standard *ISO/IEC 42001:2023*. Designed to ensure the responsible development and use of AI systems, this standard outlines the requirements for establishing, implementing, maintaining, and continually improving an Artificial Intelligence Management System (AIMS) within organizations.[100] This pioneering standard paves the way for the development of future standards aimed at fostering responsible innovation and adoption of AI.

Furthermore, data quality has a significant impact on AI systems. AI systems that are trained on poor quality data and unstructured data sets can result in high error rates and other negative consequences. The use of data standards[101] goes beyond ensuring interoperability across data sources, and can be used to demonstrate data integrity and accuracy across heterogeneous datasets, providing quality assurance and supporting the development of responsible AI systems. In this context, the *ISO/IEC SD 5259* series of standards on data quality for analytics and ML is an important part of the equation.[102]

It is worth noting that Singapore and the Philippines are the only SEA economies to participate in *ISO/IEC JTC 1/ SC 42*. Both have reached participant status, indicating that they have sufficient technical capacity to meaningfully contribute to ongoing technical discussions and voting mechanisms. Having invested heavily in AI research and development and significantly improved their AI capabilities, Singapore and the Philippines thus have an interest in contributing to standards development.

The IEEE has also been heavily involved in the development of systems governing autonomous system design, and has developed several standards pertaining to ethics. The *P7000* series of standards, for example, seeks to address specific issues in the intersection of technological and ethical considerations that are faced by Autonomous and Intelligent Systems (AIS).[103]

In this regard, *IEEE 7000-2021* on addressing ethical concerns during system design is a clear standout for SEA economies.[104] Other highlights include standards governing the deployment of AI within specific contexts.[105] These include *P2247.1* governing the classification of AI-driven adaptive instructional systems, or *P2660.1* on practices for the integration of low-level automation functions and other software agents in industrial control platforms. Such standards notably lay the groundwork for more granular implementations of AI within specific sectors—in this case, education and industrial manufacturing.

If encouraged and implemented, these standards have the capacity to codify approaches to addressing AI transparency and bias. But without regional collaboration, SEA's ability to enjoy the collective benefits from AI is compromised through a rush to regulation and an assortment of emerging innovations that will be limited in terms of expansion, acceleration, and amplification.

International standards can be an integral part of this collaborative approach, by helping to articulate common requirements, specifications, guidelines, or characteristics, ensuring the development of AI systems and applications are interoperable, safe, and reliable[106]—building trust and confidence in the

[100] ISO (2023) ISO/IEC 42001:2023 - Artificial intelligence Management system, www.iso.org/standard/81230.html
[101] Data standards refer to the rules by which data are described and recorded.
[102] Singapore is the only AMS that is a participating member in the AI sub-committee, ISO (n.d.) ISO/IEC JTC 1/SC 42, www.iso.org/committee/6794475.html?view=participation
[103] IEEE Standards Association (n.d.) Autonomous Systems, https://standards.ieee.org/industry-connections/ec/autonomous-systems.html
[104] IEEE Standards Association (2021) IEEE 7000-2021, https://standards.ieee.org/standard/7000-2021.html
[105] IEEE Standards Association (2021) AI Systems Related Standards, https://standards.ieee.org/initiatives/artificial-intelligence-systems/standards.html#2247
[106] US National Institute of Standards and Technology (2019) U.S. Leadership in AI: A Plan for Federal Engagement in Developing Technical Standards and Related Tools, www.nist.gov/system/files/documents/2019/08/10/ai_standards_fedengagement_plan_9aug2019.pdf

technology, helping SEA economies advance their AI plans, and providing opportunities for the region to benefit from AI.

However, the ease of transmission and interpretation of data from one system to another raises privacy and data protection concerns, as digital rights should be weighed against the benefits that accrue with interoperability. Moreover, interoperability through the imposition of AI standards by regulatory authorities or incumbents in a sector could potentially exclude new entrants or innovations not based on currently used AI standards.

PILLAR 3: SKILLS, CAPABILITIES, AND KNOWLEDGE THAT DRIVE, SUPPORT, AND INCENTIVIZE INVESTMENT AND INNOVATION AROUND RESPONSIBLE AI

Dynamic and vibrant business environments are both the catalyst and the product of AI ecosystems that are conducive to the emergence of ethical and responsible AI practices.

By fostering vibrant tech ecosystems, SEA economies give data-driven start-ups the flexibility to experiment, iterate, and pivot quickly, which is crucial in a rapidly evolving global AI landscape. They can pioneer new AI applications, explore untapped markets, and address specific regional challenges—ultimately contributing to national and regional economic growth and competitiveness.

A robust business environment also attracts investment and talent to the region. Venture capital firms and investors are drawn to the potential for high returns and disruptive innovations offered by AI start-ups. This influx of capital fuels the growth of the AI ecosystem, enabling start-ups to scale their operations and expand their reach. The presence of a thriving start-up ecosystem also attracts skilled professionals and experts in AI, creating a virtuous cycle of knowledge exchange, collaboration, and talent retention.

Likewise, education is an important factor in ensuring AI is developed and deployed responsibly. It entails raising awareness around the possible advantages and risks of AI, as well as making ethical considerations more widely known and understood.

This education should begin in schools, where students can learn the basics of AI, and continue in universities, where students can gain more advanced knowledge of AI concepts and learn how to develop ethical AI systems. This may include how AI can be used and misused, how it can be made to create or disseminate both information and disinformation, and how it is simultaneously transforming the way we act, react, and transact while learning and evolving along with our changing habits and behaviors.

In addition to education, lifelong skilling, reskilling, and upskilling initiatives are crucial for workers to both benefit from and contribute to the data economy. This includes skills in data science, machine learning (ML), and software engineering, as well as knowledge about the ethical considerations of AI. This includes understanding the way biases can potentially intervene within AI systems, as well as the fundamentals of data privacy and security.

This knowledge ensures AI systems are created to be fair, inclusive, and beneficial for society, while making it easier to hold accountable those who develop and use AI systems.

This section focuses on the way dynamic business ecosystems and forward-looking educational programs play a pivotal role in empowering individuals and communities to work towards making the ethical and responsible use of AI a cultural, organizational, institutional, and economic priority.

AI BUSINESS ENVIRONMENT IN SEA

The on-the-ground sentiment is that there is great excitement and optimism around AI all across the SEA region, with many AI entrepreneurs and businesses making local ecosystems active and dynamic. At the same time, there is wide recognition that much more could be achieved if a number of fundamental barriers were addressed by SEA economies.[107]

According to the World Intellectual Property Organization (WIPO)'s *Global Innovation Index 2022* report, AMS are indeed well positioned to drive and leverage digital innovation for economic growth—though much remains to be done to effectively leverage the many competitive and comparative advantages that economies in the region possess.

Table 7. Global Innovation Index (GII) scores and rankings (2022)

SEA ECONOMY	GII 2022 SCORE	GII 2022 GLOBAL RANKING (Out of 132 countries)	GII 2022 REGIONAL RANKING (Out of 9 AMS)
Singapore	57.3	7	1
Malaysia	38.7	36	2
Thailand	34.9	43	3
Viet Nam	34.2	48	4
The Philippines	30.7	59	5
Indonesia	27.9	75	6
Cambodia	20.5	97	7
Lao PDR	17.4	112	8
Myanmar	16.4	116	9

Source: WIPO (2022) Global Innovation Index (GII) 2022, www.wipo.int/global_innovation_index/en/2022

In this regard, Singapore stands out both globally and regionally. Globally, it is the only ASEAN country to be in the global top 10 in terms of overall GII scores. Regionally, it leads the group of nine AMS that are covered in the report, with a total GII score that is well ahead the scores of other AMS.

Looking at individual indicators, Singapore takes first place in 11 of the 81 indicators used to compute the GII, including: Political and operational stability, Government effectiveness, Regulatory quality, ICT access, and venture capital investors.

At the same time, the *Asia-Pacific AI Readiness Index 2.0* finds that Singapore tops the Asia-Pacific (APAC) region across all measures of readiness to adopt and leverage AI (consumer, business, and government)—reflecting a conducive policy and regulatory environment that is successfully maximizing

[107] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

the impact of AI and other data-driven innovations.[108] After Singapore, the other AMS that stand out in terms of AI readiness are Thailand (consumer readiness), Viet Nam (business readiness), and Malaysia (government readiness).

Table 8. Asia-Pacific AI Readiness scores and rankings (2021)

OVERALL RANKING (Out of 11 countries)	CONSUMER READINESS SCORE (Out of 100)	BUSINESS READINESS SCORE (Out of 100)	GOVERNMENT READINESS SCORE (Out of 100)
1	Singapore (65.9)	Singapore (49.7)	Singapore (81.5)
2	Thailand (63.9)	Japan (48.4)	Australia (74.2)
3	Hong Kong (63.1)	India (47.3)	Japan (71.6)
4	The Philippines (61.8)	Hong Kong (45.4)	Hong Kong (69.3)
5	Malaysia (58.7)	New Zealand (41.7)	New Zealand (66.3)
6	India (58.3)	Australia (41.5)	Malaysia (57.1)
7	Indonesia (53.5)	Viet Nam (39.9)	India (55)
8	..	Malaysia (39.4)	Viet Nam (46.7)
9	..	The Philippines (36.6)	Thailand (45)
10	..	Thailand (35.6)	Indonesia (43.3)
11	..	Indonesia (29.9)	The Philippines (40.4)

Source: Salesforce (2021) APAC AI Readiness Index 2.0, www.salesforce.com/content/dam/web/en_au/www/documents/pdf/asia-pacific_ai-readiness-index-2021.pdf

The report's correlation analysis further shows that AI readiness is strongly correlated with GDP per capita, economies' propensity to harness technological innovation, the dynamism of local start-up ecosystems, and the ease with which businesses can navigate government processes and bureaucratic mechanisms—suggesting that AI can be a catalyst of change for SEA countries, while their economies' dynamism can further expand the breadth of potential AI use cases.

Together, these findings suggest that the full potential of the region's AI ecosystems in promoting industry development and government efficiency has yet to be fully realized. According to some AI experts, the main reason local AI ecosystems cannot grow as rapidly or as widely as they could in enabling greater AI adoption and innovation in SEA is because of a pervasive AI skills gap that puts small and medium AI companies at a disadvantage compared to local and international tech giants.

Highly skilled, AI-trained talents are in high demand, and are likely to be swayed to join household names that offer attractive salaries and benefits—which means skilled workers (and the investments

[108] Salesforce (2021) Asia-Pacific AI Readiness Index 2.0, www.salesforce.com/content/dam/web/en_au/www/documents/pdf/asia-pacific_ai-readiness-index-2021.pdf

their innovative talents attract) are essentially being hoarded by the biggest local and international tech companies.[109]

This limits AI start-ups' ability to grow, which in turn affects the extent to which they can benefit from the various enabling policies and regulations that are being designed and implemented for their benefit.[110]

EDUCATION AND SKILLS TO PREPARE FOR THE FUTURE OF WORK

According to the OECD's latest estimates, up to 27% of all jobs could be replaced by rapidly advancing forms of AI.[111] And according to the World Economic Forum (WEF)'s most recent study on the topic, the impact of AI on the nature, quality, and availability of jobs will be felt globally, but will especially affect economies with high concentrations of low-skill, highly automatable, and informal jobs.[112]

While several SEA economies are largely industrialized, knowledge- and service-driven economies, around half of the population in the region remains rural and around half of the labor force works in the informal sector.[113] This reality accentuates labor force skill gaps and hinders SEA economies' efforts to grow into regional technology hubs.

In this context, AI skills and education are growing into a major competitive and comparative advantage for individual SEA economies and the region as a whole. A region characterized by a young, dynamic, and tech-savvy population with a marked appetite for digital innovation, there is a real opportunity for SEA to be the focal point of the next generation of AI experts and specialists.

Across the region, efforts and resources are being devoted to growing countries' ability to provide lifelong skilling, reskilling, and upskilling initiatives to ensure the workforce can keep up with rapidly evolving AI trends. At the same time, schools and universities are introducing a wide range of data analytics and AI-focused courses to equip the upcoming workforce with the necessary skills to embrace AI technologies effectively.

For example, the Monetary Authority of Singapore (MAS) has launched a scheme to overcome one of the region's biggest hurdles regarding AI training: the lack of skilled instructors. The *Financial Sector Artificial Intelligence and Data Analytics (AIDA) Talent Development Programme* aims to increase the number of skilled workers who can develop and innovate AI solutions for the financial industry.[114] It does so by working with financial institutions, established training providers, and educational institutions to co-curate training programs and modules which incorporate the latest developments and trends in AI and analytics. Singapore's *AIDA Talent Development Programme* stands out as there are no other SEA economy that have such a program to our knowledge.

At the ASEAN level, a number of initiatives have been launched to make AI training more accessible and effective. To fulfill the ASEAN Economic Community (AEC)'s goal of the free flow of skilled labor, ASEAN countries are developing the *National Qualifications Frameworks*, a certification scheme

[109] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[110] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[111] OECD (2023) Employment Outlook 2023, www.oecd-ilibrary.org/employment/oecd-employment-outlook-2023_08785bba-en
[112] World Economic Forum (2023) Future of Jobs 2023, www3.weforum.org/docs/WEF_Future_of_Jobs_2023.pdf
[113] ASEAN (2020) Regional Study on Informal Employment Statistics to Support Decent Work Promotion in ASEAN, https://asean.org/asean2020/wp-content/uploads/2021/01/Regional-Study-on-Informal-Employment-Statistics-to-Support-Decent-Work-Promotion-in-ASEAN-2019.pdf
[114] FinExtra (2023) MAS launches AI and data analytics talent programme, www.finextra.com/pressarticle/96920/mas-launches-ai-and-data-analytics-talent-programme

specifically devoted to standardizing technical and digital skills taught across the region.[115] Once launched, the scheme will allow a person trained in the Philippines to work in Viet Nam or Thailand, and vice-versa, allowing countries to better navigate the challenge of lost, displaced, or diminished labor opportunities.

Concurrently, the *ASEAN Regional Forum on the Future of Education* is setting the stage for ASEAN Senior Officials of Education (SOMED) to align on the various ways in which the region's education agenda can be transformed to better address 21st century challenges.[116] Funded by the ASEAN-Republic of Korea Cooperation Fund and driven by the *ASEAN Socio Cultural Community (ASCC) Research and Development Programme*, the Forum emphasizes the need to prioritize educational quality and inclusiveness, digital citizenship, cybersecurity, additional and sustained resources, and governance and monitoring.

At the international level, UNESCO is working closely with ASEAN to provide future-oriented insights, recommendations, and pathways for the transformation of education in a way that meets and addresses the region's specific challenges, such as the impact of digitalization on the future of work and education.[117] These joint efforts are set to continue as UNESCO supports ASEAN's advancement of an upcoming *ASEAN Education 2050 Roadmap*.[118]

RESPONSIBLE AI FOR ECONOMIC OBJECTIVES AND ASPIRATIONS

Our research shows that a major barrier to the operationalization of responsible AI in SEA is the fact that AI is still largely seen and used as a cost-effective tool to maximize productivity and efficiency in profit-driven activities.

Government and industry leaders in SEA are more concerned about keeping their digital economies innovative and competitive, with the view to becoming a regional AI hub. In this context of pragmatic business-driven priorities, responsible AI is still perceived as too new or too abstract to deliver quantifiable impact.

As the initial economic model presented in the following section attempts to demonstrate, the notion of "responsible" AI is not incompatible with SEA's prioritization of leveraging AI for economic growth and development.

In fact, operationalizing responsible AI through supportive governance frameworks and enabling business environments can lead to untapped social and economic impact—both tangible and intangible benefits for people, businesses, and governments alike.

[115] East-West Centre (2020) Can ASEAN Expand Vocational Training to Help Workers Survive Automation and AI?, www.eastwestcenter.org/publications/can-asean-expand-vocational-training-help-workers-survive-automation-and-ai

[116] ASEAN (2023) Forum on future of education discusses digital transformation, green education in ASEAN, https://asean.org/forum-on-future-of-education-discusses-digital-transformation-green-education-in-asean

[117] UNESCO (2023) UNESCO contributes to call for transformative approach for education in Southeast Asia, www.unesco.org/en/articles/unesco-contributes-call-transformative-approach-education-southeast-asia

[118] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

DRIVING ECONOMIC GROWTH BY OPERATIONALIZING RESPONSIBLE AI

If properly equipped with the tools, knowledge, and skills to harness and leverage AI in a responsible manner, the SEA region has much to gain in terms of inclusive economic growth and sustainable economic development.

SIZING THE ECONOMIC IMPACT OF AI IN SEA

Governments across SEA are turning to algorithmic platforms, systems, and technologies to drive economic recovery, sustain economic growth, and make their digital economies more dynamic and competitive.

Though still in their infancy, AI products and services are being introduced across finance, healthcare, retail, transport, manufacturing, and agriculture—strategic industries that together drive the economic dynamism of both emerging and mature SEA economies. Many of the immediate potential productivity gains—enabling the automation of tasks, streamlining of processes, and optimal allocation of resources—have been largely documented.

However, according to the OECD's AI Policy Observatory's estimation of VC financial investment in AI-related firms worldwide, VC AI investments in the region remained low in 2022.[119] Apart from Singapore and Indonesia, VC investments in AI stand at less than USD 100 million. In contrast, leading countries like the United States invested more than USD 55 billion, a figure that far eclipses total investments in SEA and constitutes almost half of the global total.

Similar trends are seen on a per capita level, with most SEA countries seeing only less than USD 1 of VC investments in AI per capita. Apart from VC AI investments, it is also worth noting that academia and university research hubs have also launched initiatives to capture the economic opportunities from AI, evidenced by spin-off AI firms such as FathomX (from the National University of Singapore)[120] and Pintarai (from the University of Technology Malaysia)[121].

While SEA economies are now increasingly recognizing the potential and importance of AI, investments need to continue to be forthcoming for AI's economic potential to be truly realized.

In addition to this direct economic impact, there are more indirect economic benefits to consider. Namely, the richness and diversity in application and innovation, the potential for sustained and transformational economic growth, and the ability to create durable competitiveness by boosting employment opportunities and overall investment. This is in addition to the fact that AI is expected to continue transforming a range of industries and creating new, previously unforeseen occupations, products, and services.

Table 9 shows that the increased adoption of AI is set to lead to economic growth of up to USD 950 billion by 2030—with the contribution to GDP ranging from 10-18% for SEA economies.[122] Singapore's economy would gain USD 110 billion, representing 18% of its expected 2030 GDP while emerging

[119] OECD.AI (2023), Visualizations powered by JSI using data from Preqin, https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=vc-investments-in-ai-by-country
[120] Yahoo Finance (2022) Breast Cancer AI Company FathomX Raises SGD$ 2.24 million in Pre-series A Funding, https://finance.yahoo.com/news/breast-cancer-ai-company-fathomx-003000541.html
[121] Pintarai (n.d.) About Us, https://pintarai.com/about-us.html
[122] Kearney (2020) Racing toward the future: artificial intelligence in Southeast Asia, www.kearney.com/digital/article/?/a/racing-toward-the-future-artificial-intelligence-in-southeast-asia

economies such as Brunei Darussalam, Cambodia, Lao PDR, and Myanmar would experience an uplift of 10% of their respective GDPs.

Table 9. VC investments in AI and projected contribution of AI to GDP in AMS

SEA ECONOMY	VC INVESTMENTS IN AI, 2022 (USD million)[123]	VC INVESTMENTS IN AI PER CAPITA, 2022 (USD)[124,125]	CONTRIBUTION TO GDP IN 2030 (USD BILLION)[126]	SHARE OF GDP IN 2030 (%)[127]
Singapore	1865	312.13	110	18
Malaysia	76	2.24	115	14
Indonesia	529	1.92	366	12
Thailand	46	0.64	117	13
Philippines	63	0.55	92	12
Viet Nam	12	0.12	109	12
Brunei Darussalam, Cambodia, Lao PDR, Myanmar	-	-	41	10

Source: Access Partnership research

SIZING THE ECONOMIC IMPACT OF RESPONSIBLE AI IN SEA

There is a general consensus that AI may be the key for both emerging and mature digital economies to unlock a wide range of known and unknown, tangible and intangible, economic benefits. But very little has been written about the potential economic impact of responsible and ethical AI.

Indeed, AI that is used in a fair, transparent, and accountable manner can be much more than a simple productivity tool; putting people and their well-being at the center of AI development and deployment can have major ramifications for both the future of what AI can do for people and the future of what people can do with AI.

Despite this reality, there are currently no studies attempting to quantify the economic value and impact of putting AI at the service of fairer, more responsible use cases—including climate change preparedness, natural catastrophe readiness, post-pandemic recovery, women's labor force participation, reducing the digital divide, lifting people out of poverty, etc.

We propose here a first attempt that may lead to similar models being further refined.

The first step is to understand the channels through which responsible AI impacts economic sectors. Ideally, the "responsibilization" of AI should mitigate any harms (i.e., adverse side-effects) associated with the adoption and usage of AI.

[123] OECD.AI (2023), Visualizations powered by JSI using data from Preqin, https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=vc-investments-in-ai-by-country
[124] *Ibid.*
[125] Population Pyramid (2022) List of countries ordered by their population size, www.populationpyramid.net/population-size-per-country/2022/
[126] Kearney (2020) Racing toward the future: artificial intelligence in Southeast Asia, www.kearney.com/digital/article/?/a/racing-toward-the-future-artificial-intelligence-in-southeast-asia
[127] *Ibid.*

Looking at the current discussions and debates around the major risks of AI, three main categories stand out:

- Job displacement and bias: In the corporate context, lack of explainability and bias could lead to users and customers losing trust in AI systems. In addition, AI can potentially automate a wide range of tasks and activities, which may lead to the displacement of thousands of occupations. Research indicates that at least 5% of occupations could be fully automated by currently demonstrated technologies.[128] This could lead to increased wage polarization, income inequality, and a lack of income advancement.
- Privacy and freedom violations: Because certain AI systems require volumes of personal data as training sets, there is a high risk to individuals' rights and freedoms. This impacts not only the concerned individuals, but may also have reputational implications for the companies behind this impact. The cost of data breaches could also accelerate; research indicates that, on average, businesses gain USD 2.7 in benefits from every USD 1 in privacy investments.[129]
- Liability issues: Some AI algorithms have been reported to produce inaccurate diagnoses, decisions, and recommendations in healthcare settings and other regulated settings. For example, there is no clarity of liability if an AI-powered robot malfunctions during a surgical procedure leading to potential injury to the patient. Another prevalent example of AI liability is the risks of self-driving cars, which may lead to fatal accidents due to incorrect AI decision-making.[130] However, there is no clear liability procedure for such issues.

These three categories allow us to infer that the overall impact of responsible AI is achieved when there are lower (as close to zero as possible) negative externalities and higher adoption and usage of AI services across the board. Looking at this through the lens of businesses, for example, the adoption of responsible AI would lead to lower compliance and verification costs, thereby increasing profitability.

In this context, research indicates that more than 40% of managers in companies with at least USD 100 million in annual revenues observe improved products and services as a result of their responsible AI efforts.[131] Adoption of responsible AI can thus promote the widespread adoption and use of AI, and therefore, responsible AI could act as a potential source of competitive advantage for SEA businesses.

In this context, we estimate that the negative externalities of AI can be quantified to add at least 20% to the overall AI potential.[132] Using this figure as a starting point, we can draw a preliminary estimate of at least USD 230 billion that adopting responsible AI could add to the SEA's economy by 2030 (in addition to the USD 950 billion by 2030 calculated in the previous section)—adding between 2.5 (emerging economies) to 4.5 (Singapore) percentage points to the contribution of AI to the GDP of SEA economies.

[128] McKinsey (2018) AI, automation, and the future of work: Ten things to solve for, www.mckinsey.com/featured-insights/future-of-work/ai-automation-and-the-future-of-work-ten-things-to-solve-for
[129] Cisco (2020) Cisco Data Privacy Benchmark Study 2020, www.cisco.com/c/dam/global/en_uk/products/collateral/security/2020-data-privacy-cybersecurity-series-jan-2020.pdf
[130] BBC (2020) Uber's self-driving operator charged over fatal crash, www.bbc.com/news/technology-54175359
[131] MIT Sloan Management Review and BCG (2022) RAI Enables the Kind of Innovation That Matters, https://sloanreview.mit.edu/article/rai-enables-the-kind-of-innovation-that-matters
[132] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

This initial estimate of the potential value-add of responsible AI reiterates the importance of SEA governments going beyond the operationalization of AI in general and prioritizing responsible AI across sectors and industries.

This is reflected in the emergence of sector-specific initiatives aimed at empowering business leaders and organizations as they seek to seize the economic and financial benefits of responsible AI. In Singapore, for example, the *Veritas Toolkit version 2.0* is an open-source toolkit developed by an industry consortium and with the support of the Monetary Authority of Singapore to enable the responsible use of AI in the financial industry.[133]

[133] Monetary Authority of Singapore (2023) Toolkit for responsible use of AI in the financial sector, www.mas.gov.sg/news/media-releases/2023/toolkit-for-responsible-use-of-ai-in-the-financial-sector

PILLAR 4: STAKEHOLDERS AND ORGANIZATIONS THAT CONTRIBUTE TO MITIGATING AI RISKS AND BIASES AND MINIMIZING HARM FROM AI

As AI technologies continue to advance, it is becoming increasingly crucial that their development and governance prioritize the protection and promotion of human-centric values.

According to the Stanford Institute for Human-Centered Artificial Intelligence (HAI), human-centered AI is defined by systems that are continuously improving through human input to bridge the gap between machines and human beings more effectively.[134]

To this end, developing machine intelligence that understands and adapts to human language, emotion, and behavior requires AI creators and designers to be broadly representative of humanity. This requires a true diversity of thought across gender, ethnicity, nationality, culture, and age—as well as across disciplines.

At the moment, most AI systems are not created or implemented with these considerations in mind. In fact, by their very existence, many carry the potential to infringe on citizens' and consumers' rights. For instance, facial recognition systems can track and monitor individuals without their consent, violating their right to privacy. Predictive policing algorithms may perpetuate racial bias and discrimination, which contravenes the right to equality before the law.

Such scenarios are already the object of discussions and debates in SEA. In Papua New Guinea, the government's legitimate attempt to use AI technologies to enhance public safety and cut monitoring costs raised concerns about the potential for these technologies to be used for surveillance purposes.[135]

To prevent such situations, it is crucial to involve a variety of voices and perspectives in the development and governance of AI technologies. This requires a collaborative effort involving governments, civil society organizations (CSOs), non-governmental organizations (NGOs), academia, and the private sector.

In this context, such organizations have a vital role to play in advocating for AI that is developed and governed in a human-centered manner. They can bring diverse perspectives to the table, raising awareness of the potential implications of AI technologies on human rights and advocating for the adoption of ethical AI practices. They can also ensure the rights of marginalized groups that may be disproportionately affected by AI technologies are upheld.

Most notably, CSOs and NGOs can bridge the gap between businesses' interest to 'innovate first and plan later' and governments' propensity to 'regulate first and adjust later'. Specifically, they can help SEA governments translate the hype and excitement around AI into actionable plans and sustainable approaches that tackle some of the unique challenges the region faces: climate change, sustainable agriculture, livable urbanization, improved connectivity, reduced digital divide, women's empowerment, indigenous culture and heritage, and ethnic minorities' rights.

[134] Stanford Institute for Human-Centered Artificial Intelligence (2023) Our Vision, https://hai.stanford.edu/navigate/welcome
[135] ISP (2023) AI in Papua New Guinea: Strengthening National Security and Defense, https://isp.page/news/ai-in-papua-new-guinea-strengthening-national-security-and-defense

This section examines some of the ways AI is already delivering meaningful and impactful socio-economic outcomes across SEA, as well as some of the ways these initiatives can be sustained and improved over time by focusing on operationalizing responsible AI at all levels of civil society.

CASE STUDIES: SOCIOECONOMIC IMPACT OF RESPONSIBLE AI

Other than contributing to economic growth and development, AI can help address a number of complex, longstanding challenges. From poverty reduction and fair elections to natural disaster mitigation and smart urbanization, many initiatives across SEA are allowing AI to be used far beyond profit-driven purposes.

Our research shows that AI is being leveraged in a variety of ways across SEA. This variety reflects a significant diversity not only in terms of business models, but also in applications with impactful implications for social and economic inclusivity. Notably, applications of AI in disaster prevention, healthcare, minorities' rights, and public service delivery have reflected AI's true potential for fundamental social change in SEA.

The case studies presented here thus serve as evidence not only of AI's potential as a driver of economic growth and recovery, but of its role as a game changer in ensuring that economic opportunities are equitably, sustainably, and inclusively distributed.

AI FOR DISASTER PREVENTION

Many SEA economies are prone to natural disasters. For instance, countries in the lower Mekong sub-region are particularly vulnerable to changing weather patterns, climate change, and consequently the natural disasters that arise from these changes, such as floods and droughts. The populations worst hit by these calamities are also typically less equipped to predict the onset of these disasters and take the necessary pre-emptive action to mitigate their effects.

In Cambodia alone, such disasters have led to a total estimated cost of USD 521 million in damages over the last decade, with 3.7 million people affected by floods.[136] To help mitigate the impact of such disasters, Cambodia's National Committee for Disaster Management manages the **EWS1294 early warning system** which relies on a network of smart sensors and systems that automates warning calls and messages when an impending flood is detected. Warnings are delivered to users registered through the Interactive Voice Response (IVR) platform depending on their indicated location. As of October 2021, the system is available in 21 out of Cambodia's 24 provinces with over 100,000 subscribers registered and over two million alerts sent.[137]

In the environmental sphere, a group of researchers from the National University of Singapore has used supervised learning techniques to train a neural network to predict forest fires in Indonesia. Their model, Agni, performed better than baseline models and shows the ability of machine learning using remote sensing data to generate an accurate predictive model. This could potentially be a cost-effective way for Indonesia to predict and mitigate the impacts of forest fires.[138]

[136] CDRI (n.d.) Using technology for better disaster preparedness and building resilience, www.cdri.world/blogs/using-technology-better-disaster-preparedness-and-building-resilience;
[137] EWS1294 (n.d.) Early Warning System – Cambodia, http://ews1294.info/en/home/
[138] arXiv, Cornell University (2021) Predicting Forest Fire Using Remote Sensing Data and Machine Learning, https://arxiv.org/pdf/2101.01975.pdf

AI FOR HEALTHCARE

In many SEA economies, the ubiquity of smartphones made the use of mobile contact-tracing applications an effective means to control the impact of the COVID-19 pandemic. In Brunei Darussalam, the government went several steps further and integrated AI into its BruHealth application to assist with outbreak predicting and planning, enabling management of policies and resources to control the spread of the virus.

The successful adoption of the BruHealth application led to additional features being gradually expanded into the app, the most impactful being the integration with the national health system, Brunei Health Information and Management System (BruHIMS), which allows users to access their online personal health records and make appointments at healthcare institutions. The BruHealth app, initially made mandatory as part of a response to the pandemic, has now become the national all-in-one health application whose usefulness and benefits will continue to extend beyond the existence of the virus.

In Indonesia, Hasan Sadikin Hospital in Bandung University has been trialing the use of AI to help patients with Rett Syndrome and cerebral palsy (often unable to communicate verbally). The AI system uses patients' head-pose and gaze-tracking to allow them to communicate with their caregivers. These head-pose and gaze-tracking algorithms are calibrated to detect minute gestures of the head or eyeballs to determine between several binary options such as to 'eat' or 'drink' or choosing between 'dad' or 'mom' for caregiving.

In Malaysia, where those above the age of 65 currently account for 7% of the population, eldercare is a focus of medical start-up SmartPeep. A medical start-up based in Malaysia's Johor state, SmartPeep has developed an AI surveillance system that automatically detects falls through AI-powered cameras placed in hospital rooms. SmartPeep's system tracks the activities of patients while they are moving around, and rapidly notifies caregivers if it detects that patients have fallen abruptly. SmartPeep's AI solution is also able to detect when patients are displaying signs of distress and will also alert carers when such signs are detected—allowing them to provide rapid response for patients suffering from conditions like dementia.[139]

AiMASK is a Computer Vision software deployed by Thailand's Ministry of Higher Education, Science, Research, and Innovation in support of public healthcare enforcement efforts during the COVID-19 pandemic. It monitors surveillance camera footage to determine if members of the public are wearing a mask at all, and if it is being worn properly. This software assisted public health officials in identifying which areas had the lowest compliance rates and needed further enforcement efforts, ensuring that 97.5% of the public in Bangkok were wearing their masks correctly.[140]

Another AI system being deployed in the healthcare sector is Singapore Eye Lesion Analyser Plus (SELENA+), a National AI pilot project in Singapore that utilizes AI to screen diabetic patients. The first phase has shown that it is comparable to current standards of care, but is able to save manual efforts from technicians. The second phase will explore if AI support allows non-physical technician readers to

[139] KrASIA (2018) SmartPeep takes a step towards preventing falls with video AI, https://kr-asia.com/smartpeep-takes-a-step-towards-preventing-falls-with-video-ai
[140] Daily News (2021) AI results reveal Bangkok people wearing masks found 'Don Muang area' lowest, https://d.dailynews.co.th/bangkok/822484/

better detect diabetic eye complications, and the potential of SELENA+ to improve efficiency and consistency through process automation.[141]

AI FOR MINORITIES' RIGHTS

AI can also help the marginalized such as those with disabilities, elderly, victims of abuse, or those stricken with poverty. Whether it is assisting those with physical disabilities, providing automated support and assistance to those in need, or better identifying the needs of those not necessarily visible in government databases (isolated rural populations, unregistered individuals, informally employed, etc.).

In the Philippines, the **Asian Development Bank (ADB)** is utilizing AI to better identify areas stricken with poverty, a social issue that has been exacerbated since the pandemic: poverty has risen from 16.7% in 2018 to 20% in 2021 with an estimated 4 million Filipinos entering poverty.[142] Convolutional Neural Networks (CNNs) are commonly used for computer vision and image classification tasks. They can take input images, differentiate them from other images, and assign importance to various aspects or objects within them, without significant human intervention.[143]

The neural network was taught to predict the intensity of night-time light sources using daytime satellite images as input. The reasoning was that intense night-time light sources are good proxies for higher wealth and tend to correlate with lower levels of poverty. The CNN was also taught to recognize features within daytime images that relate to socioeconomic development.

In Singapore, market research consultancy **Quilt.AI** is working with gender equality NGO the Association of Women for Action and Research (AWARE) to address online misogyny and gender-based violence in Singapore. It uses an AI-generated misogyny model to provide insight into online misogyny in Singapore.[144] The model was trained using RoBERTa, a training model for Natural Language Processing (NLP) systems, and tested on a set of 24,500 tweets randomly drawn from Singaporean Twitter accounts.[145] The model was able to conclude that belittling and objectification was the most common category of misogynistic posts identified, and that misogynistic content was twice as likely to be 'liked' and 4.5 times as likely to be retweeted when compared to non-misogynistic content.

AI technologies are also helping to overcome traditional language biases in AI development, where Natural Language Processing (NLP)—which is used to understand speech and text—is often programmed for English and other major-spoken languages. To help ensure local users in Myanmar are not deprived of the benefits of AI due to language restrictions, local start-up **Expa.ai** is developing in-house capabilities for Natural Language Understanding (NLU) technologies in Burmese.

Aimed primarily at e-commerce applications, Expa.ai's suite of AI-powered software fills a niche by allowing foreign multinationals greater ease of access to Myanmar's robust Burmese-speaking market, while also creating opportunities for local players to expand into the region. More importantly, Expa.ai's work represents a practical application for Burmese language AI-powered NLU technology that could

[141] Ministry of Health Singapore (2021) Efficacy of The Selena+ System, www.moh.gov.sg/news-highlights/details/efficacy-of-the-selena-system
[142] Asian Development Bank (2020) Mapping Poverty through Data Integration and Artificial Intelligence, www.adb.org/sites/default/files/publication/630406/mapping-poverty-ki2020-supplement.pdf
[143] Towards Data Science (2018) A Comprehensive Guide to Convolutional Neural Networks — the ELI5 way, https://towardsdatascience.com/a-comprehensive-guide-to-convolutional-neural-networks-the-eli5-way-3bd2b1164a53
[144] AWARE (2021) Quilt.AI x Aware study of online misogyny in Singapore, www.aware.org.sg/wp-content/uploads/Quilt.AI-x-AWARE-study-of-online-misogyny-in-Singapore.pdf
[145] Facebook (2019) RoBERTa, https://ai.facebook.com/blog/roberta-an-optimized-method-for-pretraining-self-supervised-nlp-systems/

serve as the foundation for further efforts in this space. This could in turn empower Myanmar and the Burmese people to overcome the historical impediments imposed on their development by decades of military rule and enable them to close the gap with regional peers.

AI FOR PUBLIC SERVICE DELIVERY

AI can also free government staff from burdensome manual tasks by automatically recognizing handwritten text; optimizing schedules and meetings through planning algorithms; and using speech recognition, natural language processing, and question-answering technology to provide automated customer service via chat-bots. Such capabilities could potentially address three common pain points for governments: resource constraints, paperwork burdens, and backlogs.[146]

Singapore's Government Technology Agency (GovTech) has created a next-generation Virtual Assistant platform called **Virtual Intelligent Chat Assistant (VICA)**. VICA powers chatbots on a wide range of government websites in Singapore, including the main COVID-19 messaging channel, with further enhancements like support for more chat platforms and live chat escalation in progress. VICA helps enhance the user experience by increasing convenience and accessibility, whilst saving costs and time for the government.[147]

Another implementation by GovTech is the **VigilantGantry** contactless system, which formed part of the nation's response to the COVID-19 pandemic. It was developed by GovTech's Data Science and Artificial Intelligence Division to reduce the manpower needed at temperature screening stations and to facilitate contactless temperature screening in areas with high footfall.[148]

In Indonesia, President Joko Widodo has announced a plan to increase the speed and efficiency of the government by replacing civil service positions with AI. This initiative also aims to reduce the levels of bureaucracy and the level of red tape.[149]

As these examples demonstrate, AI innovation and experimentation are rapidly materializing within and across SEA economies—covering key sectors, encompassing all types of businesses, and enabling for-profit and not-for-profit use cases alike.

While the numerous case studies above illustrate the transformative impacts of AI, we recognize that these AI applications come with risks and challenges, such as bias, discrimination, black boxes—merely having an AI solution to a problem does not guarantee full alignment with a responsible approach to AI. In this regard, SEA economies need to carefully use these AI applications, and ensure that there are adequate safeguards in place to mitigate harms and risks.

MAKING AI GOVERNANCE IMPACTFUL IN SEA

Our on-the-ground discussions with AI experts and stakeholders show that two very important elements missing from national and regional approaches to AI are the impact of AI on indigenous communities

[146] Deloitte (2020) AI-augmented governments, www2.deloitte.com/lu/en/pages/public-sector/articles/ai-augmented-government.html
[147] GovTech Singapore (2023) VICA – Virtual Intelligent Chat Assistant, www.tech.gov.sg/products-and-services/vica/
[148] GovTech Singapore (2020) How GovTech developed fit for purpose temperature scanners – Part 2, www.tech.gov.sg/media/technews/how-gt-developed-fit-for-purpose-temperature-scanners-part-2
[149] The Jakarta Post (2019) 'Faster with AI': Indonesia to replace ministerial aides with machines, www.thejakartapost.com/news/2019/11/28/indonesia-to-replace-ministerial-aides-with-ai.html

and its implications for climate change—in fact, many decision-makers are not even aware that AI can have negatively impact climate change or indigenous people's rights.[150]

IMPACT OF AI GOVERNANCE ON MINORITIES

A recurring finding from our research on AI is the fact that AI systems, products, and services are far from being representative of the wider population. This is also true in SEA, a region characterized by a rich tapestry of languages, cultures, and traditions.

AI systems/datasets are predominantly trained with Western data, in English. In addition, they tend to be both made and used by affluent, urbanized tech workers. In this context, it is no surprise that AI does not necessarily reflect the diversity of languages or cultures in the SEA region.

The specificities of rural, non-English speaking users are rarely—if ever—represented in the datasets used to train algorithms, nor considered when it comes to the way the algorithms are deployed.

By neglecting entire sections of SEA's languages, cultures, and ways of thinking, ethnic minorities and indigenous people are made invisible to AI, a reality that is only going to aggravate pre-existing ethnic, religious, and community fissures in SEA. There are complex questions of political representation, and more emerging concerns over the discrimination and bias that AI systems may perpetuate all across SEA.

There is also the matter of how socially inclusive AI/data governance is in the region. Unlike other regions like Latin America and Africa, which have already kickstarted these conversations, indigenous data rights—namely, indigenous data governance and data sovereignty—have not been included in the SEA national/regional policies and discussions.

The data rights and sovereignty of indigenous people in SEA are often not included in national or regional level discussions, and indigenous people risk facing discrimination and elimination from the AI datasets, policies, and discussions altogether. The fact that the words "minority" and "indigenous" are absent from national AI policies and strategies, and do not appear in the *ASEAN Guide on AI Governance and Ethics*, is indicative of the work that remains to be done for AI to be operationalized in a truly responsible and ethical manner in SEA.

If these issues are not taken into account when developing AI governance frameworks in SEA, many communities in the region risk being marginalized even further—with high chances they are left behind by AI instead of being empowered by it.

IMPACT OF AI ON CLIMATE CHANGE

Our research finds that more and more AI experts and stakeholders consider responsible AI not just as a responsibility to humans, but also as a responsibility to the environment.

Specifically, this entails recognizing and mitigating the impact of data-hungry AI on climate change, as well as driving and supporting the many AI use cases that are being developed to protect the environment and reduce climate change.

[150] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

According to research, data-hungry AI contributes to the rapid growth of massive data farms, which consume vast amounts of energy and whose fuel emission footprint is comparable to that of the aviation industry.[151] The increasing use of generative AI is also set to increase carbon emissions, with estimates stating that just creating OpenAI's GPT-3 consumed 1,287 megawatt hours of electricity and generated 552 tons of carbon dioxide equivalent; and the maintenance and use of it will consume even more energy.[152]

Indeed, training a large AI model to handle human language can lead to emissions of nearly 300,000 kilograms of carbon dioxide equivalent, about five times the emissions of the average car in the United States, including its manufacture.

These worrying trends are also observed in SEA, a region that is particularly vulnerable to the impact of climate change considering its dependence on agriculture and its heavily populated coastlines.

In this context, it is urgent for SEA economies to leverage all manner of policy and regulatory mechanisms to ensure economy-transforming technological development does not contribute to irreversible damage to habitats and environments.

AI can certainly be used to support both renewable energy generation and energy efficiency measures. It can be used to localize renewable energy production, lowering the need for expensive power distribution networks. AI-driven drones and remote sensors can also help monitor forestry activities more effectively to prevent human-induced degradation.

AI can also improve energy efficiency by incorporating data from smart meters to predict energy demand and optimize energy production. 5G-based smart grids can connect to numerous data points across long distances, ranging from wind turbines and rooftop solar panels to electric vehicle (EV) batteries.[153]

To turn these possibilities into action, SEA economies should include environmental considerations in AI governance frameworks, as well as make AI-driven innovation a key priority of climate-related plans and initiatives.

Singapore, for example, has made its data centers both energy-efficient and economically competitive by prioritizing the use of AI-enabled hyperscale cloud data centers that boast an average power usage effectiveness (PUE) of 1.2 given their higher resource utilization and sophisticated energy efficiency practices. As a result, Singapore has a smaller number of data centers than other countries in the region but leads in terms of data center capacity.[154]

As of 2021, Singapore's data centers boast close to six million square feet of rack space, exceeding the capacity of countries that have more than double the number of data center facilities, such as Australia

[151] Horizon (2019) AI can help us fight climate change. But it has an energy problem, too, https://ec.europa.eu/research-and-innovation/en/horizon-magazine/ai-can-help-us-fight-climate-change-it-has-energy-problem-too
[152] Scientific American (2023) A Computer Scientist Breaks Down Generative AI's Hefty Carbon Footprint, www.scientificamerican.com/article/a-computer-scientist-breaks-down-generative-ais-hefty-carbon-footprint/
[153] ASEAN Climate Change and Energy Project (2021) Using 4IR Tech To Tackle Climate Change In ASEAN, https://accept.aseanenergy.org/using-4ir-tech-to-tackle-climate-change-in-asean
[154] Access Partnership (2022) Green data centers: Singapore's sustainable data center opportunity, https://accesspartnership.com/green-data-centres-singapores-sustainable-data-centre-opportunity

and Japan. Together, these factors have made local data centers a critical part of Singapore's competitiveness as a regional business and technology hub.[155]

TOWARDS STAKEHOLDER-DRIVEN AI IN SEA

According to the *Special Report from the Global Data Governance Mapping Project*, 43 out of 68 studied nations had an AI strategy in place, but only 18 attempted to engage their citizens in the strategy's development. Only 13 of these nations issued an open invitation for public comment, and only four provided evidence that public input helped shape the final text.[156]

Although some acknowledged the comments, most governments did not make changes in response to the comments that they received. The number of people commenting on the strategy was generally small, comprising individuals and organizations that are already knowledgeable about AI and willing and able to articulate their concerns.

Thus, concludes the report, AI governance may be 'for the people', but it is not 'by the people'—meaning that even the frameworks developed to enable AI in a responsible manner may not be entirely responsible themselves.

This is a very important finding, as it has a direct impact on the trust that citizens and consumers put into the governance frameworks that guide the economic activities of the future. This is especially true when it comes to the governance of data-driven technologies like AI, as despite the widespread use of AI systems by users, there exists a lack of understanding regarding how these systems utilize their data to generate predictions and recommendations that impact their everyday lives.

As time progresses, if users do not adhere to nor understand the way AI is governed, they may develop a sense of distrust not only towards AI systems, products, and services but also towards policymakers responsible for regulating them. Therefore, it becomes imperative for policymakers to proactively engage and involve citizens in informed discussions to establish collaborative, consultative, representative, and inclusive AI governance frameworks.

Another major finding from the report is the fact that among those governments who conducted consultation processes when developing their AI strategy, most provided information in their national language and not in indigenous and foreign languages, which could make it harder for some of their citizens (or foreigners) to participate. Some nations hosted in-person events, but the vast majority of participatory mechanisms were exclusively held online, potentially preventing those with no internet access from commenting.

The study also examined the length of time governments gave for the public to comment in their formal consultations. When online comments were requested, official portals or websites were left open for an average of about a month. Some countries, like Brazil, allowed comments for 3 months, but others gave as little as two weeks—which can significantly reduce the number of participants.

These elements are important to the extent that the loss of trust in the governance development process may discredit or hinder the transformative potential of AI for populations (in SEA and elsewhere). AI is indeed a great opportunity to tackle some of the unique challenges the region faces:

[155] *Ibid.*
[156] Global Data Governance Mapping Project (2022) For the people but not by the people: Public engagement in national AI strategies, https://globaldatagovernancemapping.org

looming climate change, sustainable agriculture, frantic urbanization, uneven connectivity, digital divide, marginalized communities, indigenous minorities, etc.

But this implies translating the hype and excitement around AI into actionable plans and sustainable approaches that take all needs and points of view into consideration, and truly work to leave no one behind.

BENCHMARKING FRAMEWORK

Our analysis of the responsible AI landscape in SEA demonstrates many differences among economies in their capacity to enable, leverage, and capitalize on responsible AI. The amalgamation of obstacles such as unreliable digital infrastructure, uncoordinated institutions, insufficient investment, and a scarcity of digital skills hampers SEA economies' ability to effectively harness and drive responsible AI in their economies.

Considering this context, a one-size-fits-all approach may not be ideal for empowering SEA economies to prioritize responsible AI in their digitalization agendas. To address this, we have developed a benchmarking framework aimed at empowering SEA economies to achieve two distinct but interconnected objectives:

1) Create a policy and regulatory environment that allows a responsible AI ecosystem to emerge; and

2) Operationalize responsible AI across society, government, and the economy at their own pace and in their own manner.

Our benchmarking framework serves as a constructive and non-normative diagnostic tool for SEA economies to evaluate their current progress against past performance, and identify areas for improvement. The framework draws upon international principles, guidelines, standards, and best practices that have facilitated the growth of more mature AI markets. The framework seeks to complement and support the implementation of the *ASEAN Guide on AI Governance and Ethics*.

It is important to emphasize that this framework is not meant to compare or rank SEA economies against one another. Rather, it highlights past accomplishments, identifies existing gaps, obstacles, and limitations, and aligns with success metrics driving local and regional priorities.

Overall, this benchmarking framework aims to provide SEA policymakers with the knowledge and tools necessary to foster and support national and regional journeys towards fairer, sustainable, and more equitable access to the opportunities presented by the development and operationalization of responsible AI.

BENCHMARKING PILLARS

We have identified four key pillars that underpin a favorable ecosystem for responsible AI practices and initiatives to emerge:

- Pillar 1: National AI laws, policies, and regulations—including AI-enabling measures and AI-adjacent initiatives—that are devoted to the operationalization of AI in general.
- Pillar 2: Principles, guidelines, and standards that specifically enable fair and responsible AI practices and initiatives.
- Pillar 3: Skills, capabilities, and knowledge that drive, support, and incentivize investment and innovation around responsible AI.
- Pillar 4: Stakeholders and organizations that contribute to mitigating AI risks and biases and minimizing harm from AI.

Together, these pillars provide SEA economies with an accurate overview of where they stand in terms of defined priorities, declared capabilities, and observed outcomes. The rationale for each pillar is set out in Table 10 below:

Table 10. Description of benchmarking pillars for responsible AI in SEA

PILLAR 1: NATIONAL AI LAWS, POLICIES, AND REGULATIONS—INCLUDING AI-ENABLING MEASURES AND AI-ADJACENT INITIATIVES—THAT OPERATIONALIZE AI IN GENERAL
National AI policies/strategies/regulations are vital in an AI ecosystem as they establish the guardrails within which an ecosystem for ethical and responsible development, deployment, and use of AI technologies can emerge. As such, they define the roles and responsibilities of government agencies, and outline all the necessary information required to get things done (mandates, resources, milestones, roadmaps, Key Performance Indicators (KPIs), etc.). They also facilitate international cooperation, harmonization, and provide a supportive environment for the sustainable growth and adoption of AI. These frameworks can address issues such as fairness, privacy, accountability, and safety, providing a foundation for fostering public trust, promoting innovation, safeguarding individual and group rights, and addressing the potential risks and challenges associated with AI.
PILLAR 2: PRINCIPLES, GUIDELINES, AND STANDARDS THAT SPECIFICALLY ENABLE FAIR AND RESPONSIBLE AI PRACTICES AND INITIATIVES
Complementary to national AI policies, responsible AI principles, standards, and guidelines play a vital role in enabling fair and responsible AI. They serve as a framework to ensure alignment with ethical values and respect for human rights, fostering safety, transparency, trust, and public acceptance. By addressing biases, safeguarding privacy, and promoting safety, these principles establish a solid foundation for the development and deployment of AI technologies that are reliable, equitable, and uphold individual rights. Furthermore, they facilitate international collaboration, and promote the responsible adoption and utilization of AI, thus maximizing the benefits of AI while effectively mitigating its risks and challenges.
PILLAR 3: SKILLS, CAPABILITIES, AND KNOWLEDGE THAT DRIVE, SUPPORT, AND INCENTIVIZE INVESTMENT AND INNOVATION AROUND RESPONSIBLE AI
The private sector, academia, and civil society are key players of the social fabric in propelling AI investment and fostering innovation to enable the responsible use of AI. Businesses are at the forefront of AI development and implementation, while academic institutions and civil society possess specialized expertise, research capabilities, and perspectives to drive research and development in AI. The collective expertise and knowledge from businesses, academia, and civil society can shape AI-related policies and regulations, particularly the responsible development of AI in the ecosystem. Their input helps ensure that policy decisions are informed, balanced, and aligned with the evolving needs of AI development, deployment, and ethical considerations based on the country's unique context. These stakeholders collectively deepen a country's AI capabilities, from implementation capability to talent development and policy development, creating a robust AI ecosystem that drives responsible and impactful progress

in the field of AI. Therefore, ensuring that appropriate AI skill development happens across all these stakeholder groups is critical to the sustainable and responsible growth of AI economies.
PILLAR 4: STAKEHOLDERS AND ORGANIZATIONS THAT CONTRIBUTE TO MITIGATING AI RISKS AND BIASES AND MINIMIZING HARM FROM AI
Aside from responsible AI principles, there is a need for a wide range of experts, stakeholders, and organizations—including academics, non-governmental organizations (NGOs), civil society organizations (CSOs), and not-for-profit organizations—to actively ensure that AI does not cause harm (both anticipated and unforeseen) nor leaves anyone behind. AI risk and bias management mechanisms thus play a vital role in mitigating potential harm and ensuring the fairness and non-discrimination of AI systems. By identifying and addressing biases and managing risks, they foster transparency, trust, and compliance with legal and ethical obligations. They also help educate the greater public on AI's potential. These mechanisms are indispensable in promoting responsible and accountable AI practices that align with societal values and deliver beneficial outcomes for individuals and society at large.

Source: Access Partnership research

BENCHMARKING CRITERIA

For each Pillar, we have developed a number of criteria to assess where SEA economies stand in terms of building environments and ecosystems that are favorable for responsible uses of AI to emerge. Table 11 below lists all 40 criteria, providing the rationale and the assumptions that led to their formulation.

Table 11. Description of benchmarking criteria for responsible AI in SEA

PILLAR 1: NATIONAL AI LAWS, POLICIES, AND REGULATIONS—INCLUDING AI-ENABLING MEASURES AND AI-ADJACENT INITIATIVES—THAT OPERATIONALIZE AI IN GENERAL	
CRITERIA	DESCRIPTION
Q1. Is there a national AI policy / strategy / law / regulation / framework in place?	The presence or absence of a national AI policy/framework/strategy offers a first glimpse of how advanced its AI ecosystem is. Having a national AI policy/framework/strategy indicates that AI has been at the top of the country's digital agenda, and serves as a crucial indicator of a country's preparedness and dedication to fostering a thriving AI ecosystem.
Q2. Does the national AI policy have clear objectives, milestones, roadmap, roles & responsibilities so that it can be effectively implemented?	Having a national AI policy is not enough. A more important consideration surfaced from our interviews is how effectively the national AI policy can be implemented. As it would be subjective to assess the degree of effectiveness, we have listed key factors that enable effective implementation such as having clear objectives, milestones, roadmap, roles, and responsibilities that we can objectively evaluate and assess.
Q3. Is there a national AI body tasked with coordinating national AI priorities and goals?	While some countries have multiple government agencies driving the AI agenda, they have no single body/agency coordinating the national AI efforts. This often results in duplicated and uncoordinated efforts, and poor implementation. A national AI body that addresses AI-related matters and enables a coordinated approach and strategic plan. It can drive greater effectiveness and efficiency of AI initiatives through coordinated policy and regulation development, cross-sector collaboration, resource allocation, talent development, international collaboration, and public trust and engagement.
Q4. Does the national AI agency/existing agency have a clear mandate, bureaucratic legitimacy, and allocated budget to do its job effectively?	The mere existence of a national AI agency/existing agency is not enough. We need to consider the effectiveness of the agency through objective criteria such as whether it has a clear mandate, bureaucratic legitimacy, and allocated budget to do its job effectively.
Q5. Does the national AI agency/existing agency engage with AI industry players to spread awareness of planned or existing national AI measures (policies, strategies, laws, regulations, etc.)?	Active engagement with AI industry players is crucial for fostering awareness, ensuring alignment among stakeholders, and fostering a shared understanding of responsible AI practices / principles.
Q6. Are there any data governance / privacy laws and regulations in place that directly contradict other AI-enabling efforts?	From our desk research and interviews, the presence of contradictory data governance/privacy laws and regulations may stifle the responsible development of AI.

	As such, we have included this question to not just identify enablers, but to also assess the presence of disabling/contradictory policies in the ecosystem.
PILLAR 2: PRINCIPLES, GUIDELINES, AND STANDARDS THAT SPECIFICALLY ENABLE FAIR AND RESPONSIBLE AI PRACTICES AND INITIATIVES	
CRITERIA	DESCRIPTION
Q7. Is the country signatory to international or multilateral agreements on AI ethics, principles, or standards (e.g., the UNESCO Recommendation on the Ethics of Artificial Intelligence, the OECD Principles on AI, the OECD/G20 AI Principles)?	A common insight from our interviews with AI experts and stakeholders is that multilateral guidelines such as the UNESCO AI principles may be more widely relevant to SEA governments compared to regional- or country-specific regulatory approaches as seen in the United States, the European Union, and China. International/multilateral agreements can indeed be used as a checklist for governments' AI developments and implementation.
Q8. Does the national AI policy contain, explicitly or in spirit, a reference to ensure that AI has a positive impact on society (i.e., minimize harm inflicted)?	Among the several principles and themes in the AI policy sphere, we have identified these two principles of "ethical" and "responsible" as the most significant and relevant to the SEA region. However, a key insight from our interviews is that SEA countries have their own concept of "responsible AI", and words like "responsible" and "ethical" may not be directly present in the text of the country's AI framework, but may be present in other forms of phrasing. Thus, we have included both explicit and nuanced references to ethical and responsible AI in this question to assess if the national AI policies contain any form of reference to ensure that AI has a positive impact on society.
Q9. Does the national AI policy contain measures that enable the development and deployment of responsible AI?	Beyond literal references to responsible AI, this question assesses if the national AI policy contains any policy measures that enable responsible AI (e.g., establishing AI ethics boards/organizations, and rolling out data governance policies that emphasize responsible data collection, usage, and sharing).
Q10. Does the national AI coordinating body have any mechanisms or measures related to responsible AI?	Building on the previous questions, this question examines if the national AI agency (or coordinating body) has any mechanisms/measures related to responsible AI, such as publishing guidelines on responsible AI implementation for specific sectors and AI impact assessments to help AI developers measure their systems in an objective, responsible, and verifiable manner.
Q11. Is responsible AI listed as one of the priorities of the national AI coordinating body?	This question assesses whether responsible AI is listed as an explicit priority of the national AI coordinating body, which would reveal whether responsible AI is at the top of the national AI coordinating body's agenda.
Q12. Is there a monitoring tool / mechanism / framework / organization in place to ensure that AI industry players (from both the public and private sectors) effectively implement responsible AI measures?	Stakeholders from our consultative workshop highlighted the need for a monitoring tool / mechanism / framework / organization to ensure that AI developers comply with responsible AI measures. Such monitoring is crucial to reinforce accountability, mitigate potential risks, and ensure the responsible deployment and implementation of AI across various sectors.
Q13. Does the AI industry association have a responsible AI framework and/or guidelines?	Similar to the question above, we assess whether other key players such as an AI industry association or businesses from the private

Q14. Does the AI industry association implement responsible AI measures?	sector have responsible AI framework/guidelines and implement any responsible AI measures. This provides us with an indicative cross-cutting perspective on whether the key stakeholders in the AI ecosystem prioritize responsible AI.
Q15. Do businesses in the private sector have any responsible AI principles/guidelines (developed within their own organizations or referenced from other organizations/government bodies) to guide the development and deployment of AI products/solutions?	
Q16. Do businesses in the private sector implement any responsible AI principles/guidelines in their development and deployment of AI products/solutions?	
PILLAR 3: SKILLS, CAPABILITIES, AND KNOWLEDGE THAT DRIVE, SUPPORT, AND INCENTIVIZE INVESTMENT AND INNOVATION AROUND RESPONSIBLE AI	
CRITERIA	**DESCRIPTION**
Q17. Do the public and private sectors have the infrastructure to develop, deploy, and adopt AI solutions?	Aside from having government policies and responsible AI frameworks, we need to examine if the public and private sectors have the infrastructure and capability to develop, deploy, and adopt AI solutions.
Q18. Does the government develop, deploy, and adopt AI solutions to enhance the delivery of public services?	
Q19. Do businesses in the private sector develop, deploy, and adopt AI solutions?	
Q20. Is there sufficient AI talent to meet the manpower demands in the private sector?	A common theme across our interviews with AI experts and stakeholders has been talent/human capital development in AI-related skills through education and training to meet the growing demands in the private sector. Thus, we have included questions at all levels—AI education in universities, AI talent and training in the private sector and civil society—to assess the readiness of the workforce in adopting and deploying AI in a responsible manner.
Q21. Do universities offer undergraduate/graduate/postgraduate courses on AI, and specifically, on a responsible approach to AI?	
Q22. Do NGOs, CSOs, and other citizen organizations provide skilling, reskilling, or upskilling training opportunities for employees in AI-related skills, and specifically in responsible AI implementation/deployment?	
Q23. Is there an AI industry association that oversees AI development?	Based on our desk research, AI industry associations play a significant role in representing and advocating for the interests of the AI industry. They also play multi-faceted roles including (a) facilitating knowledge sharing and collaboration, (b) fostering public-private partnerships, (c) contributing to the discussions and development of AI policies, standards, and ethics, (d) supporting talent development and education (e) driving industry research and innovation, and (f) promoting international collaboration. Thus, we have included the presence of an AI industry association as a positive indicator of a thriving AI ecosystem, as it contributes to the growth, competitiveness, and responsible development of the AI ecosystem.
Q24. Do stakeholders, including policymakers, researchers, industry representatives, and civil society organizations collaborate on AI-related	We have learned from some interviews that collaboration on AI is at times limited to specific stakeholders such as industry players

initiatives, including knowledge-sharing, research and development, development of AI ethics and principles, and innovation?	and civil society only, as government bodies do not always understand the nuances of AI operationalization. However, based on our desk research, collaboration between key stakeholders including policymakers, researchers, industry representatives, and civil society organizations is crucial in achieving a balanced and representative discourse on AI's impact on society and people and developing a holistic impact assessment, driving research and innovation, and ensuring the effective implementation of AI policies and initiatives.
Q25. Are NGOs, CSOs, and other citizen organizations involved in research and development activities in AI?	
PILLAR 4: STAKEHOLDERS AND ORGANIZATIONS THAT CONTRIBUTE TO MITIGATING AI RISKS AND BIASES AND MINIMIZING HARM FROM AI	
CRITERIA	**DESCRIPTION**
Q26. Are businesses from the private sector, NGOs, CSOs, and other citizen organizations asked to contribute to AI-related policies / frameworks (i.e., are stakeholders from representative institutions invited to provide input on AI policies/frameworks)?	Our desk research shows that NGOs, CSOs, and other citizen organizations are essential to bringing diverse perspectives and ethical considerations to the table, ensuring that AI development takes into account societal impact and addresses concerns related to fairness, privacy, and bias. In addition, as civil society organizations represent the interests of the public, they can advocate for inclusivity, equity, and the protection of individual rights in AI use. Their participation promotes accountability and transparency, and informs public discourse on AI-related policies and issues.
Q27. Is there a designated testbed / sandbox facilitated by the government for AI industry players to test AI regulations, policies, and applications, in a way that minimizes and mitigates the potential risks associated with AI?	Stakeholders from our consultative workshop highlighted the need for the government to provide a controlled test environment (i.e., testbed / sandbox) for AI industry players to experiment with AI regulations and applications. The testbed / sandbox aims to reduce the risks associated with AI and ensure that AI innovations comply with regulations before widespread deployment and adoption, fostering safer and more accountable AI development.
Q28. Does the public/private sector have any data protection and data privacy measures to safeguard personal and sensitive information in AI data collection, storage, and use (either self-erected measures or imposed by the national government)?	Some interviewees highlighted the need for adequate data protection and data privacy measures to safeguard personal and sensitive information in AI data collection, storage, and use.
Q29. Does the public/private sector have any bias and fairness detection mechanisms or measures such as algorithmic auditing that detect bias and ensure unbiased data sets, algorithm design, and AI implementation (either self-erected measures or imposed by the national government)?	A common theme from our interviews with AI experts and stakeholders is the need to have mechanisms that can identify and mitigate the risks of AI, to ensure that AI systems are fair, unbiased, and non-discriminatory.
Q30. Does the public/private sector have any bias and fairness mitigation mechanisms or measures that address bias issues and ensure equitable outcomes in AI systems (either self-erected measures or imposed by the national government)?	
Q31. Does the public/private sector have any non-discrimination and fairness mechanisms or guidelines that outline the need for diverse and representative data collection—including data from invisible/at-risk populations such as marginalized,	An emerging theme from our interviews has been the lack of discourse on AI's impact on invisible/"at-risk" populations such as indigenous and minority communities, and the lack of inclusion of indigenous/minority data governance and data sovereignty in AI policies/strategies. In this regard, indigenous communities in

underrepresented, and/or endangered indigenous communities, minorities, and the differently abled (either self-erected measures or imposed by the national government)?	ASEAN risk being marginalized even further unless there is a concerted effort to empower them. Thus, we have included questions on mechanisms or guidelines on the need for diverse and representative data collection, data governance, and data sovereignty mechanisms for all "at-risk" populations.
Q32. Does the public/private sector have any data governance and data sovereignty[157] mechanisms or guidelines that include invisible/at-risk populations such as marginalized, underrepresented, and/or endangered indigenous communities, minorities, and the differently abled (either self-erected measures or imposed by the national government)?	
Q33. Does the public/private sector have any environment-related guidelines or mechanisms that guide AI's impact on the environment/climate change (either self-erected measures or imposed by the national government)?	Several interviews highlighted that the impact of AI on the environment has been actively discussed or incorporated in national AI policies.
Q34. Does the public/private sector have any policy guidelines or principles that outline the need for AI developments to protect/not harm human rights (either self-erected measures or imposed by the national government)?	Our desk research demonstrated that AI has the potential to impact human rights, such as privacy, freedom of expression, and non-discrimination. Thus, there is a need to emphasize the protection and non-harm of human rights in AI developments, particularly for vulnerable populations.
Q35. Does the public/private sector have any guidelines or principles that outline the need for explainability and interpretability of AI systems (either self-erected measures or imposed by the national government)?	Based on our desk research, a key component of reducing AI risk is to have AI systems that are transparent, explainable, and understandable for humans to trust and verify the system's outcomes.
Q36. Does the public/private sector have any AI risk assessment processes or mechanisms such as AI impact assessments that can identify potential risks and harms associated with AI technologies (either self-erected measures or imposed by the national government)?	Several interviews highlighted the need for risk assessment mechanisms to identify, mitigate, and regularly monitor for potential AI risks and harms as there remain many ethical, legal, and societal implications of AI use. While these questions bear similarities with Q25 and Q26 above, Q32-34 are scoped at a broader level to assess if the public/private sector has any AI risk assessment mechanisms to identify and mitigate the intentional misuse of AI models/systems (e.g., using AI to create fake identities, assist in fraud activities, and launch targeted cyberattacks on vulnerable individuals/systems), rather than the granular level of algorithmic auditing of biases.
Q37. Does the public/private sector have any AI risk mitigation strategies or processes that can mitigate potential/current risks and harms associated with AI technologies (either self-erected strategies or imposed by the national government)?	
Q38. Is there any continuous/regular monitoring and evaluation of AI systems in the private/public sector that monitors the performance of AI systems, detects and addresses any emerging issues, and evaluates the impact of AI technologies on individuals and society?	
Q39. Does the public/private sector have any policy guidelines or principles that highlight the need for human oversight in AI deployment and development to ensure human control, decision-making, and accountability in AI systems (either	Our desk research has also revealed that human oversight in AI deployment is important in ensuring that AI systems operate within defined boundaries and adhere to legal and ethical standards. That said, we recognize that human oversight may not be the best practice 100% of the time, as certain AI systems designed for

[157] Data sovereignty refers to the idea that a country or jurisdiction has the authority and right to govern and control the data generated within its borders. Imperva (2023) Data Sovereignty, www.imperva.com/learn/data-security/data-sovereignty/

self-erected measures or imposed by the national government)?	specific tasks may demonstrate superior performance and reliability when functioning autonomously or with limited human intervention.[158]
Q40. Does the public/private sector have any policy guidelines or principles that govern the use of AI technologies in assisting human decision-making on issues directly affecting human life (e.g., autonomous weapons, self-driving cars, AI-assisted judicial decisions) (either self-erected measures or imposed by the national government)?	This is pertinent given the rise of AI technologies used in high-risk activities/applications (e.g., autonomous weapons) and in assisting human decision-making on issues directly affecting human life (e.g., self-driving cars, AI-assisted judicial decisions), which can have a long-lasting impact on someone's life and livelihood. Thus, we have included questions that assess if key human oversight guidelines or principles are established at both the general AI deployment level, and in the specific context of AI used in high-risk activities and on issues directly impacting human life.

Source: Access Partnership research

[158] Ben Green (2022) The flaws of policies requiring human oversight of government algorithms, www.sciencedirect.com/science/article/pii/S0267364922000292

SCORING MECHANISM

For each benchmarking criterion, we have developed a scoring mechanism that allows a total score to be derived for each pillar and SEA economy. Table 12 below provides more details on the scoring process and the assumptions behind it.

Table 12. Scoring mechanism to benchmark responsible AI in SEA

PILLAR 1: NATIONAL AI LAWS, POLICIES, AND REGULATIONS—INCLUDING AI-ENABLING MEASURES AND AI-ADJACENT INITIATIVES—THAT OPERATIONALIZE AI IN GENERAL	
CRITERIA	SCORING MECHANISM
Q1. Is there a national AI policy / strategy / law / regulation / framework in place?	Yes = 3 points Announced / Upcoming = 1.5 points No = 0 points
Q2. Does the national AI policy have clear objectives, milestones, roadmap, roles & responsibilities so that it can be effectively implemented?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q3. Is there a national AI body tasked with coordinating national AI priorities and goals?	Yes = 3 points Announced / Upcoming = 1.5 points No = 0 points
Q4. Does the national AI agency/existing agency have a clear mandate, bureaucratic legitimacy, and allocated budget to do its job effectively?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q5. Does the national AI agency/existing agency engage with AI industry players to spread awareness of planned or existing national AI measures (policies, strategies, laws, regulations, etc.)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q6. Are there any data governance / privacy laws and regulations in place that directly contradict other AI-enabling efforts?	Yes = 0 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 3 points
PILLAR 2: PRINCIPLES, GUIDELINES, AND STANDARDS THAT SPECIFICALLY ENABLE FAIR AND RESPONSIBLE AI PRACTICES AND INITIATIVES	
CRITERIA	SCORING MECHANISM
Q7. Is the country signatory to international or multilateral agreements on AI ethics, principles, or standards (e.g., the UNESCO Recommendation on the Ethics of Artificial Intelligence, the OECD Principles on AI, the OECD/G20 AI Principles)?	Yes (at least signatory to one) = 3 points Announced / Upcoming = 1.5 points No = 0 points
Q8. Does the national AI policy contain, explicitly or in spirit, a reference to ensure that AI has a positive impact on society (i.e., minimize harm inflicted)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q9. Does the national AI policy contain measures that enable the development and deployment of responsible AI?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q10. Does the national AI coordinating body have any mechanisms or measures related to responsible AI?	Yes = 3 points Announced / Upcoming = 1.5 points No = 0 points

Q11. Is responsible AI listed as one of the priorities of the national AI coordinating body?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q12. Is there a monitoring tool / mechanism / framework / organization in place to ensure that AI industry players (from both the public and private sectors) effectively implement responsible AI measures?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q13. Does the AI industry association have a responsible AI framework and/or guidelines?	Yes = 3 points Announced / Upcoming = 1.5 points No = 0 points
Q14. Does the AI industry association implement responsible AI measures?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q15. Do businesses in the private sector have any responsible AI principles/guidelines (developed within their own organizations or referenced from other organizations/government bodies) to guide the development and deployment of AI products/solutions?	Yes = 3 points Inconclusive evidence of these elements through available source documents/Upcoming = 1.5 points No = 0 points
Q16. Do businesses in the private sector implement any responsible AI principles/guidelines in their development and deployment of AI products/solutions?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
PILLAR 3: SKILLS, CAPABILITIES, AND KNOWLEDGE THAT DRIVE, SUPPORT, AND INCENTIVIZE INVESTMENT AND INNOVATION AROUND RESPONSIBLE AI	
CRITERIA	**SCORING MECHANISM**
Q17. Do the public and private sectors have the infrastructure to develop, deploy, and adopt AI solutions?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q18. Does the government develop, deploy, and adopt AI solutions to enhance the delivery of public services?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q19. Do businesses in the private sector develop, deploy, and adopt AI solutions?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q20. Is there sufficient AI talent to meet the manpower demands in the private sector?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q21. Do universities offer undergraduate/graduate/postgraduate courses on AI, and specifically, on a responsible approach to AI?	Yes = 3 points Offers undergraduate/graduate/postgraduate courses on AI, but no specific courses on a responsible approach to AI = 1.5 points No = 0 points
Q22. Do NGOs, CSOs, and other citizen organizations provide skilling, reskilling, or upskilling training opportunities for employees in AI-related skills, and specifically in responsible AI implementation/deployment?	Yes = 3 points Provides AI training opportunities but they are not specific to responsible AI = 1.5 points No = 0 points

Q23. Is there an AI industry association that oversees AI development?	Yes = 3 points Announced / Upcoming = 1.5 points No = 0 points
Q24. Do stakeholders, including policymakers, researchers, industry representatives, and civil society organizations collaborate on AI-related initiatives, including knowledge-sharing, research and development, development of AI ethics and principles, and innovation?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q25. Are NGOs, CSOs, and other citizen organizations involved in research and development activities in AI?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
PILLAR 4: STAKEHOLDERS AND ORGANIZATIONS THAT CONTRIBUTE TO MITIGATING AI RISKS AND BIASES AND MINIMIZING HARM FROM AI	
CRITERIA	**SCORING MECHANISM**
Q26. Are businesses from the private sector, NGOs, CSOs, and other citizen organizations asked to contribute to AI-related policies / frameworks (i.e., are stakeholders from representative institutions invited to provide input on AI policies/frameworks)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q27. Is there a designated testbed / sandbox facilitated by the government for AI industry players to test AI regulations, policies, and applications, in a way that minimizes and mitigates the potential risks associated with AI?	Yes = 3 points Inconclusive evidence of these elements through available source documents/Upcoming = 1.5 points No = 0 points
Q28. Does the public/private sector have any data protection and data privacy measures to safeguard personal and sensitive information in AI data collection, storage, and use (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents/Upcoming = 1.5 points No = 0 points
Q29. Does the public/private sector have any bias and fairness detection mechanisms or measures such as algorithmic auditing that detect bias and ensure unbiased data sets, algorithm design, and AI implementation (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q30. Does the public/private sector have any bias and fairness mitigation mechanisms or measures that address bias issues and ensure equitable outcomes in AI systems (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q31. Does the public/private sector have any non-discrimination and fairness mechanisms or guidelines that outline the need for diverse and representative data collection—including data from invisible/at-risk populations such as marginalized, underrepresented, and/or endangered indigenous communities, minorities, and the differently abled (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q32. Does the public/private sector have any data governance and data sovereignty[159] mechanisms or guidelines that include invisible/at-risk populations such as marginalized, underrepresented, and/or endangered indigenous communities, minorities, and the differently abled (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q33. Does the public/private sector have any environment-related guidelines or mechanisms that guide AI's impact on the environment/climate change (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points

[159] Data sovereignty refers to the idea that a country or jurisdiction has the authority and right to govern and control the data generated within its borders. Imperva (2023) Data Sovereignty, www.imperva.com/learn/data-security/data-sovereignty/

Q34. Does the public/private sector have any policy guidelines or principles that outline the need for AI developments to protect/not harm human rights (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q35. Does the public/private sector have any guidelines or principles that outline the need for explainability and interpretability of AI systems (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q36. Does the public/private sector have any AI risk assessment processes or mechanisms such as AI impact assessments that can identify potential risks and harms associated with AI technologies (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q37. Does the public/private sector have any AI risk mitigation strategies or processes that can mitigate potential/current risks and harms associated with AI technologies (either self-erected strategies or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q38. Is there any continuous/regular monitoring and evaluation of AI systems in the private/public sector that monitors the performance of AI systems, detects and addresses any emerging issues, and evaluates the impact of AI technologies on individuals and society?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q39. Does the public/private sector have any policy guidelines or principles that highlight the need for human oversight in AI deployment and development to ensure human control, decision-making, and accountability in AI systems (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points
Q40. Does the public/private sector have any policy guidelines or principles that govern the use of AI technologies in assisting human decision-making on issues directly affecting human life (e.g., autonomous weapons, self-driving cars, AI-assisted judicial decisions) (either self-erected measures or imposed by the national government)?	Yes = 3 points Inconclusive evidence of these elements through available source documents = 1.5 points No = 0 points

Source: Access Partnership research

Our benchmarking framework does not attribute weights to its pillars given the dynamic and multifaceted nature of driving and implementing responsible AI. Assigning weights risks oversimplifying the complex interplay of factors in an AI ecosystem. Instead, we have adopted a weight-neutral approach to capture a holistic evaluation, acknowledging that different contexts and stakeholders may prioritize different aspects of responsible AI.

For each SEA economy, the score of each question will be summed up and tabulated into a total country score. This total country score will allow the categorization into one of three tiers: Advanced, Promising, and Emerging. The description of each tier is outlined in Table 13 below:

Table 13. Description of benchmarking tiers for responsible AI in SEA

Tier 1: Advanced (71-100 points)*	Tier 2: Promising (36-70 points)*	Tier 3: Emerging (0-35 points)*
A largely mature and enabling AI ecosystem that harnesses the transformative potential of fair, ethical, and responsible AI. This is underpinned by a multitude of enablers, including governance frameworks geared at promoting a safe, principled, and human-centered usage of AI, and forward-looking plans and mechanisms aimed at keeping policy and regulatory responses nimble and adaptive.	A generally conducive AI ecosystem that supports and drives the development and deployment of responsible AI across a wide range of socioeconomic use cases. The main challenge is the ability to effectively coordinate and consolidate institutional and organizational efforts—a barrier that hinders the sustained operationalization of responsible AI.	An up-and-coming AI ecosystem that recognizes the value and importance of operationalizing AI in a fair, ethical, and responsible manner, but that still requires a number of foundational building blocks to effectively turn ambitions and aspirations into action. If these challenges can be overcome, responsible AI can be leveraged to both catch up with more mature ecosystems and further improve lives and livelihoods.

** Given that there are 40 indicators, and the maximum point for each question is 3 points, the total possible score for a country would be 120 points. For easier computation and tabulation, each country's score will be normalized to a total of 100 points before the countries are organized into corresponding tiers.*

Note: This point range is mainly for internal reference, we do not expect to share the numerical values publicly, to keep attention focused on the areas of improvement and not on the scores themselves.

Source: Access Partnership research

It is important to note that this benchmarking framework should not be viewed as a standalone diagnostic tool, but rather as a guide that directs SEA governments to a tailored set of recommendations—which will enable them to translate broad, high-level aspirations into actionable steps for operationalizing responsible AI.

RECOMMENDATIONS

The benchmarking framework developed above aims to equip SEA policymakers with an evidence-based approach to drive responsible AI from a policy, regulatory, and governance perspective.

The recommendations presented in this section are directly derived from the desk research and interview findings presented in the landscape overview, addressing the various drivers, barriers, benefits, challenges, and dynamics that SEA economies should navigate to effectively operationalize responsible AI.

It is important to note that these recommendations are not presented as a one-off or standalone exercise, but are expected to culminate in an *ASEAN Responsible AI Roadmap*, which will complement and enhance the *ASEAN Guide on AI Governance and Ethics*, and provide practical and customized guidance to all 11 SEA economies covered in this report—effectively bridging the gap between conceptual considerations on responsible AI and tangible outcomes through a series of workshops and engagements with SEA policymakers and other stakeholders.

GENERAL RECOMMENDATIONS

1. Support regional efforts and commitments on responsible and ethical AI: The *ASEAN Guide on AI Governance and Ethics* represents a significant milestone in SEA's approach to prioritizing ethical considerations in AI policymaking. As the region's inaugural guide to AI governance, the Guide marks a pivotal shift towards placing ethics at the forefront of AI development and deployment. Importantly, it positions ASEAN as a prominent advocate for adopting multilateral and inter-jurisdictional approaches to AI governance, underscoring the region's commitment to responsible AI practices on the global stage. This sets a promising foundation for future regional and global collaboration on AI policy development, which will be crucial in fostering interoperability among AI frameworks.

The Guide presents a comprehensive set of national-level and regional-level initiatives that governments in the region can consider implementing to design, develop, and deploy AI systems responsibly. In alignment with these initiatives, the upcoming *ASEAN Responsible AI Roadmap* is developed with the explicit goal of complementing and supporting the *ASEAN Guide on AI Governance and Ethics*. While the Guide outlines general commitments and principles, the Roadmap will provide actionable steps for ASEAN policymakers and stakeholders to operationalize responsible AI adoption and innovation within the region. Together, both documents will offer a comprehensive framework and action plan for policymakers to drive responsible AI adoption in the region.

2. Promote responsible AI practices as a gateway to long-term economic growth and competitiveness: As this report suggests, responsible AI is not incompatible with national priorities that promote economic growth and dynamism across SEA. As AI becomes a central feature of SEA digital economies, responsible AI will take center stage in ensuring this economic growth is sustainable and inclusive in the long term.

Both individually and through ASEAN, AMS can enhance capacity-building activities for policymakers to recognize responsible AI's role in trade transformation and economic recovery, particularly for emerging economies. Best practices can be showcased through case studies, demonstrating how responsible AI can be a catalyst to improve productivity and efficiency.

3. **Actively participate in discussions on international AI standards-setting and implement where standards are available:** International standards-setting brings together diverse stakeholders with different levels of expertise. Thanks to this diversity, the process can nimbly respond to technological, business, or regulatory changes. By developing and using internationally recognized AI standards, AI products and services can maintain high benchmarks for security, safety, quality, and reliability, making them more appealing to consumers. In addition, implementing standards improves the interoperability of standardized technologies, processes, or methods across producers, suppliers, and consumers.

For now, Singapore is the only AMS participating in the ISO/IEC JTC 1/SC 42 committee. By taking part in the standards-setting process, Singapore has demonstrated its technical capabilities and ability to contribute meaningfully to ongoing technical discussions. As a result, Singapore has been granted voting rights, further cementing its position as a leader in the global tech community. Having invested heavily in AI research and development and significantly improved its AI capabilities, Singapore emerges as an attractive destination for AI investment and innovation.

4. **Drive responsible and sustainable investment in AI:** According to a study conducted by Kearney, the widespread adoption of AI in SEA has the potential to boost the GDP of ASEAN member states by an estimated USD 1 trillion by 2030.[160] Yet the lack of investment compared to that in the United States, China, or Europe is hindering the growth of AI ecosystems in enabling greater AI use cases and innovation in SEA.

Currently, AI is a priority for the region's digital economies, but responsible AI is just emerging as an important driver of potential economic benefits. To this end, the private sector, academia, and civil society are crucial in driving responsible AI investment, innovation, and research that is locally led and fit-for-purpose for SEA's unique needs.

5. **Expand resources dedicated to promoting digital skills and literacy:** The digital disparities within SEA, coupled with limited infrastructure and education access, hinder the region's potential to become a global AI hub. To leverage responsible AI as an economic driver, the entrepreneurial and educational environment should equip the labor force with responsible AI skills and knowledge.

SEA countries are prioritizing skills development, investing in skilling, reskilling, and upskilling initiatives, and introducing AI-focused courses to ensure the workforce is prepared for AI advancements. This addresses the short-term need to get people back to work and the long-term goal of equipping them with new skills. Additionally, educational curricula should be adapted to the needs of a digitally enabled workforce. Singapore has successfully introduced coding to primary and secondary school curricula and Science, technology, engineering, and mathematics (STEM) coursework in secondary and vocational training programs. These initiatives can be used to introduce students to abstract facets of AI, such as the role of ethics in computer science, the influence of biases in society and data, and the importance of data quality and representativeness.

6. **Prioritize national and regional digital inclusivity:** The growing digital divide is not new in SEA; it has been the focus of national and multilateral policies and strategies for the better part of a decade. What is new is the pace and scope at which this divide can grow now that AI is permeating all manner of tools, products, and services. All across SEA, rural populations, the unconnected, the unbanked,

[160] Kearney (2020) Racing toward the future: artificial intelligence in Southeast Asia, www.kearney.com/service/digital/article/-/insights/racing-toward-the-future-artificial-intelligence-in-southeast-asia

women, and ethnic minorities remain disproportionately affected by this digital divide. These divides are likely to be aggravated if AI systems are developed without due consideration for their potential to reflect and amplify existing inequalities in society. In this regard, it is pertinent that SEA economies should prioritize the operationalization of responsible AI to ensure that AI technologies minimize harms, including the risk of exacerbating societal divides.

SEA economies should work towards translating the excitement around AI into actionable plans and sustainable approaches that tackle some of the region's unique challenges, with connectivity playing a significant role in this. Specifically, prioritizing ICT infrastructure and connectivity geared toward responsible AI is crucial to enable more inclusive access, ethical oversight, and bridge the digital divide. In SEA, AI is used in diverse ways with significant social and economic inclusion implications. NGOs, CSOs, and citizen organizations can bring ethical considerations to AI development, ensuring the societal impact is considered and concerns related to fairness, privacy, and bias are addressed. CSOs can advocate for inclusivity, equity, individual, and group rights in AI use, promoting accountability and transparency and informing public discourse on AI policies and issues.

7. Adopt multi-stakeholder processes to drive the emergence of a human-centered approach to AI: To effectively address the challenges posed by AI, policymakers in SEA should continue to develop guiding principles, voluntary frameworks, and standards and certifications while engaging with stakeholders and participating in international discussions. In this regard, international collaboration and cooperation on AI is important for countries to share their best practices, ethical standards, and regulatory frameworks in AI with their global peers. For example, the AI Verify Foundation, recently established by IMDA Singapore in June 2023, is actively engaging with UNESCO, the European Union, and the United States[161] to explore collaborative opportunities for their AI Verify testing tool, which promotes responsible AI use through global open-source contributions.[162]

Another vital part of this approach is collaborating with organizations in civil society, the private sector, in particular the Big Tech companies, and NGOs. Through collaboration, governments can leverage AI tools and resources, datasets, and expertise to address pressing sustainability challenges and support vulnerable populations. Governments can also support efforts to understand better and address the legal and ethical issues that AI technologies create. SEA can also look towards international developments, for instance, in the United States, the Biden-Harris Administration has secured voluntary commitments from leading AI companies including Amazon, Google, Meta, Microsoft, and OpenAI towards responsible, safe, secure, and transparent development of AI technology. By working together, all stakeholders can help shape AI's responsible and sustainable future.

AI partnerships have already evolved between major tech companies such as Amazon, Facebook, Google, DeepMind, Microsoft, IBM, and Apple. The Global Partnership on Artificial Intelligence (GPAI) is a multi-stakeholder consortium which aims to bridge the gap between theory and practice on AI by supporting cutting-edge research and applied activities on AI-related priorities. Its efforts include increasing public awareness and understanding of AI while serving as an open platform for discussing the impact of AI on society and people. One primary focus is developing accountable, transparent, and fair AI systems. The partnership has over 80 partners, including non-profit organizations from three

[161] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[162] IMDA (2023) Fact Sheet – Open-sourcing of AI Verify and set up of AI Verify Foundation, www.imda.gov.sg/-/media/imda/files/news-and-events/media-room/media-releases/2023/06/7-jun---ai-annoucements---annex-a.pdf

continents and ten countries, providing a multi-stakeholder platform for ongoing AI research sharing and best practices formulation.

8. **Implement AI risk and impact assessment frameworks to identify and address harms:** AI impact assessments are recommended by experts as they provide a concrete evaluation premise to establish the likelihood of negative impacts on populations or organizations. This approach removes the potential for controversy surrounding political and cultural sensitivities and instead links responsibility to tangible outcomes. It also allows for tailored considerations of responsibility within specific economic sectors and use cases.

The value of risk-based assessments of AI solutions has already been acknowledged as a crucial component of AI governance and ethics within ASEAN. The *ASEAN Guide on AI Governance and Ethics* has identified four critical components for responsible AI governance, and one of them is conducting risk-based assessments. The Guide provides an AI Risk Impact Assessment template for developers and deployers of AI systems and AI governance/AI ethics committees within organizations to identify potential risks and vulnerabilities associated with the AI system, and ensure that the responsible design, development, deployment, and monitoring of the AI system.

9. **Proactively tackle the impact of AI on minority groups and climate change:** The lack of diversity in AI systems poses significant challenges in general but is especially problematic in the SEA region given the region's unique diversity.[163] Many AI systems are still predominantly trained with Western datasets and in English, which does not represent the cultural and linguistic diversity of the region and even makes entire populations invisible to the eyes of most AI models. To address this issue, data governance policies should prioritize including diverse and representative data in open-source projects and digital public goods. Additionally, AI policymaking should be inclusive and representative, considering the diverse perspectives of individuals within the country and free from external influence. In this context, Singapore's efforts to develop the National Multimodal LLM Program to cater to SEA's diverse cultures and languages should be supported at the regional and multilateral level.[164]

At the same time, responsible AI should go beyond the notion of responsibility towards humans, and adopt a broader perspective that encompasses both the impact of AI on the environment (animals, plants, biodiversity, natural resources, and habitats) and the ways in which AI can be leveraged to alleviate the hardships of those most vulnerable to the effects of climate change.[165] As AI grows and evolves, so does its energy footprint. This is especially worrying for SEA economies, which are already particularly vulnerable to major and frequent natural disasters. SEA economies should learn from regional and global best practices that are already leveraging clean and renewable sources to power the digital economy. At the same time, initiatives that put AI at the service of mitigating and reducing the effects of climate change should be actively supported.

10. **Align ASEAN's AI plans and initiatives with wider developments and frameworks**: ASEAN is resolutely carving its own path towards harnessing and operationalizing responsible AI, prioritizing a cautious, business-friendly approach rather than drawing directly from what the European Union (EU),

[163] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[164] GovInsider (2023) Singapore to channel US$52 million into building capacities for SEA's first regional LLM, https://govinsider.asia/intl-en/article/singapore-to-channel-usdollar52-million-into-building-capacities-for-seas-first-regional-llm
[165] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

the United States, and China are doing.[166] In short, ASEAN is developing approaches that fit its own needs, priorities, and capabilities. As promising as this approach may be, the region cannot ignore the trends, issues, and dynamics taking shape in other jurisdictions.

Globally, landmark measures such as the EU's *AI Act* are set to reverberate far beyond Europe's borders. Many businesses in ASEAN, especially those aiming to operate in or with the EU, now find themselves needing to comply with these regulations. For example, the EU *AI Act* requires organizations providing essential services, such as insurance and banking, to conduct an impact assessment to evaluate how using AI systems will affect people's fundamental rights.[167]

These regulatory requirements could significantly impact the development cycles, product strategies, and overall AI investment for businesses in the region.[168] Likewise, the various geopolitical discussions and sensitivities that have emerged in the wake of the UK's AI Safety Summit may be indicative of further turmoil to come as countries aim to become global frontrunners in the race to define what 'ethical' and 'responsible' AI is and can do.[169]

Regionally, it is equally important that the individual efforts of AMS do not overshadow or underplay ASEAN's collective digital integration efforts. For example, it is important that AMS policymakers strategically gear their AI initiatives towards the provisions outlined in the Digital Economy Framework Agreement (DEFA);[170] this will allow the progress made at the national level to converge and contribute towards the collective efforts being made at the regional level. By doing so, the region can ensure that AI advancements are harmoniously integrated into the broader digital economy strategy, maximizing the interoperability of digital infrastructures while ensuring AI in the region is effectively focused on transparency, accountability, and fundamental rights.[171]

[166] SCMP (2023) As AI regulation looms, should Asia follow West's lead and risk 'killing innovation'?, www.scmp.com/week-asia/politics/article/3225185/ai-regulation-looms-should-asia-follow-wests-lead-and-risk-killing-innovation
[167] MIT Technology Review (2023) Five things you need to know about the EU's new AI Act, Five things you need to know about the EU's new AI Act | MIT Technology Review
[168] Business Times (2023) EU's new AI Act could add to compliance costs for ASEAN firms, www.businesstimes.com.sg/international/asean/eus-new-ai-act-could-add-compliance-costs-asean-firms-industry-players
[169] Global Times (2023) UK and Japan spar over inviting China to global AI summit, shows divergence within G7, www.globaltimes.cn/page/202308/1296919.shtml
[170] ASEAN (2023) ASEAN launches world's first regionwide Digital Economy Framework Agreement, https://asean.org/asean-launches-worlds-first-regionwide-digital-economy-framework-agreement
[171] ASEAN (2023) Digital Economy Framework Agreement (DEFA): ASEAN to leap forward its digital economy and unlock US$2 Tn by 2030, https://asean.org/asean-defa-study-projects-digital-economy-leap-to-us2tn-by-2030

TARGETED RECOMMENDATIONS

It is important to note that these tier recommendations are intended to identify priority areas for action by SEA governments. We recognize that there is considerable scope in going beyond the recommendations for the specific tier to operationalize responsible AI. For instance, emerging AI economies may leverage insights from other tiers' recommendations to complement and support their endeavors—nonetheless, this report suggests that they should start with foundational steps like developing an AI strategy, among others.

TIER 1: ADVANCED

1. **Drive human-centered AI adoption:** Mature AI economies have an opportunity to set global standards of inclusive AI systems by pursuing AI initiatives that benefit all societal groups, with the ambition to ensure that the rapid digitalization of society leaves no one behind. To create AI systems that cater to modern society's diverse fabric, stakeholders from mature AI economies including governments, businesses, academia, and civil society should encourage input from marginalized communities in the early stages of AI system development. This includes specific consideration for the needs of indigenous populations, ethnic minorities, women and children, the elderly, the unbanked, the digitally illiterate, persons with disabilities, those vulnerable to climate change, and those still affected by the economic slowdown caused by the COVID-19 pandemic. This will ensure that systems respect their rights and cultural practices and address biases.

Advanced AI economies should also remember that even within prosperous and hyper-connected economies, there are still many people struggling to find a place or make a living. Addressing barriers to access and education, prioritizing accessibility for the elderly, disabled, and digital illiterate, and bridging the digital divide will tackle inclusivity issues. Collaborating with various stakeholders and community representatives is crucial to keeping AI innovations inclusive and accessible.

2. **Advance and support multi-stakeholder knowledge sharing:** Advanced AI economies should use their unique position to drive and support the emergence of responsible and ethical AI governance in less mature digital economies. Through regional platforms, international fora, and multilateral cooperation, there is a real opportunity to share experiences, knowledge, and best practices with neighboring trade partners.

By encouraging collaboration, aligning standards, and exchanging expertise, other SEA countries can collectively work towards responsible AI adoption and contribute to establishing regional norms. Capacity-building initiatives are also vital in enhancing understanding and implementing ethical AI policies and providing regional and national gap analysis. These efforts ensure that best practices in ethical AI governance are easily shared, promoting trust, transparency, and accountability in AI development and deployment.

3. **Foster an agile approach to AI policymaking and regulation:** Looking at the scope and pace of AI advancement, it is important that AI policies can keep pace. Policies should be regularly updated based on emerging trends and advancements. Collaboration and information-sharing across jurisdictions, especially between ASEAN Member States, are crucial for developing sustainable and interoperable governance frameworks. Harmonizing standards and addressing cross-jurisdictional challenges will facilitate the seamless implementation of AI technologies. Additionally, investing in

capacity-building, education, and proactive evaluation of policies will enable policymakers to make informed decisions and promote responsible AI development and deployment.

As seen in less mature AI economies, governments have already revised policies to encourage overseas investment in the field and promote AI education in universities. For example, Lao PDR is committed to bridging gaps and enhancing its digital landscape to support economic development and provide better public services.[172] The notion of continuous revision and review is a principle that should be adopted through the AI landscape.

4. **Education and capacity building to build AI readiness:** Education and capacity building in AI is imperative for Advanced AI ecosystems to ensure the workforce remains competitive, productive, and relevant. Policymakers should focus on developing lifelong learning initiatives to minimize potential job displacement and prepare the workforce for the transition to more AI-intensive sectors.

These efforts should also extend to building the civil service's capacity in AI, which is critical for effective policy formulation and governance in a rapidly evolving AI landscape. By building both the workforce and government body's AI readiness, policymakers can position their economies at the forefront, allowing them to set regional benchmarks and sustain leadership in an increasingly AI-driven era.

TIER 2: PROMISING

1. **Prioritize responsible and ethical AI:** Promising AI economies should position responsible and ethical AI as a central focus of all AI-related efforts and initiatives, prioritizing transparency, fairness, and accountability. Ensuring inclusivity, representation, and participation is crucial to engaging diverse stakeholders, including marginalized communities, throughout the decision-making process and ultimately driving towards sustainable economic growth in the age of AI.

Policymakers should adopt a participatory approach and invest in education and awareness to foster informed public discourse on AI's potential risks and benefits. Policymakers can establish a framework that promotes fairness, transparency, and societal values in AI development and deployment by placing responsible and ethical AI at the forefront and embracing inclusivity, representation, and participation.

2. **Strengthen intra- and inter-government coordination:** To create a thriving AI ecosystem, policymakers should strengthen inter-governmental coordination and cooperation while streamlining bureaucratic processes. By aligning policies and initiatives through inter-governmental task forces, governments can promote a consistent approach to AI governance.

Streamlining bureaucratic processes, such as simplifying regulations and accelerating decision-making, enables a more agile and responsive environment for AI innovation. Ultimately, these efforts facilitate institutions and administrations in effectively navigating AI governance and harnessing the transformative potential of AI for societal and economic progress.

3. **Educate and upskill to meet market demand:** Policymakers should collaborate with academia and the private sector to strengthen ties and ensure that AI-driven initiatives effectively address specific labor market needs and priorities. This involves forming partnerships for knowledge exchange, conducting labor market analysis to identify skill gaps, and developing tailored education and training

[172] MPT (2021) 10-Year National Digital Economy Development Strategy (2021-2030), First 5-Year National Digital Economy Development Plan (2021-2025), https://docs.google.com/document/d/1Tgnuva5jG8YuHsJde4VAfk-j1Jrb_0Xi/edit

programs. Industry advisory boards can provide guidance, while continuous monitoring and evaluation ensure the initiatives remain responsive to evolving demands. By fostering collaboration and aligning initiatives with labor market requirements, policymakers can equip the workforce with the necessary AI skills, support economic growth, and address the dynamic needs of the AI-driven labor market.

The *ASEAN Guide on AI Governance and Ethics* explicitly encourages government agencies to support AI start-ups by providing funding and grants to help their employees gain the necessary skills and knowledge to develop more effective AI systems. This can be achieved through various means, such as subsidizing AI and AI ethics course fees or providing incentives for start-ups that adopt AI Governance tools. Ensuring start-ups have access to a skilled workforce is essential for building trust in AI and facilitating its adoption across the region.

TIER 3: EMERGING

1. Develop a comprehensive, overarching national AI strategy: Developing a national AI plan, policy, or strategy is crucial as it provides a clear roadmap for guiding AI development. A comprehensive strategy positions the country as a technological leader by fostering innovation, attracting talent, and encouraging investment in AI research and development. Creating certainty for the private sector and broader civil society will, in turn, enhance economic competitiveness, ensure ethical and responsible AI deployment, foster a skilled workforce, address societal challenges, and enable international collaboration.

With clear objectives and priorities, countries can shape their AI ecosystem, promote innovation, align technologies with national goals, and promote responsible AI values. By integrating AI education, addressing ethical considerations, and fostering international cooperation, countries can unlock economic opportunities, tackle societal challenges, and position themselves as leaders in the AI-driven global landscape.

2. Centralize coordination of AI national strategy implementation: For emerging AI economies, a broader national AI strategy should be actionable through an implementation plan. Creating a centralized, national body or agency specifically dedicated to coordinating AI operationalization efforts offers several advantages: it provides centralized coordination to manage stakeholders in a fast-paced environment, and makes it possible to streamline strategic planning, policy development, monitoring, and evaluation of AI initiatives. It also enables international engagement and representation, ensuring the country remains connected to global AI developments.

By establishing a dedicated body, governments can enhance efficiency, foster innovation, and effectively implement AI initiatives to maximize the benefits of AI for economic growth, societal well-being, and technological advancement.

3. Ensure strategies and implementation functions are sufficiently resourced: It is important to note that simply having a national AI strategy or a national AI agency in place does not, in and of itself, guarantee the maturation of a country's AI ecosystem. Indeed, both the strategy and the agency should be given supportive factors that allow them to achieve the outcomes with which they are tasked; resources, experts, mandates, etc. Without these, there is a real risk of having a strategy in name only.

To effectively drive and accelerate AI-driven efforts, it is crucial to ensure that the national AI strategy and the national AI body have the necessary institutional and organizational resources, support, and buy-in to function and get things done. Additional support can take the shape of financial resources, technological infrastructure and connectivity, and expertise while fostering collaboration and stakeholder engagement. Strong leadership and organizational support are essential to empower the national AI body. By investing in these areas, governments can create an environment that enables effective implementation, coordination, and acceleration of responsible AI initiatives, maximizing the benefits of AI for society.

4. **Build AI awareness and skills through education and training:** AI education and upskilling is a foundational building block that emerging economies need to prioritize to ensure that they can remain relevant and competitive in the AI wave and the rise of the digital economy. Policymakers should invest in efforts to increase AI awareness and promote robust programs on data literacy and programming for the workforce and students.

By establishing partnerships with educational institutions, industry experts, and tech innovators, policymakers can create a holistic learning ecosystem that keeps pace with evolving AI technologies. This collaborative approach is crucial in not just ensuring that the economy can actively participate in and reap benefits from the AI wave, but to also remain a relevant player in the broader digital economy landscape.

5. **Prioritize the improvement of ICT infrastructure and connectivity as an enabler of data-driven economic growth**: The improvement of ICT infrastructure and digital connectivity is pivotal for the emergence and maturation of AI ecosystems in SEA. Reliable and affordable access to the Internet not only powers digital innovation, but it also enables equitable access to digital resources, ensuring that all segments of the population—including those in rural, remote, and underprivileged areas—can contribute to and benefit from AI-driven economic opportunities.

It is undeniable that the region is already working to make the Internet more affordable and accessible. Numerous ASEAN-wide initiatives have been launched in this regard: the *Strategic Plan for Information and Media 2016-2025*,[173] the *ASEAN Digital Masterplan 2025*,[174] the *ASEAN Communication Master Plan 2018-2025*,[175] and a wide range of sector-specific initiatives. Most recently, Indonesia[176] and Malaysia[177] have partnered with SpaceX, a private satellite-Internet provider, to boost Internet connectivity in hard-to-reach areas. However, despite these efforts, the digital divide persists in SEA, with low proportions of internet access among rural populations in emerging economies,[178] and low home-based internet access across digitalized economies.[179]

To ensure SEA populations and communities can leverage AI as a driver of inclusive economic growth and development, several action items should be prioritized by SEA policymakers. This includes

[173] ASEAN (2016) Strategic Plan for Information and Media 2016-2025, https://asean.org/wp-content/uploads/2021/08/14.-May-2016-ASEAN-Strategic-Plan-for-Information-and-Media-2016-20251.pdf
[174] ASEAN (2022) ASEAN Digital Masterplan 2025, https://asean.org/book/asean-digital-masterplan-2025
[175] ASEAN (2021) ASEAN Communication Master Plan 2018-2025, https://asean.org/wp-content/uploads/2021/03/ASEAN-Communication-Master-Plan-2018-2025.pdf
[176] The Business Times (2023) Indonesia, SpaceX launch satellite to boost Internet connectivity, www.businesstimes.com.sg/international/indonesia-spacex-launch-satellite-boost-internet-connectivity
[177] SCMP (2023) Malaysia issues license to Elon Musk's Starlink to bring internet to remote areas, www.scmp.com/news/asia/southeast-asia/article/3228362/malaysia-issues-license-elon-musks-starlink-bring-internet-services-remote-areas
[178] UNESCAP (2021) In-depth study on the design and implementation plan of internet exchange points in CLMV countries, www.unescap.org/kp/2021/depth-study-design-and-implementation-plan-internet-exchange-points-clmv-countries
[179] Statista (2021) Share of population with internet access at home in the Asia-Pacific region in 2021 (by country or territory), www.statista.com/statistics/1293198/apac-population-with-internet-access-at-home-by-country

investing in accessible and affordable high-speed broadband networks and data centers to bridge the digital divide, enabling widespread community participation in data-driven advancements. Public-private partnerships are also critical, not just for infrastructure development but for community-focused digital literacy programs.

CONCLUSION & NEXT STEPS

CONCLUSION

Overall, this report finds that SEA economies have a great appetite to harness the full potential of AI and are, for the most part, well on their way to leveraging AI to dynamize and diversify their digital economies across a wide range of innovative and transformative use cases.

Regarding responsible AI, all SEA governments recognize that ensuring AI is developed and implemented in an accountable, inclusive, and sustainable manner is an increasingly determinant factor in sustaining their economies' competitive and comparative advantages.

This recognition is largely evidenced by their participation and adherence to several regional, international, and multilateral initiatives specifically aimed at defining and refining AI governance frameworks. A major highlight in this regard is the *ASEAN Guide on AI Governance and Ethics*, which is the culmination of sustained regional alignment efforts.

Despite these encouraging developments, not all economies in the region are equally or adequately equipped to enable, leverage, or harness responsible AI. Indeed, a number of technical, institutional, infrastructural, and financial barriers remain in the way of building an environment and ecosystem that effectively allows responsible AI to emerge—making it both important and urgent to regularly track and assess the progress being made in this area.

NEXT STEPS

The benchmarking framework and methodology developed in this report is a valuable tool that will allow SEA economies to assess where they currently stand, where they could be, and how they can get there.

To this end, the next step will be to turn the findings and recommendations from this report into practical initiatives and activities, with clear steps, objectives, and milestones. These will be presented in an upcoming *ASEAN Responsible AI Roadmap*, which will provide customized guidance to ASEAN governments.

For each tier, the Roadmap will provide a set of best practices from international experiences, case studies with learnings and pitfalls to avoid, as well as actionable steps to effectively bridge the gap between conceptual considerations and tangible outcomes.

APPENDIX I. OVERVIEW OF AI ECOSYSTEMS IN SEA

The following tables provide a summary of all known AI laws, policies, regulations, plans, roadmaps, and frameworks in SEA and in international/multilateral settings.

NATIONAL AI POLICIES/STRATEGIES

NATIONAL AI STRATEGIES AND POLICIES IN SEA			
COUNTRY	MAIN AI STRATEGY	KEY AI AGENCY	NOTABLE AI / DATA INITIATIVES
Brunei Darussalam	None for AI	None for AI, the Ministry of Finance and Economy is the main coordinator for digital economy initiatives	- Wawasan 2035 - Digital Government Strategy (2015-2020) - E-Government National Centre (EGNC)
Cambodia	None for AI	None for AI, the Ministry of Industry, Science, Technology & Innovation (MISTI) is the main coordinator for digital economy initiatives	- Cambodia Digital Economy and Society Policy Framework 2021-2035 - Digital Government Policy 2022-2035 - MISTI guiding paper: "Artificial Intelligence Landscape in Cambodia: Current Status and Future Trends"
Indonesia	National AI Strategy 2020-2045 (Strategi Nasional Kecerdasan Artifisial Indonesia 2020-2045)	Indonesian Artificial Intelligence Industry Research and Innovation Collaboration (KORIKA)	- Making Indonesia 4.0 - Digital Indonesia Roadmap 2021-2024 - Indonesia Digital Industry Development Master Plan for 2023-2045 - Tokopedia AI Research Centre - NVIDIA AI R&D Centre - Indonesia AI Forum on Data Privacy and Protection
Lao PDR	None for AI	None for AI, the Ministry of Technology and Communications (MTC) is the main coordinator for digital economy initiatives	- 9th National Socio-Economic Development Plan (NSEDP, 2021-2025) - National Digital Economy Development Vision (2021-2040) - Digital Economy Strategy (2021-2030) - National Digital Economy Development Plan (2021-2025) - UNDP Digital Government Transformation - e-Government Center - Lao National Internet Center (LANIC) - Decree on E-Commerce
Malaysia	National Artificial Intelligence Roadmap 2021-2025 (AI-Roadmap)	None for AI, the Ministry of Science, Technology, and Innovation (MOSTI) is the main coordinator for digital economy initiatives, with support from the Malaysia Digital Economy Corporation (MDEC)	- Industry Digitalization Transformation Fund (2019 budget) - National Big Data Analytics Framework - National IoT Strategic Roadmap - National E-Commerce Strategic Roadmap - National Fiberisation and Connectivity Plan 2019-2023 - Digital Free Trade Zone (DFTZ) - National Policy on Industry 4.0 (Industry4WRD) - Malaysia Digital Economy Blueprint (MyDIGITAL)

Myanmar	None for AI	None for AI, the Ministry of Transport & Communications (MOTC) is the main coordinator for digital economy initiatives, with support from the Digital Economy Development Committee (DEDC)	- Digital Economy Roadmap 2018-2025 - Sustainable Development Plan 2018-2030 - Citizens Privacy and Security Protection Law - ARISE Plus Myanmar
The Philippines	National AI Strategy for The Philippines	- AI Taskforce (coordinated by the Department of Trade and Industry, DTI) - National Center for AI Research (NCAIR) - Department of Science and Technology (DOST) - Department of Information and Communications Technology (DICT) - Commission on Higher Education (CHED) - National Innovation Council	- Filipinnovation and Entrepreneurship Roadmap - Digital Transformation Strategy 2022 - PhilHealth Digital Transformation 2017-2022 - Cloud First Policy - National ICT Ecosystem Framework (NIEF) 2022 - National Government Data Centre (NGDC) -University of Philippines White Paper on Developing an AI Governance Framework for the Philippines -Draft Bill on Promoting the Development and Regulation of AI in the Philippines
Singapore	National AI Strategy 2.0	- AI Singapore - National AI Office - Advisory Council on the Ethical Use of AI and Data - Infocomm Media Development Authority (IMDA)	- Autonomous Vehicle Rules - Principles to Promote Fairness, Ethics, Accountability, and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector - Program on the Governance of AI and Data Use - Model AI Governance Framework - National AI Program in Government - National AI Program in Finance - Artificial Intelligence in Healthcare Guidelines (AIHGle) - Model AI Governance Framework for Generative AI (proposed)
Thailand	National AI Strategy and Action Plan (2022-2027)	- Thailand National AI Strategy Working Committee - National Electronics and Computer Technology Center (NECTEC) - Digital Government Development Agency (DGA) - Ministry of Higher Education, Science, Research, and Innovation - Ministry of Information and Communication Technology (MICT) - Ministry of Digital Economy and Society (MDES) - Digital Economy Promotion Agency (DEPA)	- Thailand 4.0 - AI for Social Good - Digital Park Thailand - Ethical Guidelines for AI (draft) - Thai People Map and Analytic Platform (TPMAP)
Timor-Leste	None for AI	None for AI, the Ministry of Transport and Communications (MoTC) is the main coordinator for digital economy initiatives	- National Strategic Development Plan (SDP) 2011-2030 - National Strategic Plan for Digital and ICT Development 2022–2032 - National Policy for ICT 2017-2019

Viet Nam	National Strategy on Research, Development, and Application of Artificial Intelligence until the Year 2030 (Decision 127/QD-TTg)	- Ministry of Information and Communications (MIC) - Ministry of Planning and Investment (MPI) - Ministry of Science and Technology (MOST) - VietAI	- Draft National Standard on Artificial Intelligence and Big Data - National Digital Transformation Strategy Program Through 2025, to 2030 - National Strategy for the Fourth Industrial Revolution Through 2030 - E-Government Development Strategy Towards the Digital Government in the 2021-2025 Period - National Program for Using IT in the Operations of State Agencies (2016-2020) - Draft Architecture Framework for e-Government of Viet Nam (version 2.0) - National Databases Decision No.714/QD-TTg- ICT Reference Framework for Smart Cities (version 1.0)

REGIONAL AI POLICIES/STRATEGIES

REGIONAL AI INITIATIVES AND PROGRAMS IN SEA		
ORGANIZATION	SEA MEMBER(S)	AI INITIATIVE / PROGRAM
Asian Development Bank (ADB)	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, Viet Nam	- Digital Technology for Development Unit - ADB Ventures - Artificial Intelligence and Digitalization Fund - ADB Digital Learning Labs (a.k.a. ADB Digital Innovation Sandbox)
Association of Southeast Asian Nations (ASEAN)	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste*, Viet Nam	- ASEAN Digital Masterplan 2025 - ASEAN Digital Integration Framework Action Plan (DIFAP) 2019-2025 - Consolidated Strategy on the Fourth Industrial Revolution for ASEAN - ASEAN Guide on AI Governance and Ethics (published in February 2024) - Discussion Paper on the Responsible Development and Use of Generative AI in ASEAN (final version planned for early 2024)
European Commission	*N/A*	- Ethics Guidelines for Trustworthy Artificial Intelligence - AI Act
G7	*N/A*	Hiroshima Process towards responsible AI
G20	Indonesia	AI Principles (non-binding)
Global Partnership on Artificial Intelligence (GPAI)	Singapore	GPAI Global Summit
OECD	10 ASEAN countries (via the OECD Southeast Asia Regional Program, SEARP)	- OECD Principles for Trustworthy AI - OECD Framework for Classifying AI Systems - Expert Group on AI Compute and Climate (a.k.a. OECD AI Compute Taskforce)
United Nations	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, Viet Nam	- UNESCO Recommendations on Ethics in AI - Inter-Agency Working Group on Artificial Intelligence (IAWG-AI) - AI For Good (annual summit and year-long activities) - United Nations System-Wide Strategic Approach and Road Map for Supporting Capacity Development on Artificial Intelligence - Principles for the Ethical Use of Artificial Intelligence in the United Nations System - Partnership on Artificial Intelligence - Global Working Group (GWG) on Big Data - Policy Guidance on AI for Children (UNICEF)
World Bank	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Timor-Leste, Viet Nam	- Technology and Innovation Lab - Disruptive Technologies for Development (DT4D) Challenge - Disruptive Technologies for Development Fund
World Economic Forum (WEF)	*N/A*	- Global AI Action Alliance - Blueprint for Equitable and Inclusive AI - AI Youth Council - Artificial Intelligence Standards for Children (proposed)

Note: Timor-Leste is not yet a full-fledged ASEAN member, but it does have an observer status that should allow it to become the 11th member of the organization. More details here: ASEAN (2022) ASEAN Leaders' Statement on the Application of Timor-Leste for ASEAN Membership, https://asean.org/wp-content/uploads/2022/11/05-ASEAN-Leaders-Statement-on-the-Application-of-Timor-Leste-for-ASEAN-Membership.pdf

APPENDIX II. COUNTRY PROFILES

This section provides a summary of recent developments in terms of AI priorities and capabilities for each SEA economy.

BRUNEI DARUSSALAM

COUNTRY OVERVIEW

Brunei Darussalam's digital landscape has experienced remarkable growth and development in recent years, reflecting the country's commitment to embracing technology and digital transformation. An evident manifestation of this commitment is the *Digital Economy Masterplan 2025*, launched in 2020 with the objective of fostering socioeconomic growth through digitalization.[180]

With a strong emphasis on connectivity, the country boasts a well-established internet infrastructure. The percentage of households and businesses subscribing to fixed broadband services has increased significantly from 51% in 2019 to 88% in 2023. Similarly, the mobile broadband coverage provided by the 4G network has improved from 91% to 99.3% during the same period.[181] This widespread access to high-speed connectivity has spurred the adoption of mobile-based services and applications, further propelling the nation's digital landscape forward.

Building on this strong digital infrastructure, Brunei Darussalam has shown keen interest in equipping society with skills and capabilities to reap the benefits of digital development. In the *National Education System for the 21st Century guidelines*, ICT skills including online communication, information analysis, and strategic and instrumental skills are mandatory parts of the school curriculum.[182]

Likewise, the Ministry of Transport and Info-communications and the Digital Economy Council have put digital talent development as one of four strategic thrusts to ensure full participation of the population in the digital era. To this end, the *Brunei Darussalam ICT Industry Competency Framework (BIICF)* provides a national standard for key roles in the ICT industry, enabling professionals to identify relevant technical and soft skills competencies and advance their careers through proper training.

The government of Brunei Darussalam recognizes the importance of cooperation between the government and industry in building a digital society. It has actively pursued e-government initiatives such as the *e-Darussalam* portal and the *Smart Nation* platform to streamline public services and improve efficiency. The institutional framework for digital government was integrated into the *Digital Economy Masterplan 2025* in 2020.

In terms of the digital industry, Brunei Darussalam has increased productivity and production through digital ID and digital payment initiatives that facilitate business transactions. Under the *Digital Payment Roadmap 2019-2022*, the government is developing a digital payment hub that promotes secure, auditable, low-cost, and instantaneous transactions and cash flow management, which will also reduce cash dealings in government transactions by 90%.[183]

[180] Digital Economy Council (2020). Digital Economy Masterplan 2025, www.mtic.gov.bn/de2025/index.html#page=1.
[181] AITI (2023) Statistics, www.aiti.gov.bn/events-and-publications/statistics/.
[182] Brunei Darussalam Ministry of Education, The National Education System for the 21st Century, www.moe.gov.bn/spn21dl/SPN21%20ENG%20%282013%29%20COMPLETE.pdf
[183] The Star (2022). Brunei working on digital payment gateway, www.thestar.com.my/aseanplus/aseanplus-news/2022/03/03/brunei-working-on-digital-payment-gateway.

The government has also implemented various programs, incubators, and co-working spaces to foster innovation, support start-ups, and drive technological advancements. The *Brunei Darussalam Innovation Lab (BIL)* serves as a national platform for building an innovation ecosystem and entrepreneurial community, focusing on areas such as robotics, automation, and AI.

Overall, Brunei's digital landscape showcases the nation's dedication to harnessing technology for the benefit of its citizens, improving public services, enhancing business operations, and fostering a culture of innovation and entrepreneurship.

AI ECOSYSTEM

Brunei's AI ecosystem is still in its early stages of development, but the country has taken some notable steps in recent years to promote the adoption of AI. The BIL launched in 2019 has identified 10 focus areas to develop an innovation ecosystem, of which AI is a major one. The BIL has since hosted a number of events and initiatives to promote AI, including hackathons, workshops, and training programs.

The government has also established a number of other initiatives that include an objective to support the development of AI in Brunei. These include the Authority for Info-communications Technology Industry (AITI)'s *Strategic Plan 2020-2025* with reference to AI as an area for capacity-building, *Wawasan 2035*, and the *Digital Government Strategy 2015-2020*.

Brunei Darussalam has especially been keen to leverage AI to improve the efficiency and effectiveness of its public services. The *Ministry of Transport and Infocommunications (MTIC) 2025* plan has highlighted advanced digital technologies, including AI, as a critical tool and enabler.[184]

Programs such as the Teens for AI initiative, which involves collaboration from AITI, Ministry of Education (MOE), Unified National Networks (UNN), and Darussalam Enterprise with other private sector stakeholders highlight the government's focus on building talent and capacity in the field of AI. Beyond government initiatives, private sector players such as Centre for AI Innovation (CEAI) Global are also driving AI innovation through awareness programs on AI for Non-Technical Personnel and the establishment of *CEAI @ Brunei*.

While the government of Brunei Darussalam has not set out a national AI policy yet, it is expected that these diverse initiatives will serve as steppingstones to a holistic whole-of-government approach to AI.

Despite these encouraging initiatives, Brunei Darussalam also faces a number of challenges in terms of harnessing AI for impact. An important one is the lack of data; Brunei Darussalam has a relatively small population, which means that there is less data available for AI to be trained on. To promote data flow within and across its borders, AITI is in the process of developing a comprehensive data protection and governance framework.[185]

[184] MTIC (2020) MTIC 2025, www.mtic.gov.bn/MTIC2025/documents/MTIC_2025-Strategic-Plan_FINAL.pdf
[185] AITI (2023) Regulatory, www.aiti.gov.bn/regulatory/pdp/.

CAMBODIA

COUNTRY OVERVIEW

Recognizing the potential of the digital economy, the Cambodian government has taken significant steps towards establishing a solid foundation for digital growth. This commitment is outlined in the *Digital Economy and Social Policy Framework 2021-2035*, which outlines the government's priority to leverage digital transformation for economic expansion.

The *Digital Economy and Social Policy Framework of Cambodia 2021-2035* is a positive sign of the government acknowledging the need to better drive Cambodia's digital transformation to take advantage of digital technologies and drive new economic growth, increase productivity, and enhance economic efficiency.[186]

This is reflective of the rapid pace of developments in Cambodia's digital landscape. Digital start-ups, particularly those in the financial services sector, have been early pioneers in the market.[187] The number of e-wallet accounts has surged to 17.9 million as of 2023, driven by the government's promotion of digital economy objectives during the pandemic. Similarly, the e-commerce sector, estimated to be valued at USD 938 million in 2023, is also anticipated to grow to USD 1,485 million by 2027, with a Compound Annual Growth Rate (CAGR) of 12.15%.[188] These developments demonstrate that the Cambodian population possesses the necessary financial and digital literacy to embrace technology, such as FinTech solutions, as part of their daily lives.

Aspects of digitalization and using ICTs as it transitions towards Industry 4.0 are also recognized in other development plans, such as the *Development of National Media* and the *Information and Digital Literacy (MIDL)* framework led by the Ministry of Posts and Telecommunications. With an aim to turn Cambodians into digital citizens, the promotion strategy will outline key competencies and skill levels for using digital technologies.[189]

Indeed, these developments have been focused within urban centers, and have also been slower to permeate to other parts of the economy, such as manufacturing and agriculture. Furthermore, the regulatory framework in Cambodia in other parts of digital economy related aspects such as personal data protection and cybersecurity are still under development.

AI ECOSYSTEM

Cambodia lags behind other countries in the region when it comes to AI development. There is currently no AI start-up scene to speak of in Cambodia, though there are a few start-ups actively engaged in AI-related work, often integrating robotics, electronics, and IoT technology into their projects. For Cambodia's AI market to grow and diversify by attracting a significant pool of talented individuals seeking opportunities in this field, a number of policy and regulatory measures will have to be launched.

At present, Cambodia has no policies, regulations, or strategies specifically focused on AI. Existing policies such as the *Science, Technology, and Innovation Roadmap 2030* and the *E-Government Master*

[186] Khmer Times (2021) Cambodia's digital economic and society policy for 2021-2035 launched, www.khmertimeskh.com/50877443/cambodias-digital-economic-and-society-policy-for-2021-2035-launched/
[187] Phnom Penh Post (2021) Cambodia's Digital Economy, www.phnompenhpost.com/financial/cambodias-digital-economy
[188] Statista (Accessed 2023), www.statista.com/outlook/dmo/ecommerce/cambodia?kw=&crmtag=adwords&gclid=EAIaIQobChMIu-fpnfbQ_wIVWl8PAh3_TgmWEAAYASAAEgLyuPD_BwE
[189] Khmer Times (Accessed 2023) www.khmertimeskh.com/501033702/royal-government-launches-policy-to-transform-digital-landscape-of-cambodia/.

Plan 2017-2022 primarily emphasize the broader scope of the fourth industrial revolution, with minimal attention given to AI as an emerging technology.

However, two recent developments suggest that Cambodia may be ready to launch a framework around AI.

First, the publication by the Ministry of Industry, Science, Technology, and Innovation (MISTI) of Cambodia's first-ever report on AI, highlighting finance, education, and healthcare as primary sectors that stand to benefit from AI adoption.[190] Notably, the report emphasizes the importance of responsible AI research and development, along with the establishment of trustworthy AI ecosystems.

Second, the publication of the *ASEAN Guide on AI Governance and Ethics*, which demonstrates Cambodia's commitment, along with its ASEAN partners, to enabling and leveraging responsible AI to drive the digital economy in an inclusive and sustainable manner. Most importantly, once finalized and endorsed by ASEAN, these guidelines could serve as a first step towards Cambodia's own AI regulations.[191]

Overall, the Cambodian government is closer than ever to supporting the emergence of a national AI ecosystem through enabling AI policies and regulations. To this end, it plans to establish a cross-ministry committee comprising representatives from MISTI, the Ministry of Post and Telecommunication, and the Ministry of Education, Youth, and Sport. This committee will oversee the development of new AI regulations and guidelines, indicating a growing emphasis on AI adoption within the government's agenda.

In pursuit of this goal, the government acknowledges various challenges that should be addressed, including the scarcity of skilled personnel and the need for a robust legal framework encompassing privacy, ethics, data, and cybersecurity. Furthermore, Cambodia recognizes the urgency to invest, adapt, and prepare for the global impact of AI in alignment with the industry 4.0 trend.[192]

[190] Phnom Penh Post (2023) 1st scholarly report on AI in Cambodia made public, www.phnompenhpost.com/national/1st-scholarly-report-ai-cambodia-made-public.
[191] Reuters (2023) Exclusive: Southeast Asia to set 'guardrails' on AI with new governance code, www.reuters.com/technology/southeast-asia-set-guardrails-ai-with-new-governance-code-sources-2023-06-16/.
[192] MISTI (2023) AI Landscape in Cambodia: Current Status and Future Trends, https://policypulse.org/wp-content/uploads/2023/06/AI-Landscape-in-Cambodia.pdf.

INDONESIA

COUNTRY OVERVIEW

Indonesia is Southeast Asia's largest digital economy and home to ASEAN's largest tech firms, including GoJek, Traveloka, Tokopedia, Bukalapak, and Ovo.[193] Its digital economy reached USD 77 billion Gross Merchandise Value (GMV) in 2022 and is projected to hit USD 130 billion GMV by 2025, growing at 22% year-over-year (YoY).[194] Dubbed as the "digital archipelago",[195] the government is focused on achieving its digital ambitions and has launched various initiatives and strategies to grow its digital economy and accelerate digital transformation in the country.

In 2018, President Joko Widodo launched the *Making Indonesia 4.0* initiative[196] to capture opportunities from the Fourth Industrial Revolution (4IR) and to realize Indonesia's plans to become among the top ten largest economies in the world. Coordinating Minister for Economic Affairs, Airlangga Hartarto listed five technologies that will contribute to the success of Making Indonesia 4.0, namely Internet of Things (IoT), AI, Human-Machine Interfaces, robotics and sensor technology, and 3D printing technology.[197] Among these five technologies, AI is highlighted as the central and fundamental driver of growth.[198]

In 2021, the government launched a *Digital Indonesia Roadmap 2021-2024* to develop four strategic sectors—digital infrastructure, digital government, digital economy, and digital society—in its efforts to unlock greater economic growth in areas such as digital finance, e-commerce, digital education, digital health, and more.[199]

Most recently in 2022, the National Development Planning Ministry (Bappenas) unveiled the *Indonesia Digital Industry Development Master Plan for 2023-2045*, which outlines strategies for digital industry development, greater innovation and research, design, and development (RD&D), and fostering digital talents, among others.[200]

To support digital growth, Indonesia is also focused on growing its ecosystem of MSMEs and start-ups. The government is targeting to digitalize 30 million MSMEs by 2024.[201] MSMEs represent a significant driver of growth as they account for 99.9% of the businesses in Indonesia and contribute 61% of the national GDP.[202]

Meanwhile, the private sector is unlocking the benefits of adopting digital technologies such as AI. Ride-hailing firm Go-Jek, web forum Kaskus, e-commerce platform Tokopedia, and most FinTech players, are actively adopting AI solutions to further consolidate their competitive advantages.

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[193] Asia House (2020) Driving commercial and political engagement between Asia, the Middle East and Europe, https://asiahouse.org/news-and-views/asia-house-advisory-analysis-indonesias-ai-ambitions/
[194] Google (2022) e-Conomy SEA 2022 report, https://economysea.withgoogle.com/home/
[195] McKinsey (2018) The digital archipelago: How online commerce is driving Indonesia's economic development, www.mckinsey.com/featured-insights/asia-pacific/the-digital-archipelago-how-online-commerce-is-driving-indonesias-economic-development
[196] Ministry of Industry (2018) Making Indonesia 4.0 Brief, www.kemenperin.go.id/download/18384
[197] Coordinating Ministry for Economic Affairs (2021) Increasing Industrial Innovation and Competitiveness to Accelerate Making Indonesia 4.0, www.ekon.go.id/publikasi/detail/3508/peningkatan-inovasi-dan-daya-saing-industri-untuk-mengakselerasi-making-indonesia-40
[198] Ministry of Industry (2018) Making Indonesia 4.0 Brief, www.kemenperin.go.id/download/18384
[199] Minister of Communication and Informatics (2021) The Minister of Communication and Information Presents Indonesia's Digital Roadmap in the ATxSG, www.kominfo.go.id/content/detail/35713/siaran-pers-no240hmkominfo072021-tentang-menkominfo-paparkan-roadmap-digital-indonesia-dalam-atxsg/0/siaran_pers
[200] ANTARA News (2022) Bappenas unveils document to support digital transformation, https://en.antaranews.com/news/261485/bappenas-unveils-document-to-support-digital-transformation
[201] ANTARA News (2022) SMEs Ministry aims to digitalize 30 million MSMEs by 2024, https://en.antaranews.com/news/274449/smes-ministry-aims-to-digitalize-30-million-msmes-by-2024
[202] Embassy of the Republic of Indonesia in Myanmar (2022) Indonesia strives to expand coverage of digitalization of MSMEs, https://kemlu.go.id/yangon/en/news/20994/indonesia-strives-to-expand-coverage-of-digitalization-of-msmes

AI ECOSYSTEM

AI is booming in Indonesia, especially among its tech-savvy youth and professionals. Capitalizing on its vast geography, market size, and youthful demographics, Indonesia has become a major hotspot for venture capital investments in the region and is poised to become a regional front-runner in AI development.[203]

Indonesia's desire to cement a reputation as a leader of digital transformation in the region has culminated in the introduction of the monumental *National Strategy for Artificial Intelligence 2020-2045* (*Stranas KA*), which sets out Indonesia's overarching policy framework that will guide AI development in the decades to come.[204] The launch of *Stranas KA* is noteworthy in that Indonesia was the second ASEAN Member State to launch a national strategy for AI after Singapore.[205]

Stranas KA identifies four key focus areas: 1) fostering a skilled workforce that is ready to develop and use AI, 2) establishing regulations to govern the ethical and responsible use of AI, 3) developing a strong data and infrastructure ecosystem for AI innovation, and 4) promoting AI research and development to accelerate public and private sector adoption of AI technologies.

The overarching governance framework surrounding ethical AI will be critically important to drive the overall strategy. *Stranas KA* sets out the importance of aligning the strategy with *Pancasila* values to promote the ethical and responsible use of AI; this entails preventing AI from being negatively exploited, upholding data privacy and protection, ensuring transparency in AI decision-making, promoting the use of AI for achieving the sustainable development goals, and designing AI to be non-discriminatory. *Stranas KA* also recommends forming a data ethics board to oversee AI development, as well as create regulations and national standards for AI innovation. In particular, the strategy stresses the importance of synergy between the government, businesses, and society in ensuring safe and responsible use of AI.

In this regard, the AI Innovation Summit 2023 held in August 2023 with the theme "Democratizing AI for All", was a step in the right direction. The event aimed to promote inclusive, ethical, responsible, and trustworthy AI—all major ideas echoed in Indonesia's regional and multilateral commitments on AI. Indonesia is indeed a member of the G20 and has endorsed the *G20 AI Principles* in 2019. As a member of UNESCO, Indonesia, along with 192 other member states, adopted the *UNESCO Recommendation on the Ethics of AI* in November 2021, the first global standard on the ethics of AI.[206]

Most recently, in December 2023, KOMINFO published the *AI Ethics Circular Letter*, which is seen as a guide for the use of AI in Indonesia in line with the global principles of responsible AI.[207] Deputy KOMINFO Minister Nezar Patria highlighted this as the government's first step in aligning with AI developments globally, and that the government is seeking to maximize the benefits of AI while minimizing associated risks.[208]

[203] Asia Society Policy Institute (2022) Raising Standards: Data & Artificial Intelligence in Southeast Asia, https://asiasociety.org/policy-institute/raising-standards-data-ai-southeast-asia
[204] Government of Indonesia, Stranas KA, https://ai-innovation.id/
[205] Center for Security and Emerging Technology (2021) Indonesia's AI Promise in Perspective, https://cset.georgetown.edu/publication/indonesias-ai-promise-in-perspective/
[206] Center for AI and Digital Policy (2022) Artificial Intelligence and Democratic Values, www.caidp.org/reports/aidv-2022/
[207] Bisnis Tekno (2023) KOMINFO's AI Circular Letter is positively welcomed, https://teknologi.bisnis.com/read/20231224/84/1726905/industri-dan-masyarakat-sambut-positif-surat-edaran-ai-kemenkominfo
[208] Bisnis Tekno (2023) KOMINFO's AI Circular Letter is positively welcomed, https://teknologi.bisnis.com/read/20231224/84/1726905/industri-dan-masyarakat-sambut-positif-surat-edaran-ai-kemenkominfo

Indeed, many Indonesian national and regional government-related entities are proactively adopting AI to implement programs as well as solutions. A few state projects already employ AI technology, including one to anticipate forest fires, while some government agencies are promoting AI development and technology-based solutions at schools and teaching faculties.[209]

In healthcare, the Indonesian Ministry of Health in its *2021-2024 Digital Transformation Strategy* in the Health Sector recognizes the use of AI in its plan to enable big data analytics in medical sectors.[210] Additionally, the Indonesian Train Agency, a state-owned enterprise, has recently rolled out a facial recognition system to support its passenger verification system.[211] Meanwhile, the Indonesian government launched the Jakarta Smart City (JSC) initiative to use AI to tackle the city's governance, living, mobility, economic, and environmental issues.[212]

In terms of private sector adoption of AI, it was reported in 2019 that only one in seven businesses in Indonesia has implemented AI in their business, as compared to 41% of businesses in Asia Pacific.[213] While the low adoption figure reflects room for improvement, there are also shining examples of the successful adoption of AI by Indonesian companies to innovate and increase productivity.

However, despite great public and private sector excitement about new AI technologies, Indonesia does not currently have the provisions to regulate AI or a dedicated agency to oversee AI development. Indonesia also faces challenges in regulating AI, building infrastructure, anticipating copyright infringement concerns, and developing skills within the Indonesian workforce.

To ensure the continued growth of Indonesia's AI industry, there are a few areas that Indonesia can focus on. Firstly, Indonesia could establish a dedicated government agency for AI development to spearhead the *Stranas KA*, coordinate across government agencies, determine their roles and responsibilities, and study and monitor the policy and ethical implications of AI technologies.

In 2022, the National Research and Innovation Agency (*Badan Riset dan Inovasi Nasional*, BRIN) established an AI and Cybersecurity Research Center to draft new AI regulations, which are expected to be codified in a Presidential Decree (*Peraturan Presiden*, PERPRES) by the end of 2023. At the same time, Indonesia's Artificial Intelligence Industry Research and Innovation Collaboration Body (*Kerja Sama Riset dan Inovasi Industri Kecerdasan Buatan*, KORIKA) is a quasi-government organization established in 2019 by the *Stranas Ka* to serve as a platform for AI collaboration among industry stakeholders, researchers, and government institutions.

It seems that despite these efforts, the biggest hurdle to achieving the goals of *Stranas KA* lies in the fact that responsibilities for delivering the strategy are spread across a wide range of organizations—an implementation complexity that has historically proved challenging in Indonesia.[214]

There is also a digital talent deficit to address to maintain Indonesia's digital competitiveness. Currently, there is a limited AI talent pool for Indonesian companies to tap into, with a gap of 600,000 digital talent

[209] The Jakarta Post (2020) Indonesia sets sights on artificial intelligence in new national strategy,www.thejakartapost.com/news/2020/08/13/indonesia-sets-sights-on-artificial-intelligence-in-new-national-strategy.html
[210] Ministry of Health (2021) Blueprint for Digital Health Transformation Strategy 2024, https://oss2.dto.kemkes.go.id/artikel-web-dto/ENG-Blueprint-for-Digital-Health-Transformation-Strategy-Indonesia%202024.pdf
[211] Jakarta Daily (2023) PT Kereta Api Indonesia Introduces Face Recognition Boarding Gate for Streamlined Train Travel, www.jakartadaily.id/tech-media/1628841463/pt-kereta-api-indonesia-introduces-face-recognition-boarding-gate-for-streamlined-train-travel
[212] Techwire Asia (2020) AI to be a US$366b industry in Indonesia by 2030, https://techwireasia.com/2020/10/ai-to-be-a-us366b-industry-in-indonesia-by-2030/
[213] Jakarta Globe (2019) Only One in Seven Indonesian Companies Use AI Today, https://jakartaglobe.id/context/only-one-in-seven-indonesian-companies-use-ai-today
[214] Asia House (2020) Asia House Advisory analysis: Indonesia's AI ambitions, https://asiahouse.org/news-and-views/asia-house-advisory-analysis-indonesias-ai-ambitions

available vis-à-vis the demand from the tech sector every year.[215] Aswin Tanu Utomo, Vice President of Engineering at Tokopedia, echoed that it is "increasingly difficult to find Indonesian talent that has the experience to take [AI] to the next level."[216]

To address these concerns, KOMINFO has launched digital training programs on three levels, namely the *National Movement of Digital Literacy (GNLD)* to prepare participants with basic skills, the *Digital Talent Scholarship (DTS)* program for mid-level training, and the *Digital Leadership Academy (DLA)* program for advanced-level training.[217]

[215] Bandung Institute of Technology (2021) Indonesia lacks digital talent, www.sbm.itb.ac.id/2021/11/29/indonesia-lacks-digital-talent/
[216] Tech in Asia (2018) Indonesia welcomes AI as it embraces digital disruption, www.techinasia.com/indonesia-ai-digital-disruption
[217] Cabinet Secretariat of the Republic of Indonesia (2021) Gov't to Increase Target of Digital Talent Training Participants in 2022, https://setkab.go.id/en/govt-to-increase-target-of-digital-talent-training-participants-in-2022/

LAO PDR

COUNTRY OVERVIEW

Lao PDR is a rapidly growing economy that has embraced digital technologies across various industries and sectors, making significant strides in digital transformation. Internet penetration rates have increased from 20% in 2015 to 62% in 2023, and the number of mobile phone users has risen from 3.5 million to 6.4 million during the same period.[218]

This has facilitated the expansion of e-commerce and digital services, leading to increased and accelerated overall trade, as digital enablers have enhanced trade in both physical goods and digital services.

To drive digital transformation, the government of Lao PDR has implemented various national strategies and frameworks, such as the *National Digital Economic Development Vision 2021-2040*, the *National Digital Economy Development Strategy 2021-2030*, the *National Digital Economy Plan 2021-2025*, and the *National ICT Policy 2015-2025*.

While some of these provide limited guidance on implementation, they outline the government's goals for adopting technologies across government and society. These frameworks emphasize the government's vision and commitment to a digital Laos, with a specific focus on e-government, e-commerce, and the development of a digital workforce.

Building upon these strategies, the government has drafted sector-specific implementation plans, including the *Digital Health Strategy* and the *Digital Government Master Plan*. Furthermore, Lao PDR introduced the *Law on Electronic Data Protection* in 2017, establishing a comprehensive regulatory framework for data privacy and governance. The government is currently developing a national data strategy that will guide the use of data in improving public services and advancing economic development in Lao society.

Despite commendable digital progress, challenges persist in terms of the affordability and quality of internet services in rural areas, as well as the digital skills of the workforce and educational ecosystem. To address relatively low digital literacy rates, the government launched the first-ever Digital Literacy Camp, introducing students to e-learning and important topics like online safety and cybersecurity.[219]

Additionally, the government has expressed its intent to promote research and development in artificial intelligence and has revised policies to encourage overseas investment in the field, while also promoting AI education in universities. Lao PDR remains committed to bridging these gaps and further enhancing its digital landscape to support economic development and provide improved public services.[220]

AI ECOSYSTEM

Lao PDR does not have a national, overarching strategy specifically devoted to AI, but it has launched various initiatives aimed at setting the stage for AI adoption by the public and private sectors.

[218] Laotian Times (2023) Digital 2023 Report on Laos Released, https://laotiantimes.com/2023/03/13/digital-2023-report-on-laos-released-internet-mobile-and-social-media
[219] UNICEF (2023). In Lao PDR, a digital transformation of education has begun, www.unicef.org/laos/stories/lao-pdr-digital-transformation-education-has-begun
[220] MPT (2021) 10-Year National Digital Economy Development Strategy (2021-2030), First 5-Year National Digital Economy Development Plan (2021-2025), https://docs.google.com/document/d/1Tgnuva5jG8YuHsJde4VAfk-j1Jrb_0Xi/edit

The *Five Year National Socioeconomic Development Plan (2021-2025)* outlines aspirations to invite foreign private investment into AI and improve research and development in this area.[221] The Plan states that AI should become a priority area in education, and the curriculum strengthened, by reinforcing it with greater inclusion of AI technologies. Higher education is targeted for this re-prioritization. However, further details about funding or other arrangements that will help bolster this have been limited.[222]

Fostering a robust research and development ecosystem, including AI research, will be another major development that can drive both public and private investment. The *National Science Technology and Innovation Strategy 2016-2025* highlights the need to strengthen research and development capabilities in the country. It acknowledges that research and development efforts need to be enhanced to support technological innovation and the knowledge-based economy.

To this end, investment in AI will be facilitated by revisions to the *Law on Investment Promotion 2016*,[223] which would bring Lao PDR closer to regional and global best practices by allowing domestic and foreign investment to be dealt with under the same legal regime, and by bringing further market elements to Lao PDR's economy.[224]

[221] LaoFab (2021) 9th Five-Year National Socioeconomic Development Plan (2021-2025), https://laofab.org/document/download/4870#:~:text=The%209th%20Five%2DYear%20National,2030%20of%20the%20Lao%20PDR
[222] LaoFab (2021) 9th Five-Year National Socioeconomic Development Plan (2021-2025), https://laofab.org/document/download/4870#:~:text=The%209th%20Five%2DYear%20National,2030%20of%20the%20Lao%20PDR
[223] UNCTAD (2017) Law on Investment Promotion, https://investmentpolicy.unctad.org/investment-laws/laws/177/lao-people-s-democratic-republic-investment-law
[224] ASEAN Briefing (2021) How to Claim Investment Promotion Incentives in Laos: New Guidelines in Effect, www.aseanbriefing.com/news/how-to-claim-investment-promotion-incentives-in-laos-new-guidelines-in-effect

MALAYSIA

COUNTRY OVERVIEW

Malaysia's digital economy has experienced rapid growth in recent years, driven by government initiatives, private sector investment, and increasing adoption of digital technologies. In 2022, the digital economy contributed an estimated 22.6% of the country's GDP and that percentage is expected to rise to 25.5% in 2025.[225]

Malaysia has also witnessed increasingly rapid adoption of emerging technologies such as AI, robotics, and blockchain, which has the potential to benefit other sectors of the economy. The deployment of 5G technology is also underway, providing a foundation for further advancements in areas like Smart Cities, Internet of Things (IoT), and autonomous vehicles.[226]

Successive Malaysian governments have prioritized the growth of the country's digital economy, which is made clear from the implementation of a wide range of policies and measures to spur digital transformation. Major ones include the *National Big Data Analytics Framework* (2014), the *National IoT Strategic Roadmap* (2015), the *National E-Commerce Strategic Roadmap* (2016), the *National Policy on Industry 4.0* (2018), and the *National Fiberisation and Connectivity Plan 2019-2023*. In 2021, there was a major push by Malaysia towards digital transformation as reflected in the unveiling of the *National Fourth Industrial Revolution (4IR) Policy* document and *Malaysia Digital Economy Blueprint (MyDIGITAL)*.[227]

The National Council of Digital Economy and Fourth Industrial Revolution (MED4IR), which is a committee chaired by the Prime Minister, coordinates the implementation of Malaysia's digitalization strategy. It is supported by six clusters, namely: (1) economy; (2) digital and data infrastructure; (3) talent pool (4) delivery service of the public sector (5) inclusive digital society; and (6) digital environment.

AI ECOSYSTEM

Malaysia's National 4IR Policy document identifies AI as one of the key technologies that "are foundational to the nation's 4IR agenda".[228] In 2021, the Ministry of Science, Technology and Innovation launched the *Malaysian National AI Roadmap for 2021-2025*, a national strategy envisioning "a nation where AI augments jobs, drives national competitiveness, encourages innovation and entrepreneurship to bring economic prosperity, social good, and improve people's wellbeing".[229]

The Roadmap, which builds on the 2015 *National Data Analytics Initiative*, incorporates the Principles for Responsible AI as 1) Fairness, 2) Reliability, Safety & Control, 3) Privacy & Security 4) Inclusiveness, 5) Transparency, 6) Accountability, and 7) Pursuit of human benefit & happiness. It further includes strategies and initiatives to achieve the national vision, such as the adoption of hyperscale AI cloud computing and storage, advancing AI research and development, strengthening digital infrastructure to enable AI, fostering AI talents, cultivating AI awareness, and enhancing global collaboration.[230] In

[225] United States of America Department of Commerce (2023). Market Intelligence: Malaysia Digital Economy, www.trade.gov/market-intelligence/malaysia-digital-economy-0#:~:text=The%20digital%20economy%20contributes%2022.6,fastest%2Dgrowing%20sectors%20in%20Malaysia.
[226] *Ibid.*
[227] ISEAS-Yusof Ishak Institute (2022). Strategic Policies for Digital Economic Transformation: The Case of Malaysia, www.iseas.edu.sg/wp-content/uploads/2022/10/ISEAS_EWP_2022-6_Lee.pdf
[228] Economic Planning Unit, Malaysia Prime Minister's Department (2021) National Fourth Industrial Revolution (4IR) Policy, www.epu.gov.my/sites/default/files/2021-07/National-4IR-Policy.pdf
[229] Ministry of Science, Technology, and Innovation (2021) Malaysia National AI Roadmap 2021-2025, https://airmap.my/
[230] *Ibid.*

addition to the Roadmap, there are also sector-specific AI initiatives such as in healthcare, retail, legal services, banking, and smart cities.[231]

In July 2023, Minister of Science, Technology, and Innovation Chang Lih Kang indicated that the MOSTI is considering spearheading the drafting of a bill to regulate AI, including requiring the labeling of AI-generated content to increase transparency and enable informed consumption.[232] MOSTI is currently working with Universiti Teknologi Malaysia and representatives from government agencies, academia, and industry to develop a code of ethics and governance for AI.[233] This governance and ethics code will form the basis of Malaysia's AI regulation and is expected to be ready by 2024.[234]

While there are multiple government agencies implementing the AI agenda, the Ministry of Science, Technology, and Innovation (MOSTI) is the main coordinator with support from MDEC.[235] There are also several research centers, including the Malaysian Institute of Microelectronic Systems (MIMOS) and the Penang Science Cluster (PSC), aimed at driving AI research efforts in Malaysia. The Malaysian government also launched the *Centre of Artificial Intelligence for Future Industry (CAIFI)* in October 2019 to further support AI ecosystem development in Malaysia.[236]

There has also been a greater inclusion of AI elements in the core curriculum at universities at all levels.[237] According to an Engineering Accreditation Council report, more students are choosing to study AI-related subjects in university; since 2021, the number of students choosing to study Engineering and AI has increased by 30%.[238] In addition, the government is encouraging industry partnerships with universities and creating collaboration opportunities between government agencies and research bodies.[239]

Malaysia's AI start-up scene has been very dynamic with over 90 local start-ups established in recent years focusing on AI applications in various capacities, including image detection, language processing, biometric applications, data analysis, and machine learning.[240] Other businesses in the start-up ecosystem are also using AI for e-commerce, human sentiment analysis, and automated customer support.[241] However, only an estimated 15-20% of Malaysian businesses currently use AI.[242]

While still in the pilot phase, AI has also been implemented within the government, such as facial recognition, biometrics, and elderly monitoring in government/private hospitals.[243] Government agencies have also started using AI to predict positive/negative perceptions on key policy issues (for

[231] AzmiLaw (2023) Overview of Artificial Intelligence in Malaysia, www.azmilaw.com/insights/overview-of-artificial-intelligence-in-malaysia-2/
[232] The Star (2023) Law on AI being studied, Law on AI being studied | The Star
[233] The Edge Malaysia (2023) MOSTI developing code of ethics, governance for AI, expected to be ready by 2024, Mosti developing code of ethics, governance for AI, expected to be ready by 2024 (theedgemalaysia.com)
[234] The Edge Malaysia (2023) MOSTI developing code of ethics, governance for AI, expected to be ready by 2024, Mosti developing code of ethics, governance for AI, expected to be ready by 2024 (theedgemalaysia.com)
[235] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[236] MIMOS (2021) Centre of Artificial Intelligence for Future Industry (CAIFI), www.mimos.my/services/national-facilities/centre-of-artificial-intelligence-for-future-industry-caifi/#:~:text=MIMOS%20Centre%20of%20Artificial%20Intelligence,showcase%20and%20national%20initiative%20alignment.
[237] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[238] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[239] IIC (2020) Artificial Intelligence in the Asia-Pacific Region, www.iicom.org/wp-content/uploads/IIC-AI-Report-2020.pdf
[240] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[241] Analytics India Mag (2019) A Quick Look At 5 Deep Tech Startups In Malaysia With Big Ambitions, https://analyticsindiamag.com/a-quick-look-at-5-deep-tech-startups-in-malaysia-with-big-ambitions/
[242] Tech Collective (2022) Delivering real-world intelligence using AI for businesses in Malaysia, https://techcollectivesea.com/2022/07/20/real-world-intelligence-ai/#:~:text=Artificial%20intelligence%20(AI)%20especially%20is,believe%20more%20businesses%20must%20understand.
[243] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

the government).[244] Sentiment analysis such as the use of natural language processing, text analysis, computational linguistics, and biometrics to identify, extract, quantify, and study affective states and subjective information, has been a key differentiator and is the main AI trend in Malaysia.[245]

[244] IIC (2019) Artificial Intelligence in the Asia-Pacific Region, www.iicom.org/wp-content/uploads/IIC-AI-Report-2020.pdf
[245] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

MYANMAR

COUNTRY OVERVIEW

Over the past decade, Myanmar has prioritized digital technologies and integrated them into national policies and plans. For example, the *Myanmar Digital Economy Roadmap* was released in February 2019 by the Ministry of Transport and Communications to centralize both current and future digital economy initiatives.[246] The Roadmap is complemented by the *Myanmar e-Governance Master Plan 2016-2020* which aims to digitize public services and government activities.

Supportive reforms liberalizing the telecommunications sector in 2013 have allowed Myanmar to catch up with the region.[247] As of 2023, the country has 22 million Internet users, with a penetration rate of 44%, and 64.60 million mobile connections, representing 118% of the total population.[248]

However, there is still significant potential for growth, particularly in reaching rural, remote, and vulnerable populations, as unique SIM penetration remains low. The government aims to increase Internet access and upgrade Internet infrastructure to enable a comprehensive e-strategy, specifically in areas such as education and governance, while also focusing on enhancing the technical competence of the workforce.

While Myanmar's digital economy is expected to continue to grow, there remains considerable room for improvement. The country should seize the opportunity to accelerate overall trade by harnessing its national digitalization efforts and reflecting international standards. This necessitates increased investments in ICT infrastructure and the development of appropriate policy frameworks. Myanmar currently has no specific laws or regulations on intellectual property rights, privacy, right to information, or cybercrime.

Although a draft cybersecurity law was circulated among selected business associations for comment in 2021, the military regime opted to incorporate privacy and data protection provisions into the *Electronic Transaction Law* rather than adopting a separate *Cybersecurity Law*. In 2022, a revised draft of the *Cybersecurity Law* was released for further consultation, which included measures prohibiting unauthorized use of VPNs.[249]

AI ECOSYSTEM

The AI ecosystem in Myanmar is very nascent, suggesting a lot of potential due to a largely untapped AI market.[250]

A few noteworthy AI projects and applications do stand out in Myanmar. Authorities in Mandalay have made use of AI to optimize traffic flows across the city; the technology is known as the Sydney Coordinated Adaptive Traffic System (SCATS), which uses AI to generate dynamic traffic-flow

[246] Digital Economy Development Committee, www.mopf.gov.mm/en/ministry-article/publication/myanmar-digital-economy-roadmap
[247] World Bank (2015) Myanmar's telecom sector takes off, https://blogs.worldbank.org/ppps/myanmars-telecom-sector-takes
[248] Datareportal (2023) Digital 2023: Myanmar, https://datareportal.com/reports/digital-2023-myanmar.
[249] MCRB (2022) The Right to Privacy in the Digital Age: Experience from Myanmar, www.ohchr.org/sites/default/files/documents/issues/digitalage/reportprivindigage2022/submissions/2022-09-06/CFI-RTP-Myanmar-Centre-Responsible-Business.pdf.
[250] National Center for High-performance Computing (2019) 2019 SCSE AI Technology, Application and Innovation for Digital Cities https://event.nchc.org.tw/2019/SmartCitiesAI/; Charlie Than and U Aung Myint (2019) Smart Cities in Myanmar, https://event.nchc.org.tw/2019/SmartCitiesAI/download.php?fcode=2cce3440-5f46-11e9-8291-005056a946bd.pdf&fname=Charlie%20Than.pdf

visualizations from data collected from remote-control traffic lights, high-definition video cameras, and road sensors throughout the city.[251]

In agriculture, AI is also being leveraged in promising pilot programs. For example, Yangon-based AgriTech start-up Village Link introduced Htwet Toe, a mobile application that allows farmers to upload photos of their crop issues, ask questions, and receive suggested remedies from Village Link's agricultural professionals. Village Link is tapping on AI and image recognition technology to help improve the application in the near future.[252]

Another area where AI has been applied in Myanmar is in the healthcare sector. During the COVID-19 pandemic, Helping Our People Everyday (HOPE) Telecare, a digital healthcare platform in Myanmar that provided free online healthcare services through volunteer doctors, partnered with DOC2US, a Malaysian telemedicine provider to extend telemedicine solutions to those in Myanmar who needed it. As part of the next phase of collaboration, DOC2US will be incorporating its blockchain technology in electronic health records, artificial intelligence, and digital signature system to further enhance HOPE's offerings.[253]

To support further growth, Myanmar needs to address a few key challenges. Chief among them is the lack of enabling policies and regulations around AI. Myanmar has not developed a national AI strategy, mainly because of a lack of technical knowledge or operational understanding of the policy and regulatory requirements of leveraging AI for economic development.[254]

Likewise, Myanmar does not have a single principal data protection law and does not have a data protection agency. Its data protection and privacy legislation is fragmented and elements of it are spread out across four legal instruments,[255] namely: the *Constitution of the Republic of the Union of Myanmar* (2008); the *Law Protecting the Privacy and Security of Citizens* of 8 March 2017 as amended by *Law No. 16/2020*; the *State Administration Council Law 4/2021*; and the *Electronic Transactions Law* of 30 April 2004 as amended by *Law No. 6/2014)* and the *State Administration Council Law No. 7/2021*.

In this context, the *ASEAN Guide on AI Governance and Ethics* marks a turning point for Myanmar, as it reflects an official (and publicly visible) commitment to leveraging digital technologies for the good of populations, businesses, and institutions alike. On the international stage, Myanmar has not endorsed the OECD's or the G20's *AI Principles*, but it has adopted the *UNESCO Recommendation on the Ethics of AI* together with all 193 members of UNESCO. It remains to be seen how Myanmar will implement these in practice.[256]

Myanmar faces many other challenges; first, a critical shortage of skilled workforce to accelerate change and development in Myanmar. As per 2018 figures, Myanmar's secondary school enrolment rate was 68%[257] and tertiary school enrolment rate was 19%.[258] Myanmar thus lacks an adequate professional workforce, especially technical professions required in the ICT sector (engineers, electricians, data

[251] The Asia Foundation (2018) Leapfrogging and Sidestepping: Outliers Spark Municipal Reform in Myanmar, https://asiafoundation.org/2018/12/05/leapfrogging-and-sidestepping-outliers-spark-municipal-reform-in-myanmar/
[252] Techwire Asia (2020) Myanmar at the crossroads of a tech-driven agriculture boom, https://techwireasia.com/2020/10/myanmar-at-the-crossroads-of-a-tech-driven-agriculture-boom/
[253] Techwire Asia (2021) Myanmar relying on digital healthcare and telemedicine to deal with COVID-19, https://techwireasia.com/2021/10/myanmar-relying-on-digital-healthcare-and-telemedicine-to-deal-with-covid-19/
[254] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.
[255] Center for AI and Digital Policy (2022) Artificial Intelligence and Democratic Values, www.caidp.org/reports/aidv-2022/
[256] *Ibid.*
[257] World Bank Data Bank (2022) School enrollment, secondary (% gross) - Myanmar, https://data.worldbank.org/indicator/SE.SEC.ENRR?locations=MM
[258] World Bank Data Bank (2022) School enrollment, tertiary (% gross) - Myanmar, https://data.worldbank.org/indicator/SE.TER.ENRR?locations=MM

scientists, lawyers, and accountants).[259] Myanmar is in a particularly unique situation in that it has a young, digital-native population that is eager to learn and apply new skills for the overall improvement of the country. [260] The younger generation has a genuine interest in technological and digital solutions including AI/ML.[261]

Another challenge facing Myanmar is the lack of infrastructure to support the adoption of AI. Myanmar still lacks widespread access to reliable electricity and internet connectivity, which are essential for the development of AI-based technologies. Among the ASEAN countries, Myanmar has the lowest electrification rate, with only half of its population connected to the national grid and 80% of the rural people having no access to grid electricity.[262]

Meanwhile, Myanmar's internet penetration rate stands at 44%.[263] The government is working to address these issues by investing in infrastructure projects such as the *National Electrification Project*[264] and the *Myanmar Digital Economy Roadmap 2018-2025*.[265]

AI start-ups in Myanmar are also facing difficulties in various areas, such as challenges in raising sufficient capital to fund start-up operations and growth, collecting localized data and information (e.g., specific weather and agricultural data for AgriTech AI start-ups), training AI models to understand local languages (most AI start-ups/companies in Myanmar are focusing on image and language processing), and ensuring that the AI applications are easy to use for non-urban or non-English-educated populations.

Lastly, there is the issue of political stability and security. Human Rights Watch has expressed its "heightened concern" over cameras armed with AI technology that can scan faces and vehicle license plates in public places. Furthermore, sections of the *Law Protecting the Privacy and Security of Citizens* have been suspended,[266] with immense implications for the potential of AI being used for purposes other than productivity and efficiency gains.

Following the military coup in Myanmar, many AI start-ups have shifted their operations to neighboring countries due to the increasingly unfavorable business environment. For instance, AgriTech AI start-up Greenovator has moved operations from Myanmar to Chiang Mai, Thailand.[267]

[259] Nathan Associates (2018) ICT Development for Innovation and Growth in Myanmar, https://nathaninc.com/wp-content/uploads/2018/02/MooreMadden-ICT-reducedsize.pdf
[260] ASEAN (2022) ASEAN-ROK Technical and Vocational Education and Training Mobility (TEAM) Programme, Country Report: Myanmar, https://asean.org/wp-content/uploads/2022/10/20221006-6.Country-Report_Myanmar.pdf
[261] National Center for High-performance Computing (2019) 2019 SCSE AI Technology, Application and Innovation for Digital Cities https://event.nchc.org.tw/2019/SmartCitiesAI/; Charlie Than and U Aung Myint (2019) Smart Cities in Myanmar, https://event.nchc.org.tw/2019/SmartCitiesAI/download.php?fcode=2cce3440-5f46-11e9-8291-005056a946bd.pdf&fname=Charlie%20Than.pdf
[262] International Trade Administration (2023) Burma - Country Commercial Guide, www.trade.gov/country-commercial-guides/burma-energy
[263] Datareportal (2023) Digital 2023: Myanmar, https://datareportal.com/reports/digital-2023-myanmar
[264] Government of Myanmar, Myanmar National Electrification Project, https://drdnepmyanmar.org/en
[265] Oxford Business Group, Myanmar's new digital strategy improves ICT development and network readiness, https://oxfordbusinessgroup.com/reports/myanmar/2020-report/economy/connection-roadmap-new-digital-strategy-for-government-trade-and-investment-to-improve-sector-development-and-network-readiness
[266] Tilleke & Gibbins (2021) Myanmar Amends Legislation on the Privacy and Security of Citizens amid State of Emergency, www.tilleke.com/insights/myanmar-amends-legislation-on-the-privacy-and-security-of-citizens-amid-state-of-emergency/
[267] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

THE PHILIPPINES

COUNTRY OVERVIEW

The potential of the Philippines' digital economy represents a significant portion of the country's growth and socioeconomic development. According to Digital Transformation ng Pilipinas (DigiPinas), a local industry group, the Philippines' digital economy is valued at USD 20 billion, with the potential to reach USD 150 billion by 2033.[268]

On the policy front, the need for digital transformation to accelerate post-pandemic economic recovery continues to be a key policy priority, and the digitalization of key sectors including finance, agriculture, healthcare, and public service delivery remains a critical part of the national economic strategy.[269]

The Philippines has been actively seeking out foreign investment to grow their industries, including a four-day trip in May 2023 by President Marcos Jr. to the United States, where he pitched the Philippines as a potential investment partner in areas such as digital infrastructure.[270]

In addition to ongoing efforts to support digital transformation and innovation, the Philippines government has also been making progress by putting in place some regulatory safeguards to manage the use of data and technology. Most notably, the Philippines passed its *Data Privacy Act* in 2012,[271] significantly ahead of many other Asian economies.

Since then, its National Privacy Commission has been actively developing and implementing regulations and other forms of guidance to manage the use of personal data and automated decision-making (ADM) systems.[272] The Philippines has also responded to perceived gaps in their existing framework to develop new legislation. This includes the *E-commerce Bill* that will cover all e-transactions,[273] as well as the upcoming *Cybersecurity Bill* that is expected to follow the ongoing consultation on the country's cybersecurity strategy.[274]

AI ECOSYSTEM

AI is generally nascent in the Philippines, with the private sector leading in AI innovation and investment and the government largely focused on building foundational enabling frameworks. The decision to focus on supporting innovation and giving industry the space to drive research is deliberate.

In 2021, the Philippines launched its *National AI Strategy Roadmap*, but no other policies or regulations.[275] The development of standards and guidelines currently does not seem like a priority for the Philippines government, which has focused on enabling innovation and developing an AI-ready workforce. For example, the *National AI Strategy Roadmap* did not call for any specific regulations to

[268] Digital Transformation ng Pilipinas (2023) Gov't online shift may boost Philippine digital economy, www.bworldonline.com/technology/2023/01/05/496484/govt-online-shift-may-boost-philippine-digital-economy
[269] The Philippines National Economic and Development Authority (2023) Philippine Development Plan 2023-2028, https://pdp.neda.gov.ph/wp-content/uploads/2023/01/PDP-2023-2028.pdf
[270] The Straits Times (2023) Marcos wraps up US trip with a deeper alliance – and reassurances for China, www.straitstimes.com/world/united-states/marcos-wraps-up-us-trip-with-deepened-alliance-and-reassurances-for-china
[271] The Philippines National Privacy Commission (2023) Data Privacy Act of 2012, https://privacy.gov.ph/data-privacy-act/
[272] The Philippines National Privacy Commission (2022) Registration of Personal Data Procession System, Notification regarding automated decision-making or profiling, designation of data protection officer, and the national privacy commission seal of registration, https://privacy.gov.ph/wp-content/uploads/2023/05/Circular-2022-04-1.pdf
[273] Philippine Star (2022) House OKs e-commerce bureau bill, www.philstar.com/headlines/2022/12/08/2229333/house-oks-e-commerce-bureau-bill
[274] The Philippines Department of Information and Communications Technology (2023) DICT seeks public's inputs on draft National Cybersecurity Plan 2023-2028, https://dict.gov.ph/dict-seeks-publics-inputs-on-draft-national-cybersecurity-strategy-2023-2028/
[275] The Philippines Department of Trade and Industry (2021) National AI Strategy for the Philippines, https://innovate.dti.gov.ph/resources/roadmaps/artificial-intelligence/

be developed. Instead, it called for the build-up of an AI ecosystem, and the AI ecosystem's "conscience".[276]

The Philippines currently does not have a national AI body, though the Department of Trade and Industry (DTI), the Department of Science and Technology (DOST), the Department of Information and Communications Technology (DICT), and the Commission on Higher Education (CHED) have all been identified as government bodies tasked to look into AI.[277]

Separately, a member of the House of Representatives has proposed a draft Bill on "Promoting the Development and Regulation of AI in the Philippines".[278] Amongst other things, the Bill seeks to establish a new AI Development Authority (AIDA) that would develop AI regulations and oversee compliance.[279] At this early stage, it is difficult to tell whether the Bill will have the necessary traction.[280]

The development of an AI-friendly business environment and an AI ecosystem has been the government's top priority when it comes to their policy approach to AI. The *National AI Strategy Roadmap* identified key challenges facing the development of such an ecosystem, including the need to enhance the existing network and connectivity infrastructure, the need for additional cloud resources, access to data, and an AI-ready workforce.[281] Many of these challenges are significant, and the government continues to work to improve on them.

There has been a growing number of stakeholders, particularly from the education sector, calling for safeguards to be put in place. The draft Bill on Promoting the Development and Regulation of AI in the Philippines calls for a central AI body and AI regulations or guidelines, though it is currently uncertain if it would pass.[282]

Most recently, the Department of Labor and Employment (DOLE) and DICT have called for safeguards to mitigate the impact of AI on employees.[283] However, as DOLE has only committed to further studying the issue, it is unclear if any standards or regulations will emerge.[284]

Likewise, DOLE and the Labor Secretary recently called for regulations governing the use of AI in the workplace.[285] The key concern appears to be the potential impact of the use of AI on employees, particularly in the business process outsourcing (BPO) space which forms a key part of Philippines' economy.[286] The DICT has also echoed DOLE's call for regulation in this area.[287]

Given the significant role that conglomerates play in the Philippines' economy, the government has also sought their cooperation to build the AI ecosystem. In June 2023, DTI announced that the conglomerates agreed to cooperate with the government to provide USD 20 million to fund the

[276] Towards Data Science (2022) AI Strategy is Now a Nation-Defining Capability, https://towardsdatascience.com/ai-strategy-is-now-a-nation-defining-capability-35f64bda1054
[277] The Philippines Department of Trade and Industry (2021) National AI Strategy for the Philippines, https://innovate.dti.gov.ph/resources/roadmaps/artificial-intelligence/
[278] BusinessWorld (2023) Bill seeks development, regulation of AI technology, www.pna.gov.ph/articles/1201053
[279] Philippine News Agency (2023) Solon calls for passage of bill protecting public from AI risks, https://privacy.gov.ph/data-privacy-act
[280] *Ibid*.
[281] The Philippines Department of Trade and Industry (2021) National AI Strategy for the Philippines, https://innovate.dti.gov.ph/resources/roadmaps/artificial-intelligence/
[282] Philippine News Agency (2023) Solon calls for passage of bill protecting public from AI risks, https://privacy.gov.ph/data-privacy-act/
[283] Philippine Star (2023) DOLE backs regulating AI in workplace, www.philstar.com/headlines/2023/06/14/2273753/dole-backs-regulating-ai-workplace
[284] *Ibid.*
[285] Philippine Star (2023) DOLE backs regulating AI in workplace, www.philstar.com/headlines/2023/06/14/2273753/dole-backs-regulating-ai-workplace
[286] HRM Asia (2023) Regulation of AI in the workplace considered in the Philippines, https://hrmasia.com/regulation-of-ai-in-the-workplace-considered-in-the-philippines/
[287] CNN Philippines (2023) DICT chief backs calls for AI regulation in workplace, www.cnnphilippines.com/news/2023/6/15/dict-ai-regulation-workplace.html

establishment of the proposed National Center for AI Research (NCAIR), suggesting that the conglomerates see AI as strategically important as well.[288]

With the rising media attention on AI, a growing number of stakeholders are making their voices heard or studying the issue internally. This includes Philippines' National Innovation Council, the Analytics Association of Philippines (AAP), the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), the National ICT Confederation of the Philippines (NICP), the Advanced Manufacturing Workforce Development (AMDev) Program, the Collaborative Research and Development to Leverage Philippine Economy (CRADLE) program, the Asian Institute of Management, the University of Philippines, the Philippine Institute for Development Studies (PIDS), and others.[289]

[288] Philippine News Agency (2023) Conglomerates investing $20-M for AI center, www.pna.gov.ph/articles/1177557
[289] OpenGov Asia (2023) Promoting and Creating AI Awareness in the Philippines, https://opengovasia.com/promoting-and-creating-ai-awareness-in-the-philippines/

SINGAPORE

COUNTRY OVERVIEW

Singapore has made significant progress in its digital transformation efforts to actively embrace technology to drive economic growth, innovation, and competitiveness. It is ranked fourth globally (and top in Asia) out of 63 countries in the 2022 International Institute for Management Development (IMD) World Digital Competitiveness Index.[290] IMD also recognized Singapore as the leading smart city in Asia and the seventh smartest in the world.[291] This is attributed to a combination of factors, including modern physical and digital infrastructure, a strong digital talent base, and robust Intellectual Property (IP) regulations.

Singapore also has a flourishing digital economy, which was valued at USD 18 billion in 2022 and has the potential to reach USD 30 billion by 2025.[292] This growth is driven largely by e-commerce, which is expected to hit USD 11 billion, a USD 9 billion recovery in online travel, and a high digital adoption in ecommerce (98%) and food delivery (92%). Singapore also remains a key investment destination in the region with digital financial services continuing to attract the most investor interest, taking up 25% of the USD 1.9 billion investment pool in H1 2022.[293]

The *Smart Nation* initiative guides the Singapore government's push towards digital transformation. It comprises three key pillars, namely (1) Digital Economy; (2) Digital Government; and (3) Digital Society, with the aim of increasing total factor productivity, improving the lives of Singaporeans, retaining local talent and attracting foreign talent.[294]

There are also five main domains that the Smart Nation Initiative is focusing on transforming: (1) transport; (2) finance; (3) urban living, (4) education; and (5) health. In engineering its transformation into a Smart Nation, the Singapore government has also pursued several Strategic National Projects to drive and enable the adoption of digital and smart technologies throughout Singapore. Notable ones include *GoBusiness*, *CODEX*, *E-Payments*, *LifeSG*, the *Smart Nation Sensor Platform*, *Punggol Smart Town*, and *Smart Urban Mobility*.[295] There is also a call to focus on sustainability with the *Singapore Green Plan 2030* which aims to harness technology-driven solutions to "secure a green, livable, and sustainable home for generations of Singaporeans".

Despite significant progress, there remain several barriers that Singapore faces to unlocking the full benefits of digital transformation. One such barrier is the limited adoption of advanced digital technologies. While most businesses in Singapore have Internet access and an online presence, adoption rates for advanced technologies such as the Internet of Things (IoT) are considerably lower. In particular, small- and medium-sized enterprises (SMEs) face greater challenges in adopting such technologies.

[290] International Institute for Management Development (2023) World Digital Competitiveness Ranking, www.imd.org/centers/wcc/world-competitiveness-center/rankings/world-digital-competitiveness-ranking/
[291] Smart Nation Singapore (2023) Singapore named top Asian city in the 2023 IMD Smart City Index, www.smartnation.gov.sg/about-smart-nation/our-journey/achievements/
[292] Google, Temasek, Bain & Company (2022) e-Conomy SEA 2022: Through the waves, towards a sea of opportunity, https://services.google.com/fh/files/misc/e_conomy_sea_2022_report.pdf
[293] Temasek (2022) e-Conomy SEA 2022 report: Southeast Asia's digital economy is on course towards $200B GMV in 2022, three years earlier than projected, www.temasek.com.sg/en/news-and-resources/news-room/news/2022/e-Conomy-SEA-2022-report
[294] Singapore Computer Society (2020) Singapore Smart Nation Initiatives and Possible Opportunities, www.scs.org.sg/articles/smart-nation-singapore
[295] Smart Nation Singapore (2023) Our Strategic National Projects, www.smartnation.gov.sg/about-smart-nation/transforming-singapore/

Another barrier is the lack of specific digital skills that have increased in demand, particularly with the COVID-19 pandemic. A recent online survey carried out by Gallup and Amazon Web Services (AWS) in 2022 found that while Singapore has one of the highest digital literacy rates in the region, only about 10% of workers have advanced digital skills such as cloud architecture, software development, artificial intelligence (AI) and machine learning (ML).[296]

AI ECOSYSTEM

The Singapore government announced its first *National AI Strategy* in 2019 to map out a plan for the development and deployment of scalable, impactful AI solutions in key sectors of high value and relevance by 2030.[297]

Since then, significant advancements in the AI landscape, including the release of ChatGPT in November 2022, has prompted the Singapore government to refine its national AI strategies. [298] In December 2023, the Singapore government introduced the second iteration, *National AI Strategy 2.0 (NAIS 2.0)*, which outlines its ambitions "to be a pace-setter—a global leader in choice AI areas, that are economically impactful and serve the Public Good".[299]

Underpinned by the vision "AI for the Public Good, for Singapore and the World", the *NAIS 2.0* revolves around two twin goals: (1) Excellence: To selectively develop peaks of excellence, advance the field, and maximize value creation in AI; and (2) Empowerment: To raise up individuals, businesses, and communities to use AI with confidence, discernment, and trust.[300]

To achieve this, the new strategy will direct efforts through ten enablers in three categories of activity drivers (industry, government, and research), people and communities (talent, capabilities, and placemaking), and infrastructure and environment (compute, data, trusted environment, and leader in thought and action).[301] The *NAIS 2.0* outlines 15 courses of action over the next three to five years.[302] These include AI-specific training programs, a dedicated physical space for AI, and the allocation of a sufficient carbon budget for data centers.[303]

The revised national AI strategy embodies three key shifts. First, Singapore has repositioned AI as a necessity rather than an opportunity or accessory, and highlighted the need to have both technical experts and savvy users to maximize AI's potential.[304] Second, Singapore has shifted from a local to global outlook, and now harbors global ambitions to make a significant contribution to AI breakthroughs globally.[305] Third, Singapore will transition from a projects-to-systems approach, moving beyond flagship National AI Projects to develop wide-scale infrastructure and foundation for AI. [306]

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[296] The Straits Times (2022) Less focus on degrees could ease tech talent crunch: Survey, www.straitstimes.com/business/old-school-bosses-let-tech-workers-slip-through-the-net-survey
[297] Smart Nation Singapore (2023) The Next Frontier of Singapore's Smart Nation Journey, www.smartnation.gov.sg/initiatives/artificial-intelligence/
[298] Smart Nation Singapore (2023) National AI Strategy, www.smartnation.gov.sg/nais/
[299] Smart Nation Singapore (2023) National AI Strategy, www.smartnation.gov.sg/nais/
[300] Smart Nation Singapore (2023) National AI Strategy, www.smartnation.gov.sg/nais/
[301] Smart Nation Singapore (2023) National AI Strategy, www.smartnation.gov.sg/nais/
[302] Smart Nation Singapore (2023) National AI Strategy, www.smartnation.gov.sg/nais/
[303] The Business Times (2023) Singapore updates AI strategy with aim to contribute globally valuable breakthroughs, www.businesstimes.com.sg/startups-tech/startups/singapore-updates-ai-strategy-aim-contribute-globally-valuable-breakthroughs
[304] Lexology (2023) The Shape of Things to Come - Singapore Unveils National AI Strategy 2.0, www.lexology.com/library/detail.aspx?g=3b1ed241-3edf-4752-b4c6-35035a7e4d32#:~:text=The%20NAIS%202.0%20is%20based,way%20to%20create%20positive%20impact
[305] Computerworld (2023) Singapore makes key policy shifts in revised national AI strategy, www.computerworld.com/article/3711387/singapore-makes-key-policy-shifts-in-revised-national-ai-strategy.html
[306] Lexology (2023) The Shape of Things to Come - Singapore Unveils National AI Strategy 2.0, www.lexology.com/library/detail.aspx?g=3b1ed241-3edf-4752-b4c6-35035a7e4d32#:~:text=The%20NAIS%202.0%20is%20based,way%20to%20create%20positive%20impact

In the domain of responsible AI governance, the Singapore government pioneered Asia's first *Model AI Governance Framework*, to provide "detailed and readily implementable guidance to private sector organizations to address key ethical and governance issues when deploying AI solutions".[307]

The Framework adopts a risk-based management approach to address the technology risks associated with AI and is based on two high-level guiding principles: (1) Organizations using AI in decision-making should ensure that the decision-making process is explainable, transparent, and fair, and (2) AI solutions should be human-centric.[308]

Additionally, the Singapore government launched *AI Verify* in May 2022, an AI governance testing framework and software toolkit to help organizations validate the performance of their AI systems against internationally recognized AI governance principles (e.g., those from the EU, OECD, and Singapore) through standardized tests.[309] The Singapore government subsequently launched the *AI Verify Foundation* in June 2023 to harness the collective contributions of the global open source community to develop AI testing tools for the responsible use of AI.[310] Most recently, in January 2024, Singapore introduced the *Model AI Governance Framework for Generative AI*, a new model aimed at expanding the existing framework covering traditional AI and which was last updated in 2020.[311]

Other sector-specific frameworks that the Singapore government has created include the *Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector*,[312] the *National AI Program in Government*,[313] *the Veritas Initiative* for the financial industry,[314] the *National AI Program in Finance*,[315] and the *Artificial Intelligence in Healthcare Guidelines (AIHGle)*.[316]

The Singapore government also established an *Advisory Council on the Ethical Use of AI and Data*, and a research program on the *Governance of AI and Data Use* in partnership with Singapore Management University.[317] A *Digital Services Laboratory* (DSL) program was also set up to bring together relevant parties to identify strategic areas benefiting from faster intermediation, and address digitalization challenges. Meanwhile, the Artificial Intelligence Technical Committee (AITC), formed under the Information Technology Standards Committee (ITSC), will recommend the adoption of relevant international AI standards for Singapore, and further promote awareness of AI emerging standards.[318]

Singapore also has a thriving AI research and start-up ecosystem. Launched in 2017, *AI Singapore* brings together all Singapore-based research institutions and companies developing AI products to perform

[307] IMDA (2019) Model AI Governance Framework, www.imda.gov.sg/about-imda/research-and-statistics/sgdigital/tech-pillars/artificial-intelligence
[308] PDPC (2020) Model Artificial Intelligence Governance Framework Second Edition, www.pdpc.gov.sg/-/media/Files/PDPC/PDF-Files/Resource-for-Organisation/AI/SGModelAIGovFramework2.pdf
[309] IMDA (2023) Singapore launches AI Verify Foundation to shape the future of international AI standards through collaboration, www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/singapore-launches-ai-verify-foundation-to-shape-the-future-of-international-ai-standards-through-collaboration
[310] IMDA (2023) Singapore launches AI Verify Foundation to shape the future of international AI standards through collaboration, www.imda.gov.sg/resources/press-releases-factsheets-and-speeches/press-releases/2023/singapore-launches-ai-verify-foundation-to-shape-the-future-of-international-ai-standards-through-collaboration
[311] Channel News Asia (2024) Singapore proposes generative AI framework, www.channelnewsasia.com/singapore/generative-ai-artificial-intelligence-proposal-framework-4051526
[312] MAS (2018) Principles to Promote Fairness, Ethics, Accountability and Transparency (FEAT) in the Use of Artificial Intelligence and Data Analytics in Singapore's Financial Sector, www.mas.gov.sg/~/media/MAS/News%20and%20Publications/Monographs%20and%20Information%20Papers/FEAT%20Principles%20Final.pdf
[313] Straits Times (2021) S'pore to invest additional $180m to accelerate AI research; launches two new AI programmes, www.straitstimes.com/business/spore-to-invest-additional-180m-to-accelerate-ai-research-launches-two-new-ai-programmes
[314] MAS (2023) Veritas Initiative, www.mas.gov.sg/schemes-and-initiatives/veritas
[315] Smart Nation Singapore (2021) Two New National AI Programmes Launched, www.smartnation.gov.sg/media-hub/press-releases/new-ai-programmes-2021
[316] Andaman Medical (2021) Singapore publishes Artificial Intelligence in Healthcare Guidelines (AIHGle), https://andamanmed.com/singapore-publishes-artificial-intelligence-in-healthcare-guidelines-aihgie
[317] Singapore Government (2018) AI Governance and Ethics Initiatives, www.gov.sg/~/sgpcmedia/media_releases/imda/press_release/P-20180605-1/attachment/Artificial%20Intelligence%20Governance%20and%20Ethics%20Initiatives.pdf
[318] IMDA (2023) AI Technical Committee, www.imda.gov.sg/itsc/technical-committees/artificial-intelligence-technical-committee-aitc

use-inspired research, grow knowledge, create tools, and develop the talent to power Singapore's AI efforts.[319] Despite its small size, Singapore is also home to large number of AI start-ups (899).[320]

Additionally, about one-third of companies in Singapore have implemented AI in some capacity, as highlighted in the 2021 *Global AI Adoption Index*.[321] Against this backdrop, policymakers are keen to build the foundations for and drive the rapid take up of AI, given its presumed potential to strengthen Singapore's economy—adding up to USD 215 billion in gross value across 11 industries by 2035[322]—and positioning Singapore as the data, algorithmic, and talent hub for the region.[323]

[319] AI Singapore (2023) AI Singapore, www.aisingapore.org
[320] Tracxn (n.d.) AI start-ups in Singapore, https://tracxn.com/explore/Artificial-Intelligence-Startups-in-Singapore/
[321] The Straits Times (2021) 1 in 2 companies in Singapore has sped up AI roll-out in the wake of COVID-19: Study, www.straitstimes.com/tech/tech-news/1-in-2-companies-in-singapore-has-sped-up-ai-roll-out-in-the-wake-of-covid-19-study
[322] CIO (n.d.) How Singapore is using AI, www.cio.com/article/3292616/how-singapore-is-using-artificial-intelligence.html
[323] Digital News Asia (n.d.) Adoption of AI in ASEAN, www.digitalnewsasia.com/digital-economy/adoption-artificial-intelligence-rise-asean

THAILAND

COUNTRY OVERVIEW

The Thailand Board of Investment (BOI) estimates that the country's digital economy is poised for greater growth and is expected to contribute about 25% of Thailand's gross domestic product (GDP) by 2027, up from 17% in 2018.[324] This digital economy growth is driven by e-commerce, rising Internet and mobile penetration, innovations in digital payments, and the acceleration of government-wide digitalization due to the COVID-19 pandemic.

The COVID-19 pandemic has accelerated the government's adoption of digital technologies for effective prevention and control measures. Government agencies have developed new mobile applications, such as Department of Disease Control (DDC)-Care, which enables people to self-assess their COVID-19 infections and provide tracking for people who travelled from at-risk countries. The Department of Disease Control can then access the data as a tool to evaluate the risk of COVID-19 infected people and provide recommendations, including for those who develop COVID-19 symptoms.[325]

The Thai government has also focused on advancing the adoption of new technologies under the Thailand 4.0 vision, which includes Artificial Intelligence, 5G, and Smart Cities, with various initiatives developed by the Ministry of Digital Economy and Society (MDES). A major push by Thailand towards digitalization is reflected in the MDES' Thailand *Digital Economy and Society Development Plan (2018-2037)*, which is a 20-year national digital blueprint for digital transformation of government operations and businesses.

These initiatives provide strong impetus to Thailand's digital economy—it ranks 38th in the Institute for Management Development (IMD) Digital World Competitiveness Ranking in 2021, the highest place it has achieved.[326]

AI ECOSYSTEM

In July 2022, Thailand's *National AI Strategy and Action Plan (2022-2027)* was approved by the Prime Minister's Cabinet Office.[327] This represented a significant milestone in Thailand's AI development journey as prior to this, Thailand did not have national strategy on AI. Most of Thailand's AI initiatives were embedded within broader policies and strategies developed by different ministries and agencies, including the *Twelfth National Economic and Social Development Plan (2017-2021)*,[328] the *Thailand 4.0* policy,[329] and *Digital Park Thailand*.[330]

Thailand 4.0, for example, emphasizes the growth and spread of advanced technologies such as AI, IoT, smart devices, and robotics to transform existing production and services into smart, value-added production and services.

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[324] Thailand Board of Investment (2017) Data Center and Cloud Service in Thailand, www.boi.go.th/index.php?page=business_opportunities_detail&topic_id=128004&language=en
[325] Alita Sharon (2020) COVID-19 pushed digital transformation across Thailand, https://opengovasia.com/covid-19-pushes-digital-transformation-across-thailand
[326] Bangkok Post (2021) Thailand achieves highest digital competitiveness rank to date, www.boi.go.th/index.php?page=business_opportunities_detail&topic_www.bangkokpost.com/business/2190243/thailand-achieves-highest-digital-competitiveness-rank-to-date#:~:text=This%20year%2C%20the%20company%20has,has%20achieved%20since%20ranking%20startedid=128004&language=en
[327] AI Thailand, About AI Thailand, https://ai.in.th/en/about-ai-thailand
[328] National Economic and Social Development Board, Twelfth National Economic and Social Development Plan (2017-2021), www.nesdc.go.th/ewt_dl_link.php?nid=9640
[329] Royal Thai Embassy, Washington DC (n.d.) Thailand 4.0, https://thaiembdc.org/thailand-4-0-2
[330] Board of Investment of Thailand (n.d.) Digital Park Thailand, www.boi.go.th/upload/04_Digital_Park_Thailand&EEC_13589.pdf

Under the vision "Thailand has an effective ecosystem to promote AI development and application to enhance the economy and quality of life within 2027", the *National AI Strategy* outlines five sub-strategies: 1) Preparing Thailand's readiness in social, ethics, law, and regulation for AI application; 2) Developing infrastructure for sustainable AI development; 3) Increasing human capability and improving AI education; 4) Driving AI technology and innovation development; and 5) Promoting the use of AI in public and private sectors.

On ethical AI, it is noteworthy that the first sub-strategy is focused on building a strong legal and regulatory framework for AI application that promotes ethical and safe development and use of AI. The work plans that will drive this sub-strategy include setting out a policy and standard for AI ethics, as well as driving awareness and education around it.

In the first phase of the *Strategy (2022-2023)*,[331] the government of Thailand will study previous work on AI ethics, namely the *Digital Thailand – AI Ethics Guideline*, approved by the Cabinet in February 2021.[332] Most recently, the Steering Committee on AI for Thailand having reported that a '*Thailand AI Ethics Guideline*' has been prepared, alongside the Thai government's release of two comprehensive proposals for regulations following the launch of the *National AI Strategy*.

In October 2022, the Office of the National Digital Economy and Society Commission (ONDE) released the *Draft Royal Decree Business Operations that Use Artificial Intelligence System* for public feedback.[333] This draft Decree adopts a risk-based approach to regulating AI systems, seemingly drawing inspiration from other proposed frameworks, such as the European Commission's proposal on the EU *AI Act*.[334] AI systems deemed as higher risk will be subject to greater regulatory scrutiny, with certain systems being prohibitively risky. [335]

In August 2023, the Electronic Transactions Development Committee of the Electronic Transactions Development Agency (ETDA) released the *Draft Act on the Promotion and Support for National AI Innovations in Thailand* for public comments.[336] The draft Act aims to promote and provide support for the development of an AI ecosystem through legal mechanisms. Notably, it proposes the establishment of an AI promotion committee, comprising representatives from sector-specific regulators, to supervise the implementation of the draft Act. Key proposed mechanisms under the draft Act include a Testing Center Sandbox that allows an AI service provider to test an AI system in a controlled environment prior to launch, and a Manual/guideline/notification for data sharing and creation of a governing data intermediary, amongst others.[337]

[331] AI Thailand, Programs, https://ai.in.th/en/programs
[332] Office of the National Digital Economy and Society Commission (2022) The 1/2022 meeting of the steering committee on artificial intelligence for Thailand development (National AI Committee), https://onde.go.th/view/1/%E0%B8%A3%E0%B8%B2%E0%B8%A2%E0%B8%A5%E0%B8%B0%E0%B9%80%E0%B8%AD%E0%B8%B5%E0%B8%A2%E0%B8%94%E0%B8%82%E0%B9%88%E0%B8%B2%E0%B8%A7/%E0%B8%82%E0%B9%88%E0%B8%B2%E0%B8%A7%E0%B8%97%E0%B8%B1%E0%B9%89%E0%B8%87%E0%B8%AB%E0%B8%A1%E0%B8%94/1754/TH-TH
[333] Baker Mckenzie (2023) AI regulation in Thailand: Current state and future directions, https://insightplus.bakermckenzie.com/bm/attachment_dw.action?attkey=FRbANEucS95NMLRN47z%2BeeOgEFCt8EGQJsWJiCH2WAWuU9AaVDeFguGeARDEncDx&nav=FRbANEucS95NMLRN47z%2BeeOgEFCt8EGQbuwypnpZjc4%3D&attdocparam=pB7HEsg%2FZ312Bk8OIuOIH1c%2BY4beLEAe9Q37ImwtvME%3D&fromContentView=1
[334] AI Asia Pacific Institute (2023) 2023 Trustworthy Artificial Intelligence in the Asia-Pacific Region, https://aiasiapacific.org/
[335] AI Asia Pacific Institute (2023) 2023 Trustworthy Artificial Intelligence in the Asia-Pacific Region, https://aiasiapacific.org/
[336] Baker Mckenzie (2023) AI regulation in Thailand: Current state and future directions, https://insightplus.bakermckenzie.com/bm/attachment_dw.action?attkey=FRbANEucS95NMLRN47z%2BeeOgEFCt8EGQJsWJiCH2WAWuU9AaVDeFguGeARDEncDx&nav=FRbANEucS95NMLRN47z%2BeeOgEFCt8EGQbuwypnpZjc4%3D&attdocparam=pB7HEsg%2FZ312Bk8OIuOIH1c%2BY4beLEAe9Q37ImwtvME%3D&fromContentView=1
[337] Baker Mckenzie (2023) AI regulation in Thailand: Current state and future directions, https://insightplus.bakermckenzie.com/bm/attachment_dw.action?attkey=FRbANEucS95NMLRN47z%2BeeOgEFCt8EGQJsWJiCH2WAWuU9AaVDeFguGeARDEncDx&nav=FRbANEucS95NMLRN47z%2BeeOgEFCt8EGQbuwypnpZjc4%3D&attdocparam=pB7HEsg%2FZ312Bk8OIuOIH1c%2BY4beLEAe9Q37ImwtvME%3D&fromContentView=1

Current initiatives to leverage AI to increase more effective and efficient operations and provision of services are underway in the public and private sector. Thailand's Digital Government Development Agency (DGA), with the mandate of driving government digital transformation, has been implementing several AI initiatives, from AI courses on using AI and furthering knowledge of the ethics of AI for government services[338] to launching AI-powered chatbots to answer citizen queries.[339] The draft *Digital Government Development Plan 2023-2027* was unveiled in February 2023 by the DGA and is expected to further support the usage of AI in government.

Meanwhile, in the private sector, banks are moving towards facial recognition for electronic know-your-customer regulations, as well as blockchain and machine learning for fraud detection. For Dr Passakon Prathombutr, "AI is shaping the future of the financial services industry in Thailand, with more local and foreign FinTech companies implementing AI in their processes and operations."[340]

To further facilitate and enable AI use and development, the Thai government has engaged in public-private partnerships to help it achieve its AI ambitions. For instance, Thailand is participating in the AI for Social Good Project—Strengthening AI Capabilities and Governing Frameworks in Asia and the Pacific, where it is collaborating with the Association of Pacific Rim Universities (APRU), United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and Google researchers. The project aims to explore opportunities and challenges for maximizing AI benefits for society, with Thailand identifying 'Poverty Alleviation' and 'Medicine and Healthcare' as two priority areas.[341]

Nevertheless, while Thailand has great potential and a dynamic AI start-up ecosystem, there are several issues to continue addressing, including building a conducive regulatory environment for the growth of AI innovation and investment, ramping up local and foreign investment,[342] and increasing the pool of local AI talent.

To address the talent gap, the Office of National Higher Education, Science, Research, and Innovation Policy Council (NXPO) is driving public policies to support digital talent development including the *Science, Research and Innovation Fund* and the soon-to-be-launched *Higher Education Fund*. Meanwhile, the *Equitable Education Fund (EEF)* provides 2,500 scholarships annually to support students from low-income families to enter vocational colleges. These scholarships, as well as funding from the private sector, can be tapped to foster digital talent development.[343]

Increasing investments in Thailand's AI ecosystem will also be key. This is on the agenda of the National Innovation Agency (NIA), which is gearing up to support foreign investments in Thailand through joint ventures and partnerships with local entities in technology, targeting US 1 billion worth of deals over five years, including in AI.[344]

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[338] Thailand Digital Government Academy (n.d.) Modern Technology and AI for Government Service, https://tdga.dga.or.th/index.php?option=com_eventbooking&view=event&id=218&catid=34&Itemid=156&lang=th; Thailand Digital Government Academy, AI for Government Services, https://tdga.dga.or.th/index.php?option=com_eventbooking&view=event&id=176&catid=35&Itemid=379&lang=th

[339] Bangkok Post (2022) DGA readies AI rollout to transform state agencies, www.bangkokpost.com/business/2284830/dga-readies-ai-rollout-to-transform-state-agencies

[340] IIC (2019) Artificial Intelligence in the Asia-Pacific Region, www.iicom.org/wp-content/uploads/IIC-AI-Report-2020.pdf

[341] Association of Pacific Rim Universities (2022) APRU on Bloomberg: The next stage: APRU-Google-UN ESCAP AI for Social Good Project now working directly with government agencies, https://apru.org/news/the-next-stage-apru-google-un-escap-ai-for-social-good-project-now-working-directly-with-government-agencies/

[342] Insights based on expert and stakeholder consultations conducted by Access Partnership between March and November 2023. Between interviews, workshops, and one-on-one discussions, Access Partnership gathered the expertise of over 170 AI practitioners from industry, government, academia, and non-profit sectors.

[343] Office of National Higher Education Science Research and Innovation Policy Council (2022) MHESI and MDES join forces to strengthen an ecosystem for digital talent development, www.nxpo.or.th/th/en/14288/

[344] Bangkok Post (2022), Agency focuses on foreign investments, www.bangkokpost.com/business/2466107/agency-focuses-on-foreign-investments

TIMOR-LESTE

COUNTRY OVERVIEW

ICTs play an important role in Timor-Leste's social, political, and economic development. Since independence, the country has made notable progress in expanding mobile phones and mobile broadband coverage to its population.

In the effort to reduce multi-dimensional poverty in the country and transition Timor-Leste from a low-income country to an upper middle-income one, with a healthy, well-educated, and safe population by 2030, the *National Strategic Development Plan (SDP)* was introduced in 2010. This plan provides the vision for Timor-Leste's long-term development from 2011 to 2030. The SDP is an integrated package of policies framed around three pillars: (1) social capital; (2) infrastructure development; and (3) economic development.

The SDP has a total of 149 subgoals across the pillars, which serve as a guide for sector plans, programs and projects developed by the government, and also provide support for the development activities of other actors such as civil society, religious organizations, non-governmental organizations (NGOs), and development partners. The telecommunications sector is included as an important infrastructure sector in the SDP. The SDP has enabled the liberalization of the telecommunications sector and allowed competition through private sector participation, as well as established an independent regulatory body with the aim to improve access to reliable and affordable mobile and broadband services.

The SDP outlines the following three targets for 2020: (1) all citizens will have access to reliable, affordable and high-speed Internet; (2) all students and health professionals will have portable Internet access devices; and (3) Timor-Leste will be part of the technology-enabled world.

In addition to the SDP, the Government of Timor-Leste adopted the *2030 Agenda for Sustainable Development* through Government Resolution No. 34 of 2015 on 23 September 2015, and mandated the establishment of a working group on SDG implementation that is led by the Prime Minister's Office. The 2030 Agenda includes 17 Sustainable Development Goals (SDGs), 169 targets and some 230 indicators. The 2030 Agenda has established the use of ICTs as both a lever and an accelerator in the promotion of the SDGs.

The existing digital divide between Timor-Leste and other AMS could further widen as the fourth industrial revolution ushers in emerging technologies, such as AI, blockchain, Internet of things, and big data.

AI ECOSYSTEM

While the country does not seem to have dedicated policies to foster its AI ecosystem, the maturing of its ICT sector would create a strong foundation for future AI developments AI.

Since 2002, Timor-Leste has made significant strides in developing its telecommunications infrastructure. Prior to independence, the country had limited access to modern communication systems. Telecomunicacoes de Timor-Leste (Telemor), a state-owned company, was established as the primary telecommunications service provider.

Telemor initially focused on basic telephony services, including fixed-line and mobile connections. However, mobile telephony played a vital role in expanding communication services due to its flexibility and cost-effectiveness, with multiple operators entering the market. Efforts were made to improve infrastructure, including the development of submarine fiber-optic cables, to enhance international connectivity and internet access within the country.

In recent years, the government has worked towards liberalizing the telecommunications sector and promoting competition. Prior to its liberalization, Timor-Leste's telecom sector was monopolized by Portugal Telecom. The country's liberalization policies have involved issuing licenses to additional operators, encouraging private sector participation, and diversifying service offerings. Timor-Leste has also focused on improving internet connectivity and digital initiatives. Various projects have been launched to support e-government services, digital literacy, and ICT training programs to enhance digital inclusion and drive economic development.

A major challenge for Timor-Leste is internet connectivity—namely, its reliability and affordability. The International Telecommunication Union (ITU) reports that Timor-Leste faces some of the highest internet costs in the Asia-Pacific region. Limited competition and the geographical challenges of providing connectivity contribute to the high costs of internet services. While the 3G coverage in the country can reach 92% of the population and more than 80% of its population owns a mobile phone, the lack of affordable options means that the country's internet penetration rate is only about 40%.

This obstacle hinders the opportunity for valuable data generation that can then be used by AI models for various commercial and governmental purposes. For those using the internet, the cost factors as a higher percentage of income than for neighboring countries. This suggests that internet affordability might also be a factor of income levels in the country. Improving income levels and internet affordability will be key to leveraging developments in AI for the country.

VIET NAM

COUNTRY OVERVIEW

As one of the most dynamic economies in the Asia-Pacific region, Viet Nam is seen as a new "Asian Tiger".[345] Its digital economy is rapidly growing and diversifying, hitting USD 23 billion GMV in 2022 and expected to reach USD 50 billion by 2025—making it the fastest growing market in the region.[346]

To realize its digital ambitions, Viet Nam will require a significant increase in the country's digital capability, supported by robust policies and legislative frameworks. Viet Nam has launched several national strategies and policies to guide its digital transformation in the years ahead.

In 2019, the COVID-19 pandemic accelerated the process, culminating in 2020 with the launch of two key national strategies to achieve nationwide digitalization through selected sectors and technologies: the *National Digital Transformation Program Through 2025, With Orientations Toward 2030*[347] and the *National Strategy for the Fourth Industrial Revolution Through 2030*.[348] These initiatives lay a solid foundation for further digital transformation processes that will steadily prepare Viet Nam for AI in the future.

The *National Digital Transformation Program* sets out the dual goal of (i) developing a digital government, a digital economy, and a digital society, and (ii) also establishing globally competitive Vietnamese digital technology enterprises. Objectives include growing the digital economy to account for 20% of national GDP by 2025 and 30% by 2030, and to build a safe and reliable legal and regulatory environment by developing legislation and guidelines on interconnectivity and data sharing, as well as regulatory sandboxes to support innovation.[349]

The *National Strategy for the Fourth Industrial Revolution Through 2030* further expands on the digital transformation goals with defined domestic and international goals in e-government, connectivity development, and capabilities in emerging technologies. In particular, there is an emphasis on developing physical and digital infrastructure such as high-speed internet, and investing, researching, and developing key technologies to actively participate in the 4IR such as AI, healthcare technology, IoT, big data, and blockchain.

E-government has emerged as a key priority for Viet Nam's central government. The digitalization of public service delivery, aimed at lowering transaction costs between government, businesses, and people, and leveraging cross-sectoral and cross-agency data, promises significant benefits to enable the development of a digital economy and society.

Decision No. 942/QD-TTg, approving the E-Government Development Strategy Towards the Digital Government in the 2021-2025 Period, with a Vision to 2030 was signed in June 2021,[350] identifying data

[345] Vietnam Investment Review (2021) Vietnam new Asian tiger: Business Times, https://vir.com.vn/vietnam-new-asian-tiger-business-times-91253.html
[346] Google, e-Conomy 2022 SEA Report: Vietnam, https://services.google.com/fh/files/misc/vietnam_e_conomy_sea_2022_report.pdf
[347] Luat Vietnam (2020) Decision No. 749/QD-TTg 2020 National Digital Transformation Program Through 2025, https://english.luatvietnam.vn/decision-no-749-qd-ttg-on-approving-the-national-digital-transformation-program-until-2025-with-a-vision-184241-doc1.html
[348] Luat Vietnam (2020) Decision No. 2289/QD-TTg 2020 the National Strategy on the Fourth Industrial Revolution through 2030, https://english.luatvietnam.vn/decision-no-2289-qd-ttg-dated-december-31-2020-of-the-prime-minister-on-the-promulgation-of-the-national-strategy-on-the-fourth-industrial-revolutio-196528-doc1.html
[349] LuatVietnam (2020) Decision No. 749/QD-TTg 2020 national digital transformation program through 2025, https://english.luatvietnam.vn/decision-no-749-qd-ttg-on-approving-the-national-digital-transformation-program-until-2025-with-a-vision-184241-Doc1.html
[350] Bao Chinh Phu (2021) First e-government development strategy towards digital government issued, https://en.baochinhphu.vn/first-e-government-development-strategy-towards-digital-government-issued-11141453.htm

as a key resource to be leveraged and establishing a whole-of-government approach to digitalize public services.[351]

As Viet Nam seeks to grow its digital economy and draw foreign investment, it will have to pay close attention to growing its MSMEs, which make up 95% of all firms in Viet Nam, 40% of GDP, and employ 50% of the country's workforce.[352] Although an overwhelming number of them think that digital transformation plays an important role, up to 70% are still operating outside the digital economy and only around 20% are "tentatively exploring it."[353] More than half of them (57.6%) have insufficient resources to adopt digital tools in their business operations due to competing demands for time in managing their businesses, unfamiliarity with digital platforms, or having inadequate support to migrate their enterprise online.[354]

AI ECOSYSTEM

AI development and adoption in Viet Nam is emerging as an area of focus for the government. While it is still nascent, there are trends that point to the fast-developing AI industry in Viet Nam.

A 2020 report found that about 49% of respondents (business executives) in Viet Nam were still piloting AI initiatives rather than scaling or having achieved full-scale end-to-end implementation in different activities across sectors. Globally, Viet Nam is ranked 55th out of 181 countries in the 2022 Government AI Readiness Index.[355] While not spectacular, this ranking was an improvement of seven places as compared to 2021's ranking (which in turn was an improvement of 14 places as compared to 2020's ranking).

In 2021, the government launched the landmark *National Strategy on the Research, Development, and Application of AI Until the Year 2030*.[356] The Strategy aims for Viet Nam to be among the top five countries in ASEAN and top 60 in the world for the research, development, and application of AI by 2025, and then top four in ASEAN and top 50 respectively by 2030. It outlines five strategic directions, including the establishment of data and computing infrastructure, legal frameworks to govern the use of AI, an enabling AI ecosystem, promotion of the application of AI, and international cooperation.

While there is no explicit mention of ensuring the ethical and responsible use of AI, the Strategy promises to apply AI towards the betterment of its citizens and to devise a system of laws and regulations that would prevent "abuse and infringement upon legitimate rights and interests of organizations and individuals," as well as to develop "legal documents on privacy protection, human rights…for AI-related activities."

This has been met with skepticism by experts, who find it necessary for Viet Nam to further consider important ethical issues such as privacy and surveillance, bias and discrimination, and the role of human

[351] Ministry of Information and Communications (2021) Vietnam issued its first e-government strategy towards digital government, https://english.mic.gov.vn/Pages/TinTuc/147615/Vietnam-issued-its-first-e-government-strategy-towards-digital-government.html
[352] General Statistics Office of Vietnam, Enterprises, www.gso.gov.vn/en/enterprises; Asia Society Policy Institute (2022) Raising Standards: Data & Artificial Intelligence in Southeast Asia, https://asiasociety.org/policy-institute/raising-standards-data-ai-southeast-asia
[353] Vietnam Insider (2022) Why digital transformation holds huge potential to grow Vietnam's economy, https://vietnaminsider.vn/why-digital-transformation-holds-huge-potential-to-grow-vietnams-economy/
[354] Vietnam Investment Review (2021) Over 57.5 per cent of Vietnamese SMEs struggle with digital transformation: How can they cope with the challenge?, https://vir.com.vn/over-575-per-cent-of-vietnamese-smes-struggle-with-digital-transformation-how-can-they-cope-with-the-challenge-83754.html
[355] VietnamPlus (2023) Vietnam's Government AI Readiness Index higher than global average, https://en.vietnamplus.vn/vietnams-government-ai-readiness-index-higher-than-global-average/249073.vnp
[356] Socialist Republic of Vietnam Government News (2021) National Strategy On R&D and Application of Artificial Intelligence, https://en.baochinhphu.vn/national-strategy-on-rd-and-application-of-artificial-intelligence-11140663.htm

judgment in the National AI Strategy.[357] Viet Nam has also not explicitly endorsed the OECD/G20 *AI principles*,[358] though the *ASEAN Guide on AI Governance and Ethics* signals a certain commitment to implement a collectively agreed-upon vision for ethical and responsible AI.

In June 2023, it was reported that the Deputy Minister of Science and Technology Bui The Duy said the ministry is working with Australian experts to develop "rules to hold AI developers and users responsible for their actions".[359] Furthermore, in April 2023, MIC opened public consultations on a draft *National Standard on Artificial Intelligence and Big Data*, which includes the aim to establish quality requirements for safe and ethical use of AI. Specifically, the draft *Standard on AI* identifies unintentional bias in AI as a key consideration to take note, alongside privacy and data subject rights.[360]

The government has launched supporting initiatives such as *Viet Nam AI Grand Challenge*, a program launched in 2019 to encourage the development of AI technology, through providing funding, support, and resources to AI start-ups and researchers, helping them develop and commercialize their AI solutions. Viet Nam has also set up several AI Centers of Excellence in universities and research institutions to encourage the development of AI technology by providing support to researchers and collaboration opportunities with industry partners to develop AI solutions.[361]

Viet Nam is also strengthening foundational building blocks such as data privacy and protection, and open data that will play a part in driving AI development. In April 2023, the Vietnamese Government promulgated the *Personal Data Protection Decree*, providing a comprehensive and uniform approach to personal data protection in Viet Nam. The government's goal is to ultimately enact a comprehensive and robust law for effective and enforceable personal data protection in 2024.[362]

Though an emerging technology in Viet Nam, many public agencies are already using AI to provide better public services. This is also against the backdrop of its *National AI Strategy*, which commits to applying AI towards elevating public services and making cities smarter.[363]

In Thu Duc City, authorities have established an AI camera system to maintain public security and order, with the capabilities to analyze images, recognize license plates, and predict vehicles' moving routes.[364] Ho Chi Minh City also plans to pilot AI technology for supervising its urban railway system, predicting passengers' demand for using the metro, setting up traffic forecasting models and analyzing traffic behavior, and forecasting the possibility of disease transmission and epidemiological factors.[365]

Meanwhile, the private sector has been key driver of the development of AI in Viet Nam. A few large corporations are prominent in the AI space, notably Financing and Promoting Technology (FPT), Vingroup, and Zalo, which have the resources to invest in the research, development, and deployment

[357] Montreal AI Ethics Institute (2021) Challenges of AI Development in Vietnam: Funding, Talent and Ethics, https://montrealethics.ai/challenges-of-ai-development-in-vietnam-funding-talent-and-ethics/
[358] Center for AI and Digital Policy (2022) Artificial Intelligence and Democratic Values, www.caidp.org/reports/aidv-2022/
[359] Vietnamnet Global (2023) Local firms demand incentives to develop tech industry, https://vietnamnet.vn/en/local-firms-demand-incentives-to-develop-tech-industry-2155362.html
[360] OneTrust Data Guidance (2023) Vietnam: MIC requests comments on draft AI and big data standard, www.dataguidance.com/news/vietnam-mic-requests-comments-draft-ai-and-big-data
[361] MIC (2023) Vietnam well-positioned to benefit from AI: website, https://mic.gov.vn/Pages/TinTuc/tinchitiet.aspx?tintucid=157800
[362] Future of Privacy Forum (2023) Vietnam's Personal Data Protection Decree: Overview, Key Takeaways, And Context, https://fpf.org/blog/vietnams-personal-data-protection-decree-overview-key-takeaways-and-context/
[363] Socialist Republic of Vietnam Government News (2021) National Strategy On R&D and Application of Artificial Intelligence, https://en.baochinhphu.vn/national-strategy-on-rd-and-application-of-artificial-intelligence-11140663.htm
[364] Voice of Vietnam (2022) Thu Duc City operates an AI camera system to manage security and order, https://vov.vn/xa-hoi/thanh-pho-thu-duc-van-hanh-he-thong-camera-ai-quan-ly-an-ninh-trat-tu-post993428.vov
[365] OpenGovAsia (2023) Ho Chi Minh City, Vietnam Deploys AI Applications, https://opengovasia.com/ho-chi-minh-city-vietnam-deploys-ai-applications/

of AI.[366] In 2021, FPT announced an investment of VND 300 billion (USD 13 million) on AI research and development over the next five years.[367]

With strategic funding from VinGroup, VinAI has risen to become among the top 25 AI research-based companies in the world, with a headcount of over 200, of almost 180 are AI scientists.[368] A member of Vingroup, VinBigData, introduced VinBase, a multi-cognitive AI platform that helps Vietnamese enterprises use AI and Big Data solutions in their production and business activities.[369]

Other domestic firms such as Viettel have spun off AI research-based institutes. Viettel's AI open platform features speech synthesis applications that take into account the regional variances in spoken Vietnamese—Northern, Central, and Southern—for use in announcements, customer service systems, and e-readers for the visually impaired or people on the go.[370] There is also a high number of innovative start-ups integrating AI into new products and services. These include the Intelligent Healthcare System for Vietnamese People (VAIPE), a product to convert Vietnamese Voice Into Text (VAIS), a Driver Monitoring System (DMS), and a camera that recognizes people under protective masks.[371]

Various partnerships are also facilitating the development of AI in Viet Nam. In April 2021, Viet Nam launched its first artificial intelligence research center at the Hanoi University of Science and Technology (HUST).[372] In August 2021, the Viet Nam-Australia AI cooperation network was launched. Initiated by Viet Nam's Ministry of Science and Technology (MOST), the network aimed to create a platform for knowledge sharing and opportunities between individuals and organizations across both countries to develop the AI industry in Viet Nam.[373]

[366] Montreal AI Ethics Institute (2021) Challenges of AI Development in Vietnam: Funding, Talent and Ethics, https://montrealethics.ai/challenges-of-ai-development-in-vietnam-funding-talent-and-ethics
[367] The Star (2021) Viet Nam accelerates investment in artificial intelligence, www.thestar.com.my/aseanplus/aseanplus-news/2021/09/08/Viet Nam-accelerates-investment-in-artificial-intelligence
[368] Forbes (2023) Vietnam's AI Leadership Status Is Blossoming, www.forbes.com/sites/cindygordon/2023/02/22/vietnams-ai-leadership-status-is-blossoming/?sh=5d99e6e61a4e
[369] MIC (2023) Vietnamese are becoming more involved in AI solutions, https://english.mic.gov.vn/Pages/TinTuc/157427/Vietnamese-are-becoming-more-involved-in-AI-solutions.html
[370]Viettel (2022) Viettel AI Open Platform: Shaping a digital society on artificial intelligence platform, https://viettelgroup.ai/en.
[371] MIC (2023) Vietnamese are becoming more involved in AI solutions, https://english.mic.gov.vn/Pages/TinTuc/157427/Vietnamese-are-becoming-more-involved-in-AI-solutions.html
[372] Hanoi Times (2021) Vietnam inaugurates first AI research center in Hanoi, https://hanoitimes.vn/vietnam-inaugurates-first-ai-research-center-in-hanoi-316904.html
[373] Hanoi Times (2021) Vietnam-Australia artificial intelligence cooperation network launched, https://hanoitimes.vn/vietnam-australia-artificial-intelligence-cooperation-network-launched-318558.html

APPENDIX III. OVERVIEW OF EXPERT / STAKEHOLDER INTERVIEWS

The desk research used to produce this report was complemented by a series of interviews with AI experts and stakeholders from SEA and other regions. The table below shows the profiles of the interviewees.

COUNTRY / REGION	ORGANIZATION	SECTOR
APAC	Economic Research Institute for ASEAN and East Asia (ERIA)	Academia / Research
APAC	Asia Society Policy Institute	Academia / Research
APAC	Data & Society Research Institute	Academia / Research
APAC	GSMA	NGO / CSO
APAC	Economic Research Institute for ASEAN and East Asia (ERIA)	Academia / Research
APAC	UNDP	Multilateral Organization
APAC	Nathan Associates (aka CADMUS)	Policy Consultancy
Cambodia	Ministry of Post and Telecommunications	Government Representative
Global	Institute for Ethics in Artificial Intelligence (IEAI) - Technical University of Munich	Academia / Research
Global	Responsible AI Institute (RAII)	NGO / CSO
Global	Technische Universität München (TUM)	Academia / Research
Global	ForHumanity	NGO / CSO
Global	Center for AI and Digital Policy (CAIDP)	Academia / Research
Global	Partnership for AI	Multilateral Organization
Global	UNESCO	Multilateral Organization
Indonesia	AmCham Indonesia	Industry Association
Indonesia	Nikel	AI Industry
Indonesia	Nikel	AI Industry
Malaysia	Universiti Sains Malaysia	Academia / Research
Myanmar	Greenovator	AI Industry
Singapore	National University of Singapore	Academia / Research
Singapore	Centre for AI & Data Governance	Academia / Research
Thailand	Artificial Intelligence Entrepreneur Association of Thailand	Industry Association
Thailand	UNESCO, Bangkok	Multilateral Organization
The Philippines	Analytics Association of the Philippines	Industry Association
Viet Nam	Workforce for an Innovation and Start-up Ecosystem (WISE)	AI Industry
Viet Nam	OhmniLabs	AI Industry

APPENDIX IV. COMPARATIVE REVIEW OF ASSESSMENT METHODOLOGIES

To ensure our own benchmarking framework covers all major areas that make for a practical and effective approach to responsible AI in SEA, we examined 11 frameworks and methodologies that are currently available to track the advancement and impact of AI use in different economies using different lenses.

This comparative analysis allows us to identify any potential gaps or limitations that may make these methodologies unusable or impractical given the specificity of SEA economies' AI needs, priorities, targets, aspirations, and capabilities.

OVERVIEW

Our comparative analysis finds that there is no single framework that covers the wide breadth of SEA's unique AI drivers and dynamics, or is designed with SEA economies' range of specific needs, priorities, and capabilities in mind.

The table below presents an overview of the selected statistical frameworks and methodologies that we analyze, deconstruct, and compare to draw best practices for our own benchmarking framework.[374]

KEY STATISTICAL FRAMEWORKS AND METHODOLOGIES		
ORGANIZATION(S)	AI ASSESSMENT(S)	SOURCE(S)
AI Asia Pacific Institute (AIAPI)	Trustworthy Artificial Intelligence in the Asia-Pacific Region 2022	Report
AI Singapore	AI Readiness Index (AIRI) for businesses	Methodology
Center for AI and Digital Policy (CAIDP)	AI & Democratic Values Index 2022	Report
European Commission	AI Watch Index 2021	Report and dataset
IBM	IBM Global AI Adoption Index 2022	Report
Oxford Insights	Government AI Readiness Index 2022	Report and dataset
Stanford University	Artificial Intelligence Index Report 2023	Report and data
Stanford University	AI Vibrancy tool 2021	Interactive platform and datasets
Tortoise Media	The Global AI Index 2023	Methodology report and interactive data platform
Responsible Artificial Intelligence (AI) Lab (RAIL), Kwame Nkrumah University of Science and Technology, Ghana	FACETS Responsible AI Framework	Report
UNESCO	Readiness Assessment Methodology	Report

Source: Access Partnership research

[374] Given the sheer volume of research being conducted around AI, it is impossible to keep track of all frameworks and mechanisms that exist. We have selected the 11 that we felt were closest to our own objectives, with the knowledge that this selection is neither exhaustive nor definitive.

We note that at the time of writing (early July 2023), there are several upcoming statistical frameworks and methodologies that have yet to be published. The table below provides a summary of the main ones we are actively monitoring.[375]

UPCOMING STATISTICAL FRAMEWORKS AND METHODOLOGIES		
ORGANIZATION(S)	AI ASSESSMENT(S)	NOTES
Data for Development (D4D)	Global Index on Responsible AI	General information
Paris Peace Forum	The Ethical Impact Assessment for AI Methodology	General information
USAID	Responsible AI Ethics Guide and Checklist for Policymakers	Guide and Checklist

Source: Access Partnership research

COVERAGE

The table below shows that some frameworks cover several SEA economies among many others (the *AI & Democratic Values Index 2022*, the *Government AI Readiness Index 2022*, and the *Global AI Index 2021*), while others are intentionally kept high-level so as to be applicable to as many countries as possible (the *FACETS Responsible AI Framework* and the *Readiness Assessment Methodology*).

AI ASSESSMENT(S)	SEA COVERAGE
Trustworthy Artificial Intelligence in the Asia-Pacific Region 2022	Singapore
AI Readiness Index (AIRI) for businesses	Singapore
AI & Democratic Values Index 2022	Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Viet Nam
AI Watch Index 2021	None
IBM Global AI Adoption Index 2022	Singapore
Government AI Readiness Index 2022	Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Singapore, the Philippines, Timor-Leste, Thailand, Viet Nam
Artificial Intelligence Index Report 2023	Indonesia, Malaysia, Singapore
AI Vibrancy tool 2021	Malaysia, Singapore
The Global AI Index 2023	Indonesia, Malaysia, Singapore, Viet Nam
FACETS Responsible AI Framework	Applicable to all economies
Readiness Assessment Methodology	Applicable to all economies

Source: Access Partnership research

[375] Once these become available, we may revisit our comparative analysis to include them in a new iteration of this report.

OBJECTIVES

Regarding the frameworks' stated objectives, we find that most of the criteria and metrics used are focused on assessing the general AI capabilities of businesses and governments—not necessarily their ability or propensity to operationalize responsible AI.

As shown in the table below, out of the three metrics that center around responsible AI, only the *Readiness Assessment Methodology* and *AI & Democratic Values Index 2022* seek to measure countries' progress towards the responsible/trustworthy implementation and use of AI.

OBJECTIVES OF THE AI ASSESSMENT(S)		
OVERARCHING OBJECTIVE(S)	SPECIFIC OBJECTIVE(S)	AI ASSESSMENT(S)
Act as a Playbook / Information booklet	As a playbook/assessment tool for the private sector	- AI Readiness Index (AIRI) for businesses - IBM Global AI Adoption Index 2022
	For various stakeholders to understand AI	Artificial Intelligence Index Report 2023
Drive international collaboration	Drive deeper international collaboration to achieve a cross-cutting AI ecosystem	Trustworthy Artificial Intelligence in the Asia-Pacific Region 2022
Aid policymaking	To guide policy priorities at a country level	- AI Watch Index 2021 - AI Vibrancy tool 2021
Rank countries/governments	Rank countries based on their capacity for AI	The Global AI Index 2023
	Rank governments on their AI readiness	Government AI Readiness Index 2022
Enable responsible AI	Measure countries' preparedness towards the responsible implementation of AI	Readiness Assessment Methodology
	Encourage countries to implement trustworthy, human-centric AI	AI & Democratic Values Index 2022
	Encourage companies to build responsible and trustworthy AI systems	FACETS Responsible AI Framework

Source: Access Partnership research

A more detailed compilation of these frameworks' objectives is available in the table below:

AI ASSESSMENT(S)	OBJECTIVE(S)
Trustworthy Artificial Intelligence in the Asia-Pacific Region 2022 *AI Asia Pacific Institute (AIAPI)*	Proposes the establishment of the Tiered AI Framework for International Collaboration (TAFIC) outlining how Singapore, Japan, South Korea, Australia, and India can identify areas of common interest to **drive deeper international collaboration** in order to achieve a vibrant, dynamic, and cross-cutting regional AI ecosystem
AI Readiness Index (AIRI) for businesses *AI Singapore*	AIRI allows **business units and organizations** to assess their AI readiness and identify the gap between their current and desired state. It enables organizations to understand their suitable approaches to adopt AI and implement targeted programs to increase AI readiness. Ultimately, AIRI translates abstract concepts into concrete actions **to help organizations accelerate their AI adoptions**.
AI & Democratic Values Index 2022 *Center for AI and Digital Policy (CAIDP)*	(1) To document the AI policies and practices, based on publicly available sources, (2) To establish a methodology for the evaluation of AI policies and practices, based on global norms, (3) To provide a basis for comparative evaluation, (4) To provide the basis for future evaluations, and (5) To ultimately **encourage all countries to make real the promise of AI that is trustworthy, human-centric, and provides broad social benefit to all**.
AI Watch Index 2021 *European Commission*	Develop an AI index that includes the **dimensions relevant for policymaking**
IBM Global AI Adoption Index 2022 *IBM*	Provides insights into overall AI adoption around the globe, the barriers and challenges that are hindering AI from reaching its potential, and the use cases, industries and countries where AI is most likely to thrive. It offers a **playbook for** 42% of **companies** that report exploring the use of AI today, and a window into the AI trends and challenges that are likely to come.
Government AI Readiness Index 2022 *Oxford Insights*	**Score governments on their readiness** to implement AI in the delivery of public services.
Artificial Intelligence Index Report 2023 *Stanford University*	Provide unbiased, rigorously vetted, and globally sourced data for **policymakers, researchers, executives, journalists, and the general public to develop intuition about the complex field of AI**.
AI Vibrancy Tool 2021 *Stanford University*	Provides a transparent evaluation of the relative position of countries based on users' preference; identifies relevant national indicators **to guide policy priorities at a country level**; and **shows local centers of AI excellence for not just advanced economies but also emerging markets**.
The Global AI Index 2023 *Tortoise Media*	Rank countries based on **capacity for artificial intelligence**; specifically, by measuring levels of investment, innovation and implementation and analyze the international landscape across the areas of talent, infrastructure, operating environment, research, development, commercial ventures, and government strategy.
FACETS Responsible AI Framework *Responsible Artificial Intelligence (AI) Lab (RAIL), Kwame Nkrumah University of Science and Technology, Ghana*	**To ensure that AI solutions are delivered with integrity, equity, respecting individuals**, and always being mindful of the social impact by evaluating AI solutions according to established standards (ISO 26000) and frameworks (e.g., FACETS, etc.)
Readiness Assessment Methodology *UNESCO*	To **help countries understand where they stand on the scale of preparedness to implement AI ethically and responsibly for all their citizens**, in so doing highlighting what institutional and regulatory changes are needed.

Source: Access Partnership research

METHODOLOGY

With respect to the methodology employed by the selected AI assessments, we examine five main aspects: (a) Research data sources, (b) Pillars of the assessment, (c) Questions / indicators, (d) Scoring criteria, and (e) Timeliness of the assessment.

Our key observations include:

- Research data sources: Several AI assessments such as *AI Watch Index 2021* and *The Global AI Index 2023* rely on open-source datasets for their indicators. Some assessments, such as the *Artificial Intelligence Index Report 2023*, collect their own research data, while others, like the *IBM Global AI Adoption Index 2022*, commission data from external organizations. Beyond quantitative data, assessments like the *Trustworthy Artificial Intelligence in the Asia-Pacific Region 2022* and the *Readiness Assessment Methodology* conduct roundtable discussions with experts to develop qualitative indicators.

- Pillars of the assessment: While most assessments include general pillars such as infrastructure readiness, AI policy and governance, AI R&D, skills, and investment, only a select few assess ethical AI as a central component/pillar. Notable assessments focusing on responsible AI include the *IBM Global AI Adoption Index 2022*, the *Government AI Readiness Index 2022*, the *Artificial Intelligence Index Report 2023*, the *FACETS Responsible AI Framework*, and the *Readiness Assessment Methodology*.

- Questions / indicators: The majority of AI assessments incorporate questions/indicators that are easily answered using the framework's scoring mechanisms. The indicators cover various aspects of the AI ecosystem, including economic, social, policy/governance, and business readiness and perspectives. While responsible AI questions are included in most metrics examined, they are not necessarily their primary focus.

- Country-focused responsible AI assessments: Both the *Readiness Assessment Methodology* and the *AI & Democratic Values Index 2022* include questions on the adoption of multilateral/regional/international frameworks for AI policy, such as the *OECD/G20 AI Principles* and the *UNESCO Recommendation on the Ethics of AI*. The *Readiness Assessment Methodology* also assesses the presence of AI policies addressing the inclusion of indigenous/minority languages, preservation of cultural heritage, gender and rural/urban gaps in AI use, and the impact of AI on the environment and sustainability—all of which are key relevant considerations for responsible AI in SEA.

- Scoring criteria: To rank and categorize countries/governments/businesses into different tiers, the metrics often employ scoring criteria to calculate final scores. Of note, *The Global AI Index* weighs its indicators based on their relevance and contribution to investment, innovation, and implementation. While the weighting system enhances the explanatory value of comparative rankings, the report acknowledges that the weights are based on subjective assumptions.

  Conversely, some AI assessments, including the *Readiness Assessment Methodology*, the *AI Watch Index 2021*, and the *IBM Global AI Adoption Index 2022* do not utilize scoring criteria since the analysis is based solely on a corresponding dataset.

It is worth noting that the *Readiness Assessment Methodology* is particularly complex as beneficiary countries are unable to conduct the assessment independently. The assessment should be carried out by an independent consultant or research organization, with support from a National Stakeholder Team comprising diverse representatives such as personnel from the UNESCO Secretariat, the UNESCO National Commission, government officials, members of the academic community, civil society, or the private sector.[376] This requirement poses challenges for SEA governments, as it makes it more complicated to conduct the assessment and act on its findings.

- Timeliness of the assessment: All the AI assessments examined here are published in 2022 or 2023, except for the *Global AI Vibrancy Tool 2021*, which is scheduled to be updated in the second half of 2023.

LIMITATIONS

Each AI assessment serves specific objectives, but gaps and limitations remain. The most relevant ones for our own work on responsible AI in SEA are:

- No existing AI assessment contextualizes responsible AI in SEA: There are benchmarks that assess various aspects of AI policies, readiness, and adoption, including incorporating certain aspects of responsible AI such as trustworthiness and democratic values (*Trustworthy AI in the Asia Pacific Region* and *AI & Democratic Values Index* respectively). But responsible AI is not a one-size-fits-all concept that can be forced to fit the unique SEA context. To ensure AI is developed and adopted in a way that has a true, long-lasting impact on society, considerations of ethics, fairness, accountability, safety, and transparency need to reflect SEA's unique circumstances.

  Where there are existing AI assessments, such as in the *FACETS Responsible AI Framework*, there is a lack of data to evaluate where an economy currently stands on the spectrum of responsible AI operationalization. A robust assessment framework needs to provide specific measures and criteria that capture responsible AI dimensions, as well as some sort of quantitative metric. Together, these complementary approaches will provide a more complete picture of AI development in SEA economies and its alignment with ethical and societal considerations.

- Existing AI assessments overlook the complex, interconnected nature of stakeholder involvement in AI development: The AI assessments examined here tend to focus on measuring the role that a single group of stakeholders plays in AI development, which often overlooks the complex and interwoven nature of technological innovation within a society. AI assessments such as the *Government AI Readiness Index*, the *AI Readiness Index (AIRI) for businesses* and the *IBM Global AI Adoption Index* are designed for specific groups of stakeholders, which are only a part of the responsible AI equation.

  Indeed, building environments and ecosystems that are favorable to responsible AI development involves a multi-stakeholder approach including government, private sector, academia, and civil society. In this sense, a benchmarking framework developed specifically for

[376] UNESCO (2023) Readiness assessment methodology: a tool of the Recommendation on the Ethics of Artificial Intelligence, https://unesdoc.unesco.org/ark:/48223/pf0000385198

SEA and focused on responsible AI should consider the complementarity of different stakeholders' contributions to responsible AI.

- Existing AI assessments tend to emphasize the intentions of AI policies rather than assess the effectiveness of their implementation: AI policy is still in its early days and there is far more information about what governments intend to do than what they have actually achieved. This is also true of the frameworks examined here; their focus is often on articulating goals, intentions, aspirations, ambitions, and high-level principles rather than providing concrete steps and actions to take.

  While it is valuable to understand intentions and aspirations, this poses a challenge for several existing AI assessments in terms of assessing the actual impact and effectiveness of policies. Many tend to rely on existing frameworks such as the *AI & Democratic Values Index*, which may not be fully relevant or appropriate, especially if applied to the regional SEA context given the varying availability of information.

  Others do not comprehensively cover all aspects of AI policies and practices. For example, the *Global AI Index* and the *AI Vibrancy Tool* only evaluate a single aspect of AI governance. Hence, it is important to develop a benchmarking framework that offers a balance between capacity and implementation to provide SEA policymakers with a practical way to implement changes and improvements.

BEST PRACTICES

Despite these limitations, the existing benchmarking methodologies also offer a range of best practices that can help guide our development of a benchmarking framework for responsible AI in ASEAN.

- Designing multidimensional assessment frameworks that provide comprehensive evaluations of AI development: AI assessments such as the *Government AI Readiness Index* and the *AI Watch Index* evaluate different aspects of AI development, including governance, technology readiness, infrastructure, data availability, research and development capabilities, and skills.

  This best practice promotes a well-rounded assessment that goes beyond singular metrics and takes into account the interplay of various factors shaping the responsible and effective adoption of AI technologies.

- Combining quantitative data measures with qualitative insights from stakeholder engagement: Several AI assessments emphasize the collection of multiple data points including from primary sources through surveys, questionnaires, and official statistical sources, which are supported by an extensive secondary data review and analysis. In addition, interviews conducted with a wide range of AI experts and stakeholders (policymakers, researchers, academics, and practitioners) provide a complete and accurate representation of on-the-ground sentiment and activities.

  This best practice recognizes that responsible AI development requires collaboration and participation from various actors, including governments, businesses, academia, and civil society. Involving these stakeholders ensures a broader range of perspectives, expertise, and insights, leading to more informed decision-making, greater inclusivity, and enhanced accountability in shaping AI policies and practices.

- **Incorporating internationally recognized principles, guidelines, and standards for credible benchmarking assessment:** AI assessments such as the *Global AI Index* and the *AI & Democratic Values Index* evaluate where an economy currently stands relative to well-known frameworks on AI policy (the *OECD/G20 AI Principles*, the *UNESCO Recommendation on the Ethics of AI*), human rights (the *Universal Declaration for Human Rights*), and democratic decision-making (transparency, accountability, rule of law).

  This best practice provides a solid foundation for evaluating AI policies and ensures a level of consistency and comparability across different economies. By adhering to established principles and standards, the benchmarks enhance their credibility and contribute to the harmonization of AI policies at the regional and international level.

APPENDIX V. OVERVIEW OF ASSESSMENT METHODOLOGIES

The table below summarizes the indicators, metrics, and scoring mechanisms used by the various benchmarking/assessment methodologies examined in this report.

AI ASSESSMENT(S)	RESEARCH DATA SOURCES	PILLARS OF THE METRIC / FRAMEWORK	QUESTIONS / METRICS	SCORING CRITERIA (IF APPLICABLE)	TIMELINESS OF METRIC / REPORT
Trustworthy Artificial Intelligence in the Asia-Pacific Region 2022	The report combines salient points from the 1. Roundtable discussion involving key experts from government, private sector, academia, and civil society from each country to obtain first-hand information and cross-cutting perspectives on the current AI developments 2. Desktop research using open-source data from academic literature, policy reports, white papers, and media articles	Pillars of the Tiered AI Framework for International Collaboration (TAFIC): 1. Human Society 2. City-to-City 3. National 4. Bilateral 5. Regional 6. International	N/A - the report used qualitative analysis to assess case study countries on their best practices, opportunities and challenges, and prospects for international collaboration.	N/A	The 2022 (second edition) report was published in July 2022, succeeding its initial edition in 2021.
AI Readiness Index (AIRI) for businesses	N/A – not indicated	AIRI consists of five pillars, which map to twelve dimensions. The five pillars are interdependent and synergistic: 1. Organizational Readiness a. Management support b. AI Literacy c. AI Talent d. Employee Acceptance of AI e. Experimentation Culture 2. Business Value Readiness a. Business Use Case 3. Ethics and Governance Readiness a. AI Governance b. AI Risk Control 4. Data Readiness a. Data Quality b. Reference Data 5. Infrastructure Readiness a. Machine Learning (ML) Infrastructure b. Data Infrastructure	Questions: 1. Organizational Readiness a. Percentage of employees who are AI-literate b. Level of AI skills of employees c. Degree of management support for AI initiatives d. Degree of employee acceptance of AI e. Type of experimentation culture 2. Business Value Readiness a. Identification of Business Use Cases and their value propositions 3. Ethics and Governance Readiness a. Awareness and application of AI Governance concepts b. Degree of AI Risk Control 4. Data Readiness a. Degree of internal processes to ensure Data Quality b. Availability of a single source of truth for data and common data definition and units of measurements to ensure data consistency 5. Infrastructure Readiness a. Presence of adequate Machine Learning (ML) Infrastructure for comprehensive AI development and deployment	The specific score for each option is not specified. The scores are tabulated and grouped into the following tiers: 1. AI Unaware – Average score less than 2.5 2. AI Aware – 2.5 to 3.4 average score 3. AI Ready – 3.5 to 4.5 average score 4. AI Competent – Average score greater than 4.5	AIRI (version 2.0) was released in September 2022.

			b. Presence of appropriate method (e.g., data lake) for central repository of data		
AI & Democratic Values Index 2022	Desktop research The report assessed the following: 1. AI policies and practices of the top 40 countries by GDP 2. 35 other countries that were considered "high impact" and allowing for the AIDV Index to be representative of both the diversity and commonalities among countries worldwide in terms of AI policies and issues encountered and best practices.	NA. There is no overarching pillars in the Index, instead the Index identified 12 factors to assess national AI policies and practices. The factors reflect well known frameworks for AI policy (the OECD/G20 AI Principles, UNESCO Recommendation on the Ethics of AI), human rights (the Universal Declaration for Human Rights), and democratic decision-making (transparency, public participation, and access to policy documents). The report also highlighted key themes for AI policy, including algorithmic transparency and accountability.	Questions: 1. Has the country endorsed the OECD AI Principles? 2. Is the country implementing the OECD AI Principles? 3. Has the country endorsed the Universal Declaration of Human Rights? 4. Is the country implementing the Universal Declaration for Human Rights? 5. Has the country established a process for meaningful public participation in the development of a national AI Policy? 6. Are materials about the country's AI policies and practices readily available to the public? 7. Does the country have an independent (agency/mechanism) for AI oversight? 8. Do the following goals appear in the national AI policy: "Fairness," "Accountability," "Transparency," ("Rule of Law,") ("Fundamental Rights")? [implementation? = legal force? = enforcement?] 9. Has the country by law established a right to Algorithmic Transparency? [GDPR? / Council of Europe (COE)+?] 10. Has the country endorsed the UNESCO Recommendation on AI Ethics? 11. Is the country implementing the UNESCO Recommendation on the Ethics of AI? 12. Has the country's Data Protection Agency sponsored the 2018 Global Privacy Assembly (GPA) Resolution on AI and Ethics, the 2020 GPA Resolution on AI and Accountability and the 2022 GPA Resolution on Facial Recognition?	Scores for responses: 1. "Y" – Yes (1 point) 2. "N" – No (0 points) 3. "P" – Partly (0.5 points) The countries are ranked based on their total scores and categorized into 5 tiers: 4. Tier 1 – 10.5 and above 5. Tier 2 – 9.0-10.0 6. Tier 3 – 7.0-8.5 7. Tier 4 – 5.0-6.5 8. Tier 5 – 4.5 and below	The 2022 (third edition) report was published in April 2023.
AI Watch Index 2021	Desktop research and open-source datasets	Pillars: 1. Global view on the AI landscape a. AI activity b. AI areas of strength c. AI investments 2. Industry 3. Research and development a. R&D activity b. Network of collaborators 4. Technology a. Performance of AI b. Standardization 5. Societal aspects a. Diversity in research b. Higher education	Metrics: 1. AI economic players. 2. AI player intensity 3. AI areas of specialization: comparative advantage in AI thematic areas 4. AI thematic hotspots 5. EU's comparative advantage in industrial robotics trade 6. AI investments in the EU 7. AI firms' profile 8. Robotics start-ups in the EU 9. AI players in AI R&D 10. AI R&D activity score 11. AI R&D collaborating countries 12. Peer-to-peer collaborations 13. Strategic position in the network of 14. Performance of AI research	N/A – based on individual dataset numbers	This report was published in March 2022.

			15. Standardization activity engagement 16. Gender diversity index 17. Geographic diversity index 18. Business diversity index 19. Conference diversity index 20. AI in university programs in the EU 21. University places with AI content in the EU 22. AI intensity in university places in the EU		
IBM Global AI Adoption Index 2022	The data, commissioned by IBM, sheds light on the deployment of AI across 7,502 businesses around the world: 1. 500 in each country, United States, China, India, UAE, South Korea, Australia, Singapore, Canada, UK, Italy, Spain, France and Germany; and 2. 1,000 in Latin America—Brazil, Mexico, Colombia, Argentina, Chile and Peru. The polling was conducted online through Morning Consult's proprietary network of online providers from 30 March through 12 April 2022.	The key pillars are: 1. AI adoption and strategy 2. Barriers in AI adoption (including data management, and skills) 3. Importance of Trustworthy AI 4. Sustainability	Metrics include: 1. Percentage of companies that have used AI in their business 2. Percentage of companies that have developed/implemented an AI strategy 3. Top 10 factors driving companies' AI adoption 4. Types of cloud environments that companies are using 5. Companies' investment in AI applications over the next 12 months 6. Barriers in companies' adoption of AI 7. Number of different data sources companies drawing from to inform their AI, business intelligence (BI) and analytics systems 8. Degree of personnel access to company data 9. Top 10 user groups of AI at organizations 10. Importance of responsible AI practices and AI maturity in organizations 11. Importance of different aspects of trust and explainability to businesses 12. Barriers in developing explainable and trustworthy AI 13. Percentage of companies that are applying AI to sustainability-related challenges 14. Types of ESG or sustainability challenges that companies are trying to solve with AI 15. Types of automation tools that organizations are interested in using 16. Use cases that companies are using/considering using automation capabilities for 17. Benefits that organizations are gaining from using AI to automate IT, business or network processes 18. How companies are sing/considering using NLP solutions 19. How organizations are using AI to improve customer and employee care	N/A – based on Morning Consult's polling data	The 2022 (third edition) report was published in May 2022.
Government AI Readiness Index 2022	Desktop research	There are 3 pillars comprising 10 dimensions: 1. The government pillar a. Adaptability b. Digital capacity	Questions: 1. Does the government have a vision for implementing AI?	Each indicator is based on data from an open-source dataset. All scores were normalized to be between	The 2022 (sixth edition) Index was published in December 2022.

		c. Governance & Ethics d. Vision 2. The Technology Sector pillar a. Maturity b. Innovation capacity c. Human capital 3. The Data & Infrastructure pillar a. Data representativeness b. Data availability c. Infrastructure	2. Are there the right regulations and ethical frameworks in place to implement AI in a way that builds trust and legitimacy? 3. What is the existing digital capacity within government? 4. Can the government change and innovate effectively? 5. Does the country have a technology sector capable of supplying governments with AI technologies? 6. Does the technology sector have the right conditions to support innovation? 7. Are there the right skills in the population to support the technology sector? 8. Does the country have a good technological infrastructure to support AI technologies? 9. Is there good availability of data that could be used to train AI models? 10. Is the data available likely to be representative of the population as a whole?	0 and 100, and ranked for the 3 respective pillars.	
Artificial Intelligence Index Report 2023	The report includes insights from: 1. Self-collected data and data in collaboration with the Center for Security and Emerging Technology at Georgetown University, LinkedIn, NetBase Quid, Lightcast, and McKinsey 2. Raw public data 3. Desktop research	Chapters: 1. Research and Development 2. Technical performance 3. Technical AI Ethics 4. The economy 5. Education 6. Policy and Governance 7. Diversity 8. Public Opinion	Indicators: 1. Research and Development a. Number of AI Journal Publications, conference papers, and repositories b. Data on significant machine learning systems, including large language and multimodal models c. AI conference attendance d. Open-source AI research 2. Technical Performance a. Advancements in computer vision, language, speech, reinforcement learning, and hardware b. Environmental impact of AI c. AI for Science 3. Technical AI Ethics a. Meta-analysis of Fairness and Bias Metrics b. AI Incidents c. NLP Bias metrics d. Conversational AI Ethical Issues e. Fairness and Bias in Text-to-Image Models 4. The Economy a. Jobs b. Investment c. Corporate Activity d. Robot Installations 5. Education a. Postsecondary AI Education b. AI Education c. Policy and Governance	N/A - Each indicator is based on data from an open-source / self-collected dataset.	The 2023 (sixth edition) report was published in April 2023.

			6. AI and Policymaking a. National AI strategies b. Public Investment in AI c. AI-related legal cases 7. Diversity a. AI conferences b. AI postsecondary education c. K-12 education 8. Public Opinion a. Survey Data b. Social Media Data		
Global AI Vibrancy Tool 2021	Open-source data for each individual indicator	Pillars: 1. Research and Development 2. The Economy	Indicators: 1. Research and Development a. Number of AI Journal Publications, Journal Citations, Conference Publications, Repository Publications b. Number of AI Conference and Repository Citations c. Number of AI Patent Applications and Grants 2. Economy a. Total AI Private Investment b. Number of Newly Funded AI Companies c. AI Hiring Index d. Relative AI Skill Penetration e. AI Talent Concentration f. Total AI Private Investment per capita (PC) g. Number of Newly Funded AI Companies PC	The AI Vibrancy Composite Index can be expressed in the following equation: AI Vibrancy = (Ψpillar × [Ωc,t × Ψindicator]) ÷ N where c represents a country and t represents year, Ωc,t is the scaled (0-100) individual indicator, Ψindicator is the weight assigned to individual indicators, Ψpillar is the weight specific to one of the three high-level pillars and N is the number of indicators available for a given country for a specific year. Normalization To adjust for differences in units of measurement and ranges of variation, all variables in the vibrancy tool were normalized into the [0, 100] range, with higher scores representing better outcomes. A minimum-maximum normalization method was adopted, given the minimum and maximum values of each variable respectively. Higher values	The 2021 Global AI Vibrancy Tool was published in March 2022, and due to be updated in the second half of 2023.[377]

[377] As of January 2024, the updated Global AI Vibrancy Tool has not been published.

				indicate better outcomes. The normalization formula is: Min—max scalar (MS100) = 100 × (((value) − (min)) ÷ ((max) − (min)))	
The Global AI Index 2023	The Global AI Index draws on a range of 28 different data sources, including government reports, public databases from international organizations, think tanks, and private companies, as well as Tortoise's research, to measure the national ecosystems that determine capacity for artificial intelligence.	Pillars: 1. Implementation a. Talent b. Infrastructure c. Operating environment 2. Innovation a. Research b. Development 3. Investment a. Commercial ventures b. Government strategy	111 indicators, collected from 28 different public and private data sources, and 62 governments. These are split across seven sub-pillars: Talent, Infrastructure, Operating Environment, Research, Development, Government Strategy and Commercial.	A country's total score is made up of the weighted normalized sum of its sub-pillar scores. The score for a sub-pillar is then in turn the normalized weighted sum of all the indicators within the sub-pillar. The pillars are weighted accordingly: 1. Talent 15% 2. Infrastructure 11% 3. Operating Environment 6% 4. Research 26% 5. Development 14% 6. Government strategy 4% 7. Commercial ventures 24%	The 2023 (fourth edition) report was published in June 2023.
FACETS Responsible AI Framework	N/A – not indicated	Pillars: 1. Fairness 2. Accountability 3. Confidentiality 4. Ethics 5. Transparency 6. Safety	Questions: *Envision* 1. Have you considered the system purpose, including critical objectives and intended uses or applications? 2. Do you think the use of AI is in line with your organization's/community's values? 3. Did you take specific account of ethical considerations relating to the use of AI before developing an AI solution? 4. Have you taken a specific account of algorithmic bias for the envisioned AI solutions? 5. Have you envisioned stakeholders, including demographic groups (i.e., race, gender, age, disability status, skin tone, etc.), that will directly or indirectly affect the system and the expected benefits and consequences? 6. Have you envisioned whether the system/activity will impact human rights? 7. Have you considered how to track and mitigate the effects of your system/activity on the environment?	There are three options for each question, but the point for each option is not indicated. 1. Yes 2. No 3. I don't know The weight of each category of questions is as follows: 1. Envision – 30% 2. Data – 20% 3. Model – 25% 4. Deployment – 25% The weighted scores are then categorized into the following tiers: 1. >70% - Doing great	The framework was published in January 2023.

			8. Have you envisioned sensitive, premature, or adversarial uses or applications? 9. Did you identify subject matter experts and engage them during the system envisioning phase and AI solution development process? 10. Did you consider inclusivity by putting people in the center from the beginning of the process (use-case definition, data collection, and system development)? 11. Have you identified sustainability strategies for the envisioned AI solution? *Data* 1. Is data collection guidelines, specifications, and protocol in place? 2. Do you have proper data governance and control over personal and or other sensitive data? 3. Is the source of data used for the development of AI solutions known? 4. Is the dataset publicly available? 5. Does the data contain any serious issues such as (missing values, label-imbalances, invariance, etc.) that could impact the AI system developed? 6. Does the dataset follow acceptable standards best practices and specifications for data development like datasheets for datasets? 7. Is the dataset self-contained? 8. Does the data link to or otherwise rely on external resources (e.g., websites, tweets, other datasets)? 9. Is the data anonymized? *Model* 1. Do you have guidelines and specifications in place to facilitate reproducible model development? 2. Have traditional models been evaluated for reference? 3. Has the model overfitted to a sample dataset? 4. Is the model dependent on specific features? 5. Is most of the model an original idea? 6. Is the model based on published research? 7. Has the base paper been appropriately cited? 8. Does the base paper have 10+ citations? 9. Is the model tuned for optimal hyper-parameters? 10. Is the trained model publicly shared? 11. Is the model architecture publicly shared? 12. Are the results of the hyperparameter tuning reported? 13. Does the model allow use of Explainable AI (XAI) methods? 14. Does the model employ Explainable AI (XAI) methods?	2. 30-70% - Getting there 3. <30% - Keep going	

			15. Does the model use an active learning framework? 16. Is the model published in a conference or journal? *Deploy* 1. Is the AI Lab/Organization capable of reliably deploying AI solutions or applications at scale? 2. Is there a human in the decision-making process? 3. Are the decision made by the model analyzed at regular intervals? 4. Does the model learn from all the production data via active learning? 5. Are infographics/graphs used to convey the analyses of the production data? 6. Is the production data anonymized? 7. Is the inference data stored for future review, analyses or modelling? 8. Has the inference data been analyzed? 9. Is the inference data publicly shared? 10. Are the predictions averaged using ensemble methods? 11. Is the confidence score considered in the decision of the model? 12. Does the model make a prediction for every production datapoint regardless of the decision workflow? 13. For Explainable AI (XAI) methods, is the explanation for the prediction shared in a decision report? 14. Is the prediction confidence shared in a decision report?		
Readiness Assessment Methodology	The Readiness Assessment Methodology (RAM) was developed by the UNESCO Secretariat with the guidance of the High-Level Expert Group (HLEG) on the Implementation of the UNESCO Recommendation on the Ethics of AI. The HLEG is composed of more than 20 renowned experts, acting in their individual capacity. The Secretariat conducted initial desk research in order to unpack the different dimensions listed in the Recommendation into more concrete indicators. To develop the RAM, the Secretariat produced a zero-draft methodology along those	The Readiness Methodology is composed of five dimensions: 1. Legal/ Regulatory 2. Social/ Cultural 3. Economic 4. Scientific / Educational 5. Technological/ Infrastructural	Questions: *General Questions* 1. Does your government currently have plans to implement the UNESCO Recommendation on the Ethics of AI, through establishing a national AI Ethics Commission or through other measures? 2. Has your government done any prioritization regarding the specific sectors that would benefit from government intervention (such as regulation, strategies, or guidelines, etc.) regarding AI? 3. Does your government inform the public when they are subjected to the use of AI systems that profile or make decisions about them in the provision of public services? 4. Which ministry/ies are responsible for AI governance? Please elaborate on the composition of the teams. 5. Overall, what are the most important challenges to developing AI regulations and policies in the country? *Legal Dimension*	N/A, the quantitative indicators will be based on the corresponding dataset or resource. In each beneficiary country, the readiness assessment will be conducted by an independent consultant/ research organization, supported by a National Stakeholder Team comprising a variety of stakeholders, such as personnel from the UNESCO Secretariat and UNESCO National Commission, as well as representatives from the country's	The Readiness Assessment Methodology was published in 2023.

	dimensions, with each dimension containing various indicators. The expert group was divided into five sub-groups, with each discussing an assigned dimension in detail. The draft was then further refined following feedback from the experts.		1. Does your country have a national AI strategy? If not, do you have any legislation or strategy which has an indirect impact on AI regulation (for example, data privacy or anti-discrimination laws, or a digital strategy)? Please elaborate and provide the name and link to any relevant document(s) 2. Has your country enacted any binding AI regulation or soft law (for example procurement guidelines)? If your country has not enacted any AI regulation, is it in the process of enacting such regulation? Please elaborate and provide the name and link to any relevant document(s), or state the reasons why such regulation has not yet been enacted. 3. Country's score on the Cybersecurity Index 4. Does your country have a data protection law?4 If not, is your country in the process of enacting such regulation? Please elaborate and provide the name and link to any relevant document(s) 5. Country's score on the Open Data Inventory 6. Did your country sign the international Open Data Charter? 7. Do you have a national data sharing framework?7 If not, is your country in the process of creating one? Please elaborate and provide the name and link to any relevant document(s) 8. Does your country have open government data policies?8 If not, is your country in the process of adopting one? Please elaborate and provide the name and link to any relevant document(s) 9. Does your country have laws or policies regarding procurement of AI systems or products/services that include AI components? If not, are such laws or policies in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 10. Is there a freedom of information act in your country? If not, is such an act in the process of being adopted, if not, why not? Please elaborate and provide the name and link to any relevant document(s). 11. What is the main law protecting due process rights in your country? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 12. Is there a law or policy highlighting monitoring, redress, and remedy mechanisms against harms caused by AI systems? If so, which mechanisms? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 13. Is there a framework for notice and take down policies for violating content, such as online hate speech, misinformation, and disinformation? If not, is such a framework in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 14. Has your country enacted any law or policy regarding the impact of AI on social media, including transparency,	government, the academic community, civil society, and the private sector, among others. The team should provide answers to all questions in the RAM to the extent possible. Many quantitative questions which may be pre-filled by referring to (usually publicly available) data sets where the relevant data can be found.	

			misinformation, disinformation and hate speech? If not, is such a framework in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 15. Is there a government strategy/program to improve digital skills in the public sector? *Social/cultural dimension* 1. Gender gap in internet use 2. Rural/urban gap in internet use (individuals) 3. Percentage of male/female tertiary education graduates in STEM programs 4. Ratio top girls/boys in science or mathematics who expect to work as STEM professionals when they are thirty 5. Science performance difference (boys vs. girls) 6. Has your country enacted any law or policy to reduce the digital gender gap? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s). 7. Has your country enacted any law or policy to reduce the digital socioeconomic or rural/urban gap? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 8. Has your country enacted any law or policy related to enhancing diversity in the AI workforce? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 9. Is there online content and data available to train AI systems in all your country's official languages? 10. Is there online content and data available to train AI systems in your country's indigenous languages? *Public engagement and trust* 1. Country's score on the Online Services Index 2. Country's score on the E-Participation Index 3. Trust in government websites and apps 4. Trust in AI/trust in technology 5. Do you have in place any policy for addressing the impact of AI on the environment and on sustainability? If not, is such a policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s). 6. Has your country adopted a digital health policy? Please elaborate and provide the name and/ or link to the relevant document. If not, is such a policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 7. Has your country implemented any policy regarding the use of AI for the preservation of cultural heritage? If not, is there a policy on the preservation of cultural heritage that mentions the impact of AI and digital technologies? Please elaborate and provide the name and link to any relevant document(s) 8. Has your country implemented any policy regarding the use of AI for the preservation of minority and Indigenous		

			languages? If not, is there a policy on the preservation of minority and Indigenous languages that mentions the impact of AI and digital technologies? Please elaborate and provide the name and link to any relevant document(s) *Scientific/Educational* 1. R&D Expenditure 2. Research output 3. Ethical AI research 4. AI talent 5. Innovation output *Education* 1. Does your country have any laws or policies to integrate AI or other digital tools into the education system? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s). 2. Does your country have any laws or policies on how educators/professors should be trained to teach about AI/technology ethics? If not, is such a law or policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 3. Education infrastructure 4. Curriculum content 5. Are there any educational programs in your country that include both technical and ethical aspects of AI (technical aspects might include coding, machine learning, statistics, data science, etc.; ethical aspects might include information ethics, philosophy of science and technology, privacy concerns, social implication of technology, etc.)? 6. Education attainment 7. Are there technical AI courses aimed at the general population? 8. Are there courses or modules on AI ethics aimed at the general population? *Economic* 1. Labor markets 2. Does your country have a strategy to respond to AI impact on the labor market? This includes issues such as re-skilling of workers affected by automation, upskilling of workers to take advantage of opportunities presented by AI, and considering the soft skills advantages and complementarity of human skills relative to AI systems. If not, is such a strategy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s) 3. How much do companies spend on AI services (including software as a service) as a share of intermediate consumption (intermediate consumption of SIC)? 4. Investment and output *Technical and infrastructural*		

			1. Infrastructure and connectivity quantitative outputs 2. Is your country involved in standardization (both technical and ethical) of AI and digital technologies? (ISO/IEC, IEEE7000)? 3. If not, have you applied to be part of this process? 4. Computing capabilities quantitative outputs 5. Does your country have a policy for AI-driven cloud computing? If not, is such a policy in the process of being adopted? Please elaborate and provide the name and link to any relevant document(s). 6. Statistical performance indicators 7. Are there any laws or policies providing a comprehensive framework for consistent data management and publication?		