Stanford University
Human-Centered
Artificial Intelligence

The Asia Foundation
Improving Lives, Expanding Opportunities

United States Agency for International Development (USAID)
Docket No. 2024-01707
AI in Global Development Playbook; Request for information

March 1, 2024

Dear Administrator Power and USAID colleagues:

We, a group of scholars and international development practitioners affiliated with the Stanford Institute for Human-Centered Artificial Intelligence (HAI) and The Asia Foundation (TAF), offer the following submission in response to your Request for Information. Stanford HAI and TAF share the common goal of ensuring that Global Majority countries can develop and leverage AI responsibly. We submit this response as part of our joint efforts to facilitate research, education programs, and convenings to bolster global dialogue on AI that incorporates on-the-ground perspectives from Global Majority contexts.[1] We draw on HAI's strengths in rigorous, evidence-based research and policy engagement together with TAF's extensive conversations and programming with local partners across more than 20 countries in the Asia-Pacific.

We center our response on the belief that solutions grounded in local perspectives are needed to address global AI opportunities and challenges. We provide select examples of relevant research, on-the-ground experiences, and perspectives from a range of Global Majority countries to inform the AI in Global Development Playbook. However, we want to emphasize that there are significant differences across Global Majority countries when it comes to economic development, government capacity, the state of technology infrastructure, and other socioeconomic factors. This diversity underscores the importance of tailoring AI development and deployment strategies to the specific needs and circumstances of Global Majority countries.

First, we highlight several barriers preventing Global Majority countries from harnessing AI, including internet infrastructure, access to computing power and data, and poor adaptation of powerful AI systems to local contexts. We also discuss select challenges from labor market disruptions caused by AI, including disruptions to Asian IT service export sectors and worker rights issues.

Second, we outline two areas in which we believe AI technologies hold particular promise in advancing the UN Sustainable Development Goals (SDGs): 1) machine learning (ML) techniques that allow countries to overcome data scarcity issues; and 2) ML and other AI tools that can be employed to specifically address environmental challenges. We highlight potential unintended consequences and other important considerations for researchers and funders wishing to support the application of such tools in Global Majority countries.

Third, we draw lessons from existing AI policymaking efforts in Global Majority contexts and make the case for fostering AI research and development (R&D) cooperation among Global Majority countries by establishing a multilateral research institute or platform.

[1] Stanford HAI, "Stanford HAI and The Asia Foundation Announce "AI Perspectives from Asia" Program," November 6, 2023, https://hai.stanford.edu/news/stanford-hai-and-asia-foundation-announce-ai-perspectives-asia-program.

1. Challenges of responsible AI development and deployment in Global Majority countries

1.1. Barriers to AI development: Economic development and resource access (Questions 1, 8)
Many governments of low-income and middle-income countries are beginning to look at AI as a potential area for economic growth. In Asia, for example, Malaysia's AI roadmap refers to AI as "a *sine quo non* [sic] for Malaysia to attain a Developed Nation status by 2030 or even earlier," the Philippines' national AI strategy calls the development of AI capacities "drivers of sustainable and inclusive growth," and Nepal's National Science, Technology, and Innovation Policy lists biological information, AI, and robotics as priority areas for the "rapid development of industries, commerce and other sectors."[2] Yet many Global Majority countries lack the necessary resources to take full economic advantage of AI.

Internet connectivity: A key barrier to the equitable use of AI is the unequal distribution of digital infrastructure, particularly internet connectivity. Some experts argue that AI tools, particularly robotics, will be able to bridge service gaps in hard-to-reach, low-income areas.[3] However, those places are also the least likely to have meaningful internet connectivity. For example, in Southeast Asia, with rare exceptions, the least connected regions are either rural or lower-income areas.[4] Parts of Africa also face significant challenges, despite a notable rise in internet connectivity, increasing from 8 percent in 2011 to 36 percent in 2021.[5]

Access to computing power: Another major barrier to participating actively in AI research and development is access to computing power, a scarce expense globally. In low- and middle-income countries in Asia, many entities struggle to secure stable computing power, given its cost. While there are some examples of regional tech giants building their own supercomputers (e.g., VinAI), in many countries, only the government has the resources to do so.[6] The predominant supercomputer in Thailand, for example, was purchased by its National Science and Technology Development Agency.[7] Other methods for accessing computing power include collective access to compute credits through AI and programmers' associations or compute credit grants provided by companies like Amazon Web Services (AWS) to mission-based research organizations. While there is significant venture capital funding for computing power in some countries, such as Singapore, investment varies greatly across the region.[8]

In deciding whether to make long-term, costly investments in computing power, many policymakers grapple with the cost-benefit trade-off. Access to computing power is often not seen as a safe bet unless it is accompanied by talent development and access to relevant, quality

[2] Malaysia's Ministry of Science, Technology & Innovation, "Malaysia National Artificial Intelligence Roadmap 2021-2025 (AI-RMAP)," 2021, https://airmap.my/; Department of Trade and Industry Philippines, "National Artificial Intelligence Strategy for the Philippines" May 2021, https://drive.google.com/file/d/1de5kfaGi3tdUgxu1UPV8iRxKpXECTkDp/view; Nepal's Ministry of Education, Science and Technology, "National Science, Technology and Innovation Policy," 2019, https://nepalindata.com/media/resources/bulk_file/NSTI_Policy_2019_English.pdf.
[3] Adrian Wan, "Bridging the Digital Divide: Fostering Inclusivity in Southeast Asia's Digital Economy," *Tech for Good Institute*, https://techforgoodinstitute.org/blog/expert-opinion/bridging-the-digital-divide-fostering-inclusivity-in-southeast-asias-digital-economy/.
[4] Speedtest, https://www.speedtest.net/performance, accessed February 27, 2024.
[5] The World Bank, "Individuals using the Internet (% of population) - Sub-Saharan Africa," https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=ZG, accessed February 27, 2024.
[6] See VinAI, https://www.vinai.io/about-us/, accessed February 27, 2024.
[7] Suchit Leesa-nguansuk, "Thailand buying B600m supercomputer," *Bangkok Post,* December 1, 2021, https://www.bangkokpost.com/business/2224463/thailand-buying-b600m-supercomputer.
[8] For example, cumulative investment in AI compute from 2012-2023 amounted to ~US$375 million in Singapore, ~US$60 million in Indonesia, and ~US$11 million in Vietnam. See OECD.AI Policy Observatory, "Live data: VC investments in AI compute by country," https://oecd.ai/en/data?selectedArea=investments-in-ai-and-data&selectedVisualization=vc-investments-in-ai-compute-by-country, accessed February 27, 2024.

data. Yet, a lack of access to computing power could become a chokepoint in developing an AI ecosystem and even dampen the benefits of open-source models.[9] Governments also need to weigh the upsides and downsides of private sector funding models and their implications for maintaining a balanced AI research ecosystem and equitable access to computing power for civil society. There is great demand from policymakers for guidance on how to weigh these trade-offs.

Access to data: Another emerging issue, especially in South and Southeast Asia, is the recent trend of data localization laws. Many laws are the product of efforts to restrict cross-border data flows and require companies to store data locally due to national security and digital sovereignty concerns.[10] Countries where citizen data cannot legally leave the country (e.g., Bangladesh, Sri Lanka, Vietnam) may be reliant on domestic computing power to train models on local data. Yet, for many, especially low-income countries, this domestic infrastructure is not in place. As of 2023, Vietnam has 32 data centers, but Bangladesh has only seven and Sri Lanka three.[11]

Many Global Majority countries also lack important data infrastructure. While countries like the Democratic Republic of the Congo are acquiring more data to support development efforts such as natural resource mapping, they often do not have the infrastructure to manage this data. Without sufficient infrastructure to manage data access—a fixture in the United States for example—such data may remain proprietary or managed by foreign parties.[12] Data management know-how is also a challenge in Global Majority contexts. Without the latest AI or ML expertise, countries may also be reliant on foreign companies offering data processing services.

Adapting to local contexts: With few exceptions, the majority of the most powerful large language models (LLMs) have been developed by private actors in the Global North and built for the English language. Despite many developers attempting to build multilingual LLMs, the reality remains that these powerful models are not attuned to Global Majority contexts and are often biased in favor of native English speakers.[13] A key factor limiting the development of non-English LLMs is the relative lack of high-quality digitized text needed for model training.[14]

Several initiatives have emerged in Southeast Asia to develop LLMs attuned to local languages. The most notable is Singapore's publicly led Southeast Asian Languages In One Network (SEA-LION), an initiative to build open-source LLMs in Southeast Asian languages, supported by AWS and Google Research.[15] In Thailand, the Ministry of Science, Technology and the Environment has supported a public-private partnership to build an open-source chatbot in the Thai language. Under the SEA-LION framework, Indonesia's National Research and Innovation

[9] Will Knight, "The Myth of 'Open Source' AI," *Wired,* August 24, 2023, https://www.wired.com/story/the-myth-of-open-source-ai/.
[10] Xirui Li, "Southeast Asia's Data Localization Push Is a Double-Edged Sword," *The Diplomat,* October 28, 2022 https://thediplomat.com/2022/10/southeast-asias-data-localization-push-is-a-double-edged-sword/.
[11] Cloudscene, https://cloudscene.com/region/datacenters-in-asia-pacific, accessed February 27, 2024.
[12] For example, see OpenGSA, "GSA Open Data," https://open.gsa.gov/data/, accessed February 27, 2024.
[13] Paresh Dave, "ChatGPT Is Cutting Non-English Languages Out of the AI Revolution," *Wired*, May 31, 2023, https://www.wired.com/story/chatgpt-non-english-languages-ai-revolution/.
[14] Julia Kreutzer et al., "Quality at a Glance: An Audit of Web-Crawled Multilingual Datasets," *Transactions of the Association for Computational Linguistics* 10, January 31, 2022, https://direct.mit.edu/tacl/article/doi/10.1162/tacl_a_00447/109285/Quality-at-a-Glance-An-Audit-of-Web-Crawled, 50-72.
[15] Reuters, "Biased GPT? Singapore builds AI model to 'represent' Southeast Asians," *Rappler,* February 10, 2024, https://www.rappler.com/technology/features/singapore-builds-ai-model-represent-southeast-asians/; AI Singapore, https://aisingapore.org, accessed February 27, 2024.; Goh Yan Han, "$70m S'pore AI initiative to develop first large language model with South-east Asian context," *The Strait Times,* December 4, 2023, https://www.straitstimes.com/singapore/70m-s-pore-ai-initiative-to-develop-first-large-language-model-with-south-east-asian-context; Deep Tech Times, "Singapore leads regional LLM development with SEA-LION," February 5, 2024, https://deeptechtimes.com/2024/02/05/singapore-leads-regional-llm-development-with-sea-lion/.

Agency announced a public-private partnership to support the development of an LLM in Indonesia.[16] These initiatives: 1) are publicly led, 2) rally private resources, 3) are housed primarily by universities, and 4) aim for general-use, open-source models.

1.2. Challenges caused by AI development: Labor market disruptions (Question 13)

Disruptions to the IT service export sector: There is significant concern that AI will decrease global demand for service exports, such as business process outsourcing (BPO), IT service exports, and customer service. These industries have traditionally been viewed as a pathway for growth in developing economies and have become a significant economic force in South and Southeast Asia.[17] In Kearney's global services location index, for example, India, Malaysia, and Indonesia rank first, third, and sixth, respectively, in attractiveness as an offshore location for business services.[18] In Sri Lanka, projected IT services account for 1.5 percent of GDP, while in Nepal, IT export services have emerged as a promising growth area, expanding 64.2 percent between 2022 and 2023.[19] The Philippines—home to 717 call centers and 1,489 BPO companies—also relies heavily on the outsourced customer service sector.[20]

The customer service sector is experiencing a high AI adoption rate, with some e-commerce companies already substituting their entire customer service teams with systems based on ChatGPT.[21] Countries in South and Southeast Asia are likely to feel the impact of reduced demand for these services most acutely, which may lead to economic upheaval.[22] It also underscores the continued importance of digital upskilling in the region, including AI skills.

Protecting worker rights: In addition to the potential for AI to automate service-sector work in low- and middle-income countries, a main way in which AI affects labor-market dynamics is by creating demand for low-cost labor for data labeling and content moderation. Workers performing these essential tasks have organized against poor working conditions,[23] with the African Content Moderators Union filing a petition with Kenya's Parliament requesting an investigation into OpenAI, Meta, Google, and other multinationals that employ content moderators in Kenya.[24] A number of civil society organizations (CSOs) have challenged the dominant, extractive AI development model practiced by major technologies companies, such as Karya in Bengaluru and Yatri in Kerala; these grassroots efforts are essential to ensuring that AI

[16] Suchit Leesa-nguansuk, "Nectec, agencies roll out Open ThaiGPT," *Bangkok Post,* April 25, 2023, https://www.bangkokpost.com/life/tech/2556324/nectec-agencies-roll-out-open-thaigpt; Embassy of the Republic of Indonesia in Singapore, "SEA- LION Large Language Model (LLM) Project Launching," December 1, 2023, https://www.kemlu.go.id/singapore/en/news/27333/sea-lion-large-language-model-llm-project-launching.
[17] Prakash Loungani et al., "Services Exports Open a New Path to Prosperity," *IMF Blog,* April 5, 2017, https://www.imf.org/en/Blogs/Articles/2017/04/05/services-exports-open-a-new-path-to-prosperity.
[18] Arjun Sethi et al., "Regenerative talent pools: the 2023 Kearney Global Services Location Index," *Kearney,* July 2023, https://www.kearney.com/service/digital-analytics/digital/gsli/2023-full-report.
[19] Statista, "Business Process Outsourcing: Market Data & Analysis," October 2023, https://www.statista.com/outlook/tmo/it-services/business-process-outsourcing/worldwide; Institute for Integrated Development Studies, "Unleashing IT: Advancing Nepal's Digital Economy: Expanding jobs and exports," July 2023, https://iids.org.np/images/publications/15c4487b777dcf3239cd6af6dd15c2c1.pdf.
[20] Smartscrapers, https://rentechdigital.com/smartscraper, accessed February 27, 2024.
[21] Pranshu Verma, "ChatGPT provided better customer service than his staff. He fired them" *The Washington Post,* October 3, 2023, https://www.washingtonpost.com/technology/2023/10/03/ai-customer-service-jobs.
[22] By 2028, digital automation is projected to displace more than 10% of the total workforce in ASEAN-6 economies. See Oxford Economics and Cisco, "Technology and the future of ASEAN jobs," September 2018, https://www.cisco.com/c/dam/global/en_sg/assets/csr/pdf/technology-and-the-future-of-asean-jobs.pdf.
[23] Satyavrat Krishnakumar and Amay Korjan, "Worker-Led Alternatives: A Line of Hope for New Platform Futures," *Bot Populi*, October 2021, https://botpopuli.net/worker-led-alternatives-a-line-of-hope-for-new-platform-futures/.
[24] Karen Hao and Deepa Seetharaman, "Cleaning Up ChatGPT Takes Heavy Toll on Human Workers," *The Wall Street Journal*, July 24, 2023, https://www.wsj.com/articles/chatgpt-openai-content-abusive-sexually-explicit-harassment-kenya-workers-on-human-workers-cf191483.

supports the achievement of the SDGs rather than labor exploitation.[25] USAID could help protect workers rights by promoting policies that ensure fair wages and benefits for data labelers and other workers in the AI supply chain.[26] They could also help foreground the voices of workers in AI policymaking processes, including by funding CSOs that prioritize alternative, local-led pathways for AI development as well as through multi-stakeholder engagements.

2. Promising AI applications to advance sustainable development (Question 2)

2.1. Leveraging AI to overcome data scarcity issues related to SDG goals

AI tools present a significant opportunity to improve the development and evaluation of targeted public policy measures by enhancing existing data collection practices. In particular, satellite and street-level imagery have proven effective in tracking a variety of indicators of sustainable development, including socioeconomic distributions, agricultural productivity, economic activity, and population density.[27] Recent research at Stanford and beyond has sought to standardize the development of ML models for these tasks.[28] We discuss two applications of such tools to illustrate their potential to advance progress toward the SDGs.

AI for poverty assessment and reduction (SDG 1): Traditional methods of measuring poverty levels in Global Majority countries are time-consuming, expensive, and challenging to execute at scale, hampering efforts to assess the effectiveness of policy solutions. Recent ML research has revealed new opportunities for applying computer vision to identify areas of poverty and assess interventions. For example, a Stanford study used ML to estimate asset wealth of households as a measure of local livelihood in Uganda. By leveraging low-cost existing data, the research team could causally determine that electrification expansion had statistically significant positive effects on asset wealth.[29]

Other Stanford studies have similarly leveraged satellite imagery and public crowd-sourced street-level imagery to predict livelihood indicators.[30] These approaches, which augment on-the-ground data collection efforts, can help to statistically estimate the effect of poverty reduction policies. Future research can help to further explore and combine insights from open-source data to spur data-driven policymaking.

AI for agricultural yield and food security (SDG 2): ML technology can utilize remote sensing data such as satellite imagery to understand food systems in areas where surveys are conducted infrequently or at high temporal and monetary cost. These are crucial to anticipating food security in different regions, especially those undergoing climate shifts. Recent Stanford studies

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[25] Billy Perrigo, "The Workers Behind AI Rarely See Its Rewards. This Indian Startup Wants to Fix That," *TIME*, July 27, 2023, https://time.com/6297403/the-workers-behind-ai-rarely-see-its-rewards-this-indian-startup-wants-to-fix-that/.
[26] Partnership on AI, "Responsible Sourcing of Data Enrichment Services," June 16, 2021, https://partnershiponai.org/paper/responsible-sourcing-considerations/.
[27] Marshall Burke et al., "Using satellite imagery to understand and promote sustainable development," *Science* 371(6535), March 19, 2021, https://doi.org/10.1126/science.abe8628; Jihyeon Lee et al., "Predicting Livelihood Indicators from Community-Generated Street-Level Imagery," *Proceedings of the AAAI Conference on Artificial Intelligence* 35(1), May 18, 2021, https://doi.org/10.1609/aaai.v35i1.16101, 268-276.
[28] Christopher Yeh et al., "SustainBench: Benchmarks for Monitoring the Sustainable Development Goals with Machine Learning," *Thirty-fifth Conference on Neural Information Processing Systems*, December 2021, https://openreview.net/forum?id=5HR3vCylqD.
[29] Nathan Ratledge et al., "Using machine learning to assess the livelihood impact of electricity access," *Nature* 611, November 16, 2022, https://doi.org/10.1038/s41586-022-05322-8, 491–495.
[30] Jihyeon Lee et al., "Predicting Livelihood Indicators from Community-Generated Street-Level Imagery"; Christopher Yeh et al., "Using publicly available satellite imagery and deep learning to understand economic well-being in Africa," *Nature Communications* 11(2583), May 22, 2020, https://doi.org/10.1038/s41467-020-16185-w.

have successfully used ML to predict crop yields in Argentina, Brazil, and Kenya, with predictions that help anticipate low yields and enable policymakers to mitigate food insecurity.[31]

Geospatial and ML methods have also been utilized to develop novel datasets and improve crop mapping in Ghana and South Sudan and estimate crop composition in Kenya.[32] Combining this analysis with other data sources, such as soil factor databases, can help to estimate environmental impacts, which in turn can be used to plan for sustainable land usage.[33] By improving the efficiency and scalability of agricultural data collection and analysis, these methods can support policymakers and international/development organizations in taking sustainable approaches to enhance food security in short- and long-term contexts.

Ensuring responsible and effective applications of AI tools: While there is immense potential for ML techniques to close certain gaps in data collection processes in Global Majority countries, digitized information has its own gaps and lacks the social and cultural intimacy offered by traditional data-gathering methods. ML techniques must be used to augment rather than to replace these methods to ensure that certain segments of the population are not excluded.[34]

Further, ML and computer vision technologies have a long and significant history of contributing to surveillance. Stanford research has shown the capacity of surveillance technologies to invade individual privacy, suppress free speech, and increase disparities, even when these are not the goals of the researchers developing the tools.[35] It is crucial to anticipate the dual use of these technologies and ensure they do not enable oppression. Steps can include supporting civil liberties protections, transparency provisions, and policy capacity building.

2.2. Leveraging AI to advance environmental SDGs

AI technologies present a promising pathway to addressing complex environmental challenges, though the resource intensity of AI development poses its own environmental challenges.[36] Below, we highlight two examples of areas in which Stanford research has shown AI tools to hold particular promise for advancing SDGs related to environmental sustainability and climate action in Global Majority contexts.

AI for Net Zero planning (SDG 7, 12, 13): Reaching Net Zero 2050 will, among other things, require countries to develop a variety of "subsurface solutions" related to sustainable mining for

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[31] Zhenong Jin et al., "Smallholder maize area and yield mapping at national scales with Google Earth Engine," *Remote Sensing of Environment* 228, July 2019, https://doi.org/10.1016/j.rse.2019.04.016, 115-128; Anna X. Wang et al., "Deep Transfer Learning for Crop Yield Prediction with Remote Sensing Data," *COMPASS '18: Proceedings of the 1st ACM SIGCAS Conference on Computing and Sustainable Societies* (50), June 2018, https://doi.org/10.1145/3209811.3212707, 1–5; Marshall Burke et al., "Satellite-based assessment of yield variation and its determinants in smallholder African systems," *Proceedings of the National Academy of Sciences* 114(9), February 15, 2017, https://doi.org/10.1073/pnas.1616919114, 2189-2194.

[32] Rose M Rustowicz et al., "Semantic Segmentation of Crop Type in Africa: A Novel Dataset and Analysis of Deep Learning Methods," *Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) Workshops*, 2019, https://openaccess.thecvf.com/content_CVPRW_2019/papers/cv4gc/Rustowicz_Semantic_Segmentation_of_Crop_Type_in_Africa_A_Novel_Dataset_CVPRW_2019_paper.pdf, 75-82; Dan M. Kluger et al., "Two shifts for crop mapping: Leveraging aggregate crop statistics to improve satellite-based maps in new regions," *Remote Sensing of Environment* 262(112488), September 1, 2021, https://doi.org/10.1016/j.rse.2021.112488.

[33] Zhenong Jin et al., "Smallholder maize area and yield mapping at national scales with Google Earth Engine," *Remote Sensing of Environment* 228, July 2019, https://doi.org/10.1016/j.rse.2019.04.016, 115-128.

[34] Joshua Blumenstock, "Don't forget people in the use of big data for development," *Nature Comments*, September 10, 2018, https://doi.org/10.1038/d41586-018-06215-5.

[35] Pratyusha Ria Kalluri et al., "The Surveillance AI Pipeline," *arXiv preprint*, September 26, 2023, https://arxiv.org/abs/2309.15084.

[36] David Rolnick et al., "Tackling Climate Change with Machine Learning," *ACM Computer Surveys* 55(2), February 7, 2022, https://dl.acm.org/doi/full/10.1145/3485128, 1-96.

minerals needed in electric vehicles, acquiring geothermal energy, and storing CO2.[37] Stanford research led by Jef Caers has highlighted how AI tools can significantly contribute to related planning and decision-making.[38] The project employs intelligent agents—AI programs that can reason about uncertainty and decide what actions are optimal—to enable more efficient decisions regarding where to drill for minerals and to make mining practices more sustainable. The same approach can be used to make smarter decisions regarding CO2 sequestration. Intelligent agents can help determine where and how to safely inject CO2 produced by steel or cement factories into the earth for storage.

Earlier this year, a mining startup and research partner of Stanford's Mineral-X community[39] used an intelligent agent to discover the world's third largest copper mine, in Zambia, which will have a substantial impact on copper supply needed for the energy transition.[40] The discovery highlights the importance of partnerships between academia and industry with flexible funding models that are more efficient and offer flexibility in the use of resources. Government funders must consider updating their funding requirements to catch up with the quickly evolving nature and applications of AI.

AI for monitoring environmental compliance (SDG 13): Monitoring environmental compliance is notoriously challenging, especially in Global Majority contexts where regulators often have limited resources and may lack incentives to monitor and enforce noncompliance. A growing body of research has shown that ML techniques offer a promising way to lower the cost of compliance monitoring. For example, a Stanford study applied ML to high-resolution satellite imagery to monitor environmental compliance in Bangladesh's informal industry, where brick kilns are a major pollution source.[41] This approach is inexpensive, quick, and scalable, while also improving public disclosure that enables third-party monitoring.

Other studies have also demonstrated the effectiveness of ML to improve monitoring and prediction in environmental compliance scenarios.[42] However, most studies were conducted in highly developed countries. More research is needed to explore the application of ML to environmental compliance efforts in Global Majority contexts.

Ensuring responsible AI applications: While various AI systems can be powerful tools for mitigating and adapting to climate change, when applying these systems in the above mentioned contexts, it is important to remember that AI augments rather than replaces humans. Smart

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[37] Jef Caers, "Building Intelligent Agents to Reach Net-Zero 2050," *Stanford HAI*, Webinar held on February 1, 2023, https://hai.stanford.edu/events/jef-caers-building-intelligent-agents-reach-net-zero-2050; Katharine Miller, "Building Intelligent Agents to Reach Net Zero 2050," *Stanford HAI*, October 3, 2022, https://hai.stanford.edu/news/building-intelligent-agents-reach-net-zero-2050.

[38] John Mern and Jef Caers, "The Intelligent Prospector v1.0: geoscientific model development and prediction by sequential data acquisition planning with application to mineral exploration," *Geoscientific Model Development* 16(1), January 11, 2023, https://gmd.copernicus.org/articles/16/289/2023/, 289-313.

[39] An initiative that seeks to advance AI for smarter mineral exploration and sustainable mining practices, to better understand and mitigate possible downsides of increasing mineral supply, including human exploitation and environmental destruction. See Mineral-X, "Stewardship - Prosperity - Representation," https://mineralx.stanford.edu/stewardship-prosperity-representation.

[40] Taonga Mitimingi et al., "AI-Powered Zambian Copper Mine May Become World's Third Largest," *Bloomberg*, February 9, 2024, https://www.bloomberg.com/news/articles/2024-02-09/ai-powered-zambian-copper-mine-may-become-world-s-third-largest.

[41] Jihyeon Lee et al., "Scalable deep learning to identify brick kilns and aid regulatory capacity," *Proceedings of the National Academy of Sciences* 118(17), April 22, 2021, https://www.pnas.org/doi/10.1073/pnas.2018863118.

[42] Cassandra Handan-Nader et al., "Deep learning to map concentrated animal feeding operations," *Nature Sustainability* 2, 2019, https://www.nature.com/articles/s41893-019-0246-x, 298-306; M. Hino et al., "Machine learning for environmental monitoring," *Nature Sustainability* 1, October 1, 2018, https://www.nature.com/articles/s41893-018-0142-9, 583-588.

mineral exploration, for example, relies heavily on geologists, who need to provide their intelligent assistants with falsifiable geological hypotheses.

It is also well-known that ML models themselves carry considerable environmental costs.[43] Researchers estimate that the process of training certain powerful AI models can emit more than 626,000 pounds of carbon dioxide equivalent and evaporate 700,000 liters of clean freshwater.[44] Scholars have further documented the inequitable distribution of AI's environmental costs, which threaten to disproportionately impact already socioeconomically disadvantaged regions.[45] To harness ML solutions responsibly, researchers and funders alike should carefully measure and document the resource intensity of their ML models and evaluate whether their sustainable development benefits outweigh their environmental costs.

3. Approaches to AI policymaking in the Global Majority (Questions 12, 16)

3.1. Lessons from AI policymaking efforts in Global Majority contexts

Countries all over the world have started to draft legislation on AI, and many have issued national AI strategies and plans.[46] Leaders in these countries are actively seeking technical assistance. For example, Nepal will launch its AI plan drafting process in March with a gathering of local stakeholders and international experts, with coordination support from TAF. There is also increasing demand for international cooperation, both with peer economies (through venues such as ASEAN) and with industrialized countries, to learn from their experience.

Many of the strategies and long-term policies are based on existing work in economies at the frontier of AI advancements, such as the United States and the EU, and middle powers like Australia, Japan, Korea, and India. So far there are scattered attempts to make these systems interoperable, such as the U.S.-Singapore AI Governance framework and the African Union's Blueprint on AI for Africa.[47] USAID can play an important role in promoting shared understanding of these initiatives and the specific needs of middle- and lower-income economies.

In many countries and international bodies, it is unclear which ministerial departments have the mandate to regulate AI. When supporting developing countries in their AI policy drafting process, it is essential to ensure comprehensive engagement that involves the full range of relevant government players. For example, in Thailand there are several ministries promoting the adoption of AI: the Ministry of Digital Economy and Society, the Ministry of Higher Education, Science, Research and Innovation, and the Ministry of Industry. While this is not problematic per se, there are no structures in place for inter-ministerial or inter-agency collaboration. As a result,

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[43] Alexandre Lacoste et al., "Quantifying the Carbon Emissions of Machine Learning," *arXiv preprint*, October 21, 2019, https://arxiv.org/abs/1910.09700; Edmund L. Andrews, "AI's Carbon Footprint Problem," *Stanford HAI*, July 2, 2020, https://hai.stanford.edu/news/ais-carbon-footprint-problem.

[44] Emma Strubell et al."Energy and Policy Considerations for Deep Learning in NLP," *arXiv preprint*, June 5, 2019, https://arxiv.org/abs/1906.02243; Pengfei Li et al., "Making AI Less 'Thirsty': Uncovering and Addressing the Secret Water Footprint of AI Models," *arXiv preprint*, April 6, 2023, https://arxiv.org/abs/2304.03271.

[45] Pengfei Li et al., "Towards Environmentally Equitable AI via Geographical Load Balancing," *UC Riverside*, June 20, 2023, https://escholarship.org/uc/item/79c880vf.

[46] Tens of Global Majority countries have published national AI strategies, including Argentina, Brazil, Chile, China, Colombia, Egypt, Ghana, India, Indonesia, Kenya, Malaysia, Mexico, Saudi Arabia, Singapore, South Africa, Tunisia, Uganda, United Arab Emirates, Uruguay, and Vietnam. See OECD.AI Policy Observatory, "National AI policies & strategies," https://oecd.ai/en/dashboards/overview?selectedTab=countries.

[47] Smart Africa, "Blueprint: Artificial Intelligence for Africa," 2021, https://www.bmz-digital.global/wp-content/uploads/2022/08/70029-eng_ai-for-africa-blueprint.pdf.

this multiplicity could lead to overlapping of mandates and internal inefficiencies within local bureaucracies.

3.2. Fostering AI research and development cooperation among Global Majority countries

Establishing institutions, platforms, or formalized mechanisms that help facilitate international cooperation on AI R&D between Global Majority countries will be an important avenue for responsible and inclusive AI development. Stanford HAI has advocated for the establishment of a Multilateral AI Research Institute, led by the United States, that enables cooperation on cutting-edge multidisciplinary AI research in the public interest with like-minded partner countries.[48] While that proposal focuses on collaboration between Global North countries, we believe our theory of impact translates directly to Global Majority contexts.

Overcoming resource constraints through research cooperation: Developing responsible, human-centered AI is a complex challenge that requires significant resources. Regional multilateral AI research institutes or consortia could provide resource-constrained countries with access to shared data and computing resources, digital infrastructure, and talent. Partnerships between universities in the same region can also address micro-level issues such as private universities' low research outputs due to the shortage of faculty and researchers.[49] Public and private funders can play a crucial role in providing resources for both the establishment of such cooperation forums and specific AI R&D projects involving research institutions from different Global Majority countries. However, it is crucial that R&D partners in relevant Global Majority countries co-design the objectives and outcomes of such collaborative projects and institutions.

Advancing transnational R&D cooperation will ensure that Global Majority countries can cluster projects, pool knowledge, avoid duplicative work, and make the most efficient use of their limited resources and comparative advantages.[50] Ultimately it will allow resource-constrained institutions to scale their R&D projects. Additionally, such forums for cooperation could enable better communication between and iterative problem-solving among governments, academia, and private sector research partners across regions that face similar challenges.

Expanding Global Majority representation in global AI governance: As the number of global forums, platforms, and summits devoted to AI governance has increased exponentially in recent years, it has become increasingly clear that voices from the Global Majority are vastly underrepresented in these conversations.[51] Major forums for international AI governance discussions hosted by the G7, the OECD, or more recently the United Kingdom have included few—if any—stakeholders representing the perspectives of the Global Majority.

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[48] Daniel Zhang et al.,"Enhancing International Cooperation in AI Research: The Case for a Multilateral AI Research Institute," *Stanford HAI,* May 2022, https://hai.stanford.edu/white-paper-enhancing-international-cooperation-ai-research-case-multilateral-ai-research-institute.

[49] Yamina El Kirat El Allame et al., "Academic Collaboration in Africa and Asia: Current Status, Challenges, and Emerging Trends and Strategies," *International Journal of African Higher Education* 9(3), https://doi.org/10.6017/ijahe.v9i3.16041, 37–61.

[50] Cameron F. Kerry et al., "Strengthening International Cooperation on AI," *Brookings and The Centre for European Policy Studies*, October 2021, https://www.brookings.edu/wp-content/uploads/2021/10/Strengthening-International-Cooperation-AI_Oct21.pdf; Samedi Heng et al., "Understanding AI ecosystems in the Global South: The cases of Senegal and Cambodia," *International Journal of Information Management* 64, June 2022, https://doi.org/10.1016/j.ijinfomgt.2021.102454.

[51] Sumaya Nur Adan, "The Case for Including the Global South in AI Governance Discussions," *Centre for the Governance of AI*, October 20, 2023, https://www.governance.ai/post/the-case-for-including-the-global-south-in-ai-governance-conversations; Mark Scott, "The Global South's missing voice in AI," *Politico Digital Bridge*, August 31, 2023, https://www.politico.eu/newsletter/digital-bridge/the-global-souths-missing-voice-in-ai/.

In addition to the domestic benefits outlined above, intra-regional AI research collaborations could provide an important avenue for capturing Global Majority perspectives in global AI governance. Joint research projects could allow regulatory sandboxes and troubleshooting, while also providing tangible AI use cases rooted in real opportunities and challenges in Global Majority contexts that could inform discussions with policymakers in global forums.[52] Stronger regional collaboration could also help Global Majority countries better understand their unique role, individual strengths, and contributions—enabling them to participate from a position of strength and play a substantive role in shaping the global AI discourse.[53]

Challenges to regional cooperation on AI research: Unfortunately, international collaboration has become more difficult in the current landscape of heightened geopolitical and economic competition among nation states.[54] Even among peer economies, AI is often seen as a competitive field. In Southeast Asia, multiple countries aspire to be a regional leader in AI.[55]

While the Singaporean-led SEA-LION initiative may represent a valuable success story for regional AI research cooperation in Southeast Asia, it remains to be seen if more governments will officially support initiatives under this banner. Some Southeast Asian countries may prefer developing LLMs independent of this initiative with their own resources, as Thailand is doing. Governments will be tested in their commitment to solving global challenges, and effort will be needed on all sides to strike a balance on mutually beneficial collaborations between researchers.

Sincerely,

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[52] Cameron F. Kerry et al., "Strengthening International Cooperation on AI."
[53] Ylva Rodny-Gumede, "More intra-Africa university collaborations are needed," *University World News*, November 30, 2023, https://www.universityworldnews.com/post.php?story=20231126200501765.
[54] Cameron F. Kerry et al., "Strengthening International Cooperation on AI."
[55] For example, Malaysia aims to become "the leader in AI-driven [supply chain management]" and Singapore "a global hub in innovating, piloting, test-bedding, deploying and scaling AI solutions for impact." See Malaysia's Ministry of Science, Technology & Innovation, "AI-RMAP"; Smart Nation and Digital Government Office, "National Artificial Intelligence Strategy," 2019, https://file.go.gov.sg/nais2019.pdf.