The AI Maturity Matrix

Which Economies Are Ready for AI?

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Introduction

Views vary on how much AI is changing the world today, but one thing is clear: the technology is on course to shape the future of economic development. Business leaders expect large impacts on operations and value creation in the 3-to-10-year timeframe, and world-wide spending on artificial intelligence will more than double to $632 billion by 2028.[1] The long-term, expansive scale of this growth makes AI an economic priority in every region across the globe.

This growth also adds urgency to the questions that policymakers face about AI. Is a society able to build an AI-skilled workforce in key sectors? How will a government set up resilient, modern infrastructure? How does a nation spur enough investment and R&D to stay competitive?

BCG's new AI Maturity Matrix assesses 73 global economies to answer some of these key questions.[2] This matrix provides a broad view of global adoption: most economies are gradually adopting AI, but there is a small, influential group of AI pioneers that take their place as leaders. Their prize is economic advantage, but they are also poised to shape how humanity will interact with this powerfully disruptive technology.

By focusing on two pivotal aspects, this report offers a unique approach to viewing the global dynamics of AI adoption. First, we examine each economy's exposure to AI-driven disruptions. We define exposure as the potential for AI to impact a sector in an economy negatively or positively. We then assess each economy's readiness to harness AI's potential for growth and to mitigate potential risks. The resulting matrix brings together these factors to present six archetypes of AI economic development and potential. We offer recommendations tailored to the different groups to guide policymakers—and provide an interactive dashboard for a more detailed exploration of our analysis.

1. "AI Is Showing 'Very Positive' Signs of Eventually Boosting GDP and Productivity," Goldman Sachs website, May 13, 2024; "Worldwide Spending on Artificial Intelligence Forecast to Reach $632 Billion in 2028, According to a New IDC Spending Guide," IDC website, August 19, 2024.
2. Details of the selection process are available in the methodology section.

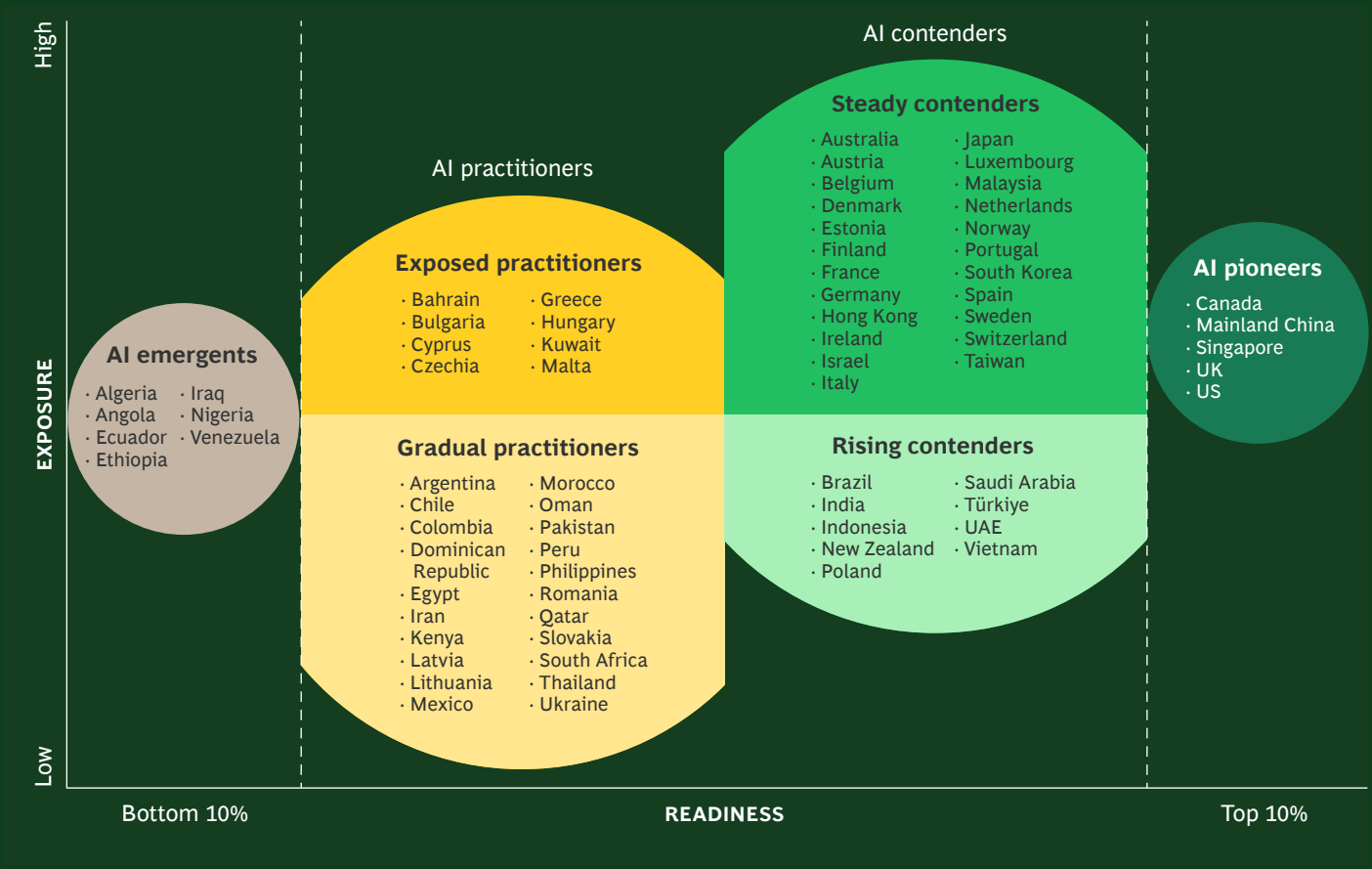
Key Findings

Out of 73 economies assessed, only five—Canada, Mainland China, Singapore, the UK, and the US—are categorized as AI pioneers. They have reached a high level of readiness by blending elements like investment and infrastructure, turning disruption into a competitive edge. They are in a unique position to guide the world forward in innovation, talent development, and AI regulation and ethics.

Several economies with high AI readiness are just behind the pace of AI pioneers. While this group of AI contenders includes established economies, it also features emerging ones like India, Saudi Arabia, and the UAE that are using policy and targeted investments to adopt AI on an advanced level. As these economies strengthen their innovation capabilities, they will grow more competitive and influential in the AI space.

Most economies in the study are not ready for AI disruption. More than 70% score below the halfway mark in categories like ecosystem participation, skills, and R&D. Policymakers must act now to adjust to a world of AI and boost resiliency, productivity, jobs, modernization, and competitiveness.

Distribution of Economies Across the Archetypes of AI Adoption



Sources: BCG Center for Public Economics; BCG analysis.

Note: Within each archetype, economies appear in alphabetical order.

The Relationship Between Exposure and Readiness

The future of AI is framed by high expectations. Yet adoption is already paying off today with efficiency gains and return on investment. Businesses that are scaling AI have boosted their revenues by 2.5 times compared to competitors. When scaled across an entire economy, such potential gains elevate AI to a pressing area for policymaking—both today and in the years ahead.

A key place for public sector leaders to start is to understand their economy's level of exposure to AI by sector. Exposure can lead to positive or negative impacts; for example, in terms of jobs, exposure could lead to displacement or create new employment opportunities throughout a sector. However, job displacement is not the only area of exposure. (See sidebar, "The Dimensions of AI Exposure.")

The Dimensions of AI Exposure

We find that exposure appears on many levels.

Productivity. Recent BCG research shows how AI's ability to automate tasks and optimize processes helps both workers and entire businesses. On one level, AI expands employee capabilities. BCG research found that in our organization, GenAI-supported consultants performed 20% better on data science tasks that fell outside their usual areas of expertise or training. One biopharma firm used GenAI to shorten its drug discovery process by 25%.[3] On a broader scale, several economies in this study are exposed to these potential shifts.

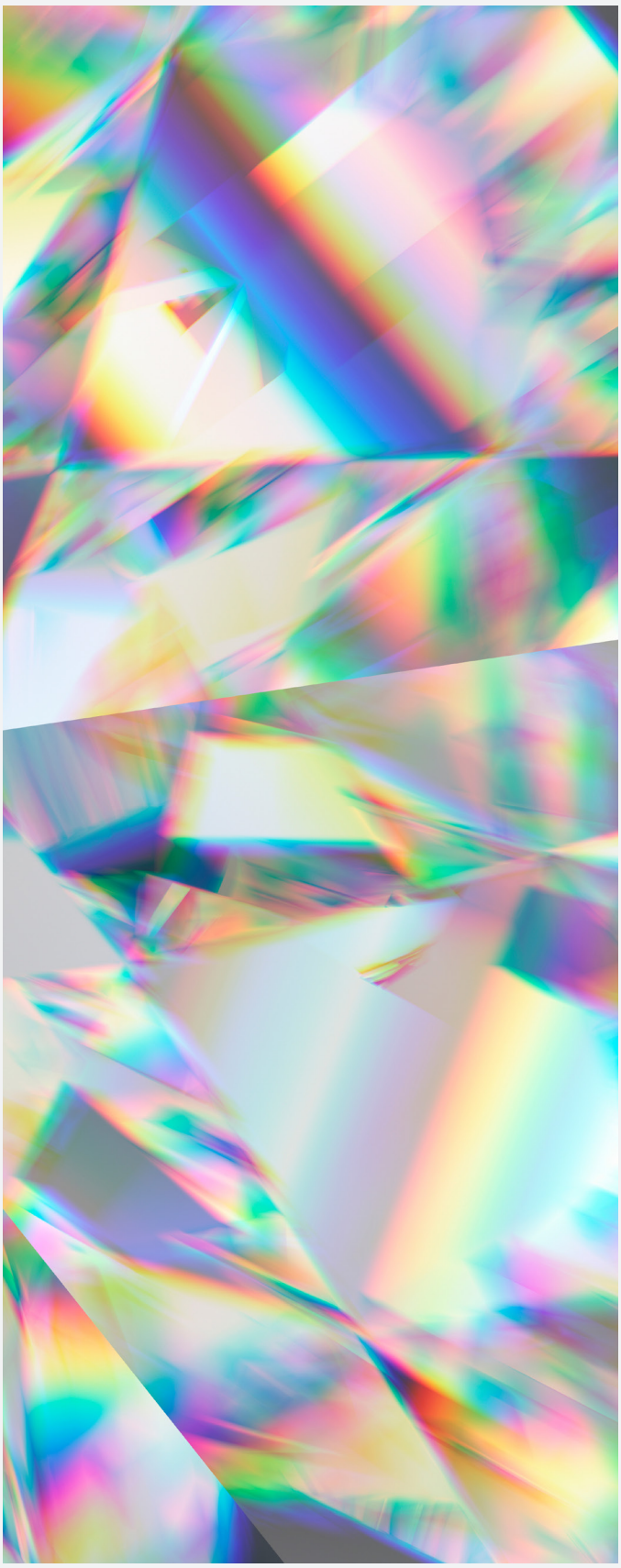
However, AI could also disrupt traditional workflows in sectors reliant on manual processes, such as manufacturing. Small businesses using classic methods will often compete with larger companies that deploy AI-driven automation. Such small businesses might struggle to match the productivity of optimized firms, impacting the sector's overall performance.

Uneven Sectoral Impact. Some sectors may lag in AI adoption, widening the gap between innovative industries and slower-moving ones. For instance, even as a tech-oriented sector like finance readily adopts AI, agriculture may be slower to fit the technology into workflows, failing to result in the overall productivity gains that could help boost a nation's economic performance.

Job Evolution. Most observers expect that AI will make some job categories obsolete. But new jobs that call for advanced technical skills, including AI specialists and AI ethics officers, will offset some of the displacement or create new employment opportunities in sectors that have long lagged in hiring.

In our methodology, which represents a snapshot of the current landscape, we gauge exposure scores through four major sources:

- A BCG **survey of business leaders** across sectors on their perceptions of exposure to AI
- The frequency and intensity of AI discussions during quarterly earnings calls of **publicly listed companies**
- The number of AI-related **job vacancies on LinkedIn**
- **GenAI-sourced insights** on disruption across various industries



3. BCG client experience.

Our study includes several findings about sector exposure to AI:

Six sectors are most exposed to AI-driven changes. These include information and communication; high-tech goods; retail; financial services; public services; and motor vehicles manufacturing, as shown in Exhibit 1.

ICT sectors (such as information and communication and high-tech goods) show high exposure because AI can greatly transform how work gets done in these areas. Yet these sectors are more than just hotbeds for automation. Such sectors also produce AI-related goods and services that other industries use or sell. In other words, economies with strong ICT sectors that produce AI technologies can see their GDPs grow.

For example, semiconductors created by an economy's high-tech goods sector—resulting in more powerful, efficient chips—are used in onboard auto electronics for autonomous driving, enhanced safety features, and improved fuel efficiency. Homegrown AI disrupts the economy's automotive sector, making it more innovative and competitive—and growth soars for both automakers and chip makers.

Exhibit 1 - Exposure to AI: Heatmap of Sectors

Sources: BCG Center for Public Economics; BCG analysis.

Note: For more details on sources, see the report's methodology section.

Economies with a high share of sectors that are most exposed to AI are among the world's most exposed to disruption. The three most exposed economies in our study are Luxembourg (with financial services making up almost 30% of GDP); Hong Kong (22% financial services and 22% business services); and Singapore (18% business services; 16% retail; 14% financial services).[4]

Economies with industry sectors that are less susceptible to AI disruption are less exposed. Such sectors include construction, agriculture, and furniture manufacturing; countries include Indonesia (13% agriculture and 11% construction of GDP); India (17% agriculture and 8% construction); and Ethiopia (36% agriculture). But these sectors can be fertile ground for economic transformation.

Along with boosting efficiency, AI can create positive spillover effects throughout an economy—especially a less exposed economy. AI can spur growth in adjacent sectors, helping a country shift the mix of sectors in its GDP. For example, AI-driven agricultural technology could help optimize supply chains with data on crop yields, weather, and market trends. The country's transportation sector would become more efficient and modernized.

Ultimately, exposure to the changes brought by AI is inherent in today's world. It's inevitable that AI will show up somewhere in an economy, even to a limited degree, so every country's economy has at least some exposure to the technology. Yet an economy with high exposure isn't necessarily in a bad spot—on the contrary, some of the most exposed economies are also the most prepared.

Readiness by Degrees

Assessing readiness helps an economy understand its strengths and weaknesses as it manages technology risk and makes the most of AI.

Readiness for AI refers to an economy's ability to effectively implement and integrate AI. This ability can be measured across six dimensions that make up BCG's ASPIRE index: Ambition; Skills; Policy and regulation; Investment; Research and innovation; and Ecosystem. (See Exhibit 2.)

This framework offers a comprehensive view on adoption levers for AI. Ambition assesses whether a country has a specific AI strategy and a government entity to oversee it, while Skills looks at the availability of AI specialists. (For more details, refer to the methodology at the end of the report.) ASPIRE is useful for assessing the full range of advanced, emerging, and developing economies, some of which are quite prepared for AI. It also showcases the imbalances that often form when an economy is highly advanced in some of these six areas and lacking development in others. (See Exhibit 3.)

Most economies must do more to prepare themselves adequately for AI disruption. The numbers are stark: Out of 73 economies assessed, only five—categorized as AI pioneers—have achieved a high level of readiness. More than 70% score below the halfway mark in categories like ecosystem participation, skills, and R&D.

Pioneers are out in front in skills, R&D, ecosystems, and investments. In skills, the US and Singapore stand out with robust AI talent pools, which are crucial for driving innovation. The US leads in investing, driven by its sophisticated capital markets and the abundance of AI unicorns. In the R&D race, Mainland China is leading in patents and AI academic papers.

Everywhere else, innovation and investment must catch up. The bulk of economies score below the average in R&D and investment, hindering their ability to foster startups or deploy homegrown solutions. Some countries that perform well in ecosystems, including Japan, Germany, and the UAE, have good telecommunications and AI infrastructure; they've benefited by accessing new technology from ecosystem partners. However, other economies score lower in innovation and ecosystem participation, leaving them with fewer options to access new solutions.

The ambition to engage AI is high throughout the world—but countries need more than ambition. Most economies, including upper-middle countries like the Dominican Republic and lower-middle-income countries like Kenya, have stated their national strategies or created national AI ministries and steering committees. Yet societies will only find positive outcomes if they move beyond planning and take proactive, concrete actions, such as forming test beds for R&D. And for many actors, it will take time before tangible results from AI emerge. Ambition must be paired with patience.

4. Sector share percentages are calculated from the total sum of all sectors, or GVA (gross value added), which we use as a proxy for GDP in the report. GDP equals GVA plus taxes minus any subsidies.

Exhibit 2 - Readiness for AI: ASPIRE Index

A	S	P	I	R	E
Ambition	**Skills**	**Policy and regulation**	**Investment**	**Research and innovation**	**Ecosystem**
· Existence of AI strategy · Existence of specialized AI government agency/ministry	· Concentration of AI-related specialists · Pool of AI-related specialists · Total public contributions in GitHub by top 1,000 users · Kaggle Grandmasters · Number of Python package downloads per 1,000 people	· Regulatory quality · Governance effectiveness · Governance of data · Economic freedom index · AI and democratic values index	· Value of AI unicorns · Mcap of IT-related and tech-related companies/GDP · Value of trade in ICT services (per capita) · Value of trade in ICT goods (per capita) · VC availability · Funding of AI companies · Computer software spending	· Research papers published on AI · AI-related patents · Top-ranked universities in data science and AI fields · Number of AI startups	· Fixed broadband internet traffic per capita · Electricity prices · Telecommunication infrastructure index · Average download speed · Online service index · Performance of economy-wide statistical systems

Sources: BCG Center for Public Economics; BCG analysis.

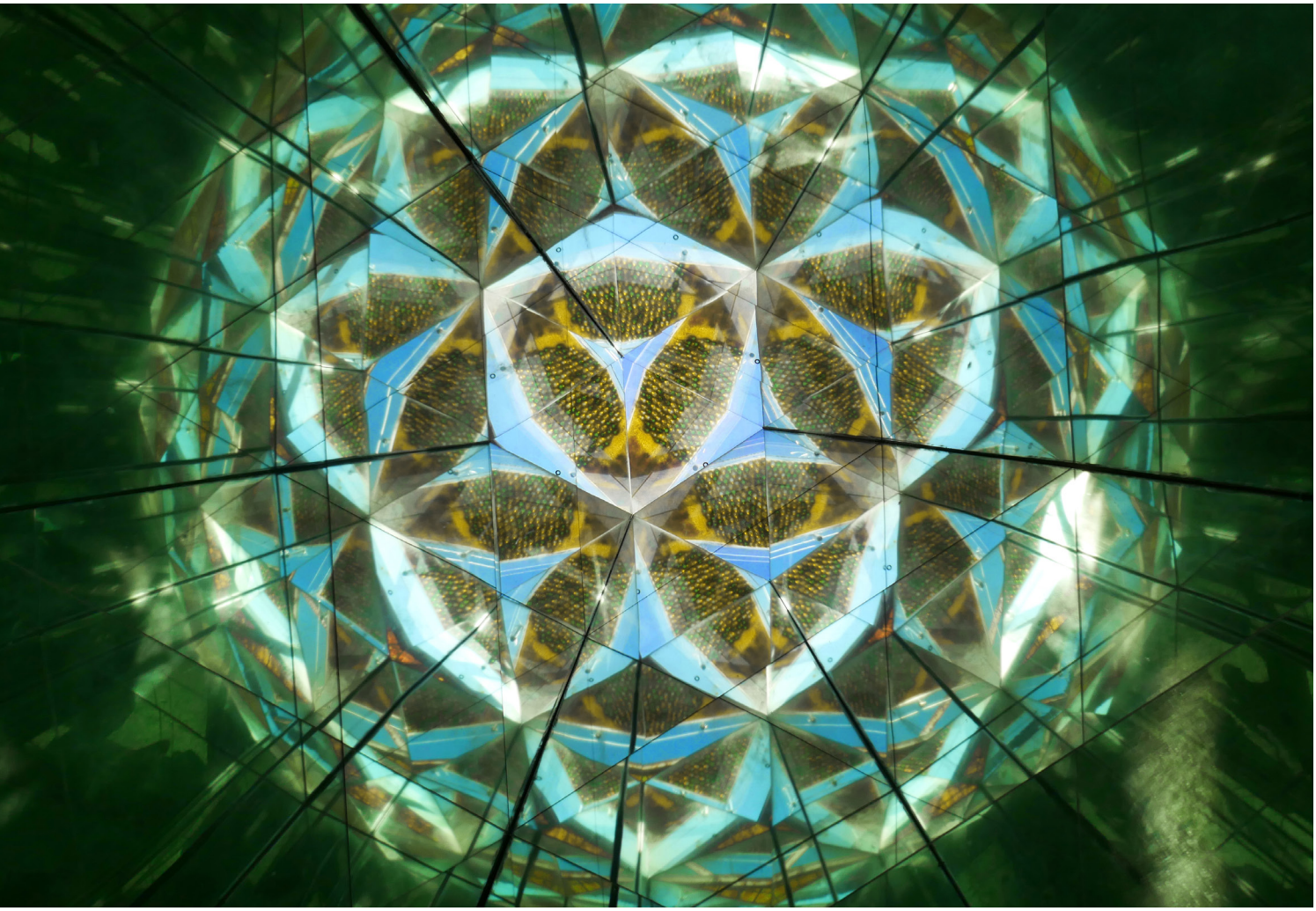
Exhibit 3 - Readiness for AI: Measuring Economies

	Economies	Total ASPIRE	Ambition	Skills	Policy and regulation	Investment	Research and innovation	Ecosystem
AI pioneers	Canada Mainland China Singapore United Kingdom United States	68 (0–100)	10 (0–10)	17 (0–25)	8 (0–10)	8 (0–15)	8 (0–15)	19 (0–25)
Top 25%	Australia, Finland, France, Germany, India, Ireland, Israel, Japan, Netherlands, South Korea, Spain, Sweden, Taiwan, UAE	58 (0–100)	10 (0–10)	14 (0–25)	8 (0–10)	6 (0–15)	4 (0–15)	16 (0–25)
Top 50%	Austria, Belgium, Brazil, Denmark, Estonia, Hong Kong, Indonesia, Italy, Luxembourg, Malaysia, New Zealand, Norway, Poland, Portugal, Saudi Arabia, Switzerland, Türkiye, Vietnam	47 (0–100)	9 (0–10)	11 (0–25)	7 (0–10)	4 (0–15)	2 (0–15)	14 (0–25)
Top 75%	Argentina, Chile, Colombia, Cyprus, Czechia, Egypt, Greece, Hungary, Latvia, Lithuania, Malta, Mexico, Pakistan, Peru, Qatar, Romania, South Africa, Thailand, Ukraine	38 (0–100)	10 (0–10)	8 (0–25)	6 (0–10)	2 (0–15)	1 (0–15)	11 (0–25)
Top 90%	Bahrain, Bulgaria, Dominican Republic, Iran, Kenya, Kuwait, Morocco, Oman, Philippines, Slovakia	31 (0–100)	7 (0–10)	7 (0–25)	5 (0–10)	2 (0–15)	1 (0–15)	9 (0–25)
AI emergents	Algeria, Angola, Ecuador, Ethiopia, Iraq, Nigeria, Venezuela	20 (0–100)	4 (0–10)	5 (0–25)	3 (0–10)	1 (0–15)	1 (0–15)	6 (0–25)

Minimum for dimension — Average — Maximum for dimension

Sources: BCG Center for Public Economics; BCG analysis.

Note: Economies positioned at the borderline between the top AI pioneers and the top 25% range are considered as part of the top 25% group. Due to rounding, the dimension scores may not sum up to the total score.



The Archetypes of AI Adoption

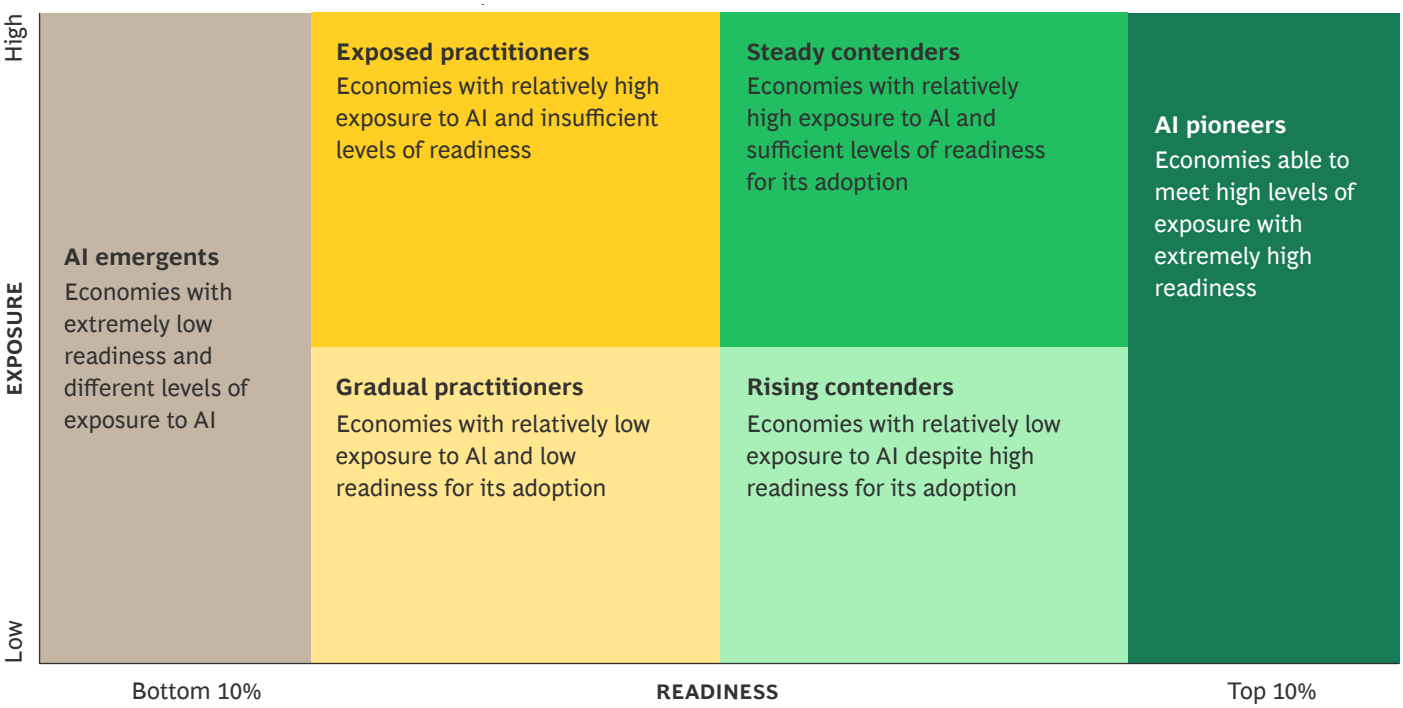
The combined analysis of AI exposure and readiness reveals six distinct adoption groups. (See Exhibit 4.)

AI Pioneers. These are the vanguards of AI adoption, building on strong infrastructures and engaging the technology in diverse sectors. All pioneers invest greatly in R&D, as shown by the many tech companies, startups, and unicorns in each of the five countries. Job sectors and education systems are full of highly skilled talent.

AI will make up progressively larger shares of the pioneers' GDPs over the next several years, as these actors supply more and more AI technologies, services, skills, and investment to the world. For example, the US exports software, platforms, and essential hardware for AI computing, as well as cloud-based AI services. Mainland China exports AI-powered consumer electronics, including autonomous driving platforms. This presence in the global tech supply chain allows pioneers to set standards and influence the entire AI landscape.

Pioneers will want to amplify their strategies to keep up their competitive edge. But as competitive as technology evolution can be, countries everywhere should come together to address the emerging ethical questions around AI. Pioneers can participate in these important ethical efforts in several ways. For one, they are authoring the world's first AI-specific regulatory codes, which will likely be models for regulation in other countries. These leaders should also convene nations throughout the world in discussions around AI ethics. (See sidebar, "How Singapore Became an AI Pioneer.")

Exhibit 4 - Definitions of the Archetypes



Sources: BCG Center for Public Economics; BCG analysis.

AI contenders have a relatively high level of AI readiness. These actors are enjoying efficient operations, lower costs, and other benefits of adoption. Going further and accelerating AI across sectors will strengthen their positions; if these economies expand their stakes in niche or specialized markets, they could compete with AI pioneers in such areas. We split AI contenders into two archetypes:

Steady Contenders. These economies have higher shares of highly exposed service sectors, such as financial services. However, their exposure is balanced by high readiness. This group is mainly dominated by high-income European economies like Germany, which has high exposure due to its large ICT and advanced manufacturing sectors. Germany's technological innovation and strong industrial base attract foreign trade and investment. Combined with its robust AI strategy, the country has established itself as a strong player in global tech markets.

A notable country here from outside Europe is Malaysia. The strong focus of the Malaysian government on AI is evident in its National AI Roadmap, tech hubs, and universities offering AI training. This shows how public sector leadership can help an emerging economy reach technology maturity and competitiveness on par with high-income economies.

Rising Contenders. These are mainly economies with lower AI exposure due to a relatively higher share of industrial and/or resource-based mix of sectors. This lower level of exposure is the main difference between rising contenders and steady contenders, but governments in this subgroup push for AI adoption with the same commitment as steady contenders.

An interesting case here is India, which is grouped with several high-income economies because of its high level of readiness.

- The Indian government has launched several AI-focused initiatives, such as the National AI Strategy and the creation of centers of excellence in AI, which aim to integrate AI into key sectors like agriculture and education.
- India is investing heavily in AI education and training programs to build a large, tech-skilled workforce.
- India has a rapidly growing startup ecosystem, particularly in AI-driven fintech, health care, e-commerce, edtech, and agritech.

Two other notable examples in this group are Saudi Arabia and Indonesia. Having focused on building AI foundations since launching the National AI Strategy in 2020, Saudi Arabia is now emerging as a global center of excellence in fields of national priority such as Arabic language AI, industrial and energy-related AI, as well as health care and education. Indonesia, through its National AI Strategy, is emphasizing education to meet the needs of its growing population and foster long-term economic growth.

How Singapore Became an AI Pioneer

Despite its small population, Singapore is a notable example of AI adoption due to a successful government strategy on AI—including talent, regulation, innovation, and investment. The country launched its National AI Strategy in 2019, with an updated version in 2023 (NAIS 2.0), focusing on integrating AI across multiple sectors. In February 2024, Singapore announced a five-year plan to invest more than US$743 million in AI to strengthen its position as a global business and innovation hub.

Skilling is a key piece of government efforts. The country's TechSkills Accelerator program has upskilled more than 230,000 people since 2016. The country's AI Apprenticeship Program (AIAP) trains Singaporean tech workers on real-world AI projects. Singapore has also moved to attract talent; the ONE Pass and Tech@SG programs make it easier for tech companies to hire international experts by simplifying the visa process.

Singapore has launched specific AI policies and frameworks. The Model AI Governance Framework guides companies in the ethical use of AI, ensuring transparency and accountability. The AI Verify Foundation is a global open-source community to support companies in deploying AI responsibly and maintaining stakeholder trust.

The country's five-year national R&D strategy—the Research, Innovation, and Enterprise (RIE) plan—funds innovation with US$19 billion, launched in 2020 across various sectors, including the digital economy. The AI Singapore program brings together the country's research institutions in an ecosystem of innovation.

Singapore also established the Center for Frontier AI Research (CFAR), which supports AI R&D related to national priorities.

AI pioneers are the vanguards of AI adoption, building on strong infrastructures and engaging the technology in diverse sectors.

AI practitioners make up a diverse group of countries at different levels of economic progress. We split AI practitioners into two archetypes:

Gradual Practitioners. These are typically upper-middle and lower-middle-income countries that are adopting AI at a moderate pace. Their economies include low-tech sectors such as tourism, textiles, wood manufacturing, and agriculture, where adopting AI is not yet imperative for companies. However, countries here can explore how AI brings efficiency or new revenue lines to these sectors. This will maintain competitiveness and foster growth as the technology becomes more relevant over time.

Long reliant on its energy resources, Qatar is using AI applications in the oil industry—its dominant sector—to optimize production and boost sustainability. This puts Qatar at the leading edge of innovation in the industry.

Exposed Practitioners. This group includes developing and developed economies vulnerable to AI disruption due to more high-exposure sectors and low readiness. Actors here will need to accelerate AI adoption and mitigate potential risks.

While these countries may currently have a gap between their AI exposure and readiness, they are well positioned to gain ground quickly with investments in infrastructure and education. It is a sound strategy to focus on niche and specialized markets.

- Malta is becoming a leader in AI regulation and blockchain, building a safe and attractive environment for tech companies.

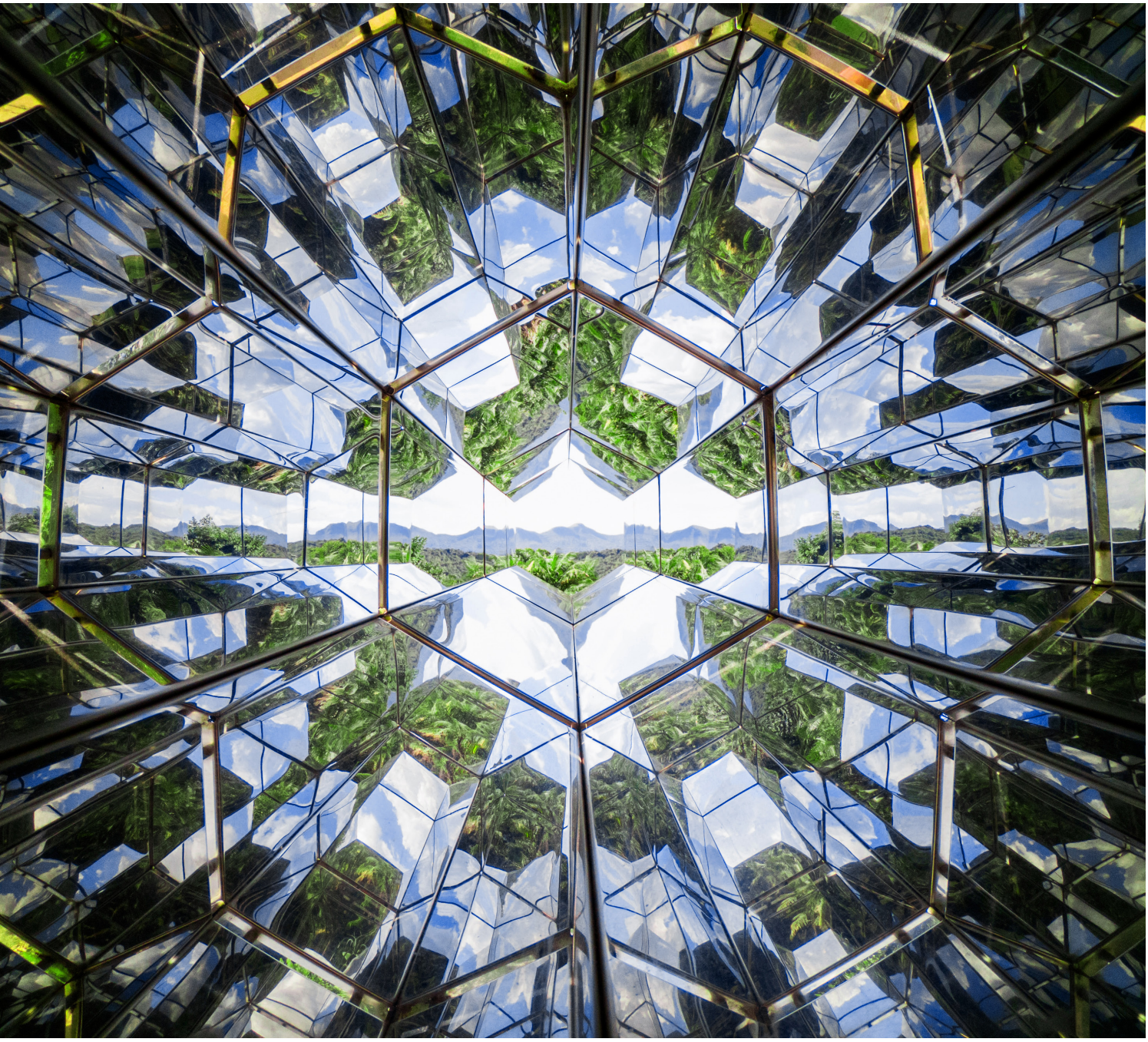
- Cyprus is using a skilled workforce to develop AI applications in tourism and financial services.

Others in the group can build on the lessons learned: Bahrain and Kuwait can leverage AI in the energy sector, especially to optimize oil production and manage supply chains. Greece and Bulgaria have strong academic traditions in engineering and mathematics, which can serve as a foundation for building AI expertise. By investing in AI-focused education and retraining programs, they can enhance their readiness.

AI Emergents. These economies are at the early stages of AI adoption. They need to build foundational strategies and infrastructure to reach the basic levels of AI integration and competitiveness.

These countries lack a national AI strategy or similar holistic approaches to AI. Skilled workers and investment are often scarce, as is activity related to research papers, patents, and startups. Nations in this archetype should look outward for international investment and sources of talent. They should also establish the basics of a government-driven technology strategy.

However, building competitiveness is not out of reach for countries in this group. Nigeria has leveraged foreign direct investment to lead Africa's fintech revolution. If the country focuses on developing AI talent within its growing population and adopts a more holistic approach—such as implementing a national AI strategy—Nigeria could build on its fintech momentum and become a key player in the continent's AI landscape.



Strategic Next Steps

What can governments do to position themselves for advantage in the AI-dominated future? We propose a set of initiatives for each archetype across three themes, as shown in Exhibit 5:

- **Enabling AI:** establishing the foundational elements for AI emergents
- **Accelerating AI:** customizing the ASPIRE levers for AI contenders and AI practitioners
- **Amplifying AI:** driving the global AI agenda for AI pioneers

Exhibit 5 - Recommendations on AI Adoption for Each Archetype

			Enabling AI **AI emergents**	Accelerating AI **AI contenders** **AI practitioners**	Amplifying AI **AI pioneers**
	A	**Ambition**	Enable AI adoption through a national AI strategy and a dedicated entity to oversee implementation.	Actively oversee AI adoption, with a focus on addressing lagging topics.	Support leading AI industry(ies) across the tech value chain.
	S	**Skills**	Provide basic AI training and digital programs to modernize the workforce.	Attract and retain AI talent pool (software developers, engineers) and focus on big data and advanced trainings in AI.	Enhance cross-cutting AI expertise and sector specialization among AI specialists.
	P	**Policy and regulation**	Enhance government effectiveness to build a foundation for AI.	Focus on AI ethics and flexible rules for experimentation.	Ensure centralized oversight and more flexible rules on open data.
	I	**Investment**	Boost investments in R&D, university programs, workshops, and engage the private sector.	Boost investment in high-performance computing and data centers, and attract FDI in AI.	Provide tailored support for national AI champions, unicorns, and startups.
	R	**Research and innovation**	Establish research centers in AI and work to ensure industry collaboration.	Create test beds for developers and startups.	Focus on applied research and ensure cross-industry sharing.
	E	**Ecosystem**	Ensure basic digital infrastructure (e.g., high-speed internet) to enable AI adoption.	Promote AI solutions and new technologies for strategic sectors.	Enhance cross-cutting AI application and support advanced tech infrastructure.

Sources: BCG Center for Public Economics; BCG analysis.

Note: FDI = foreign direct investment.

These recommendations offer a national-level approach to AI readiness. Akin to the economy-wide level, economic managers can apply this to drive sectoral transformation. For example, the framework can be used to drive change across value chains in agriculture, logistics, and robotics:

- **Ambition.** Set national ambition to boost agriculture productivity through AI-powered agritech solutions, robotics, and logistics.
- **Skills.** Reskill workers in both agriculture and logistics sectors to adopt AI-based technologies in the agriculture value chain.
- **Policy and regulation.** Develop policies that support open data access and interoperability between agritech data and supply chain systems.
- **Investment.** Invest in AI infrastructure such as Internet of Things-enabled supply chains and predictive analytics platforms to optimize logistics using agritech data; invest in R&D in scalable agricultural robotics.
- **Research and innovation.** Encourage cross-disciplinary research in AI and applications in agriculture, logistics and robotics, with an aim to share best practices.
- **Ecosystem.** Create platforms that facilitate data sharing between agritech companies and logistics firms; foster an ecosystem that connects robotics engineers, agritech experts, and industrial sectors to help transition agricultural robotics to adjacent fields.

With BCG's AI Maturity Matrix, we hope to offer policymakers a practical framework to navigate the evolving AI landscape and harness AI's potential to strengthen economies and enhance societal well-being.

Methodology

We performed a comprehensive regional analysis by dividing the world into five geographical areas: the Americas, Asia, the Middle East and Africa, Europe, and Oceania. Each area was further subdivided into relevant subregions. We then selected the top economies by real GDP 2023 to ensure at least 50% coverage of the subregion's total GDP.[5]

AI Exposure

Dimensions and Indicators

Sector-Level Indicators

The AI exposure score evaluates the sensitivity of sectors to AI and aggregates this factor at the economy-wide level based on GDP composition. Our sector classifications align with the Nomenclature of Economic Activities (NACE) used by the EU. AI exposure in each sector is assessed using the following sources.

BCG Global Innovation Survey

This annual survey captures insights from more than 1,000 executives across 19 sectors, focusing on how AI is perceived as a top-three challenge.

Quid Data Analysis

Quid data analysis assesses quarterly earnings calls and discussions from more than 5,000 publicly listed companies. The composite index developed from this data measures the frequency and depth of AI-related discussions within each sector, providing an indicator of AI's relevance in corporate strategy.

LinkedIn Job Postings

These postings measure AI exposure via sectoral AI job vacancies posted in LinkedIn as of June 2024, reflecting workforce shifts.

GenAI-Sourced Insights

AI models like ChatGPT, Gemini, and Perplexity AI were used to evaluate the susceptibility of different sectors to AI disruption. These models were informed by BCG's proprietary data related to the evaluation approach.

There are sometimes divergences between the aforementioned sources. For example, business leaders might identify AI as a challenge or opportunity before the job market fully responds, resulting in a delay before more AI-related vacancies show up throughout an industry. This time lag can create a gap between leadership perspectives and observable changes in the labor market.

Our analysis of economy-level AI exposure is based solely on a sectoral evaluation and the composition of the economy across those sectors. It does not consider additional factors such as overseas workers or business process outsourcing. As a result, certain economies, such as India, may appear to have lower exposure based on our approach. However, the large presence of Indian workers throughout the world in the information and communication sectors, as well as its business process outsourcing activities, factor into other aspects of AI maturity.

Economy-Wide Analysis

For economy-level analysis, GDP sector breakdowns were sourced from Oxford Economics, except for Ethiopia and the Dominican Republic, where national data was used to ensure comprehensive analysis.

Weighting System

The weighting system for our AI exposure score balances the reliability and significance of each data source:

- BCG Global Innovation Survey: 30%
- Quid data analysis: 30%
- LinkedIn job postings: 30%
- GenAI-sourced insights: 10%

Calculating Scores

Our process of normalization harmonized sector scores from the four data sources, standardizing them on a 0 to 100 scale using minimum-maximum scaling. After normalization, the scores were weighted and combined to create the final AI exposure score for each of the 26 sectors.

Normalization Across Data Sources

Each sector's score, as obtained from the four different sources, was normalized independently on a scale of 0 to 100. The normalization followed a minimum-maximum scaling method.

Sector-Level Aggregation

After normalization, the scores from each source were multiplied by their respective weights. This step allowed us to combine the normalized data into a single, weighted sector-level AI exposure score.

Economy-Level Aggregation

To assess an economy's AI exposure, normalized sector scores are multiplied by each sector's GDP contribution, reflecting AI exposure based on sector importance.

5. We used 2023 GDP data from the IMF's World Economic Outlook database, April 2024 edition.

AI Readiness

Dimensions and Indicators

To assess AI readiness, we selected 33 key indicators from a broad set of AI-related metrics, minimizing overlap and ensuring a comprehensive evaluation. These indicators are organized under the ASPIRE framework, covering six foundational elements:

- **A**mbition
- **S**kills
- **P**olicy and regulation
- **I**nvestment
- **R**esearch and innovation
- **E**cosystem

INDICATOR	DIMENSION	SOURCE(S)	DESCRIPTION	WEIGHT
Existence of AI strategy	Ambition	Government websites	100, if AI strategy exists; 0 if not	5.0%
Existence of specialized AI government agency/ ministry	Ambition	Government websites	100 if AI entity exists; 0 if not	5.0%
Concentration of AI-related specialists	Skills	LinkedIn; World Bank	Number of LinkedIn accounts with AI-filtered skills per 1,000 people	3.0%
Pool of AI-related specialists	Skills	LinkedIn	Number of LinkedIn accounts with AI-filtered skills	8.0%
Total public contributions in GitHub by top 1,000 users	Skills	GitHub	Public contributions from top 1,000 users per economy	3.0%
Kaggle Grandmasters	Skills	Kaggle	Number of grandmasters in AI competitions	8.0%
Number of Python package downloads per 1,000 people	Skills	Python.org community	Number of scikit-learn downloads per 1,000 people	3.0%
Regulatory quality	Policy and regulation	World Bank	Government ability to create sound policies	2.0%
Governance effectiveness	Policy and regulation	World Bank	Quality of public services and civil service	2.0%
Governance of data	Policy and regulation	Global Data Barometer	Quality of data management frameworks and security	2.0%
Economic freedom index	Policy and regulation	The Heritage Foundation	Composite index based on four pillars—rule of law, government size, regulatory efficiency, and open markets	2.0%
AI and democratic values index	Policy and regulation	Center for AI and Digital Policy	The extent of how well AI development aligns with democratic values	2.0%

INDICATOR	DIMENSION	SOURCE(S)	DESCRIPTION	WEIGHT
Value of AI unicorns	Investment	CB Insights, Global Unicorn Club with applied filter for "enterprise tech"	Total value of AI companies exceeding $1 billion valuation	3.0%
Mcap of IT-related and tech-related companies/GDP	Investment	S&P Capital IQ	Market capitalization of companies in the IT and tech sectors as a proportion of an economy's gross domestic product (GDP)	3.0%
Value of trade in ICT services (per capita)	Investment	UN Trade & Development (UNCTAD)	Value of information and communication technology services traded (imported and exported) per capita	1.5%
Value of trade in ICT goods (per capita)	Investment	UNCTAD	Value of ICT goods traded (imported and exported) per capita	1.5%
VC availability	Investment	Pitchbook	Total funding in $ billions provided by VCs	1.5%
Funding of AI companies	Investment	Pitchbook	Total funding in $ billions provided to AI companies	3.0%
Computer software spending	Investment	World Intellectual Property Organization	Economy-wide investment in software relative to its economic output	1.5%
Research papers published on AI	Research and innovation	SCImago Journal & Country Rank	Composite index: 0.5* papers + 0.25 h index + 0.25 citations	2.5%
AI-related patents	Research and innovation	WIPO	Number of patents filed that are specifically related to AI	5.0%
Top-ranked universities in data science and AI fields	Research and innovation	QS World University Rankings	Number of universities in an economy that are ranked among the top institutions in these fields by QS	2.5%
Number of AI startups	Research and innovation	*Artificial Intelligence Index Report 2024*, Stanford University Human-Centered Artificial Intelligence	Number of AI startups in an economy	5.0%
Number of data centers	Ecosystem	Cloudscene data	Number of different data centers in an economy	4.0%
Public cloud spend per employee	Ecosystem	Statista	Average expenditure on public cloud services per employee	4.0%
Adoption of emerging technologies by companies	Ecosystem	Network Readiness Index, Portulans Institute and the University of Oxford	Extent to which companies in an economy adopt and integrate emerging technologies	4.0%
Accessible supercomputer capacity by economy	Ecosystem	Manual assessment of accessibility based on top 500 supercomputers	Composite score that assesses the accessibility of processing cores of the top 500 supercomputers	1.0%

INDICATOR	DIMENSION	SOURCE(S)	DESCRIPTION	WEIGHT
Fixed broadband internet traffic per capita	Ecosystem	DataHub	Average data transferred per person	4.0%
Electricity prices	Ecosystem	World Population Review	Price of electricity per kilowatt-hour	1.0%
Telecommunication infrastructure index	Ecosystem	World Bank GovTech Maturity Index 2022	Availability and quality of telecom infrastructure	1.0%
Average download speed	Ecosystem	Speedtest Global Index (for fixed broadband)	Internet download speed in megabits per second	4.0%
Online service index	Ecosystem	United Nations	Government use of digital solutions	1.0%
Performance of economy-wide statistical systems	Ecosystem	World Bank	Quality of economy-wide statistical agencies	1.0%

Data Timespan

Our analysis primarily uses data from 2022 to 2024 to reflect current trends. We used earlier data for three areas: data governance and value of ICT trade. We analyzed data on AI startups from 2013 to 2023.

Weighting System

After selecting 33 key indicators for AI readiness, we assigned weights to each indicator and ASPIRE dimension based on internal expertise and consultations. Skills and ecosystem received the highest weights as key enablers of AI adoption, followed by investment and research and innovation.

INDICATOR	DIMENSION
Ambition	10%
Skills	25%
Policy and regulation	10%
Investment	15%
Research and innovation	15%
Ecosystem	25%

Each indicator was further weighted by significance (as shown in the indicator table above), with AI-related indicators prioritized. Statistical tests, including comparisons with equal weighting across dimensions and indicators and principal component analysis, were used to confirm weights.

Peer Group Imputation

To address missing data in the AI Readiness Index, countries were grouped by region and income level, with missing values based on peer group medians. No such input was done for South Africa, Iraq, or Ethiopia, or for specific indicators like AI-related patents, where values couldn't be reliably estimated. Imputation never exceeded 15%, ensuring at least 85% data completeness.

Calculating Scores

Normalization

We applied normalization techniques to ensure consistency across the indicators in the AI Readiness Index, transforming raw data into standardized scores from 0 to 100. Most indicators used traditional normalization. However, for indicators exhibiting significant skewness, we employed logarithmic normalization for better distribution handling.

Total Score

Each economy received a normalized score for each indicator. These scores were weighted and summed to produce the final AI Readiness Index score for each economy, ranging from 0 to 100.

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