Lippoldt, Douglas

Working Paper

Developing countries' business participation in the AI economy

CIGI Papers, No. 323

Provided in Cooperation with:
Centre for International Governance Innovation (CIGI), Waterloo, Ontario

Suggested Citation: Lippoldt, Douglas (2025) : Developing countries' business participation in the AI economy, CIGI Papers, No. 323, Centre for International Governance Innovation (CIGI), Waterloo, ON, Canada

This Version is available at:
https://hdl.handle.net/10419/322457

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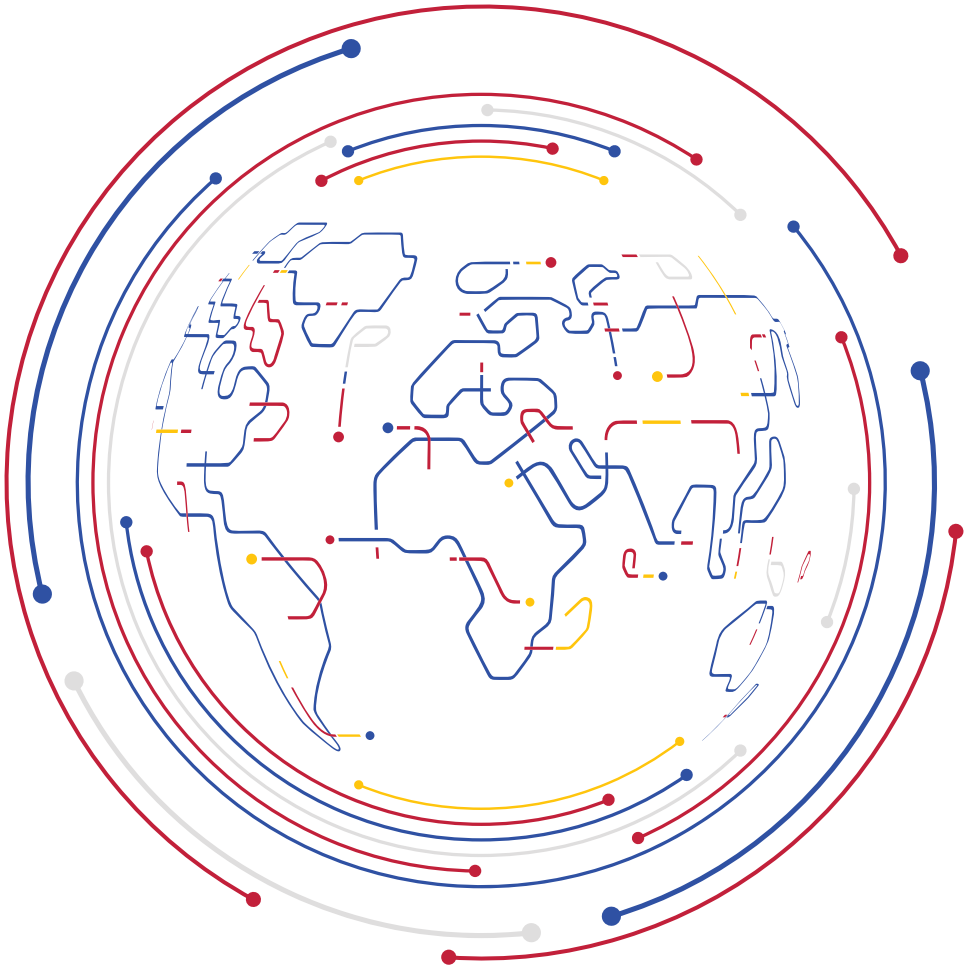

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About the Author

Douglas (Doug) Lippoldt is a CIGI senior fellow and an international trade economist based in Claremont, California. He served as chief trade economist at HSBC Global Research from 2014 to 2020. Previously, he served in various roles as a senior economist at the Organisation for Economic Co-operation and Development in Paris, France, during a tenure of 22 years. Doug's early career included seven years as an international economist with the US Department of Labor.

He has published extensively on trade topics as well as on related aspects of economic development, labour market adjustment, innovation and intellectual property. Doug holds a Ph.D. in economics from the Institut d'études politiques de Paris (Sciences Po), an M.A. in international studies from the University of Denver and a B.A. in international studies from Washington College in Maryland. He was a Fulbright Scholar at the University of Cologne, Germany, and a Peace Corps volunteer in Burkina Faso. During 2015–2019, he represented HSBC as the deputy delegate on the Business 20 Trade and Investment Task Force. He is currently a contributing author on a Think20 trade task force team.

Acronyms and Abbreviations

AI	artificial intelligence
ASEAN	Association of Southeast Asian Nations
BRI	Belt and Road Initiative
DEFA	Digital Economy Framework Agreement
DEPA	Digital Economy Partnership Agreement
DPA	Digital Policy Alert
ECLAC	Economic Commission for Latin America and the Caribbean
G7	Group of Seven
GenAI	generative AI
IoT	Internet of Things
IP	intellectual property
IPO	initial public offering
LLM	large language model
MENA	Middle East and North Africa
ML	machine learning
NCAIR	National Center for AI and Robotics
NLP	natural language processing
OECD	Organisation for Economic Co-operation and Development
PPP	purchasing power parity
R&D	research and development
SMEs	small and medium-sized enterprises
STEM	science, technology, engineering and mathematics
UAE	United Arab Emirates
VC	venture capital
WEF	World Economic Forum

Executive Summary

How are start-up businesses in middle-income developing countries participating in the rapidly expanding artificial intelligence (AI) economy? Are some developing country AI start-ups able to tap into the AI ecosystems of leading economies in Group of Seven (G7) countries?[1] What is the domestic policy context, and how can conditions be improved? Are there signs of South-South AI ecosystem development?

This case study takes stock of the development of AI start-ups engaged with G7 investors and investors from across 10 middle-income developing countries. It considers the emerging investment AI ecosystems in these countries, which are located across Africa, Southeast Asia and Latin America. The significant concentration of advanced AI innovation in developed economies heightens the importance of engagement with counterparts in G7 countries who can complement local resources with access to additional financial, technological and managerial support.

The research employs a comparative case study approach analyzing firm-level data from 2,537 AI start-ups across Brazil, Colombia, Egypt, Indonesia, Kenya, Nigeria, South Africa, Thailand, Tunisia and Vietnam. Particular attention is given to the role of G7 investors in facilitating technology transfer, with an examination of 239 AI start-ups that have attracted such investment. The analysis is complemented by an assessment of AI policy and regulatory frameworks in each study country. From national strategies to implementation and enforcement, various dimensions are reviewed.

Key findings indicate that:

- Despite modest scale, viable AI ecosystems are developing in all the case study countries; South-South investment networks are emerging alongside dominant North-South relationships; and policy and regulatory development is broadly supportive.
- Among the 10 countries, Brazil has achieved some scale; domestic investors there supply a majority of investment engagements[2] with local AI start-ups, which is unique for these markets. Brazil attracts by far the largest inflow of US investor engagements, while in most of the other markets, US investors play a lead role.
- There is some geographic clustering of these AI start-ups, pointing to the possible emergence of innovation hubs in and around cities such as Jakarta, Lagos and São Paulo.
- All of the host countries are developing national strategies. Implementation progress varies widely. In all of the case study countries, challenges remain in relation to issues such as infrastructure constraints, skills development, the urban-rural digital divide, regulating AI safety while facilitating innovation, and capacity limitations of the public administration, among other issues.

The analysis underscores that while these developing countries are pursuing diverse strategies for AI development, they are also facing challenges in striving for regulatory convergence with major AI powers, which are themselves diverging on some issues such as risk management. To succeed, the case study countries must balance international alignment with domestic innovation support, address infrastructure and talent shortages, and develop governance frameworks that protect citizens while enabling competitiveness in global AI markets. The study concludes with corresponding recommendations.

Introduction

The AI economy is advancing rapidly technologically and attracting substantial investment inflows. This is being fuelled, in part, by private sector research and development (R&D) expenditure in areas ranging from chip-making equipment to software development and commercial applications (Lippoldt 2024). There is significant geographic concentration in large-scale AI innovative activity, which is centred in roughly a dozen mostly developed countries, together with

1 The G7 countries are Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.

2 An engagement is defined here as a level of investment sufficient to place an investor among the top five in a firm.

China and India.[3] Given the assessed potential for AI to contribute substantially to future economic growth, this concentration in AI innovation presents a challenge for developing countries to gain access to and share in the benefits of this innovation while also managing the risks. This geographic concentration could also pose a challenge for firms in other parts of the world looking to tap into the latest generation of AI technology. A question remains as to whether there is potential for improved policy alignment or other adjustment to facilitate further development and technology transfer in the sector, with appropriate safeguards.

In this paper, using a comparative case study approach, the author examines how start-ups in a sample of 10 middle-income developing countries engage with the global AI economy and considers domestic policy conditions that facilitate their participation. These issues are of importance not only for the direct stakeholders in such businesses but also for those concerned with economic development more generally. International diffusion and application of the emerging AI-driven technologies from leading AI economies, along with complementary local innovation in other economies, may together contribute to improved welfare in developing countries, provided risks are managed. Such risks may come from intentional or accidental harms directly associated with AI (for example, due to biases), as well as other challenges or constraints such as regulatory impediments, adjustment costs for affected individuals and social resistance to technological change, among other considerations.[4]

Where to Plug In?

Development of AI foundation models requires significant scale and a substantial resource base to amass the necessary computing power and data.[5] Few firms or institutions in the world have sufficient capacity to tackle such a challenge. For example, according to Stanford University's 2024 *Artificial Intelligence Index Report* (Maslej et al. 2024, 5), OpenAI's GPT-4 required an estimated US$78 million worth of computational power to train in 2023. Even though some less expensive strategies for training appear to be emerging via challengers such as DeepSeek, the upfront costs remain substantial.[6] In 2023, China, the European Union and the United States together produced less than 100 notable AI models, according to the 2024 *AI Index Report* (ibid.).

But, fortunately, this is not the full story. There is room in the AI economy for smaller developers to build downstream applications that employ the larger models as a base.[7] Businesses may also develop "small language models" that have a compact design and possess far fewer parameters than a large language model (LLM) — perhaps just one-sixth or less of the number of parameters. Nevertheless, they can excel at delivering AI services for specific tasks, such as analyzing customer feedback or generating product descriptions. And there are opportunities to be found in many similar niches in the delivery of AI services to customers in developing countries, from building out hardware and software capacity to human capital development (in other words, skills) and public infrastructure for connectivity, among other possibilities.

Policy makers in developing countries have a substantial role to play in shaping the domestic conditions for business. Their choices may contribute to a nation's ability to tap into the benefits of the AI economy while safeguarding against risks. Of course, AI is not a stand-alone solution to the full range of constraints on

3 Lippoldt (2024, 14, 18) found the leading AI-intensive, innovation-driven firms (in terms of R&D expenditure) to be concentrated geographically. As of 2021, the corporate headquarters were located in just 11 countries: Canada, China, Finland, Germany, India, Ireland, Israel, Japan, South Korea, the United Kingdom and the United States. These firms were often clustered in particular regions, such as Beijing, London or Silicon Valley.

4 Ian Bremmer and Mustafa Suleyman (2023), for example, highlight key risks.

5 In a web post titled "Reflections on Foundation Models," Rishi Bommasani and Percy Liang (2021) of Stanford University's Institute for Human-Centered Artificial Intelligence define foundation models as "models trained on broad data (generally using self-supervision at scale) that can be adapted to a wide range of downstream tasks." They "see foundation models as the subject of a growing paradigm shift, where many AI systems across domains will directly build upon or heavily integrate foundation models."

6 Some foundation model developers have devised strategies to reduce training costs, in part, by trading off some refinement in the results. Chinese start-up DeepSeek famously trained its debut model for just US$6 million, though that number allegedly excludes substantial upfront costs incurred prior to the launch of training. See Metz (2025).

7 For example, see the discussion in a web post from Amazon Web Services (https://aws.amazon.com/what-is/foundation-models/) and from the World Economic Forum (Whiting 2025).

development, but it may find early application in areas particularly relevant for development such as health care, agriculture, environmental protection and industrial development.[8] Some of the benefits (and risks) may arise via business engagement in the AI economy, while other benefits (and risks) may arise via the implementation of AI solutions in other parts of the economy and the build-out of the infrastructure associated with the digital economy more broadly.

The Framework for This Paper

This paper employs a comparative case study approach. It considers the emerging AI business communities in an illustrative sample of middle-income developing countries, with a particular focus on AI start-ups, which are defined here as firms that are generally young, active and privately held, with an explicit mention of AI in their mission statement. (Details are discussed below.)

While most high-income countries are engaging deeply in the AI economy (including some high-income developing countries such as the United Arab Emirates [UAE]), the focus here on middle-income developing countries is intended to reach the next level of countries that may be on the cusp of engaging more fully in the AI economy as one element of their economic development process. The sample selection is meant to be illustrative of middle-income developing countries with some measure of AI start-up activity (at least 50 AI start-ups) and not necessarily representative of all middle-income countries. Indeed, some of their lagging peers have very little AI start-up activity at all. Nonetheless, with a sample size of 10 countries, the author was able to achieve a measure of geographic diversity (touching three continents) and economic diversity (upper- versus lower-middle income). The author also aimed to keep the overall sample size small enough so that some country narrative and detail could be provided while also keeping the report of manageable size. The case study countries include Brazil, Colombia, Egypt, Indonesia, Kenya, Nigeria, South Africa, Thailand, Tunisia and Vietnam.[9]

Particular focus is devoted to the G7 countries as partners, given the leading role of these nations in AI development over the past decade, their contributions toward advancing AI governance internationally and their extensive venture capital (VC) networks (see Box 1). The AI-relevant policy environment in each case study country is compared and contrasted among these developing countries and against leading AI business home countries. Potential areas for improved policy alignment are considered with a view to the facilitation of safe and responsible development of the sector in the case study countries, including with respect to potential facilitation of investment and associated technology transfer.

The paper opens with a review of a portion of the voluminous literature on AI. This review establishes the motivation for consideration of the issue of economic development and the opportunities and risks in relation to the AI economy. It includes a focus on businesses in the private sector and their relationship to the larger policy environment.

The next section of the paper presents a firm-level analysis of a sample of AI start-ups across the case study countries, with a primary focus on those that have attracted substantial investments from one or more investors based in the G7 nations. A separate analytical exercise considers the situation of AI-intensive unicorn companies (defined as private start-up businesses that have achieved market valuations of US$1 billion or more).

The third section reviews the comparative AI-relevant policy settings across the case study countries, with particular consideration of business perspectives. A selection of international policy guidelines and initiatives is referenced in orienting the discussion toward advantages of policy alignment and convergence, with a view to enhancing the potential for technology transfer, safety and trustworthiness in the AI economy.

The conclusions take stock of the empirical findings of the analytical sections and consider recommendations for enhancement of the policy environment in the case study countries. Appendix 1 reviews important considerations concerning the main data sources employed. Detailed supporting statistical information from the study and specific observations from the review of AI policy settings are included in Appendix 2. The extensive references section includes many accessible, hyperlinked sources.

8 See Amodei (2024). Dario Amodei is CEO of Anthropic.

9 The selection process for the 10 case study countries is discussed in the analytical section of this paper.

Box 1: G7 Nations, Governance and AI

The G7 economies have played a leading role in AI innovation, financing and technology diffusion. Likewise, the G7 governments have played a leading role in efforts to shape AI governance internationally.[10] This country grouping has repeatedly addressed issues concerning AI during its recent annual cycles for policy deliberation and coordination, including with respect to developing country partners. Below is a roundup of some of the recent milestones.

The **Hiroshima AI Process**, launched during Japan's G7 presidency in 2023 and still ongoing, aims to deliver guiding principles and a code of conduct for organizations developing advanced AI systems to promote safe, secure and trustworthy AI worldwide.[11]

The **AI Safety Summit**, convened by the United Kingdom in November 2023 with the participation of 28 countries including the other G7 members, yielded the Bletchley Park Declaration. Participants agreed to redouble their cooperation on AI safety (for example, through identification of safety risks and building risk-based safety policies) and to engage stakeholders to take responsibility when undertaking advanced model development work (for example, through external prerelease safety testing) (GOV.UK 2023).

During Italy's G7 presidency, AI remained a focus area. For example, it was highlighted during the October 2024 **Ministerial Meeting on Technology and Digital**.[12] Moreover, in 2024, the G7 foreign ministers underscored the importance of AI in relation to sustainable development, citing policy guidance in a joint communiqué on cybersecurity, inclusivity, safety and risk mitigation, among other considerations.[13]

The next steps in such international cooperative initiatives are now quite uncertain. Shifts in strategic orientation under President Trump have AI policy more focused on domestic priorities such as reducing regulation, promoting market-led AI innovation and boosting federal government use and procurement of AI (Mackowski, Carrillo and Jacobson 2025; The White House 2025). The former US emphasis on oversight, risk mitigation and equity has been set aside. Internationally, in its quest for AI dominance, especially with respect to China, the United States now appears more willing to employ unilateral approaches (Beckley 2025).

Needless to say, this scenario presents a challenge for Canada as it assumes the G7 presidency at a time of transition in its own political leadership.

10 Italy held the G7 presidency in 2024; Canada holds the reins in 2025 and in June will host the leaders' summit in Kananaskis.

11 For more information, see Government of Japan (2024). Note: the Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI System covers 11 safety measures for organizations developing advanced AI systems.

12 See G7 Italia (2024).

13 See Government of Canada (2024).

Literature Review

The advent of high-performance LLMs entered public view with the release of OpenAI's ChatGPT 3.5 on November 30, 2022, soon followed by a number of competitors. That same year also witnessed other important developments that were less in the public view with respect to generative AI (GenAI) more broadly, including the release of tools for software development and other types of content creation.[14] The availability of enhanced AI capabilities stimulated improved coverage of the technology in the economic literature. This is particularly the case with respect to the examination of governance and key regulatory and economic policy issues. Firm-level developments have been less well covered, especially in developing countries, though this is beginning to change. This literature review aims to highlight a sample of the literature and provide context for the empirical analysis that follows.

AI and Economic Development in Emerging Markets

The emergence of AI is of a dual nature for developing economies, offering transformative opportunity alongside significant risks. This tension is highlighted in the book *The Coming Wave: AI, Power, and Our Future* by Mustafa Suleyman[15] and Michael Bhaskar (Suleyman 2023). These authors anticipate that AI technologies will spread rapidly, becoming cheaper and more accessible worldwide. Developing nations will need to navigate a narrow path between open innovation and technological containment to manage risks. This approach will require robust governance frameworks, including technical safety measures, accountability systems, responsible development practices and international cooperation. At the same time, cultural and political contexts will need to be taken into account. Businesses need to factor such considerations into their risk management. Beyond the well-known risks of cyberattacks, there are risks posed by the use of poorly understood algorithms embedded in products, AI-generated misinformation, surveillance and amplification of bad actors (for example, exploiting AI for criminal or political ends, inflicting reputational damage), among others.

A rather positive assessment of the prospects for AI-supported economic development was published in October 2024 by Amodei (2024, section 3), the co-founder of leading AI firm Anthropic.[16] Amodei focuses on five key areas: biology and health, neuroscience and mental health, economic development and poverty, peace and governance, and work and meaning. He argues that people underestimate AI's potential positive impact, suggesting that in a scenario where there is successful exploitation of its potential, AI could accelerate human progress, delivering the equivalent of a century of development in just a decade or less. Great strides might be achieved in areas such as disease eradication, mental health treatment, economic growth and democratic governance. Overall, Amodei suggests a possible goal might be a 20 percent annual GDP growth rate in the developing world. According to Amodei, one strategy might be called "entente," whereby democracies share AI benefits globally in exchange for alignment on values, technology transfer mechanisms for health care, and food security. The essay emphasizes that developing nations could leapfrog traditional development paths through AI-enabled infrastructure, services and governance improvements.

In a World Bank blog post, Qimiao Fan and Christine Zhenwei Qiang (2024) point out that AI presents both transformative opportunities and significant challenges. The technology has the potential to revolutionize sectors such as education, health care and public services, as well as productivity more generally. Yet there is a risk that AI benefits may flow disproportionately to wealthy nations and major tech firms, potentially widening income gaps and undermining developing economies' competitive advantages in labour-intensive industries. The authors outline a five-part World Bank framework promoting positive

14 As defined by Claude.ai, "Generative AI refers to artificial intelligence systems that can create new content rather than simply analyzing or classifying existing data. These systems are designed to generate outputs that weren't explicitly programmed but instead are learned from patterns in training data" (see Claude.ai). GenAI is a "subset of artificial intelligence that focuses on creating new content, such as text, audio, or video, using machine learning models trained on existing data" (Lund and Ting 2023, cited in Mannuru et al. 2023, 3).

15 Suleyman was a co-founder of the pioneering AI firm DeepMind and is now CEO of Microsoft AI.

16 According to the company website (www.anthropic.com/company), "Anthropic is a Public Benefit Corporation, whose purpose is the responsible development and maintenance of advanced AI for the long-term benefit of humanity." The firm is home to a family of LLMs known as "Claude."

impacts based on digital infrastructure, local AI ecosystem development, skills enhancement, sector-specific strategies and AI safeguards.

Nishith Reddy Mannuru et al. (2023) focus specifically on the potential impacts of GenAI on developing countries. They highlight "Fourth Industrial Revolution" dimensions concerning the interplay among digital, physical and biological technologies. Of particular relevance in the commercial realm, the authors anticipate AI-derived development benefits such as increased efficiency; increased productivity (for example, from automating repetitive tasks); improved decision making; increased innovation (due to insights not easily achieved without AI); and enhanced customer experience from personalization and tailored marketing. They also highlight risks such as overreliance on AI (potentially weakening decision-making skills); AI-produced bias and discrimination; security hazards (including abuse of intellectual property [IP]); job displacement (due to automation); and unethical content (for example, fake images). In response, they advocate for collaborative efforts in areas ranging from AI policy (for example, concerning business use of AI) to investment in infrastructure; education and training; and public-private partnerships (for example, with respect to the environment).

AI Risks and Regulation in Developing Countries

AI poses a variety of risks that developing countries may struggle to manage. For example, Cecile Abungu et al. (2024) focus on economy-wide risks from highly capable AI.[17] They argue that while advanced AI systems are being developed primarily in Global North countries, their impacts will be felt worldwide. In developing countries, vulnerabilities stem from undue trust accorded to AI systems by much of the population, driven by perceptions of the potential benefits of AI.[18] The authors identify six areas of potential risk for the Global South: increased harshness of economic realities (including erosion of comparative advantages such as low-cost labour); more damaging armed conflict; more repressive and enduring authoritarianism; more persuasive manipulation of personal beliefs, behaviour and preferences; deepened cultural subordination (for example, via embedded Western bias in products); and risks due to goals embedded in AI that are misaligned with local conditions. They emphasize that Global South stakeholders need to take proactive measures. Expert advisory groups could be established to assess the options for responding to these challenges. National and regional policies will then need to address AI-specific risks and opportunities.

S. Yash Kalash (2024) highlights the Association of Southeast Asian Nations' (ASEAN's) Digital Economy Framework Agreement (DEFA), which is helping to position Southeast Asian nations to embrace AI more effectively. The region includes 10 member countries that are each at different stages of development.[19] DEFA could serve as a comprehensive framework to accelerate digital transformation across the region by harmonizing regulations, reducing barriers to digital trade, encouraging infrastructure investment and developing workforce skills. This initiative may prove helpful in establishing a basis for an eventual, possibly unified, regional AI regulatory framework. Some of the important elements may include:

- strategic infrastructure investments addressing the digital divide;
- talent development and workforce upskilling to build AI expertise;
- ethical guidelines and regulatory frameworks that balance innovation with privacy and security concerns;
- public-private partnerships and international cooperation to facilitate knowledge exchange and resource sharing; and
- harmonization of cross-border data flow regulations.

17 These authors define "highly capable AI" as referring to AI systems that "demonstrate cognitive capabilities, enabling them to perform economically valuable tasks at or above the level of human beings" (Abungu et al. 2024, 2). They provide a description of the term "Global South" as comprising 130 developing countries. Most of these countries face limited access to capital, high levels of poverty and substantial income inequality. Many also face socio-political challenges such as recurring violent conflict, weak state institutions and lower levels of education. The authors exclude China, Hong Kong, Macau and Singapore from their assessment.

18 To support this contention, the authors cite studies covering Brazil and India (ibid., 9).

19 Three ASEAN members — Indonesia, Thailand and Vietnam — are covered in the case study that follows below.

Failure to act collectively would risk widening the gap between ASEAN and the advanced economies.

Challenges to Participation in the AI Economy

Middle-income economies face significant challenges in promoting an appropriate policy context for AI development. Susan Ariel Aaronson (2024a) highlights a major geopolitical challenge arising from the adoption of more nationalistic AI policies in some leading AI economies. These include policies to constrain competitors or to nurture "sovereign AI" (in other words, measures to discriminate against foreign entities, particularly regarding data flows and infrastructure access).[20] The author warns that these challenges may stifle innovation, reinforce monopolistic markets and undermine AI as a public good, further dividing the world into AI "haves" and "have-nots." Developing countries need AI to remain competitive, yet they must pay rents to AI-advanced countries. In some cases, access may be restricted for essential components such as data, capital or computing power. Also, scale matters for the development of LLMs, so smaller developing nations face natural market constraints. However, a more cooperative international approach (for example, with respect to access to data) may provide additional scale and thereby enhance our collective human capabilities and welfare.

Aaronson (2024b) argues that effective data governance is essential for AI development. While most nations protect specific types of data, such as IP or personal data, most governments are still in the early stages of creating institutions and enforcement mechanisms to ensure that data governance is "accountable, democratically determined and effective." This is due, in part, to the challenge that data poses as something that has a multidimensional nature (in other words, it can be a good or a service — there are many different types); is international in its origins; and is traded in markets that are opaque. AI nationalism is leading some countries to alter data policies in the hopes of gaining competitive advantages. Yet most AI regulations say little about data governance, creating risks for accuracy, representativeness and trustworthiness of systems. Only the European Union and China have comprehensive AI regulations in place, while countries such as Brazil and Canada, among others, have some elements in place and may be planning more comprehensive acts.

Aaronson (ibid.) also highlights information asymmetries related to AI that favour firms with greater computing power, capital and data. This may create barriers for firms in some developing nations. Absent an interoperable international data governance system, countries with less developed institutions are disadvantaged. Developing countries may struggle to implement data laws and regulations to the satisfaction of advanced economy trading partners. This may limit access to data from partners with more rigorous protection (for example, the European Union), thus undermining the ability of developing country firms to participate more fully in the AI economy.

Anton Korinek and Joseph E. Stiglitz (2021) point to the risk of AI automation technologies for developing countries. These risks may devalue comparative advantage based on labour and natural resources. The authors propose policies to mitigate adverse effects while reaping potential gains, including:

- investing in digital infrastructure to reduce the "digital divide";
- steering toward labour-using technologies;
- developing agriculture and service sectors where AI is likely to enhance productivity but displace fewer workers;
- coordinating competition policies among developing nations to counterbalance the market power of global technology corporations; and
- changing global governance to better represent developing country interests in taxation, competition policy, IP rights and data regulation.

20 Aaronson (2024a, Table 1) provides an illustration of trade-distorting AI nationalist policies: privacy laws (China, Russia, the European Union); laws requiring that data be stored locally (El Salvador, Russia, Vietnam); regulations on personal and important data, often poorly defined (China); restrictions on data flows to certain parties (the United States bans broker sales to parties in China, Iran and Russia); data-sharing initiatives (the European Union; domestic entities may be privileged); data provenance requirements (the European Union); export controls on chips and chip-manufacturing equipment (some EU countries, Japan, the United States; for example, targeting China); and subsidization of AI infrastructure may be offered in a discriminatory manner (China, the European Union, the United States).

The Value of International Cooperation

The literature is generally supportive of the role of international cooperation in the integration of developing economies in the global AI economy. Korinek (2024) examines how advanced AI systems, particularly artificial general intelligence, will transform economic structures by diminishing labour's role while creating unprecedented productivity gains. He identifies eight policy challenges: inequality and income distribution; education and skills development (many traditional jobs will become obsolete); social and political stability; macroeconomic policy; antitrust and market regulation (to combat market concentration); IP and AI-generated innovation; environmental impacts (especially due to energy demand); and global AI governance (to ensure equity and mitigate existential risks). The author emphasizes the need for unprecedented international cooperation and a global framework to distribute AI benefits more equitably.

Trade and international investment are necessarily cross-border and, in clearing undue impediments, international cooperation has a central role to play (for example, see Lippoldt [2024, Boxes 2 and 3, 32–33]). On one hand, international regulatory alignment (for example, on issues such as IP protection or personal data protection) may facilitate in-bound foreign direct investment and technology transfer, as well as outbound market access for goods and services exports. Misalignment or inadequate protection, on the other hand, could be particularly costly for businesses in smaller developing economies, which could then face difficulties in cross-border access to models, software applications and quality data. International regulatory cooperation has the potential to support developing countries in addressing shortfalls (for example, through AI risk mitigation), to have a say in some regulatory matters, and to better track regulatory changes and respond accordingly (thereby promoting better alignment).

What does such cooperation entail? The International Federation of Accountants and Business at the Organisation for Economic Co-operation and Development (OECD) (2018, 5) defines regulatory cooperation as including "a variety of approaches, such as negotiated agreements, regulatory partnerships, supranational institutions, or inter-governmental organizations, regional agreements, mutual recognition agreements, trans-governmental networks, and formal requirements to consider international regulatory cooperation when developing regulations." Furthermore, such cooperation is often North-South but may be South-South. For example, the Digital Economy Partnership Agreement (DEPA) includes a cooperation dimension and currently covers Chile, New Zealand, Singapore and South Korea as members, with Canada, China and Costa Rica on track for eventual accession (Asia-Pacific Economic Cooperation 2024). South-South agreements can improve resilience and reduce dependency amid global uncertainties. ASEAN, of which three of this paper's sample countries are members — Indonesia, Thailand and Vietnam — is another example. Having made a fair amount of progress on the removal of impediments to trade in goods, services integration in the digital economy remains a work in progress. The ASEAN members have taken a healthy first step with a series of framework accords on personal data protection, digital data governance, data management and cross-border data. But national systems in areas such as personal data protection are not yet interoperable, and further work on regulatory alignment is required (Wachirapornpruet 2024).

Firm-Level Insights

Businesses are at the heart of this paper, and the review now turns to consider policy-relevant studies on their performance in developing countries. Jörg Mayer (2021) notes that while digitalization and slowing global trade are reducing traditional export-oriented manufacturing opportunities, technology is opening new pathways. In particular, access to data on local customer preferences is a valuable asset for developing countries. Local firms may find competitive advantage by capitalizing on local knowledge and tailored innovation, particularly serving domestic market segments including the emerging middle class. This approach could exploit the complementary relationship between services and manufacturing. It may require adaptation of data governance regulations to enable domestic firms to access and use customer preference data. It also necessitates adequate development of digital infrastructure and data capabilities as national assets. Adequate consideration of compatibility to emerging global governance systems is required, taking a tiered approach to

regulation that supports both export-oriented and domestically oriented industrialization.

Ezekiel T. Mutasa, Chitra Dhiwwale and Sundaran Sagaran A. Gopal (2024) examine AI applications, prospects and challenges in developing economies across key sectors, including manufacturing, agriculture, retail, financial services, health care and mining. They take a meta approach, drawing on empirical studies that mostly date from the period prior to the emergence of publicly accessible GenAI. The authors identify significant benefits of firm-level AI adoption, such as increased productivity and innovation. The net gains are derived via a variety of channels such as improved decision making, quality control, predictive maintenance, tools for optimization of resource use and to reduce wastage, better targeting of underserved populations and improved health-care screening. They also highlight substantial challenges to successful firm-level AI adoption, including data privacy concerns, high implementation costs, inadequate digital infrastructure, skill shortages and resistance to change.

Mutasa, Dhiwwale and Gopal (2024) highlight policy recommendations for middle-income countries:

- encourage AI adoption while addressing ethical and sociocultural considerations;
- invest in critical infrastructure, especially in rural areas;
- employ change management strategies to address resistance to adoption;
- support training programs to bridge the AI talent gap;
- use public-private partnerships to mitigate high costs; and
- address cross-sectoral challenges such as poor data quality and integration.

At the firm level, they advise that management should:

- look for sector-specific opportunities to apply AI;
- build on existing infrastructure (for example, in mobile technology);
- focus on practical, high-impact solutions;
- tailor solutions to local contexts (for example, underserved domestic populations); and
- seek collaboration between government, private sector and other local stakeholders to overcome adoption barriers and scale AI solutions.

Xueyuan Gao and Hua Feng (2023) consider the rollout of AI in China during the period prior to the recent leap forward in GenAI capabilities. They examine how AI adoption affects manufacturing firms' productivity in China. Using micro-level data from 2010 to 2021, they found that each percentage increase in AI penetration was associated with large gains in total factor productivity. The authors identified three mechanisms for this: value-added enhancement (improving product quality and production processes); skill-biased enhancement (shifting toward higher-skilled workers); and technology upgrading. Implementation of AI was found to stimulate innovation, including with respect to further AI innovations. Regarding AI policy, the authors made the following recommendations:

- target any AI subsidies at capital- and technology-intensive industries, which benefit more than labour-intensive ones;
- consider market structure (firms in industries with high concentration experienced greater productivity gains from AI, perhaps due to scale effects);
- take firm ownership into account, as private enterprises realized significant productivity improvements while state-owned enterprises did not, suggesting institutional reforms may be needed alongside technology adoption; and
- accompany AI implementation with complementary investments in human capital (AI drives demand for highly skilled workers).

David Heller and Dominik Asam (2024) examine the impact of GenAI on start-up productivity, comparing firms in the software sector to other sectors. Using GitHub Copilot's release as a quasi-natural experiment, the authors employed Crunchbase data covering 21,834 start-ups that secured initial funding between Q1 2020 and Q3 2023. They found that software-developing start-ups experienced a 20 percent reduction in time-to-funding (an early indicator of productivity) relative to other start-ups prior to Copilot's release. The effects were most pronounced for

start-ups with founders possessing technological or managerial experience, suggesting that GenAI serves as a competitive advantage when combined with complementary human capital. Their findings indicate that GitHub Copilot may substitute for traditional resources such as junior programmers while enhancing the productivity of experienced entrepreneurs. This is of particular importance during early start-up stages when resource constraints are most binding.

Nicholas Otis et al. (2024) conducted a field experiment with 640 Kenyan entrepreneurs to evaluate the impact of a GenAI business assistant (GPT-4-powered) delivered via WhatsApp. While the study found no significant average treatment effect on business performance (measured as profits and revenues), it revealed substantial heterogeneity based on pretreatment performance levels. High-performing entrepreneurs tended to benefit overall, with an approximately 15 percent improvement in performance. Low performers tended to experience negative performance, with an overall decline of eight percent. The divergent effects stemmed from the manner in which the entrepreneurs selected and implemented the AI's suggestions. High performers tended to better identify opportunities for specific improvements, while low performers disproportionately implemented generic advice (for example, price discounts) that harmed their businesses.

Literature Review: A Summing Up

This review of the literature spans economic impacts, governance challenges and implementation hurdles. It provides a basis to consider the transformative opportunities opened by AI for middle-income countries (for example, improved productivity, innovation and sector-specific solutions), as well as the risks (for example, widening inequality, job displacement and regulatory challenges). Tension between AI nationalism and international cooperation is highlighted, with scholars such as Aaronson noting how divergent regulatory approaches may create market access barriers for developing nations.

Firm-level assessments reveal that successful AI adoption depends, in part, on contextual factors including skills development, infrastructure readiness and appropriate regulatory frameworks. Several studies emphasize that while AI has the potential to accelerate economic development, this outcome requires deliberate policy design balancing innovation with ethical governance (especially regarding data governance challenges). The link between AI start-up development and national economic welfare can be seen via research showing that firms with local knowledge can create AI solutions tailored to local contexts. This may potentially create competitive advantages for such firms while also addressing national development priorities such as health care, agriculture and financial inclusion (for example, Mayer 2021; Mutasa, Dhiwwale and Gopal 2024; Mannuru et al. 2023).

AI Start-Ups and the Case Study Countries

This section presents the firm-level analysis for the case study. It begins with the principal exercise: a review of AI start-up firms with G7 investor engagement in the case study countries. This is followed by a brief assessment of AI unicorn firms, with consideration of these successful firms in relation to the case study of AI ecosystems.

Case Study Countries

The central focus here is on the prospects for developing countries to connect and integrate into the rapidly expanding AI economy, taking into account the role of AI start-ups. These are young, active, privately held businesses. They constitute a category that has demonstrated a particular dynamism in the field of AI. They are also likely to play an important role in the integration of AI into developing economies. For example, this might arise via the exploitation of niche opportunities to develop tailored AI applications or small language models to address local conditions in a developing country or region.[21] Given that many high-income countries are already leading in AI developments or positioning for wide adoption of AI, this case study targets the next tiers of countries by income. In order to ensure diversity of coverage, an illustrative sample of 10 middle-income countries was selected from across Asia, Africa ((the Middle East and North Africa [MENA] and Sub-Saharan

21 The value of exploiting this type of opportunity is supported by some of the empirical work cited in the literature review above (for example, Mayer 2021; Mutasa, Dhiwwale and Gopal 2024).

Box 2: Economies *Not* Selected for the AI Start-Up Sample

The 91 middle-income developing countries not covered directly in this case study represent a slice of the global economy that is roughly five times greater than the collective share of the case study economies (US$30.6 trillion versus US$6.1 trillion in 2023, in current US dollars).[27] The middle-income countries not covered were somewhat less well off, on average, than the case study countries by some indicators. For example, those not covered had a median GDP (purchasing power parity [PPP]) per capita of US$11,245 in 2023 versus US$15,304 for the sample countries. A portion of this differential may reflect a selection bias in that the author set out to find middle-income countries that had already demonstrated some engagement in the AI economy, with at least 50 or more AI start-ups. This choice was a natural consequence of the author's research design to examine the nascent AI sector activity in an illustrative sample of middle-income countries. While some of those not selected were competing in the AI sector (for example, Pakistan with 262 AI start-ups, Ghana with 53 or Peru with 70), many countries not selected have each faced a unique combination of challenges that prevented the emergence of an adequate number of AI start-ups. Examples of middle-income developing countries with less than the author's minimum selection threshold of 50 AI start-ups and with GDP (PPP) per capita below the author's AI sample median include Honduras (two), Laos (zero), Libya (one) and Tanzania (10).[28] Some challenges to AI start-up development — for example with respect to market openness or human capital development — may also have economic causes or consequences and that may be reflected in the lower median per capita incomes.

Africa) and Latin America. The sample includes five lower-middle-income countries and five upper-middle-income countries, as classified by the World Bank (Table 1). Box 2 presents an overview of the countries not selected for inclusion in the sample.

The author's selection of specific countries was further guided by data availability with respect to start-up firms in the AI sector and the availability of standardized AI policy and regulatory information. Data for the firm-level analysis was drawn from the Crunchbase data set,[22] which covers start-ups globally and has detailed descriptive information about start-up firms and their investor counterparts. In order to target markets with at least nascent AI ecosystems, the author selected sample countries with more than 50 start-up firms listed as having the key words "artificial intelligence" in their mission or purpose descriptions. A complementary start-up analysis was developed, drawing on the global unicorn data set produced by CB Insights.[23] This covers start-ups that are still private and that have achieved a market valuation of US$1 billion or more. Finally, with respect to policy analysis, the research turned primarily to the OECD AI Policy Observatory, which has broad country coverage, and standardized and readily accessible policy and regulatory data.[24] This was supplemented and updated using the Digital Policy Alert database[25], as well as regional and national sources.

On this basis, the country sample was established to include Brazil and Colombia; Egypt, Kenya, Nigeria, South Africa and Tunisia; and Indonesia, Thailand and Vietnam (Figure 1). As can be seen in Table 1, these nations represent a broad range in terms of economic scale and population. The sample is illustrative of a diverse group of countries that have — to varying degrees — achieved some

22 For a brief overview of Crunchbase data strengths and weaknesses, see Appendix 1.

23 See www.cbinsights.com/research-unicorn-companies.

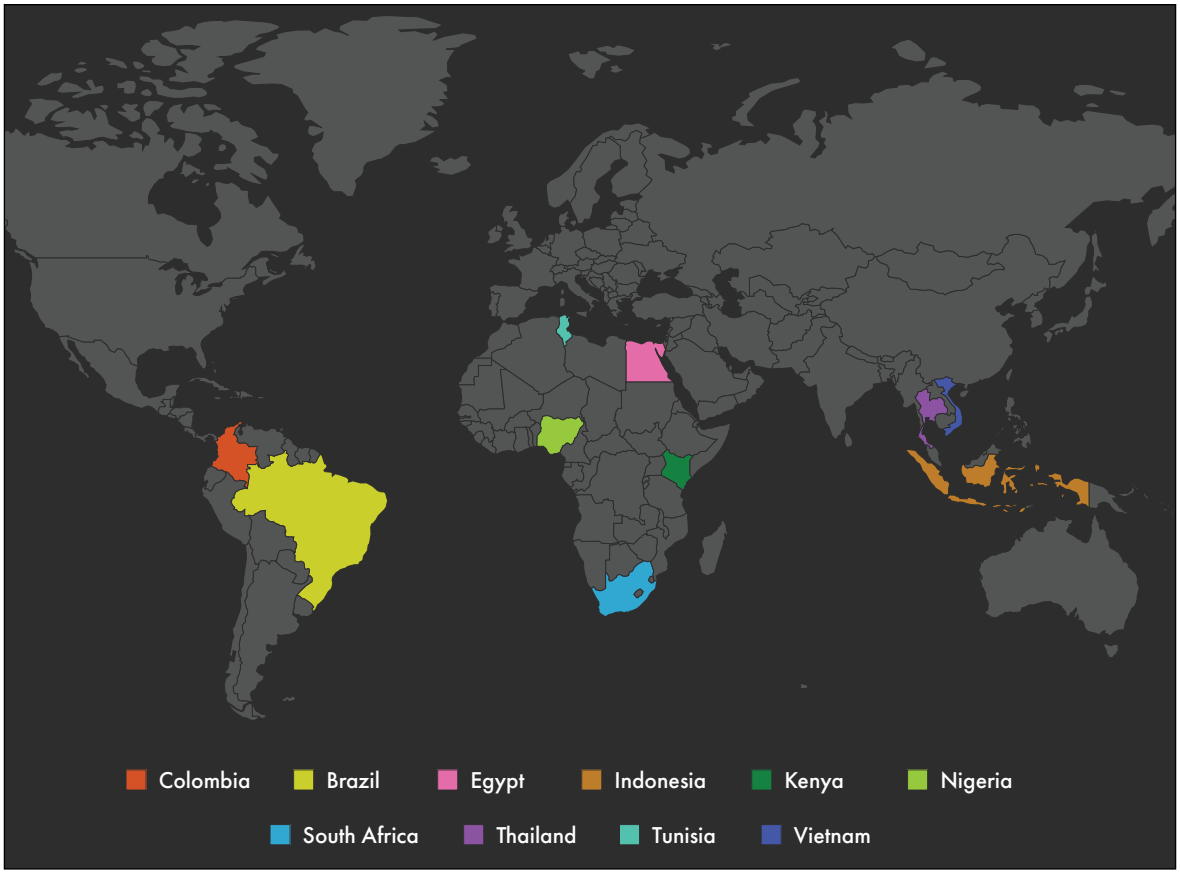
24 For an overview of the content and country coverage of the OECD AI Policy Observatory database, see Appendix 1 and https://oecd.ai/en/dashboards/overview.

25 For an overview and a link to the database website, see Appendix 1.

26 The economic data cited in this paragraph is drawn from the author's tabulations and the World Bank's World Development Indicators, available at https://data.worldbank.org/indicator. The AI start-up data is from Crunchbase and is available at www.crunchbase.com/.

27 The numbers in parentheses represent the number of AI start-ups in each of these countries as of Q1 2025.

Figure 1: Case Study Countries



Source: Microsoft Excel map; author's tabulations.

traction in the AI economy. Their situation may offer some useful insights for further development of the AI economy in other developing nations.

Context for AI Implementation in Developing Countries

There is broad awareness of AI across a substantial share of the population in developing countries. This is evidenced, for example, by relatively frequent use of Chat GPT-4 (Maslej et al. 2024, chapter 9, 449). As can be seen in Table 2, for countries covered by the Ipsos survey data,[28] a majority of adults feel positively about AI benefits and trustworthiness. This may be associated with the early stage of the sector's development in these countries, but it certainly contrasts strikingly with the view of much of the public in the more advanced economies.

In our sample countries, some of the optimism may be associated with the youthfulness of the population. For most of these countries, the median age is around the global median or younger (Thailand is an exception in this regard).[29] Age appears to be one factor influencing attitudes to AI, a point noted in Stanford University's 2024 AI Index Report (ibid., 438). Indeed, it may be that such public awareness and positive attitudes contributes an impulse toward interest in AI entrepreneurship in the sample countries.

These positive attitudes seem to have carried over to many current business leaders. A survey of business executives by the World Economic Forum (WEF) in 2024 found that respondents in eight of the sample countries did not rank "risk of adverse outcomes from AI technologies" as a

28 See Appendix 1 for details of the Ipsos survey.

29 This is based on data available at www.cia.gov/the-world-factbook/field/median-age/country-comparison/.

Table 1: Case Study Countries, Overview

Economy	Income Status	GDP		Population		AI Start-Up Firms, as Recorded in the Crunchbase Database	
	FY2025, Based on 2023 per Capita GDP	2023, Current US$, Billions	Percent of World Total	2023, Millions	Percent of World Total	Number Active, as of 1Q2025	Percent of World Total
Brazil	Upper middle income	2,173.7	2.0	211.1	2.6	973	1.1
Colombia	Upper middle income	363.5	0.3	52.3	0.6	348	0.4
Egypt	Lower middle income	396.0	0.4	114.5	1.4	98	0.1
Indonesia	Upper middle income	1,371.2	1.3	281.2	3.5	199	0.2
Kenya	Lower middle income	108.0	0.1	55.3	0.7	79	0.1
Nigeria	Lower middle income	363.8	0.3	227.9	2.8	230	0.3
South Africa	Upper middle income	380.7	0.4	63.2	0.8	294	0.3
Thailand	Upper middle income	515.0	0.5	71.7	0.9	80	0.1
Tunisia	Lower middle income	48.5	0.0	12.2	0.2	50	0.1
Vietnam	Lower middle income	429.7	0.4	100.4	1.2	186	0.2
World total (all economies)		106,170.0	100.0	8,061.9	100.0	86,235	100.0

Source: www.crunchbase.com/discover/organization.companies; Metreau, Young and Eapen (2024); https://data.worldbank.org/indicator/NY.GDP.MKTP.CD2024; https://data.worldbank.org/indicator/SP.POP.TOTL.

Note: For the fiscal year beginning July 1 2024, the World Bank defines lower-middle-income countries as having gross national income per capita ranging between US$1,146 and US$4,515; upper-middle-income countries are defined as having gross national income per capita ranging between US$4,516 and US$14,005. Tunisia's share in world total GDP is 0.05. Crunchbase relies on a variety of sources and is in part crowdsourced, so there may be variation in the quality of the data from country to country (see Appendix 1).

Table 2: Popular Perceptions of AI

	Public feelings about AI Products and services using AI have more benefits than drawbacks (% agree "very" or "somewhat")	Public trust in AI I trust companies that use AI as much as I trust other companies (% agree "very" or "somewhat")	Executives' opinions on "risk of adverse outcomes of AI technologies": Is this a top-five risk over the next two years in your country? If "yes," then rank is given (1 = most cited to 5 = fifth most cited); if "no," then "no"
Global country (simple) average	54	52	
Indonesia	78	69	Yes, #1
Thailand	74	73	No
Mexico	73	66	No
Malaysia	69	70	No
Peru	67	60	No
Türkiye	67	65	No
South Korea	66	55	No
Colombia	65	56	No
India	65	67	No
Brazil	64	60	No
Singapore	64	57	Yes, #5
Romania	61	62	No
South Africa	59	55	No
Chile	59	51	No
Argentina	57	52	No
Italy	55	53	No
Japan	52	44	No
Spain	50	49	No
Hungary	48	46	No
Poland	47	50	No
Great Britain	46	45	Yes, #4
New Zealand	44	43	No
The Netherlands	43	44	No
Germany	42	45	No
Ireland	40	39	No
Australia	40	42	No
Belgium	39	39	No
Sweden	39	42	n/a
Canada	38	39	Yes, #5
France	37	37	No
United States	37	36	Yes, #3
Egypt	n/a	n/a	No
Kenya	n/a	n/a	No
Nigeria	n/a	n/a	No
Tunisia	n/a	n/a	No
Vietnam	n/a	n/a	Yes, #1

Source: Public feelings and public trust: Ipsos (2023, 9 and 15); Executives' opinion of AI risk: Elsner et al. (2025, Appendix C, 81–91).

Note: See Appendix 1 for details of the Ipsos survey and the WEF survey.

top risk over the next two years (Table 2).[30] The exceptions were Indonesia and Vietnam, where executives did rate AI as the top risk. This may be associated with the development and advancing implementation of AI governance in the particular cultural context of those countries which may raise awareness of risks, as well as sector-specific risk issues, among other possible explanations.

Obstacles to Business

Start-ups are young companies and vulnerable to a variety of challenges, such as exhausting their liquidity, misjudging market demand for a product and unfavourable regulatory changes, among many others. Start-ups often fail. Even in countries such as the United Kingdom and the United States, many start-ups — and, in some years, most — do not survive past their fifth or sixth anniversaries.[31] In the study countries, it is unlikely that performance is much better.

To provide a glimpse into business perceptions of obstacles in the case study countries, the paper turns to the World Bank Enterprise Surveys. These have been conducted in dozens of countries, including each of the 10 case study countries and three of the G7 economies. China is included here for the sake of comparison. Table 3 presents a tabulation of firms' perceptions in each country of their biggest obstacles. Businesses are surveyed across a broad range of sectors and firm sizes and do not necessarily have a focus on AI (see the table notes for details).

For most of the countries, the obstacles shown account for a majority of the top concerns cited by businesses. The table also reveals a striking contrast between the case study countries and the G7 countries. For most of these nations, except Brazil, "political instability," "access to electricity" and "access to finance" are among the leading categories of obstacles among those shown in the table. One or more of these basic operational considerations was cited by more than 15 percent of businesses surveyed in each of the case study countries (excluding Brazil). In Egypt, Kenya and Vietnam, informal sector competition also weighed as a top concern, being cited by more than 15 percent of businesses in those three nations. Chinese businesses also cited access to finance and informal sector competition as top concerns. In addition, in three of these economies, 10 percent or more of businesses ranked "corruption" as the top obstacle. Brazil was an outlier among the developing nations, with a profile more closely resembling the G7 nations shown.

For the G7 economies covered in the table, those issues were much less frequently cited by respondents. Instead, many G7 firms pointed to shortfalls in the availability of adequately trained workforce participants as being a top concern, by far. It is notable, however, that more than 10 percent of businesses in Brazil, China and Vietnam also cited this as a top concern. This latter point is an oft-cited concern for firms developing or implementing AI systems around the world.[32]

AI start-ups may be particularly vulnerable to constraints such as high capital needs, patchy broadband and limited availability of human resources, which can directly hamper AI solution deployment or scaling. For example, a recent Brookings Institution study on leveraging AI to support Africa's economic development (Signé 2025) points to the following constraints.

- → limited digitized data availability with respect to Africa (for example, only 0.02 percent of total internet content is in African languages);
- → limited availability of digital skills and relevant human capital (universities in Africa are introducing AI courses, but often there is a lack opportunities for hands-on learning); and
- → limited R&D expenditure flows to Africa, with African use-case development often neglected.

Moreover, such challenges are magnified by operational constraints related to poor infrastructure and high costs to address the bottlenecks (for example, to develop cloud computing capacity). Start-ups seeking to address

30 Respondents could select risks from among 34 options across five categories including economic, environmental, geopolitical, societal and technological risks. See the Key Sources Annex for details of the WEF survey.

31 For example, among all US private businesses established in in the year ending March 2018, only 51.9 percent survived five years on, and by March 2024, only 47.5 percent survived. See www.bls.gov/bdm/us_age_naics_00_table7.txt, accessed October 30, 2024. According to the World Bank Group "Prosperity Data360" online database, the five-year survival rate for UK businesses in the "total industry, construction and market services except holding companies" sector was just 31 percent as of 2018 (in other words, 69 percent had failed). See https://prosperitydata360.worldbank.org/en/indicator/OECD+BDI+YS5_R.

32 For more on AI sector skills demand, see Maslej et al. (2024, chapter 4, section 2, on jobs; chapter 6 on education)

Table 3: Business Perceptions of Their Biggest Obstacles, Selected Concerns, Most Recent Year Available (% of Firms Responding)

Country	Access to Electricity	Corruption	Access to Finance	Inadequately Educated Workforce	Informal Sector	Political Instability	Subtotals (out of 100%, by Country)
Brazil	0.3	3.3	7.5	12.6	12.4	3.0	39.1
Colombia	4.6	8.7	7.5	5.2	8.2	39.0	73.2
Egypt	2.9	6.2	10.7	2.2	15.5	25.7	63.2
Indonesia	1.6	10.1	28.8	3.4	7.3	11.3	62.5
Kenya	3.0	7.7	18.3	1.6	22.9	17.0	70.5
Nigeria	27.2	12.7	30.2	0.4	4.3	4.4	79.2
South Africa	54.6	5.8	16.1	0.0	0.8	13.3	90.6
Thailand	19.8	2.3	4.6	2.6	5.0	20.3	54.6
Tunisia	0.6	15.0	39.4	5.4	8.3	11.5	80.2
Vietnam	4.2	0.3	21.2	11.7	22.1	3.6	63.1
Dev'g Country Avg.	11.9	7.2	18.4	4.5	10.7	14.9	55.7
China	4.8	1.2	22.4	13.0	19.6	0.8	61.8
France	3.3	1.5	2.8	23.8	11.1	4.3	46.8
Germany	0.2	0.4	5.0	53.5	4.1	6.2	69.4
Italy	4.5	1.1	5.4	18.8	3.8	5.5	39.1

Source: Source: World Bank (2025), "Enterprise Surveys," Global Indicators Department, Data Visualization, https://www.enterprisesurveys.org/en/graphing-tool.

Notes: 1) In the Table, "Dev'g Country Avg" refers to the average scores across the 10 case study countries. "Subtotals" refers to the tally of percentages for the six categories shown for each country. For most countries, the table captures a majority of the top obstacles identified by respondents (NB, each respondent could only select one top obstacle). 2) The surveys cover registered firms with five or more employees and one percent or more of private ownership. The survey covers most of the private sector. See Appendix 1 for details. 3) The survey respondents could select among 15 categories of biggest obstacle. The six presented here were selected for their generally high frequency in the case study countries and their relevance to AI firms (e.g., as opposed to items such as "access to land" or "crime, theft and disorder"). See the Data Visualization page, linked above, for the full list of obstacles for which data is available. By subtracting the subtotal number from 100 percent for each country, the reader can obtain the total value of the omitted categories. 4) Survey years are as follows: Brazil (2009), China (2012), Colombia (2023), Egypt (2020), France (2021), Germany (2021), Indonesia (2023), Italy (2024), Kenya (2018), Nigeria (2014), South Africa (2020), Thailand (2016), Tunisia (2020), Vietnam (2023).

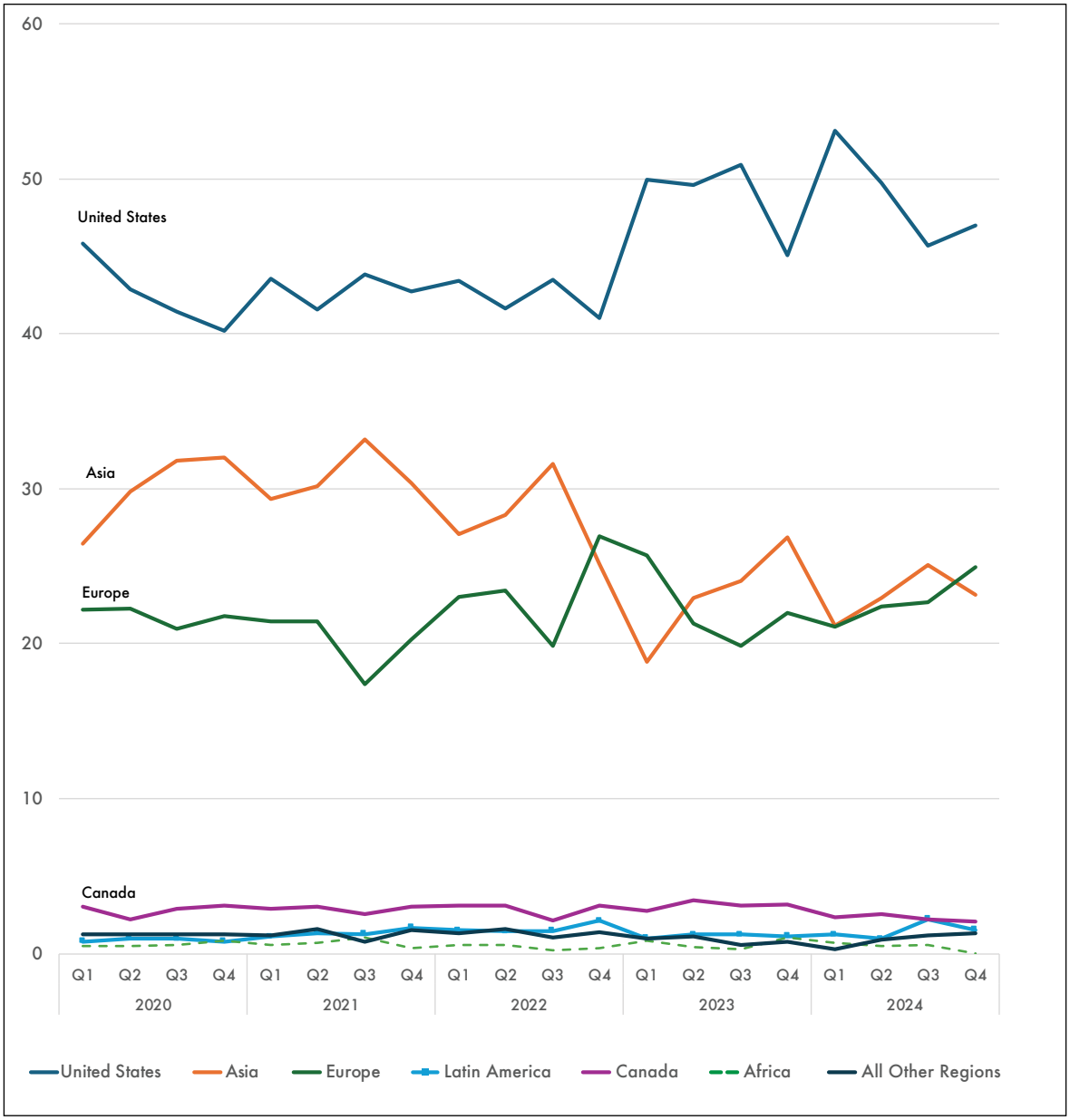
these challenges may be constrained by the very conditions in which they are operating, which contribute to risk aversion on the part of some investors and financial institutions, and shortfalls in the availability of needed capital.

Starting with a Few Definitions

Before proceeding to the detailed analysis, the paper first presents a few definitions. For the purposes of this analysis, the paper defines "AI start-up" as a firm that has "AI" integrated as part of its mission statement or purpose. The paper did not impose a strict age limit, but in the study population, the median AI start-up age by country is young, ranging from five years in Colombia to nine years in South Africa. The paper only considered firms that are currently active. Generally, the AI start-up firms in the assessment were not at the more mature stages of commercial development, such as preparing for an initial public offering (IPO) (see Box 3). Unicorns are considered in a subsequent section and tend to be more mature, in the mid-to-late stages of development for a start-up.

In looking at the commercial linkages of the AI start-ups, the paper focuses on "investor engagement," defined as a case where an investor has sufficiently supported an AI start-up to reach the level of being a top-five investor in the firm. This may involve one or more "deals," which refer to transactions where an investor provides capital in exchange for an equity stake in the firm or convertible debt. After a general introduction to capital flows in the sector (including deals), the paper then turns to use investor engagement for the assessment of the AI start-ups. The author chose investor engagement rather than deal counts in order to focus on the more substantial financial relationships, which can entail additional commercial support for an AI start-up.

Figure 2: Total Quarterly AI Funding Deal Counts, Q1 2020–Q3 2024, Shares by Region (%)



Sources: See www.cbinsights.com/reports/CB-Insights_AI-Report-2024.xlsx; author's tabulations.

Note: The Africa series is derived using proportions from the deal data for 2020 to 2024 in CB Insights Q3 2024 applied to the updated data set in www.cbinsights.com/reports/CB-Insights_AI-Report-2024.xlsx.

Table 4: AI-Related VC Funding and Deals, By Region, Q3 and Q4 2024

	Q3 2024			Q4 2024		
	Deals (Counts)	Funding (US$ millions)	Shares of Total Funding (%)	Deals (Counts)	Funding (US$ millions)	Shares of Total Funding (%)
United States	566	11,442	68.0	548	38,028	86.9
Europe	279	2,779	16.5	291	2,519	5.8
Asia	316	2,112	12.5	270	2,045	4.7
Latin America	29	62	0.4	17	92	0.2
Canada	27	184	1.1	24	922	2.1
Africa	7	9	0.1	1	0	0.0
All other regions (including Oceania)	21	245	1.5	14	160	0.4
Totals	**1,245**	**16,832**	**100.0**	**1,165**	**43,766**	**100.0**

Source: www.cbinsights.com/reports/CB-Insights_AI-Report-2024.xlsx; author's tabulations..

Situating Our Case Study in the Global VC Context

In order to situate the assessment of AI start-ups in the 10 case study countries, it is useful to start with a global perspective. Figure 2 presents an assessment of the global shares in AI start-up deal funding by region. As can be seen, the United States has a disproportionate share of the total, followed by Asia and Europe. Canada is next, followed by Latin America, all other regions (including Oceania) and Africa. The exact ranking depends on developments in each quarter. But it can be seen from the data that two of the three regions home to the study countries account for just a small share of the global VC flowing to AI start-ups. (A separate breakdown from Asia for the third region, Southeast Asia, is not available in this data set.)

The comparatively small numbers do not mean that the case study countries are unimportant for AI, however. In the first place, they collectively have some market scale, accounting for 1.2 billion people and US$6.2 trillion of GDP (in other words, just under six percent of global GDP) (see Table 1). Moreover, as noted above, most of these countries have youthful population age profiles that fall around or below the global median age, meaning that these markets may be positioned to be quite dynamic going forward. (Thailand is the exception to this metric, with a median age 10 years above the global average.) In addition, there is some notable AI development underway already, including AI entrepreneurship and business linkages to advanced economy partners, as well as national-level AI policy actions.

To give a sense of the scale of AI start-up activity, Table 4 provides an overview of AI start-ups and VC deals by region for two recent quarters (Q3 and Q4 2024).[33] This analysis reveals that there is a certain amount of activity in Latin America and Africa hinting at potential interlinkages to the financial mainstream. Running out of cash and failure to raise new capital are the top reasons start-ups fail, accounting for nearly two-fifths of all failures (CB Insights 2021, 4). These funding deals play an important role for start-ups seeking to avoid such a fate. But they can also help an AI start-up to plug into the mainstream. They can deliver non-financial benefits in the form of advice related to technology, managerial skills, operations and network connections (for example, partners in new markets).

A Look at Case Study AI Start-Up Profiles

The assessment of case study country start-ups proceeds in two parts. The first section — the

33 It should be noted that there is a lot of quarter-to-quarter volatility in VC markets. These two recent quarters are presented here for illustrative purposes and not as an indication of larger trends.

Box 3: Investment Stages for a Start-Up

There is some variation in the definitions employed to describe the number and nature of the investment stages for a start-up. But most schematic presentations share similar core features. A stylized version might include the following elements:

- **Pre-seed/bootstrapping:** Conceptualizing the business; initial development of IP, legal framework, preliminary product prototype; initial funding from founders, friends and family.
- **Seed stage:** Launch of business operations, creating product or prototype; first formal funding round to validate product-market fit.
- **Series A:** Market research, marketing, refining business plan with scaling in mind; financing to optimize product and user base after establishing product-market fit; first revenue.
- **Series B:** Establishing a commercially viable product or service; raising capital to scale the business, expand market reach and grow team.
- **Series C and beyond:** Building new products, accessing new markets; raising later-stage growth capital for significant expansion, often preceding an exit.
- **Mezzanine:** Preparation for being acquired or eventual public listing, or raising capital for continued independent growth as a private firm.
- **Exit:** Conclusion of acquisition, IPO (or other liquidity event for investors).

Sources: www.svb.com/startup-insights/vc-relations/stages-of-venture-capital/ and Alfen (2024).

heart of the firm-level analytical section — considers the situation of start-ups and their investors. In the second section, the situation of more mature unicorn companies is considered.

Start-Ups Lift Off

In this section, the analysis of start-ups draws on the Crunchbase database, which offers a sweeping view of start-up activity globally. Using a standardized format, Crunchbase provides fairly detailed information on individual start-ups and investors and the specific investment linkages between them. It is continuously updated, but it is subject to some important limitations, including a partial reliance on crowdsourced or self-reported information, which may lead to biases. There is a largely automated verification process with oversight by a Crunchbase data team and, of course, scrutiny by database users (see Appendix 1). For the present research, each sample record has been screened and every effort has been made to ensure a clean data set.

As of Q1 2025, there were some 86,235 active AI start-ups tracked globally by Crunchbase (Table 5). Across the 10 case study countries, there were 2,537 of these AI start-ups, accounting for just under three percent of the global total population of AI start-ups. Just under one in 10 of the firms in case study countries enjoyed engagement of at least one G7 "top-five" investor (239), and Brazil accounted for about half of those (see Box 4). The United States was by far the largest sending country in terms of numbers of engagements. But each G7 country had investors engaged in at least one of the case study countries. Moreover, the engagement of G7 investors was often associated with engagement by other investors from advanced and developing economies.[34]

34 The analysis revealed top-five investors from 32 economies co-investing with one or more G7 investors in start-ups. The co-investor home economies were Argentina, Australia, Brazil, Denmark, Estonia, Ethiopia, Finland, Ghana, Hong Kong, India, Ireland, Israel, Kenya, Malaysia, Mauritius, Mexico, Nigeria, Norway, Peru, Poland, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, the Netherlands, Tunisia, the UAE and Uruguay.

In none of the cases examined in the analysis was an investor from China co-engaged in a start-up that had a G7 country investor among the top-five investors in the firm. And only five Chinese AI start-up investments were found across the 10 case study countries. Four of the firms with Chinese investment were in Indonesia and one was in Thailand. In these five firms, most of the co-investors were Chinese or domestic. One Indian entity in one of the Chinese-affiliated start-ups was the only other recorded international co-investor in this group. This is notable in that despite China being a global leader in AI, the incidence of Chinese AI start-up investment in the case study countries is quite modest and separate from advanced economy partners. This is in striking contrast with US investors, who are more active in the sample countries and who often engage with domestic and third-country co-investors. There may well be a geopolitical factor contributing to this situation, where the choice of international partners may entail alignment with one or the other camp in a world where there is fragmentation in regulatory approaches (Lippoldt 2024).[35]

So what kind of AI start-up firms are attracting G7 investor interest? Unsurprisingly, roughly three-quarters of these AI start-ups declared AI as a prime sector for the firm. This was generally complemented by other claimed sectors ranging from software to financial services, agriculture, health care and education. The stated purposes varied widely as well, with machine-learning (ML) applications ranking first (42 companies), followed by process automation (12), data analytics (10), conversational AI and chatbots, and recommendation systems.[36] Just under half of the firms had between 11 and 50 employees, while a quarter had only one to 10 employees. Only half the firms revealed their revenue, but among those that did, the majority fell in the US$1 million to US$10 million range. As for location, about half were located in Brazil and the rest were mainly spread across Africa. Southeast Asia accounted for just 13 percent of the total. The median AI start-up had three top-five investors (at least one being from a G7 country). These start-ups have generally shown some success in attracting capital.

As noted above, the review of AI start-ups identified a total of 2,537 firms, with just under one in 10 receiving G7 investment (see Table 5). Many of the other firms relied exclusively on domestic investors or bootstrapping.[37] Interestingly, a review of 50 generative AI start-ups by VC firm Andreessen Horowitz found that nearly half had managed to bootstrap their launch without outside investment funding (Moore 2023). (While it is beyond the scope of this paper, it may be interesting to pursue a study of the differential outcomes for firms in developing countries that emerge purely via bootstrapping versus those that engage foreign and/or domestic investment.)

Table 6 provides an illustrative selection of AI start-up firms, including one from each of the case study countries. This table highlights some interesting characteristics of these firms, which include a number that have gone beyond core AI sector work to focus on developing a diverse range of AI applications. These have addressed needs in sectors such as health care (BioVisioner), financial services (Akiba, Kudi/Nomba), agriculture (Apollo), social networking and wellness (Fika), and the IoT (Be Wireless Solutions). Some of these involve responding to unique niches specific to a country or region.

Several of these start-ups demonstrate the synergy some firms are finding between local needs, innovative solutions and objectives in supportive government AI policy. Vozy, for example, provides AI solutions capitalizing on Spanish language capabilities and targeting Latin American markets, which fits well with Colombia's National Policy for Digital Transformation and AI (cited in Table A.4 in Appendix 2). Bahasa.ai is addressing a similar need with its Indonesian

35 As noted in the literature review (for example, Aaronson [2024a]), regulatory fragmentation in AI risks impairing the AI economy and harming stakeholders globally.

36 Only three of these firms declared any patent activity. In other sectors, start-ups will sometimes strive for an early patent, which can then be used in the mobilization of capital. It may be here that the AI sector is moving too rapidly for these firms to pause, patent and extract value. Or it may be that they are best able to defend their innovations using trade secrets protection strategies that are automatic and can be effective in unsettled environments. If a firm is focused on implementation using known techniques rather than fundamental innovation, patent protection is of secondary importance (for example, if they are utilizing open-source technologies or licensed IP rather than developing proprietary technologies). This issue goes beyond the scope of the present initiative but could be an interesting issue for future study (see Lippoldt and Schultz 2014).

37 Per Claude.AI, the definition of bootstrapping is "when entrepreneurs fund their startups using personal savings, revenue from the business, or other resources without seeking external capital from venture capitalists, angel investors, or other traditional funding sources. The term comes from the phrase 'pulling yourself up by your bootstraps,' suggesting self-reliance and independence."

Box 4: Brazilian AI Start-Ups — What Is Their Profile and Why Are There So Many?

Brazilian AI start-ups account for roughly half of the sample firms with G7 investors. This concentration provides an indication of a robust, relatively mature AI ecosystem characterized by international investment linkages. A review of the founding dates reveals a steady flow of start-up launches from 2013 onward. The median founding year is 2018. The Brazilian start-ups have broad industry diversity in comparison to other sample countries. While 88 of the start-ups list their core focus as AI products, these firms often combine this with complementary product areas (for example, software or information technology [IT] services). Other Brazilian AI start-ups are delivering product solutions in areas such as education or financial services, in part, by drawing on in-house development of AI-powered tools or applications. Many of these firms are gaining economic traction: 15 firms have revenues of US$10 million or more, and of those, three have revenues of US$1 billion or more. Blip, a customer relationship support services provider, is one example of a success story, now with revenues of US$50 to $100 million and more than 1,000 employees (see Table 6).

AI adoption is advancing across multiple sectors of the economy, with start-ups benefiting from Brazil's relatively broad economic base and its scale. And this activity is attracting the attention of investors, with some 265 unique investors cited across the sample of Brazilian AI start-ups, including a mix of domestic and international investors. This AI start-up activity is supported in Brazil by the education system, which includes several universities focused on technology and computer science; digital infrastructure, which is more built out in Brazil in comparison to some of the other sample countries; and policy that bolsters technology start-ups via incubators, accelerators and government support programs. A degree of geographic concentration in the region around São Paulo may also contribute to scale economies, availability of talent and support services, and other benefits of agglomeration (see Table 10 and Krugman [1995]). Moreover, Brazil may benefit from its steps toward coherence in its regulatory approach with the emerging European model (for example, in terms of AI risk management) (see Atanasovska and Robeli [2025] and Table A.4).

language AI communication platform, an approach in line with the country's national strategy of prioritizing local development and implementation of solutions. Aerobotics is responding to the needs of South Africa's substantial farm sector by applying AI in precision agriculture; this benefits the sector while addressing climate and resource management challenges, an approach that aligns with the country's balanced approach to AI development. Palexy in Vietnam is providing AI solutions for physical retail stores, helping to bridge traditional approaches and digital commerce, in line with the country's objective of AI adoption to boost productivity.

Overall, such examples illustrate how entrepreneurs are responding to local market needs via a broad range of technological approaches. This activity is being fuelled, in part, via a combination of international and domestic investors, which may support network development and the application of best practice managerial approaches, as well as technology transfer. Considered in conjunction with the policy developments discussed below, Table 6 helps to highlight certain dimensions of the emerging AI ecosystems in each of the case study countries.

Table 5: Private, Active, AI-Focused Start-Up Firms, as of Q1 2025

					Count of Top-Five Investor Engagements in Start-Ups with at Least One G7 Investor, by Sending Country									
Home Countries for AI Start-Ups	Total Number of AI Start-Ups, Active, by Country	Share of Global Total AI Start-Ups (%)	AI Start-Ups with at Least One G7-Based Investor	G7 Investor Incidence (% of AI Start-Ups Receiving a G7 Investment, by Destination)	Canada	France	Germany	Italy	Japan	United Kingdom	United States	Host Country	Other Countries	Other Sending Countries with Investors Co-investing with G7 Investors (and Number of Investments, if Greater than One)
Brazil	973	1.13	119	12.2	5	1	1	2	2	7	155	201	25	Argentina (6), Australia (2), Denmark, Estonia, India, Ireland, Mexico (3), Nigeria, Norway, Peru, Saudi Arabia, Spain (4), Switzerland, Uruguay
Colombia	348	0.40	9	2.6	0	0	0	0	0	2	10	3	5	Argentina, Nigeria (2), Spain (2)
Egypt	98	0.11	15	15.3	1	1	0	0	0	5	14	17	13	Kenya, Mauritius, Nigeria, Saudi Arabia (5), Tunisia, Türkiye, UAE (3)
Indonesia	199	0.23	18	9.0	0	0	1	0	9	1	11	24	10	Hong Kong, Malaysia, Singapore (7), South Korea
Kenya	79	0.09	14	17.7	1	0	2	0	2	3	19	4	14	Australia, Brazil, Ethiopia, Ghana, Hong Kong (2), the Netherlands, Nigeria, Sweden, Switzerland, South Africa (4)
Nigeria	230	0.27	22	9.6	4	3	1	0	0	3	29	16	9	Ireland, Kenya (2), the Netherlands, Poland, Saudi Arabia, Singapore, South Africa (2)
South Africa	294	0.34	21	7.1	4	1	1	0	3	3	28	23	10	Brazil, Denmark, Finland, Kenya, Mauritius (4), the Netherlands, Tunisia
Thailand	80	0.09	2	2.5	0	0	0	0	1	0	2	0	1	Singapore
Tunisia	50	0.06	7	14.0	0	2	2	0	0	0	4	5	4	Brazil, the Netherlands, Norway, Mauritius
Vietnam	186	0.22	12	6.5	0	0	0	0	8	0	10	5	8	Hong Kong, Israel, Singapore (2), South Korea, Sweden (2), Taiwan
Case study totals	**2,537**	**2.94**	**239**	**9.4**	**15**	**8**	**8**	**2**	**25**	**24**	**282**	**298**	**99**	
Memo Item: World Total AI Start-Ups (active firms, all economies)	86,235	100.00												

Source: Source: Crunchbase database; author's tabulations.

Note: The AI start-up data is drawn from the Crunchbase data and subject to certain limitations. See Appendix 1 for details.

Table 6: Illustrative List — One Start-Up from Each Case Study Country, Q1 2025

Company	Description	Headquarters	Industry	Size (Employees)	Revenue	Top Investors
Blip	Platform that simplifies procedures and combines ideas using AI chatbots, natural-language processing and customer service tools.	São Paulo, Brazil	AI, Chatbot, Customer Service	1,001–5,000	$50M–$100M	**Accel (US), Microsoft (US), Warburg Pincus (US), SoftBank (Japan), Hugo Barra (US)**
Trades.org	Empowers trade businesses and contractors with comprehensive operations support and innovative marketing services using AI and ML solutions.	Medellín, Colombia	AI, Big Data, CRM	11–50	$1M–$10M	**AngelList (US), 43 (US)**
Synapse Analytics	AI company with a suite of products helping businesses adopt AI in core operations, including ML operations platform Konan, video analytics platform Azkavision and OCR platform Doxter.	Cairo, Egypt	AI, Analytics, ML	11–50	$1M–$10M	Hub71 (UAE), **Silicon Badia (US)**, Egypt Ventures (Egypt), **Amr Awadallah (US), Simon Rowlands (UK)**
Bahasa.ai	Applies AI through chatbot services to improve customer interactions, building robust natural-language processing modules that integrate with existing IT infrastructure.	Jakarta, Indonesia	AI, NLP, Customer Service	11–50	$1B–$10B	**East Ventures (Japan)**, Gan Kapital (Indonesia), GK-Plug and Play Indonesia (Indonesia), **Kinoto C (Japan)**
Apollo Agriculture	AgTech company offering farmers access to agricultural inputs, financing and advice using ML to help emerging-market farmers maximize profits.	Nairobi, Kenya	AgTech, Financial Services, ML	101–250	<$1M	**SoftBank Vision Fund (UK), Endeavor Catalyst (US)**, Bossa Invest (Brazil), **Flourish Ventures (US)**, Rabobank (the Netherlands)
Kudi	Financial service provider using conversational interfaces, natural language processing and AI to provide access to electronic banking and financial services in emerging markets.	Lagos, Nigeria	AI, FinTech, Banking	1–10	$1M–$10M	**Y Combinator (US), Khosla Ventures (US), Partech (France), Ventures Platform (Canada), Michael Seibel (US)**
Akiba Digital	Data and technology company providing financial intelligence solutions to unlock opportunities for consumers, businesses and society using alternative data.	Johannesburg, South Africa	Analytics, FinTech, Credit Bureau	11–50	$1M–$10M	**Alumni Ventures (US), Hustle Fund (US), Google for Startups (US), Oui Capital (US), Expert Dojo (US)**
BioVisioner	AI-driven bioprocess optimization platform for biopharmaceutical development that centralizes experimental data, provides actionable insights and enables digital-twin simulations.	Bangkok, Thailand	AI, Biotechnology	11–50	$1M–$10M (estimated)	**CyberAgent Capital (Japan)**, 500 Southeast Asia (Singapore), **World AI Venture Capital (US)**
Be Wireless Solutions	Develops IoT solutions (hardware, connectivity and software) for real-time monitoring of connected objects, with AI-powered prediction and anomaly detection capabilities.	Tunis, Tunisia	IoT, AI	11–50	$1B–$10B	Capsa Capital Partners (Tunisia), **SAIS (Germany)**
Fika	AI-powered dating and social networking platform focusing on female users in Asia, emphasizing growth, authenticity and equal benefits for all users.	Ho Chi Minh City, Vietnam	AI, Dating, Social Network	11–50	$1M–$10M	**Goodwater Capital (US)**, VNV Global (Sweden), **Brian Ma (US)**, Sebastian Knutsson (Sweden), Jussi Salovaara (Singapore)

Source: www.crunchbase.com/discover/organization.companies; author's tabulations and investor database construction; Claude.ai (final table compilation assistance).

Note: In the Top Investors column, the bolded firms are based in G7 countries.

Investor Profiles

The analysis now turns to consider the investors (see Table 7). Across the 10 study countries, our inventory of top five investors in the AI start-ups revealed a total of 761 investor engagements by 526 investors from 48 economies. Overall, foreign investor engagements accounted for 60 percent of the total investor engagements for the case study countries. About one in five of these foreign investor engagements came from countries other than the G7.

The case of Brazil is worth highlighting. It was the only case study country to have more domestic investor engagements than foreign investor engagements vis-a-vis the sampled AI start-ups. This is a sign of its relatively large and dynamic AI ecosystem among the 10 study countries. As can be seen in Table 8, some 132 of the AI investors are Brazil-based, with 130 of those investing domestically. This activity is complemented by strong inflows from the United States, with 91 American investors engaged. European investments in Brazil are also playing a role including the United Kingdom (8), Spain (2) and Italy (2), as well as Latin American regional investors from Argentina (3) and Mexico (3). As noted above, the Brazilian AI ecosystem is showing promising signs of maturing and a few companies are achieving scale. For many of the Brazilian start-ups, the focus is on applying AI to sectors in areas of traditional Brazilian strengths (agriculture, health care, education). This suggests start-ups are aligning with local market needs rather than simply following global AI trends.

Drilling down a bit further into the investor database reveals that the 10 case study countries had about 222 total domestic investors who were engaged in AI start-ups in the region (Table 8). Of these, about 206 invested exclusively in their home country's AI start-ups. Twelve local investors in the case study area invested exclusively in other case study countries' AI start-ups; four local investors invested both at home and in the other

Table 7: Investor Engagements in Active, AI-Focused Start-Ups with at Least One G7 Investor, 1Q2025

Study Country	AI-Focused Start-Ups with at Least One G7-Based Investor (Counts)	Total Investor Engagements Received (Count)	Each Country's Share of the 10 Country Total Count (%)	Domestic Investor Engagements (Count)	G7 Investor Engagement Totals (Counts)	Other Foreign Investor Engagements Received (Count)	Domestic Share of Investor Engagements (%)	Foreign Share of Investor Engagements (%)
Brazil	119	399	52.4	201	173	**25**	**50.4**	**49.6**
Colombia	9	20	2.6	3	12	**5**	**15.0**	**85.0**
Egypt	15	51	6.7	17	21	**13**	**33.3**	**66.7**
Indonesia	18	56	7.4	24	22	**10**	**42.9**	**57.1**
Kenya	14	45	5.9	4	27	14	8.9	91.1
Nigeria	22	65	8.5	16	40	**9**	**24.6**	**75.4**
South Africa	21	73	9.6	23	40	**10**	**31.5**	**68.5**
Thailand	2	4	0.5	0	3	1	0.0	100.0
Tunisia	7	17	2.2	5	8	**4**	**29.4**	**70.6**
Vietnam	12	31	4.1	5	18	8	16.1	83.9
Total	**239**	**761**	**100.0**	**298**	**364**	**99**	**39.2**	**60.8**

Source: Crunchbase database, online edition, Q1 2025; author's tabulations.

Note: Other foreign investor home economies include: Argentina, Australia, Brazil, Denmark, Estonia, Ethiopia, Finland, Ghana, Hong Kong, India, Ireland, Israel, Kenya, Malaysia, Mauritius, Mexico, Nigeria, Norway, Peru, Poland, Portugal, Saudi Arabia, Singapore, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, The Netherlands, Tunisia, Turkey, UAE, Uruguay and Venezuela. Brazil, Kenya, Nigeria, South Africa and Tunisia are included in this list because some of their domestic investors invested in other case study countries.

Table 8: Domestic Investors Based in the Case Study Countries and Investing in G7 Affiliated AI Start-Ups at Home or Abroad in Other Case Study Countries, 1Q2025

Home Country	Case Study Country Domestic Investor Entities (Count)	Case Study Domestic Investors Investing Domestically (Count)	Domestic Investment Engagements (Count)	Outbound Foreign Investment Engagements by Domestic Firms to Other Study Countries (Count)	Destination Countries
Brazil	132	130	201	3	Kenya (1), South Africa (1), Tunisia (1)
Colombia	3	3	3	0	
Egypt	12	12	17	0	
Indonesia	19	19	24	0	
Kenya	7	4	4	4	Egypt (1), South Africa (1), Nigeria (2)
Nigeria	15	13	16	5	Brazil (1), Colombia (2), Egypt (1), Kenya (1)
South Africa	24	21	23	8	Kenya (6), Nigeria (2)
Thailand	0	0	0	0	
Tunisia	6	4	5	6	Egypt (5), South Africa (1)
Vietnam	4	4	5	0	
Total	**222**	**210**	**298**	**26**	

Source: Crunchbase database; author's tabulations and database construction; Claude.ai (assisted in the compilation of this table).

Note: "G7 affiliated" means there is at least one investor from a G7 country investing in the Al start-up. The investor database assembled by the author to cover entities investing in Al start-ups in the 10 case study countries includes 526 unique investors. There were 210 domestic investors investing domestically, and there were 316 domestic and foreign investors investing in the 10 case study countries across international borders.

study countries. Altogether, these local investors contributed 26 investor engagements in other case study countries. While the numbers are modest, it is interesting to see the emergence of some South-South investment flows in support of AI start-ups. There are the beginnings of regional ecosystems operating, especially among the five African case study countries. There are also African ties to Latin America with some investor engagement in both directions. This type of activity is lacking among the three Southeast Asian case study countries.

To get a better handle on the overall flows, we now turn to examine the top sending countries for investment engagements received by each of the case study countries (see Table 9).[38] The United States dominates the rankings for lead investor in seven countries. But three of the case study countries — Brazil, Indonesia and Tunisia — are their own lead investor, with the United States placing second. The strong local performance in these countries may provide an indication of a dynamic local ecosystem emerging for AI start-ups.

By a wide margin, the strong United States-to-Brazil channel accounts for the largest single international flow of investor engagements shown in the table. US investors also showed relatively strong interest in Nigeria and South Africa. Altogether, five G7 countries are represented across the table. Japan, in particular, is represented on investment flows to all three case study countries in Southeast Asia, indicating a potentially important regional corridor. (Some three quarters of Indonesia's investor engagement originate in Asia.) There are further indications of South-South regional hub flows via investor engagements such as Saudi Arabian engagement in Egypt, Mauritian engagement in South Africa and Singaporean engagement in Thailand.

38 Appendix 2 presents detailed profiles of the top G7 investors (Table A.1); the top domestic investor in each case study country, except Thailand whose covered firms only had foreign investors (Table A.2); and the top investors across all the sample countries (Table A.3).

Table 9: Leading Investment Corridors (Counts of Investor Engagements in G7 Affiliated AI Start-Ups)

Country	Top Investor	2nd Investor	3rd Investor	Top 3 Share (%)
Brazil	Brazil (200)	United States (153)	United Kingdom (8)	90.5
Colombia	United States (10)	Colombia (3)	Spain (2)	75.0
Egypt	United States (14)	Egypt (13)	Saudi Arabia (6)	60.0
Indonesia	Indonesia (25)	United States (12)	Japan (9)	78.0
Kenya	United States (17)	South Africa (6)	Kenya (4)	58.7
Nigeria	United States (31)	Nigeria (16)	Canada (4)	76.1
South Africa	United States (27)	South Africa (22)	Mauritius (4)	74.6
Thailand	United States (2)	Singapore (1)	Japan (1)	100.0
Tunisia	Tunisia (5)	United States (4)	France (2)	64.7
Vietnam	United States (12)	Japan (7)	Vietnam (5)	75.0

Sources: Crunchbase, online database, www.crunchbase.com/discover/organization.companies (Q1 2025); author's tabulations and investor database construction; Claude.ai provided final table compilation assistance.

Note: Numbers in parenthesis refer to investor engagements. "G7 affiliated" means there is at least one investor from a G7 country investing in the AI start-up.

Investment and Non-Financial Assistance

The investor profile data reveals that investor engagements often involve assistance beyond purely financial investment. Many of these investors have gained experience internationally, which they are bringing to bear in support of their chosen AI start-ups. While some investors mention provision of specialist support for specific issues such as governance, many offerings fall into two broad clusters of issues: technology transfer and ecosystem development.

Technology transfer takes a variety of forms. When large technology companies such as Google or Microsoft invest, they may provide access to their technology stacks and platforms.[39] Only about three percent of the investors in our sample explicitly mention technology or skills transfer as a focus of their service. Most often this takes place through knowledge sharing, mentorship, and network connections rather than formal technology transfer programs. For the G7 investors, in particular, management expertise transfer is often a major component of their investment process. Among other elements, this may include strategic guidance and methodological support for operational scaling in relation to technological upgrades.

Ecosystem development is another characterization that some investors give to their support. This means building mutually supportive relationships with the various counterparts that an AI start-up might need to engage in successfully pursuing its operations. Ecosystem development is an offering explicitly mentioned by 24 investors. Other dimensions of this type of assistance include network access (cited by 43 investors, this may include connections to potential customers, partners and follow-on investors), acceleration services (offered by 10 investors, which may include optimizing the implementation of AI technology), and incubation programs (offering suites of services using a holistic approach, as cited by five investors).

The technology transfer and ecosystem development support cited by these investors in our case study firms aligns with the literature cited above on firm-level AI adoption in developing countries. As Mutasa et al. (2024)

39 As noted above, AI start-ups covered in our study have generally not declared use of patent protection. In comparison, the international corporate investors are more likely to employ formal forms of intellectual property to protect their own interests. This means that the provision of adequate levels of intellectual property protection may be a useful part of the host country policy mix in order to facilitate access for domestic AI start-ups to technological inputs from abroad, along with the know-how on deployment (Park and Lippoldt 2005, 2014).

highlight, effective AI implementation requires not just funding but also knowledge sharing, strategic guidance and network connections, among other elements. Certain of the investor offerings correspond to inputs that Fan and Qiang (2024) cite as necessary for promoting positive outcomes in the AI economy, including local ecosystem development and skills development. In addition, the emerging South-South investment observed in our case study countries also lends support to Mayer's (2021) observation that firms with local knowledge can develop a measure of competitive advantage — and, potentially, improved resilience — by tailoring AI solutions to market conditions in developing countries. In sum, this complementary relationship between investors' financial and non-financial inputs addresses a variety of needs at AI start-ups and potentially more generally in their home countries.

Geography Matters

Economist Paul Krugman and others have noted agglomeration effects, whereby development in a crowded technology centre may offer firms some advantages in terms of development and diffusion of innovative products (Krugman 1995). This likely also operates in the AI economy, as well. For example, thick labour markets may develop and offer large pools of sector-relevant talent. Improved communication around innovation could emerge due to the proximity of stakeholders, thereby conferring further information advantages. The geographic concentration may be supported by the availability of VC funding in some of these areas. The combination of ample investment funding and advisory support may provide a draw to specific geographies. Other draws might include the availability of access to complementary academic research. With respect to the case study sample of G7 investor-supported AI start-ups (see

Table 10: Geographic Concentration of AI Start-Ups

Country	Total Start-Ups with G7 Investment	City	Number of Start-Ups, by City	Market Shares (%)
Brazil	119			
		São Paulo	75	63.0
		Curitiba	9	7.6
		Rio De Janeiro	4	3.4
		Other cities	31	26.1
Colombia	9			
		Medellín	5	55.6
		Bogotá	4	44.4
Egypt	15			
		Cairo	9	60.0
		Alexandria	3	20.0
		Gîza	2	13.3
		Zamalek	1	6.7
Indonesia	18			
		Jakarta	9	50.0
		Jakarta Pusat	2	11.1
		Other cities	7	38.9
Kenya	14			
		Nairobi	14	100.0

Table 10: Geographic Concentration of AI Start-Ups (Continued)

Country	Total Start-Ups with G7 Investment	City	Number of Start-Ups, by City	Market Shares (%)
Nigeria	22			
		Lagos	14	63.6
		Yaba	2	9.1
		Abuja	2	9.1
		Other cities	4	18.2
South Africa	21			
		Cape Town	9	42.9
		Johannesburg	8	38.1
		Other cities	4	19.0
Thailand	2			
		Bangkok	2	100.0
Tunisia	7			
		Tunis	6	85.7
		Sfax	1	14.3
Vietnam	12			
		Hanoi	6	50
		Ho Chi Minh City	6	50
Total	**239**			

Source: www.crunchbase.com/discover/organization.companies; author's tabulations and database construction; Claude.ai (table compilation assistance).

Table 10), one can observe some clustering. In eight of the 10countries, one city accounted for a majority of the activity. This was most pronounced in São Paulo, Brazil, with 75 AI start-ups as of 1Q2025. In South Africa and Vietnam, there was a more balanced split between two economic centres with each accounting for substantial shares of the AI start-ups (Johannesburg/Cape Town and Hanoi/Ho Chi Minh City).

AI Start-Ups That Closed

The focus in this assessment is on continuing AI start-ups that are participating in the AI economy in our sample of middle-income developing countries. But it is worthwhile to pause and consider the AI start-ups not included in our sample because they have closed (see Table 11). Of the 133 closed AI start-ups in the 10 case study countries, Crunchbase reports that only 11 had a G7 investor, while another 26 are listed as having exclusively domestic or third country investors. For the other 96 closed AI start-ups, it appears that bootstrapping was a primary means for funding the firm (though we cannot rule out a gap in the reporting on investor participation). Of the 110 closed firms that reported employment, three quarters had employment of 10 or less. Only 30 of the 133 closed firms provided reporting on closing or exit dates. Among the closed firms, "exit" is likely the preferred way out, meaning the firm was acquired or transformed via an initial public offering (IPO). This translates into a known "success rate" among the closed firms of about 10 percent (that is, 13 firms reported an exit, though there may be additional firms in this category not reported). In addition to AI, many of the "successful" closed firms are listed as having an industry focus in one or more areas such as content creation, digital marketing, internet, business intelligence or marketing automation.

Interestingly, none of the firms with G7 investors reported having an exit, meaning that their manner of closure cannot be assessed. Among all the firms reporting closure dates (excluding exits), the age tended to be relatively short (in other words, between one and three years). South Africa was an exception, due to a couple of outlier observations.

Table 11: Assessment of AI Start-Ups that Closed Down, Counts (Except "Years" Where Age Is Reported)

Home Country	AI Start-Ups That Have Closed	Firms with External Investors Listed	Firms with Listed G7 Investors	Employment (1–10)	Employment (11–50)	Employment (51–100)	Employment (101–250)	Employment (251–500)	Employment (firms failing to report)	Firms Reporting Closing Date (excluding those exiting)	Average Age At Closure, Years	Exit Reported: Acquired or IPO	Average Age At Exit, Years	Closed Firms Failing to Report Closure or Exit Date
Brazil	80	26	6	49	7	3	3	1	17	9	2.9	11	5.9	60
Colombia	5	1	1	2	2	1	0	0	0	2	1.7	0	---	3
Egypt	5	2	1	4	1	0	0	0	0	1	1.3	0	---	4
Indonesia	4	1	1	2	2	0	0	0	0	2	1.2	1	1.9	1
Kenya	8	1	1	7	1	0	0	0	0	0	---	0	---	8
Nigeria	13	2	0	11	1	0	0	0	1	1	1.2	0	---	12
South Africa	7	3	1	4	1	1	0	0	1	2	7.5	1	5.0	4
Thailand	1	0	0	1	0	0	0	0	0	0	--	0	---	1
Tunisia	3	0	0	3	0	0	0	0	0	0	--	0	---	3
Vietnam	7	1	0	1	1	0	0	1	4	0	--	0	---	7
Totals	**133**	**37**	**11**	**84**	**16**	**5**	**3**	**2**	**23**	**17**		**13**		**103**

Sources: Crunchbase, online database, www.crunchbase.com/discover/organization.companies (viewed at end of Q1 2025); author's tabulations and database construction.

Note: IPO = initial public offering.

In Brazil (the only country with more than a couple of observations), the age of successful AI start-ups that exited tended to be older than for the average AI start-up that closed. It may be that entrepreneurs and investors there are relatively quick to pull the plug on a failing firm, even as they recognize that it takes longer to prepare an exit for a successful start-up. Unfortunately, due to gaps in the data set, we are not able to confirm this for the overall population of closed start-ups.

AI Unicorns

To further assess the AI start-up-investor universe in our case study countries, we now turn to look for unicorns. Such firms are interesting reference cases for other start-ups in that they have demonstrated possible pathways to success. We draw on the database of unicorns developed by CB Insights.[40] This database provides information on the companies, their valuations, date of recognition as a unicorn, country and city of headquarters, applicable industry, and selected investors. As of January 7, 2025, the roster included 1,257 firms.[41] The current roster of unicorns includes 37 firms based in our case study countries.[42] Only one of these unicorns is also in our Crunchbase database of AI start-ups. (That is the Brazilian start-up Cloudwalk, an AI-powered financial services provider with a valuation of US$2.15 billion.) But there are other AI firms and investors of interest in the unicorn roster. In order to identify the top AI-intensive firms on the list, our technique is to tap into industry expert opinion concerning which AI firms excel and then cross reference this against the roster of unicorns.[43] The industry publication *eWeek* releases such a list of leading AI firms, with the latest edition published on October 1, 2024 and covering 150 firms (Hiter 2024). On this basis, 16 AI-intensive firms can be identified (Table 12). Of these, 13 are located in the United States, two in the United Kingdom and one in Canada.

This unicorn analysis is of interest for our current case study of AI start-ups for a variety of reasons. First of all, the fact that most of our case study countries are represented on the roster of unicorns indicates that it is possible under local conditions to grow a start-up to unicorn scale. Secondly, given the number of early stage AI start-ups that we have identified across the 10case study countries, it may prove relevant to keep in mind that AI start-ups can become unicorns and tend to do so earlier in their life cycle than non-AI firms. According to CB Insights,[44] among unicorns emerging in 2024, nearly two thirds of AI unicorns attained the status prior to scaling up and becoming fully established. Most of these AI unicorns were still in the phases of validating their business models with the initial deployment of resources. For more than four in five non-AI unicorns, their status was attained in later phases of commercial maturity, as they scaled and established themselves. Given high market expectations of AI technology start-up businesses, there may be leverage that can be exploited in seeking investors.[45]

Thirdly, there is a start-up connection to the successful AI unicorns via their pool of investors. Some of these investment firms have accumulated significant experience via their collaboration with successful AI start-ups over a period of years. As noted above, a successful international engagement with such an investor can provide a channel for technology transfer, managerial skill development and operational benefits such as access to networks to tap into subject area expertise, market knowledge and suppliers.

It turns out that a number of AI unicorn investors have direct ties to the AI start-ups in the case study countries. So this channel of G7 investor engagement is already operating to some extent:

- Andreessen Horowitz: Invests in AI unicorns Databricks, Anduril and Shield AI. The firm also operates in Brazil with investments in two AI start-ups.
- Google and Google Ventures: Invest in AI unicorns Anthropic and Synthesia. Google, Google for Startups and Google.org invest in Brazil (26 start-ups), Egypt (one start-up),

40 See www.cbinsights.com/research-unicorn-companies. Also note Appendix 1.

41 See www.cbinsights.com/research-unicorn-companies

42 The CB Insights roster of unicorns includes 37 firms from eight of the 10 case study countries: Brazil (18), Colombia (3), Egypt (1), Indonesia (7), Nigeria (2), South Africa (1), Thailand (3) and Vietnam (2). There are no Kenya- or Tunisia-based firms on the roster.

43 See Lippoldt (2024, 10). Another option is to cross reference the unicorn roster against relevant industry association membership lists. But such an approach may prove less than timely, as developments are evolving rapidly.

44 See www.cbinsights.com/reports/CB-Insights_AI-Report-2024.xlsx.

45 CB Insights uses a "Commercial Maturity" scoring for startups with the following phases: (1) Emerging; (2) Validating; (3) Deploying; (4) Scaling; (5) Established.

Table 12: Leading AI Unicorns (start-ups valued at US$1bn or more), 1Q2025

Company	Valuation (US$ Billions)	Date Designated as Unicorn	Country	City	Industry	Select Investors
OpenAI	$157.00	2019-07-22	United States	San Francisco	Enterprise Tech	Khosla Ventures, Thrive Capital, Sequoia Capital
Databricks	$62.00	2019-02-05	United States	San Francisco	Enterprise Tech	Andreessen Horowitz, New Enterprise Associates, Battery Ventures
Anthropic	$16.05	2023-02-03	United States	San Francisco	Enterprise Tech	Google
Anduril	$14.00	2019-09-11	United States	Irvine	Industrials	Andreessen Horowitz, Founders Fund, Revolution Ventures
Glean	$4.60	2022-05-18	United States	Palo Alto	Enterprise Tech	General Catalyst, Kleiner Perkins Caufield & Byers, Lightspeed Venture Partners
Hugging Face	$4.50	2022-05-09	United States	New York	Enterprise Tech	Betaworks Ventures, Addition, Lux Capital
Inflection AI	$4.00	2022-05-13	United States	Palo Alto	Enterprise Tech	Gates Frontier, Greylock Partners, Horizons Ventures
Dataiku	$3.70	2019-12-04	United States	New York	Enterprise Tech	Alven Capital, FirstMark Capital, capitalG
Shield AI	$2.80	2021-08-24	United States	San Diego	Industrials	Andreessen Horowitz, Homebrew, Point72 Ventures
Moveworks	$2.10	2021-06-30	United States	Mountain View	Enterprise Tech	Lightspeed Venture Partners, Sapphire Ventures, Kleiner Perkins Caufield & Byers
Synthesia	$2.10	2023-06-13	United Kingdom	London	Enterprise Tech	Google Ventures, Kleiner Perkins Caufield & Byers, FirstMark Capital
Cohere	$2.00	2023-05-02	Canada	Toronto	Enterprise Tech	Index Ventures, Salesforce Ventures, Section 32
Jasper	$1.50	2022-10-17	United States	Austin	Enterprise Tech	Foundation Capital, Institutional Venture Partners, Founders Capital
Runway	$1.50	2023-05-04	United States	New York	Media & Entertainment	Lux Capital, Compound, Amplify Partners
Adept	$1.00	2023-03-14	United States	San Francisco	Enterprise Tech	Greylock Partners, Addition, M12
Stability AI	$1.00	2022-10-05	United Kingdom	London	Enterprise Tech	Lightspeed Venture Partners, Coatue Management
Memo item						
CloudWalk	$2.15	2021-09-08	Brazil	Sao Paulo	Financial Services	Plug & Play Ventures, Valor Capital Group, DST Global (also Coatue, BTG Pactual)

Source: CB Insights (2025a); Hiter (2024); author's tabulations; Claude.ai for compilation. Additional investors for CloudWalk (in brackets) were identified from the Crunchbase database.

Note: CloudWalk self identifies as "the interplanetary payment network."

Indonesia (one startup); Kenya (5 start-ups); Nigeria (5 start-ups); and South Africa (one start-up).

- Sequoia Capital: Invests in OpenAI. It is also operating in Brazil (one start-up).
- Khosla Ventures: Invests in OpenAI. It is also investing in Nigeria (one start-up).
- Salesforce/Salesforce Ventures: Invests in Cohere. The firm is also operating in Tunisia (one start-up).
- Coatue: Invests in Stability AI. It is also investing in Brazil (CloudWalk).

The Brazilian start-up ecosystem appears to be fairly well integrated with ties to four of these investor groups. Nigeria has connections to two of the investors and Kenya has had success with the Google group. But connections to the others are more limited. Colombia, Thailand and Vietnam are not yet engaged via this channel, so this remains a possible opportunity for these countries to explore.

Policy Assessment

In light of the foregoing assessment of start-ups with G7 investment, we now turn to the policy environment in which they operate. We conducted a review of AI policy frameworks in each of the case study countries. Data from the OECD.AI Policy Observatory was employed as a baseline for the review. We supplemented this review by drawing on data from the activity tracker at the Digital Policy Alert (DPA) organization, as well as information from several DPA analytical reports.[46] Other updates were drawn from peer-reviewed academic and regional sources.[47]

The 10 case study countries all have launched development of AI policy frameworks to advance their engagement in the AI economy (see Box 5). They vary in their progress (details are given in Table A.4 in Appendix 2). It is interesting to see that Colombia and Brazil — with the most developed AI policy frameworks — also have the largest numbers of AI start-ups among our case study countries (see Table 5). Both countries have taken steps toward the development of advanced regulatory mechanisms such as sandbox approaches and risk-based legislation.[48] South Africa, Thailand, Tunisia and Vietnam occupy an intermediate position in AI policy development with defined national strategies, designated priorities and emerging regulatory frameworks. However, these four countries each face implementation challenges. Kenya and Nigeria show promising momentum with recent legislative developments, despite infrastructure limitations. Egypt and Indonesia represent earlier stages of policy formation, focusing primarily on capacity building and infrastructure development while still establishing basic regulatory frameworks. Across all of the case study countries, there is a common tension between fostering innovation and ensuring ethical governance. Countries are responding to this tension with engagement in international cooperation and various adaptations to the divergent regulatory approaches of their international partners. Some are leaning toward Western-aligned frameworks (in other words, the EU model) and others to alternative models influenced by partnerships with countries such as China.

Policy Review Findings

Drawing on the summaries above and the detailed policy data in Table A.4 in Appendix 2, several themes emerge.

First, the 10 case study countries have all begun to tackle AI policy and regulation using **strategic approaches**. Each of the sample countries has recognized that the scope of the challenge and opportunity of AI requires a national-level response. Accordingly, they have launched initiatives to take stock and develop national strategies or plans and action agendas. Progress in these initiatives is mixed, as can be seen in Table A.4 in Appendix 2. Yet it is notable that the sample countries are each

46 For further information on the DPA as a data source, see Appendix 1.

47 The full list of sources can be found at the bottom of Table A.4 in Appendix 2. Note: A summary table view of the OECD.AI data as of 2021 can be found in Lippoldt (2024, table 5, 21–23). The table covers the advanced economies as well as the present case study countries Brazil, Indonesia, South Africa and Vietnam.

48 With respect to AI start-ups, it may be that the consultative approaches being employed in these two nations are providing stakeholders with greater certainty and predictability in the commercial environment. This is valued by entrepreneurs and may help to promote start-up development. For example, see the discussion on certainty and predictability in regulatory processes in Geradin (2017, section C).

Box 5. Case Study Countries' AI Policy Framework Status in a Nutshell, 1Q2025

Brazil: Fairly comprehensive framework for robust regulatory development. The system is oriented towards EU-type approaches to AI governance including a recently passed Senate AI bill focused on risk management (lower house action is pending) and a proposed National Center for Algorithmic Transparency and Trustworthy AI.

Colombia: Extensive policy initiatives, including some with regulatory sandboxes through the Superintendencia de Industria y Comercio's innovation lab; balancing innovation with responsible use through a comprehensive pillar-based strategy.

Egypt: Strategy focused on becoming a regional AI hub through capacity building and research, with growing Chinese partnerships potentially creating Western alignment challenges.

Indonesia: Early-stage framework prioritizing infrastructure development across five priority areas, with recently implemented data protection legislation and developing ethics guidelines.

Kenya: Emerging strategy emphasizing key economic sectors with strong mobile infrastructure and active international governance engagement but facing resource constraints. Regulatory system is still in early stages.

Nigeria: Evolving framework with emphasis on ethics and inclusivity; significant legislative progress with new regulatory commission approval, despite persistent infrastructure challenges.

South Africa: Balanced approach focusing on inclusive growth and talent development, with the most developed venture capital ecosystem in Africa, but hampered by chronic electricity supply challenges.

Thailand: Well-developed risk-based strategy with detailed targets and implementation plan; actively participating in ASEAN governance frameworks while developing sector-specific applications.

Tunisia: Strategy focused on leveraging engineering education to become a regional AI hub, with an EU-aligned data protection framework, but facing a challenge from implementation gaps and limited enforcement.

Vietnam: Forward-looking approach with regulatory innovation including machine-readable AI labels and sandboxes; developing substantial specialist workforce amid growing partnerships with Asian technology leaders.

Sources: See Table A.4.

striving to capitalize on AI in a strategic manner, taking into account their national conditions.

Brazil and Colombia are furthest in development of their AI frameworks and have achieved some scale in development of their AI ecosystems, which they are both seeking to leverage as emerging regional players. Egypt, Kenya and Tunisia have sought to position themselves as aspiring regional AI hubs as well, albeit on a smaller scale. Several others — such as Indonesia, South Africa and Thailand — refer to development of AI as part of strategic engagement in the so-called Fourth Industrial Revolution, which refers to positive exploitation of technologies that can leverage inputs from the physical, digital and biological spheres (for example, with respect to automation or cyber-physical systems).

Second, most of the countries are facing **implementation challenges** in realizing their national plans. This is, in part, associated with developing adequate capacity in public administration and among other stakeholders

that need to be engaged. Some have sought to meet this challenge via public-private partnership arrangements.[49] In developing the regulatory regimes associated with implementation of the national plans, some of the case study countries have also underscored the need for transparency and consultation, which can have positive effects on outcomes. For example, Brazil, Colombia, Kenya, South Africa and Thailand all have made explicit references to these issues with respect to specific aspects of regulation.

Third, all 10 of the countries are still struggling with the **urban-rural digital divide**, a key element for inclusiveness in the AI economy. Closing the gap will require — among other elements — improved performance in education and infrastructure development (for example, electricity, telephony, information technology capacity).

Fourth, nearly all of the case study countries have established targets for **AI human capital development**.[50] Shortfalls are proving to be a constraint on AI development, not least because of international poaching of talent. Brazil, Egypt and Tunisia explicitly cite talent flight as a strategic risk. (And, indeed, Maslej et al. (2024, 239) report that countries such as Brazil and South Africa have experienced a steady outflow of talent to competitor markets.)

Fifth, there is a tension over **regulatory convergence and divergence**, with implications for market access in both directions for the case study countries. Selling and sourcing are both affected by regulatory compliance issues. There are risks due to fragmentation. Brazil, Colombia, South Africa and Tunisia have taken steps toward EU style approaches to regulation, while Egypt, Kenya, and Vietnam have begun collaboration with some Chinese AI initiatives (for example, via the Belt and Road Initiative (BRI), which includes a digital dimension). The United Kingdom as well has an influence, in particular on AI safety issues.

Moreover, the US market is a key source of AI technology and venture capital for all 10 countries as demonstrated in our start-up analysis. Early indications are that the US is now shifting to a much lighter regulatory regime (Carrillo et al. 2025; Villasenor and Turner 2024). While the terms of the new US AI regime still remain unsettled, there are risks of US policy changes further fracturing global AI governance. For the 10 case study countries, alignment with any one of the AI major economies could have knock-on effects in terms of market access and compliance with the other major economies. This is particularly important with respect to access to and control of data, key ingredients for the AI economy. It could affect other areas as well, such as via compliance issues with respect to exports of equipment or cross-border sales of AI services.

Conclusions

This case study considers the situation of a sample of internationally engaged AI start-ups and the role of the state in shaping the economic context for firm-level development. The research has identified some 2,537 AI start-ups in the 10 case study countries operating across a broad range of sectors. Drawing on a combination of global and domestic inputs and innovation, these firms are identifying local and regional needs and developing AI-supported solutions for commercial markets. In doing so, about one in 10 of these firms have succeeded in attracting investment from entities based in the G7 country group. Such investment provides a channel for transfer of know-how concerning development and commercial deployment of the technology beyond what might be available domestically. Domestic policy is playing a complementary role to this commercial activity. From build out of infrastructure to human capital development, and regulation, national governments are establishing the context and conditions in which the AI ecosystem is operating. As in much of the world, this is a work in progress in each of the ten case study countries.

Small Scale, Bigger Importance

The scale of the AI startup activity in the study countries is small compared to the scale of comparable activity in the leading AI nations such as the United States, China or Europe and the United Kingdom. But it is notable in that entrepreneurs in the study countries have

49 As noted in the literature review, Mutasa et al. (2024) point to public-private partnerships as one means for stakeholders to mitigate high-cost burdens (for example, with respect to infrastructure projects).

50 It is notable that action in this area is also identified by Fan and Qiang (2024), who emphasize prioritizing skills development as one of five priorities in the World Bank framework for positive AI development (see the literature review above for a discussion of this reference).

been able to establish local beachheads in their respective markets. An AI ecosystem has begun to develop around these businesses, anchored in certain dimensions via the financial sector. Moreover, there are early indications of regional cross-border networks emerging among regional investors and AI startups. This is perhaps most notable in Africa. But, within our small sample there are also intra-regional examples within Latin America and in Asia (though in Asia this is often with Japan, a G7 nation, as an anchor). While North-South channels may be providing the most substantial boost to the domestic resources for the case-study-country AI economies, there is already some traction for South-South interlinkages among the developing economies.

For the case study countries, the scale of the South-South interlinkages is presently at a sort of proof-of-concept level. Yet, there is a demonstration effect from the linkages that have been established. With efforts to better align regional policy and regulation (for example, via ASEAN, the African Union, or the UN Economic Commission for Latin America and the Caribbean, ECLAC, among other channels), such cross-border activity could develop and contribute to the resilience of the sector in developing economies. In view of the rise in policy uncertainty and geopolitical tensions among the leading AI economies, such South-South ties may evolve to play an important complementary role. For the case study countries, such rebalancing may prove to be an important part of managing dependency risk on countries such as the United States or China.

Potentially Viable AI Ecosystems

The existence of numerous AI startups across the ten sample countries demonstrates that these middle-income countries are developing potentially viable AI ecosystems. The comparative data suggests Brazil has established itself as a leading destination for AI investment among these emerging economies, potentially creating an example for technology sector development from which other markets may draw lessons. For example, among other features, it has taken a consultative approach to policy development that helps to ensure commercial perspectives are taken into account. Of course, Brazil has a natural advantage due to its market scale. But there again there may be lessons for smaller economies to strive for openness and regulatory alignment that expands the addressable market for their AI startups.

All this is not to say that the case study country linkages to the G7 AI ecosystem should be diminished. The scale and the technological advantage of these advanced economies means that it remains in the interest of these middle-income economies to strive for G7 investor engagement and regulatory alignment. In this regard, participation in the OECD processes with respect to AI policy development remains an important option.[51] AI global governance initiatives such as the OECD AI Principles continue to contribute to basic orientations in AI policy and regulation in many countries (Appendix 3). Likewise for similar initiatives at UN agencies and regional organizations. Participation in such groupings can help to ensure that a developing country's national interests are represented and potentially taken into account. In terms of next steps, there is mutual interest in striving for shared standards for safety, interoperability, and data governance (for example, providing appropriate protection for personal data and intellectual property rights while facilitating responsible data access). In addition, given the outsized role of US investment across all study countries, specific policies for managing this relationship are critical, particularly regarding technology transfer, data governance, and intellectual property.

AI Agenda and the Case Study Countries

Each of the case study countries has laid out domestic AI policy agenda items that remain to be accomplished. The good news here is that these are often matters that each country has direct influence over. An important element is domestic capacity building with respect to relevant public services (for example, regulatory enforcement), infrastructure, and education. Countries with low domestic investment (Kenya, Colombia, Thailand) might consider identification of policies that strengthen local capital formation and AI investor development (if necessary, drawing on advice from regional or international organizations). Advancing the implementation agenda for AI regulation requires particular care. In striving for appropriately balanced outcomes, best practice points to the need to take into account issues such as transparency in the process, consultation of stakeholders, avoidance of undue market restrictiveness or

51 For example, Brazil and Colombia are actively engaged at OECD on these matters, Colombia as an OECD member and Brazil as an observer. This can contribute to improved understanding of AI risks and opportunities when viewed from a policy perspective. See OECD (2024).

technological biases, and review of proposals to ensure regulatory coherence (across agencies and with respect to international standards).[52]

Businesses in a variety of countries have underscored limited availability of AI human capital as a major challenge.[53] In 2023, a LinkedIn study of AI talent in the user base by country found that while the proportion of AI talent concentration in all countries covered was rising, there was a substantial gap between developed and developing countries (Maslej et al. 2024, 237).[54] The proportion of AI talent in the user base in the United Kingdom or the United States, for example, was roughly 2.5 times greater than that of South Africa. For Brazil, the spread was even wider.[55] Policies supporting STEM education and AI-specific training programs may help developing countries to create a more appropriately skilled workforce able to participate in AI development. In the competition for investment, such human resource availability could contribute to a country's comparative advantage.

Recommendations

This case study of 10 middle-income developing countries has provided a glimpse into AI developments in the real economy. It has uncovered a positive story of comparatively modest but tangible AI sector developments on the ground in the case study countries. Drawing on the analytical findings from the case study, several recommendations follow:

→ **Ensure national AI strategies are comprehensive; update them in an on-going fashion as necessary in light of future technological developments and related matters. Implementation planning and built-in follow-up should be an integral part of this effort. Rationale:** A coherent, strategic approach is needed to address national-level challenges to achieving safe and beneficial development of the AI economy. With respect to AI start-ups, it is notable that countries with better progress in this area, such as Brazil and Colombia, have enjoyed fairly robust emergence of such firms.

→ **Structure regulatory frameworks to be supportive of AI start-ups, which in turn can promote advances in economically beneficial integration of AI in the economy.** This approach should reflect best regulatory practice including consultation of stakeholders, avoidance of undue restrictiveness, and aiming for international coherence and interoperability. The framework should address issues around data governance and include an emphasis on AI ethics and safety. **Rationale:** Our case study has shown that AI start-ups are innovating to introduce AI applications across a broad range of sectors, operating in an agile manner to bring AI to bear in a culturally appropriate manner (for example, in a local language). By removing undue regulatory impediments, clearly demarcating appropriate limits and providing regulatory sandboxes to trial products, regulators can facilitate this beneficial economic activity.

→ **Complementary policies are important and should be tackled early on with respect to business needs.** The specifics will depend on local conditions. Shortfalls in areas such as provision of reliable electricity supply in South Africa and limited access to high-speed internet in areas of Thailand away from the centre appear to have had a negative effect on some start-up activity. Drawing on the positive experiences of Brazil and Colombia, examples of areas for action may include promoting the availability of AI-relevant technical education and training, digital infrastructure development, and targeted policies that bolster technology startups via incubators, accelerators and government support programs. Inclusion of rural and economically disadvantaged areas in the targeting of measures — where appropriate — may help to promote inclusiveness in the AI economy. **Rationale:** Some of the biggest impediments to AI start-ups and development of the AI economy lie outside of the sector itself. And matters such as infrastructure shortfalls can be time consuming and costly to address. Where sufficient resources

52 For more on this, see the OECD efficient regulation principles for market openness (Tsai et al. 2011, 18, box 1) and the detailed discussion of the application of these principles in the case of Israel (ibid., 18–39).

53 See the business obstacles section above for a discussion of this point. For data on AI skills availability, see Maslej et al. (2024), especially chapters 4 and 6. For a concrete example of business concerns, see Crawford and Smith (2022). In a SAS-sponsored survey of key decision makers in 111 major organizations across the United States and United Kingdom (Crawford and Smith 2022, 19 and 21), 63 percent of respondents found that skills in their workforces were insufficient with respect to AI and machine learning; 61 percent noted their workforce size was insufficient in these areas.

54 Maslej et al. 2024, published this data, but noted that they should be interpreted with care as there can be variation by country in the use of the LinkedIn service and this can lead to variation in the quality of the data (2024, 236).

55 In addition, there is a significant gender gap in AI talent, with the proportion of AI talent among males coming in at roughly twice the rate of women in 2023 (albeit with some variation). Two notable exceptions were India and the UAE, where the incidence of AI talent among women was nearly as high as for men.

can be mobilized (for example, via public-private partnerships), concrete steps may yield early benefits, providing stimulus for the economy in their own right. Longer-term benefits may subsequently emerge via enhanced competitiveness in AI and the digital economy more broadly. In some cases, addressing constraints may remove bottlenecks that a small AI start-up would have little hope of tackling on its own.

- **Develop and retain human capital as an important national resource for the AI economy.** Successful development and implementation of AI depends on the availability of personnel with the appropriate skill sets. Yet, it is not sufficient to educate and train, talent must also be retained. This is a particular challenge for developing countries. Establishment of in-country career pathways may be a way to promote retention. Development of research centres of excellence to tackle issues pertinent to developing countries, for example, may prove a draw for highly skilled professionals who may otherwise be enticed by overseas opportunities. **Rationale:** Skilled personnel are at the heart of the AI economy and where there are shortfalls, the AI economy is constrained. Moreover, successful implementation of AI in other sectors depends on availability of skilled professionals in those sectors as well (for example, Otis et al. 2024).

- **Take steps to boost domestic investment capacity as a means of improving resilience and addressing a constraint on development of the AI sector.** Brazil has developed a comparatively large and dynamic domestic venture capital channel with respect to AI start-ups. It may be possible for the other case study countries to create a similar dynamic via mechanisms appropriate to each national context. Tools such as government seed funding to reduce risk for private investors, tax incentives for domestic investors in AI start-ups, investor forum events to raise awareness of opportunities, and investment syndication mechanisms — among other possibilities — may be established to encourage domestic investment in AI start-ups. **Rationale:** AI start-ups have the potential to play an important role in contributing AI innovation and implementation in developing economies. But, unlike in Brazil, it appears that in some of the case study countries a portion of this potential has not been realized. One differentiating factor is the availability of a fairly large-scale pool of domestic investment. It may be possible to stimulate additional domestic investment with an appropriate set of incentives.

- **International cooperation should be pursued via multiple channels including participation in international organizations, regional accords, bilateral partnerships and academic exchanges, among other options. South-South cooperation should figure in the mix, as a means of diversification and improving resilience.** International cooperation is an important means of promoting mutual understanding, giving participants a vehicle to raise concerns and share information in a timely manner. Participation in international organization activities such as the OECD.AI Policy Observatory can provide an opportunity to benchmark and compare policy settings. In cases where the cooperation is cemented via an international agreement (such as the Digital Economy Partnership Agreement), it may also help to reduce uncertainty in economic relations in areas that affect AI. Strategic diplomatic engagement may also prove helpful in times of geopolitical tension. **Rationale:** In the AI economy, scale matters. Openness to international markets can help expand the range of inputs for AI development and the addressable market for AI outputs. And international cooperation is one factor that can contribute to achieving this end.

Acknowledgements

The author gratefully acknowledges comments on the project at its inception from Paul Samson and Yash Kalash of CIGI and constructive feedback on the draft from two anonymous reviewers. He thanks the team at the Chatham House library in London for research assistance on two occasions during the project. And, he expresses his appreciation for contacts who took the time for informative background discussions related to the project including: Helen Royal at the UK Department for Science, Innovation and Technology in London; Alex Krasodomski at Chatham House, Digital Society Programme; and Charlie Humphreys, Alana Li and Matilda Buchan at Asia House in London; as well as faculty and students at the Rick and Susan Sontag Center for Collaborative Creativity (The Hive) at the Claremont Colleges in California, who shared insights on human-centred design, co-creation, and start-ups.

Appendix 1: Key Sources

→ **Crunchbase** (www.crunchbase.com/home)

Crunchbase is a continuously updated global database on firms, investors and deals. The company has developed partnerships with a diverse range of companies and investors across the globe. Rather than relying on web searching or scraping the web, the vast majority of data is crowdsourced directly from Crunchbase's venture partners (more than 4,000) and active community of contributors (more than 600,000). Crunchbase then uses a large suite of AI and ML algorithms to search and validate data using other published sources, with an in-house human data team providing manual verification for daily updates. The community of users provides a further layer of verification. (Crunchbase claims to be secure in its online operations, being Service Organization Control 2 [SOC 2] Type II compliant.)

In this manner, Crunchbase has developed a unique and substantial resource for firm-level research. There are some risks in this approach as well. The system relies in part on self-reported data, which can introduce reporting biases and accuracy issues into the database. It may also result in coverage bias whereby technology companies and technology-intensive regions are overrepresented, while some other sectors or regions potentially could be underrepresented. The reliance on crowdsourcing at times appears to result in some fields being inconsistently completed or at risk of becoming outdated, and there may be some variation from country to country in the data quality. As a result of these challenges, the results of research based on Crunchbase data should be considered with care and caveats noted.

In the course of the research for the present project, each of the selected Crunchbase records was reviewed to extract the desired fields, screen for obvious anomalies (in some cases seeking confirming information from alternative sources) and address formatting issues. The original data was generally in very good shape and every effort was made to ensure a clean data set for this project. The present analysis also employs a holistic approach, drawing on complementary sources from the literature and other references in order to check for consistency, avoid the introduction of biases and develop the storyline in an appropriately balanced fashion.[56]

→ **CB Insights Tracker: The Complete List of Unicorn Companies** (www.cbinsights.com/research-unicorn-companies)

This advisory firm tracks the emergence of unicorn companies drawing on a variety of sources and its own analytical team. The tracking spans the globe and covers more than 1,250 unicorns as of January 2025.

→ **Ipsos (2023), Global Advisor Survey** (www.ipsos.com/en-nz/global-views-ai)

The Ipsos Global Advisor Survey covered 31 countries and was largely conducted on Ipsos's Global Advisor online survey platform (in India a hybrid approach was employed). The survey ran from May 26 to June 9, 2023, and covered 22,816 adults. The definition of adult ages varied: 18 years and older in India; 18 to 74 years in Canada, Malaysia, New Zealand, South Africa, the Republic of Ireland, Türkiye and the United States; 20 to 74 years in Thailand; 21 to 74 years in Indonesia and Singapore; and 16 to 74 years in 20 other countries.

Each country's sample consists of around 1,000 individuals in each of Australia, Brazil, Canada, France, Germany, Great Britain, Italy, Japan, New Zealand, Spain, and the United States; and around 500 individuals in each of Argentina, Belgium, Chile, Colombia, Hungary, Indonesia, Ireland, Malaysia, Mexico, Peru, Poland, Romania, Singapore, South Africa, South Korea, Sweden, Thailand, the Netherlands and Türkiye.

Ipsos (2023) notes that the samples in Argentina, Australia, Belgium, Canada, France, Germany, Great Britain, Hungary, Italy, Japan, the Netherlands, New Zealand, Poland, South Korea, Spain, Sweden and the United States can be taken as representative of these countries' general adult population under the age of 75. The samples in Brazil, Chile, Colombia, Indonesia, Malaysia, Mexico, Peru, Romania, Singapore, South Africa, Thailand and Türkiye are more urban, more educated and/or more affluent than the general population. The survey results for these

56 For more information on research use of Crunchbase, see den Besten (2020).

markets should be seen as reflecting the views of the more "connected" segment of their population. The global country average is the simple (unweighted) average.

→ **WEF** (Elsner, Atkinson and Zahidi 2025), Executive Opinion Survey, (www.weforum.org/publications/global-risks-report-2025/)

The WEF survey was conducted from April to August 2024 and covered 11,000 respondents. The specific question covered in Appendix C of the report was "Which five risks are the most likely to pose the biggest threat to your country in the next two years?" There were 34 options across the following risk categories: economic, environmental, geopolitical, societal and technological. The risk for AI was specified as "Adverse outcomes of artificial intelligence technologies." For the detailed listing of all 34 risks, see Table C.1 in the WEF report (available online).

→ **World Bank Enterprise Survey** (www.enterprisesurveys.org/en/methodology)

The World Bank Enterprise surveys are conducted intermittently for countries among the membership. They cover most of the private sector and exclude agriculture, fishing, mining, public utilities, financial intermediaries, public administration, education, health and social work. Only firms that have at least one percent private ownership and five or more workers are surveyed. There is a standard questionnaire that covers 15 topics.

Sectors covered include manufacturing; construction; motor vehicle sales and repair; wholesale; retail; hotels and restaurants; storage, transportation and communications; and information technology. Notable exclusions include agriculture, fishing, mining, public utilities, financial intermediaries, public administration, education, health and social work.

→ **Digital Policy Alert** (https://digitalpolicyalert.org/activity-tracker?offset=0&limit=10&period=2020-01-01,2025-04-21)

DPA, an initiative of the Swiss-based St. Gallen Endowment for Prosperity Through Trade, is a public and independent repository of information on policy changes affecting the digital economy. Established in 2021, the team has documented thousands of policy changes covering more than a dozen policy areas from more than 50 jurisdictions. Data is freely available including via the online Activity Tracker tool, which has listings by country, policy area and targeted economic activity (listing 16,899 events concerning 9,379 policy or regulatory changes as of April 21, 2025). Data can be exported in Excel or CSV format. Various analytical studies have been compiled by the team and are also available on the site.

→ **OECD.AI Policy Observatory** (https://oecd.ai/en/dashboards/overview)

Via the observatory framework, the OECD tracks AI policy developments in 69 countries, representing a substantial portion of the global economy. Drawing on resources of the OECD secretariat, member states and a network of more than 250 AI experts from other partner and stakeholder groups, the OECD monitors national AI strategies and regulatory instruments. These can be downloaded by country in tabular format (CSV).

Table A.1: Each G7 Country's Top AI-Start-Up Investor in the Case Study Countries, Counts of Investment Engagements by Destination Country, as of Q1 2025

Investor Name	Headquarters	Brazil	Colombia	Egypt	Indonesia	Kenya	South Africa	Thailand	Tunisia	Vietnam	Nigeria	Total	Investment Style	Support Offerings
Google for Startups	United States	26	0	0	1	4	1	0	0	0	4	36	Early-stage accelerator program providing support to start-up ecosystems in emerging markets; favours scalable digital platforms with regional impact.	Offers workspace access, technical resources, Google product credits and ecosystem networking; focuses more on platform resources than direct financial capital.
Ventures Platform	Canada	0	0	0	0	0	0	0	0	0	3	3	Early-stage "discovery fund" for African start-ups with emphasis on mission-driven founders and capital-efficient business models.	Capital-focused investor with limited operational involvement; focuses primarily on financial backing for promising Nigerian ventures.
East Ventures	Japan	0	0	0	5	0	0	0	0	0	0	5	Sector-agnostic venture capital firm with strong Southeast Asian focus; has produced multiple unicorns with concentration on Indonesian market.	Primarily financial investor with regional expertise and connections; limited hands-on operational support documented.
SAIS Accelerator	Germany	0	0	0	0	1	0	0	2	0	1	4	Growth-focused initiative specifically targeting agricultural innovation in Africa; structured program with clear sector specialization.	Combines capital with agricultural expertise; offers non-equity technical assistance alongside investment in agri-tech ventures.
Startupbootcamp	United Kingdom	1	2	2	0	0	1	0	0	0	0	6	Industry-focused global accelerator network with structured programs; operates regionally with concentrated cohorts in specific markets.	Comprehensive accelerator model with formal mentorship program, networking opportunities and industry connections for portfolio companies.
Orange Ventures	France	0	0	0	0	0	0	0	0	0	2	2	Impact-oriented corporate venture arm with strategic alignment to Orange's telecom expertise; operates with standard VC financial objectives.	Provides management guidance and corporate strategic input; offers potential for business integration with Orange's ecosystem.
Lventure Group	Italy	1	0	0	0	0	0	0	0	0	0	1	Publicly listed holding company specializing in seed venture capital; focuses on digital technologies with AI specialization in the Italian market.	Primarily financial investor without significant documented operational support; focuses on early-stage digital innovations.

Source: www.crunchbase.com/discover/organization.companies; author's tabulations and investor database construction; Claude.ai (final table compilation assistance).

Note: The firm descriptions draw heavily on each firm's self-characterization and public information.

Table A.2: The Top AI-Start-Up Investor Based in Each Case Study Country, Counts of Investment Engagements by Destination Country, as of Q1 2025

Investor Name	Headquarters	Brazil	Colombia	Egypt	Indonesia	Kenya	Nigeria	South Africa	Thailand	Tunisia	Vietnam	Total	Investment Style	Support Offerings
Bossa Invest	Brazil	15	0	0	0	1	0	1	0	0	0	17	Early-stage seed investor with AI specialization; portfolio spans multiple sectors with domestic focus while opportunistically exploring African markets.	Provides hands-on management guidance and strategic direction; offers operational support to portfolio companies with limited technical assistance.
Latin Leap	Colombia	0	1	0	0	0	0	0	0	0	0	1	Venture Capital Studio focused on soft-landing purpose-driven tech companies in Latin America; emphasizes ecosystem development over pure returns.	Offers network access and regional connections; positions itself as a gateway for international companies entering the Colombian market.
Flat6Labs	Egypt	0	0	2	0	0	0	0	0	0	0	2	Leading MENA region seed accelerator with structured program; focuses on supporting early-stage Egyptian start-ups with regional growth potential.	Capital-focused investor with program-based support; offers standardized accelerator curriculum rather than customized assistance.
MDI Ventures	Indonesia	0	0	0	3	0	0	0	0	0	0	3	Multi-stage venture fund with unicorn track record; corporate venture arm of Telkom Indonesia with both strategic and financial objectives.	Primarily financial investor with limited operational support; leverages parent company's regional business connections for portfolio companies.
Catalyst Fund	Kenya	0	0	1	0	1	0	0	0	0	0	2	Impact-focused fintech accelerator targeting underserved populations; combines financial inclusion mission with market-based approach.	Provides network access to investors and partners; emphasizes ecosystem connections over direct technical or management support.
iNOVO	Nigeria	1	2	1	0	0	0	0	0	0	0	4	Accelerator program powered by UK-Nigeria Tech Hub partnership; focuses on early-stage start-ups across multiple sectors with regional outlook.	Offers primarily capital and program structure; limited ongoing support beyond initial acceleration phase.
Injini	South Africa	0	0	0	0	3	0	0	0	0	0	3	Africa's first EdTech incubator and seed investor; specialized focus on educational technology with pan-African investment strategy.	Capital focused with program-based support; offers standardized incubation rather than customized technical or management assistance.
Flat6Labs	Tunisia	0	0	4	0	0	0	0	0	1	0	5	Regional seed-stage VC firm operating across MENA; structured accelerator programs combined with seed funding for early-stage ventures.	Provides technical expertise and resources; offers standardized start-up support program with emphasis on technical development.
500 Startups Vietnam	Vietnam	0	0	0	0	0	0	0	0	0	2	2	Tech-focused seed investor affiliated with global 500 Startups network; combines local expertise with international investment approach.	Offers technical expertise and global connections; provides standardized accelerator support with technical resources for early-stage companies.

Source: www.crunchbase.com/discover/organization.companies; author's tabulations and investor database construction; Claude.ai (final table compilation assistance).

Note: The firm descriptions draw heavily on each firm's self-characterization and public information. Thailand had no local top five investors in sample AI start-ups.

Table A.3: The Overall Top 10 AI-Start-Up Investors Targeting the Case Study Countries, Counts of Investment Engagements by Destination Country, as of Q1 2025

Investor Name	Headquarters	Brazil	Colombia	Egypt	Indonesia	Kenya	South Africa	Thailand	Tunisia	Vietnam	Nigeria	Total	Investment Style	Support Offerings
Google for Startups	United States	26	0	0	1	4	1	0	0	0	4	36	Early-stage accelerator program that creates global connections for start-ups; specializes in software and digital platforms.	Offers mentorship, tech resources, Google product access and ecosystem networking opportunities but limited direct management support.
Bossa Invest	Brazil	15	0	0	0	1	1	0	0	0	0	17	Early-stage seed investor with strong domestic focus; industry-agnostic but with AI specialization.	Provides hands-on management guidance and active involvement in strategic decisions; limited technical assistance.
Canary	Brazil	12	0	0	0	0	0	0	0	0	0	12	First-check Latin American seed fund targeting innovative tech companies with scalable business models; strong domestic focus.	Capital-focused investor with limited operational involvement; offers network connections within Brazilian tech ecosystem.
Norte Ventures	Brazil	10	0	0	0	0	0	0	0	0	0	10	Pure-follower fund created and managed by entrepreneurs; focuses on early-stage Brazilian start-ups.	Primarily financial investor without significant value-added support; relies on lead investors for operational guidance.
Y Combinator	United States	5	0	1	3	0	0	0	0	0	1	10	A leading global start-up accelerator with standardized investment terms; batch-oriented program with strong alumni network.	Provides structured start-up curriculum, demo day exposure and founder network access; limited ongoing management support.
Techstars	United States	2	0	0	0	2	1	0	0	1	3	9	Global accelerator with regional programs organized by industry verticals; highly structured three-month program.	Comprehensive support including mentorship network, technical resources and business development assistance for early-stage growth.
Latitud Ventures	Brazil	8	0	0	0	0	0	0	0	0	0	8	Community-focused investment platform aimed at Latin American founders; combines capital with infrastructure.	Offers founder community, technical infrastructure and networking resources for early-stage companies.
Amazon Web Services	United States	5	0	1	0	0	0	0	0	1	0	7	Corporate investor prioritizing cloud adoption and technical ecosystem development; strategic investment approach.	Provides substantial technical support through cloud credits, architecture assistance and technology integration expertise.
Village Capital	United States	2	0	0	0	2	1	0	0	0	2	7	Impact-focused investor using peer-selection model; targets underserved markets and founders.	Combines capital with business curriculum, peer mentoring and investor connections for social impact ventures.
500 Global	United States	1	0	1	1	0	0	1	0	2	0	6	Early-stage global VC with regional funds; high-volume investment strategy across diverse geographies.	Limited operational support but offers global network access and follow-on funding potential; regional offices provide local expertise.
Startupbootcamp	United Kingdom	1	2	2	0	0	1	0	0	0	0	6	Industry-focused global accelerator network with structured programs; operates regionally with concentrated cohorts in specific markets.	Comprehensive accelerator model with formal mentorship program, networking opportunities and industry connections for portfolio companies.

Source: www.crunchbase.com/discover/organization.companies; author's tabulations and investor database construction; Claude.ai (final table compilation assistance).

Notes: The firm descriptions draw heavily on each firm's self-characterization and public information. The top 10 listing includes 11 companies due to a tie in the counts..

Table A.4: AI Policy Overview in Case Study Countries

	Brazil	Colombia
National AI Strategies and Agendas	Its national AI strategy (2021) has pillars for research, governance, workforce development and international cooperation. Current AI plan 2024–2028 proposes a National Centre for Algorithmic Transparency and Trustworthy AI. Comprehensive AI bill passed Senate in December 2024; lower house approval pending.	Established National Policy for Digital Transformation and AI in 2019 with significant government commitment to implementation. The policy is comprehensive with strategic pillars addressing technology adoption barriers, innovation conditions, human capital development and AI preparedness.
Access to AI Development Finance	Emerging venture capital ecosystem is concentrated in São Paulo, with international investors increasingly active. Some government grants available. International funding access may be impacted by diverging regulatory approaches between Brazil and major markets such as the United States, potentially complicating cross-border flows.	Government funding is available via its entrepreneurship agency including a five-year plan and budget allocation for AI; partnerships with international organizations are boosting this. C Emprende initiative provides support for AI start-ups; innovation centres in cities are also fostering a start-up ecosystem.
Emerging Regulatory Framework	Privacy legislation implemented in 2020 provides data protection foundation. Brazil's proposed AI regulation adopts a risk-based approach similar to the EU AI Act, requiring algorithmic impact assessments and human oversight for high-risk systems. The bill uniquely mandates compensation for copyright holders when their content is used to train AI systems. Risk of US regulatory clash.	Regulatory sandbox approach through the Superintendency of Industry and Commerce's (Colombia's national regulatory agency) innovation lab. Data protection regime is being established with emerging AI-specific ethical guidelines for AI deployment. Seeking to balance an enabling environment for innovation against need for responsible AI use.
AI Education, Training and Skills Development	An AI talent pipeline is developing at leading universities. National digital skills program aims to train 100,000 professionals in digital technologies. But there is a risk of talent flight abroad.	"Misión TIC 2022" program aims to train 100,000 programmers. University programs in AI developing with international academic partnerships.
International AI Cooperation	Active participation in OECD AI initiatives and bilateral agreements with European Union on AI development. Member of Global Partnership on AI. Signed the Bletchley Declaration on AI Safety. Increasing regulatory alignment with the EU model.	Active engagement with OECD AI Principles and partnerships with countries such as Canada and South Korea on AI development. Such cooperation is pursued to ensure that Colombia's AI stance is competitive.
Infrastructure Readiness	Uneven digital infrastructure with high connectivity in urban centres, some lag in rural areas. Cloud computing infrastructure developing rapidly. Data localization requirements mandate cloud service providers store local copies of government data in Brazil, potentially posing a challenge for international AI services.	Significant investment in digital infrastructure is under way with the national broadband plan, though rural connectivity remains challenging. Bridging the urban-rural digital divide is a priority area.
Implementation Challenges	Compliance challenges from uncertainty on enforcement mechanisms and the future regulatory authority's structure.	Implementation is affected by political transitions. Public sector inefficiencies and AI-hesitancy from SMEs are constraints.
Industry-Specific AI Applications	Strong focus on agricultural AI applications, financial services and natural resources in Brazil's economic priorities. Emerging focus on consumer protection in AI systems, with active enforcement.	Policy focus is on public services, health-care diagnostics and agricultural applications tailored to development priorities. Also, there is an AI role to improve rural education access and financial inclusion.
International Regulatory Divergence	Trump administration's new approach to AI regulation, with deregulation and heightened export controls, may pose risk to market access for Brazilian start-ups. Also, Brazil's alignment with EU-style regulation may increase operational costs for start-ups.	Colombia is working toward harmonization with international frameworks, particularly OECD principles, which could help mitigate regulatory divergence. US policy uncertainty poses a risk.

Table A.4: Case Study Country, AI Policy Overview (Continued)

	Egypt	Indonesia
National AI Strategies and Agendas	National AI strategy launched in 2021 focusing on capacity building, research, ethics and governance with ambition to become regional AI hub.	National AI strategy (Stranas KA) released in 2020 with five priority areas including health, bureaucratic reform, education, food security and mobility.
Access to AI Development Finance	The Information Technology Industry Development Agency provides grant support for innovation. International investors showing interest in Egyptian tech start-ups, though AI-specific funding remains limited.	VC activity growing in Jakarta. Government's 1,000 Start-up Movement is providing some support for early-stage companies including AI start-ups.
Emerging Regulatory Framework	Data Protection Law of 2020 provides foundation. National AI ethics charter under development to guide responsible AI deployment.	Personal data protection legislation recently implemented. AI ethics guidelines under development through Ministry of Research and Technology.
AI Education, Training and Skills Development	Specialized AI faculties established at universities and Egyptian AI centre for education. Partnership with international tech companies for workforce training.	Digital talent gap addressed through National Digital Talent Scholarship program. University partnerships with global tech companies developing AI curriculum.
International AI Cooperation	Regional partnerships within Arab League on AI governance. Growing collaboration with Chinese AI initiatives through BRI	ASEAN Digital Innovation Network participation. Bilateral AI cooperation with Singapore and Japan.
Infrastructure Readiness	Uneven digital infrastructure with significant investments in smart city technologies but challenges in broader connectivity.	Archipelagic geography creating digital infrastructure challenges. Palapa Ring project improving connectivity across islands.
Implementation Challenges	Bureaucratic processes slowing implementation. Brain drain of technical talent to Gulf states and Western countries.	Policy implementation varies significantly across different regions. Coordination between multiple government agencies remains challenging.
Industry-Specific AI Applications	Focus on Arabic natural language processing, health-care diagnostics and archaeological applications reflecting Egypt's specific context.	Marine resource management, disaster prediction systems and financial inclusion reflect Indonesia's specific geographic and development context.
International Regulatory Divergence	Egypt's approach to AI regulation shows potential divergence with Western frameworks through its growing collaboration with Chinese AI initiatives via BRI partnerships. This may create regulatory alignment challenges with Western markets as Egypt positions itself as a regional AI hub while balancing international partnerships.	Indonesia is working to align its regulatory approach with ASEAN frameworks while also developing partnerships with Singapore and Japan. However, its personal data protection framework may face challenges harmonizing with stricter regimes such as the EU General Data Protection Regulation, potentially affecting international data flows and AI applications that rely on cross-border data sharing.

Table A.4: Case Study Country, AI Policy Overview (Continued)

	Kenya	Nigeria
National AI Strategies and Agendas	National AI strategy emphasizes agriculture, health care, manufacturing and housing with a focus on leveraging Kenya's position as a regional tech hub. Consultation on the strategy finished in January 2025. The draft promotes implementation in manufacturing, financial sectors and other priority areas. "Silicon Savannah" tech hub aims to foster an innovation ecosystem.	National Digital Economy Policy and Strategy (2020–2030) has AI components. National Center for AI and Robotics established to coordinate development. In August 2024, the draft national AI strategy was published outlining guiding principles including ethics, inclusivity, transparency and risk management. Digital economy: 11.30 percent of GDP, Q3 2024, up 14 percent year-on-year.
Access to AI Development Finance	VC interest in Kenyan tech start-ups is growing. International donors provide AI-for-development funding. World Bank approved US$390 million in 2023 for acceleration project.	VC interest in Nigerian tech start-ups is ongoing, particularly financial technology (fintech). Some government funding through National Digital Innovation and Entrepreneurship Fund.
Emerging Regulatory Framework	The data protection law (2019) provides a foundation. The Task Force on Blockchain and AI is developing ethical guidelines. Kenya Bureau of Standards published the Draft Information Technology AI Code of Practice in April 2024 to guide responsible AI development. Kenya Robotics and AI Society Bill introduced in 2023 aims to create regulatory body for AI sector. Kenya Open Data Initiative facilitates AI development using government data.	Nigeria's Data Protection Regulation (2019) provides a foundation. National AI ethics guidelines are under development by the National Center for AI and Robotics (NCAIR). In December 2024, the House of Representatives passed a bill to establish the National Institute for Artificial Intelligence and Robotics Studies Regulation Commission, incorporating several proposals including the Control of Usage of AI Technology Bill.
AI Education, Training and Skills Development	AI academic programs are linking Strathmore and University of Nairobi. IBM Research Africa and Google AI Lab in Nairobi are building research capacity. Bilateral agreements with United States and other nations are focusing on digital upskilling and AI capacity building.	AI education initiatives at leading universities. Private sector training programs by companies such as Data Science Nigeria addressing formal education gaps. NCAIR developing capacity building programs.
International AI Cooperation	Participation in UN AI for Good initiatives. Partnership with the United Kingdom on responsible AI development through Digital Access Programme. Kenya joined Paris Charter on AI in February 2025 and participates in various international AI governance initiatives including the Seoul Declaration on AI Safety and the Bletchley Declaration.	Limited formal international AI partnerships, though engaged with pan-African AI initiatives. Nigeria has signed international AI governance frameworks including the Bletchley Declaration on AI Safety (2023), the Paris Charter on AI (2025) and the African Union's Continental AI Strategy and AI Governance Framework.
Infrastructure Readiness	Kenya enjoys strong mobile connectivity infrastructure. High mobile money penetration provides a foundation for AI fintech. By Q4 2024, mobile network connections reached US$66.1 million with 128.3 percent penetration rate, enabling a robust digital ecosystem.	Electricity infrastructure challenges affect digital deployment. Mobile connectivity growing; broadband access remains limited. Information and communications sector increasingly important: 142 million active internet subscribers by January 2025.
Implementation Challenges	Resource constraints for policy implementation. Urban-rural digital divide persists. Regulatory system for AI still in early stages.	Implementation affected by resource constraints and coordination challenges (federal/state). Early stage of AI regulation rollout.
Industry-Specific AI Applications	Mobile-based agricultural advisory services, financial inclusion technologies and wildlife conservation reflect economic priorities. AI implementation promoted in manufacturing and finance.	Financial inclusion technologies, health -are diagnostics and natural language processing for Nigeria's diverse linguistic landscape. Potential for growth in fintech, strong VC interest.
International Regulatory Divergence	Kenya balancing African Union Continental AI Strategy, cooperation with China on AI research, EU-Smart Africa cooperation and Western-led initiatives such as the Paris Charter.	Nigeria is navigating multiple international AI frameworks with different approaches, as well as the African Union and the African Continental Free Trade Area's Digital Trade Protocol.

Table A.4: Case Study Country, AI Policy Overview (Continued)

	South Africa	Thailand
National AI Strategies and Agendas	Presidential Commission on 4IR recommendations for AI adoption. National AI Policy Framework published in August 2024 focusing on inclusive economic growth, talent development, infrastructure, innovation and ethical AI.	AI Strategy (2022–2027) focuses on competitiveness and workforce development. Thailand 4.0 policy positions AI within broader digital transformation. The national AI strategy includes an action plan to advance AI development across sectors including agriculture, health care and finance, with a focus on building human resources and fostering innovation.
Access to AI Development Finance	Most developed venture capital ecosystem in Africa. Technology Innovation Agency providing government support for deep tech start-ups.	Thailand has a growing start-up ecosystem with increasing venture capital activity. Government support is available through Digital Economy Promotion Agency and innovation funds.
Emerging Regulatory Framework	Protection of Personal Information Act provides data protection foundation. AI ethics frameworks under development through Department of Science and Innovation. National Data and Cloud Policy adopted in March 2024 with provisions affecting AI development.	The Personal Data Protection Act provides a data protection foundation. AI ethical guidelines being developed through Digital Economy and Society Ministry. A draft Royal Decree on Business Operations Using AI Systems adopts a risk-based approach, categorizing AI systems into prohibited and high risk.
AI Education, Training and Skills Development	Academic AI programs at leading universities. The Council for Scientific and Industrial Research provides additional research capacity. National Skills Fund supports AI workforce development.	AI education programs are in place at leading universities. Digital workforce development is ongoing through Thailand Massive Open Online Course platform
International AI Cooperation	Active participation in BRICS cooperation on AI governance. Engagement with OECD AI principles despite non-member status and African Union's Continental AI Strategy endorsed in June 2024	Thailand participates in ASEAN's AI governance framework and has bilateral AI development partnerships with Japan and Singapore.
Infrastructure Readiness	Most advanced digital infrastructure in Sub-Saharan Africa, though significant urban-rural divide remains. Investment in telecommunication networks (approx. US$10.6bn) and data centres (approx. US$1.1bn) over the past five years. Chronic electricity supply challenges, including load shedding and power outages, create significant barriers for AI infrastructure reliability, increasing operational costs for AI start-ups and potentially limiting compute-intensive AI applications.	There is a strong digital infrastructure in urban centres, with the Thailand Digital Valley project expanding capacity. A national broadband network is under development. Thailand has also been working to improve electrical electricity grid reliability, which varies significantly between urban and rural areas; it is deploying smart grid technology and energy storage solutions.
Implementation Challenges	Economic inequality affecting equitable AI deployment. Policy implementation delayed by consultation processes.	Coordination challenges between multiple agencies involved in digital policy. Skills gap affecting implementation of advanced AI.
Industry-Specific AI Applications	Per South Africa's economic structure and social priorities: mining safety and efficiency, financial services and health-care diagnostics:.	Thailand's economic priorities for AI: medical tourism diagnostics, agricultural monitoring systems, tourism management
International Regulatory Divergence	Positioned between EU-style regulatory approaches and innovation-focused models. Group of 20 presidency for 2025 creates opportunity to shape global AI governance while balancing domestic development needs with international standards alignment.	Thailand's approach seeks to balance innovation with regulatory oversight through emerging frameworks such as AI sandboxes and testing centres; there are potential compliance challenges for global AI companies operating across different regulatory regimes.

Table A.4: Case Study Country, AI Policy Overview (Continued)

	Tunisia	Vietnam
National AI Strategies and Agendas	National AI strategy (2018) positions Tunisia as a regional AI hub with focus on building upon a strong engineering education system. Memorandum signed in 2022 between four ministries to outline the development and implementation of the national AI strategy.	National Strategy for AI Research, Development and Application through 2030 launched in 2021 with aim to become regional leader in AI. The government advancing its Digital Economy through the National Digital Transformation Program.
Access to AI Development Finance	Innovation support available through Tunisian Start-up Act framework. International donors providing additional support for innovation ecosystem.	Growing venture capital interest in Vietnamese tech start-ups. Government-innovation funding through National Technology Innovation Fund and targeted AI programs.
Emerging Regulatory Framework	Data protection law in place since 2004. Ministry of Technology developing AI-specific regulations with focus on ethics and human rights. National Authority for the Protection of Personal Data established, though with limited regulatory authority.	Cybersecurity law and data protection regulations provide a foundation. Ministry of Science and Technology developing AI governance framework. Ministry of Information and Communications published draft Law on Digital Technology Industry to regulate AI systems based on risk levels (July 2024).
AI Education, Training and Skills Development	A focus on developing a strong engineering education providing the foundation for AI skills. National AI capacity building program targeting 1,000 AI specialists for 2025.	AI education programs at leading universities. National emphasis on STEM education providing talent pipeline with government target of 50,000 AI specialists by 2030.
International AI Cooperation	Mediterranean AI cooperation through partnerships with European countries. Engagement with francophone AI research networks. Tunisia signed Council of Europe's Convention 108 for data protection in 2017.	Growing partnerships with Singapore and South Korea on AI development. Increasing engagement with Chinese AI initiatives.
Infrastructure Readiness	Relatively advanced digital infrastructure for the region, though investment needed for advanced computing capabilities.	Improving digital infrastructure and connectivity; high smartphone penetration. National program for digital transformation.
Implementation Challenges	Political transitions are affecting policy continuity. Economic challenges limiting domestic investment capacity.	Regulatory environment still developing to keep pace with technological adoption. Talent retention challenging with global demand for Vietnamese engineers.
Industry-Specific AI Applications	Textile industry optimization, olive oil production monitoring and archaeological research reflect Tunisia's economic and cultural context. AI applications enhancing Public Finance Management Information System to detect fraud and improve budget efficiencies.	Based on Vietnam's economic priorities and urbanization challenges: manufacturing optimization, aquaculture monitoring systems and urban traffic management reflecting.
International Regulatory Divergence	Tunisia's data protection framework shows alignment with EU standards through adoption of GDPR principles in draft legislation and signing of Convention 108, but implementation gaps and limited enforcement authority create regulatory uncertainty for international AI developers and investors.	Vietnam's emerging risk-based AI governance has unique features prohibiting systems that manipulate behaviour without user awareness or classify individuals based on sensitive inferences. The draft Law on Digital Technology Industry requires machine-readable labels for AI-generated content, employs sandboxes.

Sources: Basic information was extracted from https://oecd.ai/en/dashboards/overview, supplemented by data from Digital Policy Alert Activity Tracker online policy database; and https://globalailaw.com/colombia-ai-policy/; Buza, Jenzer and Bossard (2024); Buza and Scheiwiler (2024); Buza and Taha (2025a, 2025b); Deeg and Pierotic (2024); Giardini, Scheiwiler and Buza (2024); Lippoldt (2024); Filgueiras and Junquilho (2023); Martins (2025); Villasenor and Turner (2024); Carrillo et al. (2025); OECD (2024, chapter 2); Wadipalapa et al. (2024); República de Colombia (2024); https://menaobservatory.ai/en/regional/20; Élysée (2025). The author's compilation of this table was supported by Claude.ai.

Note: The Paris Charter is an accord among 10 nations establishing principles for openness, accountability and participation in AI governance (Élysée 2025).

Appendix 3: OECD Recommendation of the Council on Artificial Intelligence

The OECD principles on AI within the OECD's Recommendation of the Council on Artificial Intelligence[1] state that:

- AI should benefit people and the planet by driving inclusive growth, sustainable development and well-being.
- AI systems should be designed in a way that respects the rule of law, human rights, democratic values and diversity, and they should include appropriate safeguards — for example, enabling human intervention where necessary — to ensure a fair and just society.
- There should be transparency and responsible disclosure around AI systems to ensure that people understand when they are engaging with them and can challenge outcomes.
- AI systems must function in a robust, secure and safe way throughout their lifetimes, and potential risks should be continually assessed and managed.
- Organizations and individuals developing, deploying or operating AI systems should be held accountable for their proper functioning in line with the above principles.

The OECD recommends that governments:

- facilitate public and private investment in R&D to spur innovation in trustworthy AI;
- foster accessible AI ecosystems with digital infrastructure and technologies, and mechanisms to share data and knowledge;
- create a policy environment that will open the way to the deployment of trustworthy AI systems;
- equip people with the skills for AI, as well as support workers to ensure a fair transition; and
- cooperate across borders and sectors to share information, develop standards and work toward the responsible stewardship of AI

1 See OECD (2019). Also note that as of March 25, 2025, the OECD legal instruments online database reports that adherence to the recommendation now covers all 38 OECD member countries and the European Union, plus nine others: Argentina, Brazil, Egypt, Malta, Peru, Romania, Singapore, Ukraine and Uruguay.

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