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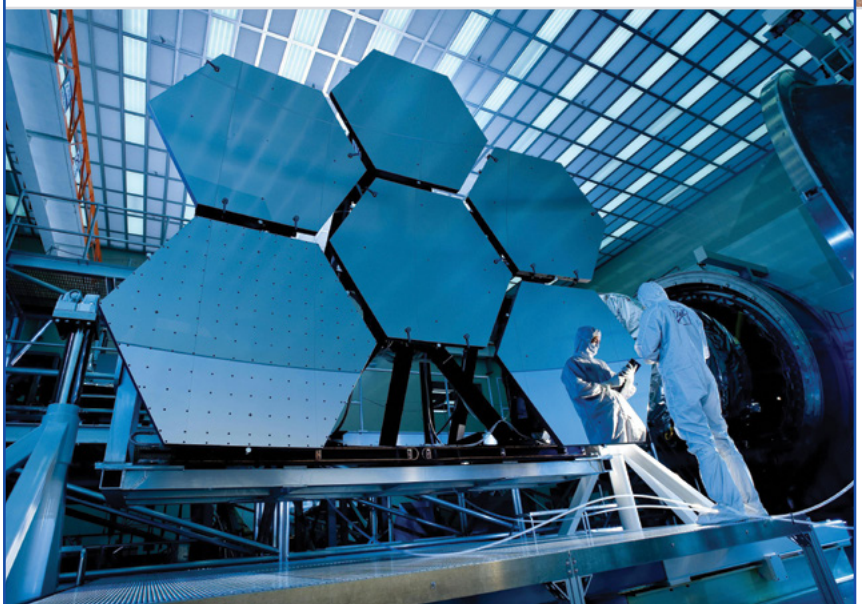
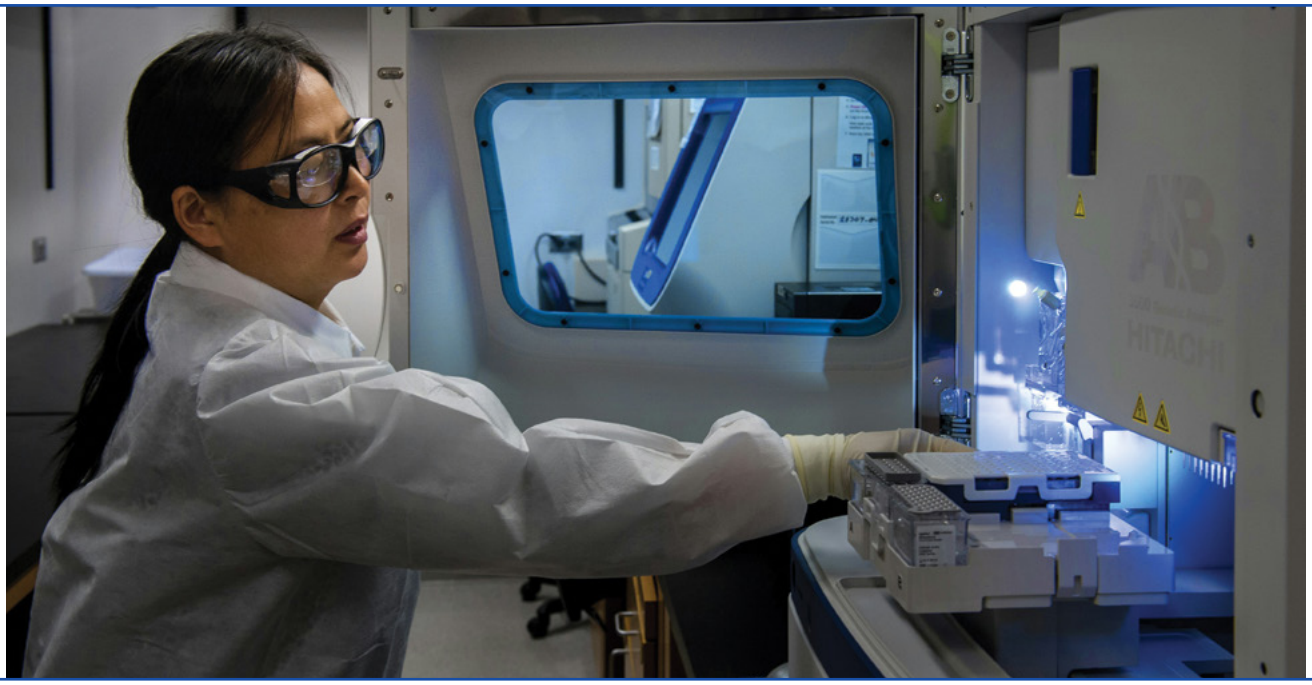
AI Pioneers:

How Countries are Seizing the AI Opportunity





The use of artificial intelligence (AI) can deliver extraordinary productivity and economic gains, revolutionizing the way business is conducted in almost every sector, and helping governments scale and streamline service delivery.

Economies that take meaningful steps to support the development and broad adoption of AI will attract massive investment and gain a considerable competitive edge.

This brief explores how countries worldwide are accelerating AI adoption by building across three key pillars: developing a skilled workforce, building robust AI infrastructure, and fostering a supportive regulatory environment. It provides actionable strategies for policymakers at every stage of their AI journey, illustrating best practices with real-world examples and offering benchmarks for effectively harnessing this transformative technology.

AI's Role in Economic Transformation

AI is far more than a chatbot. While generative AI has garnered significant public attention, it represents only a fraction of the broader economic transformation that AI is poised to catalyze. Indeed, McKinsey estimates that generative AI constitutes less than a third of AI's total economic potential, which they project could reach $17-25 trillion annually. Those potential gains will come through several channels:

- **Boosting labor productivity:** AI has the potential to boost labor productivity across a wide range of tasks, firms, and sectors, including in industries that have historically lagged behind in digitalization. Research has demonstrated AI's potential to enhance worker productivity in diverse roles from developers, call center employees, and telemarketers to financial analysts and radiologists. Goldman Sachs estimates that generative AI alone could boost U.S. labor productivity by 1.5 percentage points a year, roughly the same size increase that followed the emergence of prior general purpose technologies like the electric motor and personal computer.

- **Creating new and improved products and services:** By drastically reducing the cost and increasing the speed of prediction and pattern recognition, AI is enabling the development of entirely new products, services, and business models. Tech firms and startups are building AI-based solutions, from personalized education platforms to tools that accelerate drug discovery. At the same time, established firms are rapidly integrating AI into their operations. For example, retailers are using AI to forecast

demand with greater accuracy, while financial institutions are deploying AI to detect fraud in real time. According to the World Economic Forum's 2025 Future of Jobs Survey, 86% of employers expect AI and related technologies to significantly transform their business by 2030.

- **Improving public services:** AI offers governments and public sector organizations powerful tools to deliver services more efficiently and effectively. Be it addressing teacher shortages with personalized learning, enhancing medical diagnostics in resource-limited settings, improving disaster management, or streamlining tax collection, AI holds the promise of simultaneously reducing costs and expanding the reach of government services.

- **Creating new jobs and opportunities:** While concerns persist about AI potentially displacing workers, history demonstrates that major technological leaps tend to spur net employment growth by creating entirely new job categories – roles like data scientists, digital marketing specialists, and online content creators, largely non-existent just two decades ago, exemplify this. Early analysis of AI's impact suggests this pattern will continue, with the International Labour Organization indicating that generative AI is more likely to enhance and augment existing jobs across most sectors. Moreover, AI itself is proving to be a powerful tool for skill development, acting as a personalized learning aid, as seen with initiatives like Google's LearnLM.

- **Accelerating scientific progress:** AI is ushering in a new era of scientific discovery, exemplified by the recent Nobel Prize awarded to Google DeepMind researchers for breakthroughs in protein structure predictions. With the ability to process vast datasets, detect complex patterns, and generate novel hypotheses, AI is increasing the speed and accessibility of scientific research and helping scientists tackle challenges once thought unsolvable within our lifetimes. This is not a distant promise — AI is already transforming science and saving lives: diagnosing rare genetic diseases; detecting cancer earlier; accelerating vaccine development; and improving forecasts of extreme weather, wildfires, and floods.

Realizing these gains is not automatic or guaranteed; achieving them will require broad-based adoption and organizational adaptation. Our review of history suggests that countries who gain the most from innovation are not necessarily those who invent technologies first but those who deploy them best.

Strategies for Harnessing AI's Economic Potential

In 2023, Google published an AI Opportunity Agenda outlining steps governments, companies, and civil society can take in partnership to promote the adoption and accessibility of AI. Our subsequent AI Sprinters report explored how emerging markets at all stages of development can harness their unique strengths to leverage AI, even in the face of significant resource constraints. These reports highlighted three key areas where governments can work with the private sector to ensure the benefits of AI are shared widely:

- **Building AI Infrastructure:** The private sector, and in some cases governments, have a critical role to play in investing in R&D and AI infrastructure, including cloud infrastructure, compute capacity, and data, to ensure that researchers, technologists, and businesses have access to the tools needed to research, build, and deploy AI.

- **Developing AI Skills and Deploying AI Across the Economy:** For AI to lift economic growth, it must be adopted widely, not just by a few innovative firms but across all sectors of the economy. Achieving this requires equipping students and workers—whether in traditional industries, small businesses, or government—with foundational AI skills. It also demands organizational and process changes that help businesses integrate AI into day-to-day operations.

- **Spurring AI-Driven Innovation and Competitiveness:** To fully realize the potential of AI, policymakers must create an environment that fosters innovation and avoids overly restrictive measures that could stifle the development of beneficial tools and hinder adoption in critical sectors.

Attracting AI Investment

The demand for AI capabilities is growing around the world, and countries are increasingly competing for a share of this booming industry. Over the past five years, foreign direct investment (FDI) in AI infrastructure has surged globally, even as overall FDI has remained sluggish. In 2024, greenfield FDI into data centers reached $144 billion, about 9% of total global FDI, and these funds are increasingly being directed outside of traditional investment hubs.

Technology companies are making substantial investments across the globe to support their AI ambitions. For example, Google has announced plans to spend roughly $75 billion on capital investments in 2025. This significant outlay will focus on building new technical infrastructure to support the company's AI priorities, including data centers and subsea cables.

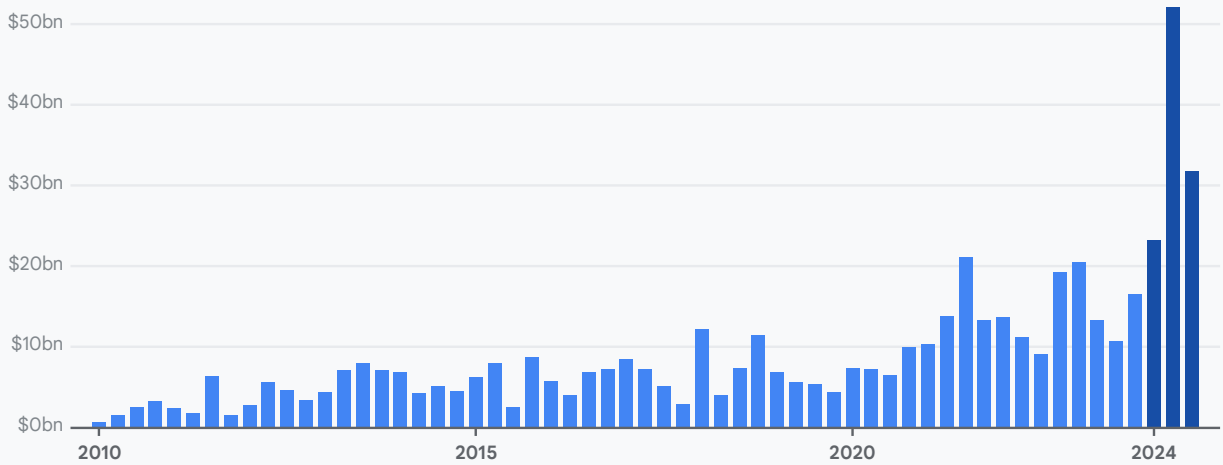
Investment in data centers can spark local economic development in areas like network infrastructure, specialized manufacturing (e.g., server hardware), and the expansion of energy capacity. Many data center projects also incorporate training programs to help local communities acquire the skills needed to work with advanced technologies.

For example, Google's most recent data center investments in Mexico, Uruguay, Thailand, South Africa, and Malaysia all involve skills training programs conducted in partnership with local education institutions and training centers.

The positive economic spillovers of data center investments can foster job creation, promote higher wages, and facilitate the transfer of technical knowledge. When supported by strong local policies and collaboration among key stakeholders, these developments can contribute to a thriving digital ecosystem and help drive long-term economic growth.

For countries that lack the capital or technical capacity needed to build data centers on their own, attracting foreign investment is vital. Generally, countries with a strong business climate and reliable institutions secure higher levels of FDI. This is especially true for AI infrastructure, which involves large, immovable assets. Companies in search of investment opportunities gravitate toward countries that enact policies that encourage innovation, offer clear and predictable tax policies, and provide reliable, cost-effective energy solutions — all crucial factors in ensuring a favorable environment for attracting sustainable AI investments.

Quarterly Greenfield Data Center Foreign Direct Investment
1Q 2010 – 3Q 2024



Source: fDi Markets

The Emergence of AI Pioneers

Today, more than 70 countries have adopted AI strategies and policies that outline different approaches to creating a vibrant AI ecosystem. This diverse range of strategies is a positive development, reflecting a broad recognition of how central AI is expected to become to economic growth and competitiveness. While there is no one-size-fits-all solution on AI, this brief highlights a series of best practices that can provide foundational guidance to any economy focused on AI development.

While many countries are still in the early stages of translating AI strategies into action, others are emerging as *AI Pioneers*, moving beyond policy blueprints to make tangible investments in AI development and adoption. Given the rapid pace at which AI is improving and the growing number of use cases, governments that act now to adopt and promote broad adoption of AI will be in a significantly better position to reap AI's economic potential, drive higher economic output, and attract inward investment.

This brief examines the steps that different economies are taking to harness AI's economic potential, and identifies a series of practices that economies can take to attract investment in and drive adoption of this critical technology.

I. Countries Leading in AI Infrastructure

Countries have historically excelled when they support technological change and harness it to improve living standards. This includes developing the infrastructure needed for technologies to be widely accessible. To support a thriving AI ecosystem, economies need to have in place not just the physical infrastructure of high-speed internet and data centers, which together form the backbone of AI development and deployment, but also complementary elements like accessible data systems, open data policies, and mechanisms for collaborative research.

Cloud First Policies. Cloud computing provides an essential foundation that businesses and governments need to fully harness the power of AI. Its vast computational resources, scalable data storage, and management and analysis capabilities are crucial for developing and deploying AI applications. In order to maximize the benefits of AI, governments and organizations should adopt a "cloud first policy" and prioritize cloud-based IT infrastructure and services over on-premise ones.

- Thailand has a strategic partnership in which Google Cloud will contribute technology and policy expertise to support Thailand's Go Cloud First policy direction. This partnership aims to modernize Thailand's government services and public sector delivery through AI technologies, beginning with public transportation, e-government services, and big data usage.
- The UK government introduced a Cloud First policy in 2013 for all technology decisions. Public sector organizations that do not deploy in Public Cloud need to substantiate the decisions based on business case and value for money behind their choice.
- The Abu Dhabi Government Digital Strategy 2025-2027 proposes a fully AI-powered governance model with the latest technologies across government operations, including cloud computing and automation.

Attracting investment in new data centers and cloud regions. McKinsey estimates that global demand for data center capacity will more than triple by 2030, with most of this demand driven by AI. This surge has prompted many governments to implement policies that encourage investment in this critical infrastructure

- Malaysia established the New Industrial Master Plan and the National AI Office, two strategic initiatives that aim to develop Malaysia's digital economy by attracting high value digital investments and accelerate AI adoption. These initiatives have helped the country attract major AI infrastructure investments including from Google, which recently announced a $2 billion data center and cloud region in the country. That investment, along with a similar investment in Thailand, is expected to contribute more than $7 billion in GDP to these economies by 2030.

- Mexico offers tax exemptions and renewable energy incentives to attract investors, with 166 data centers already operating and 73 more expected by 2029. In 2024, Google launched its Querétaro Cloud Region—its third in Latin America—providing low-latency access to Google Cloud Platform and simplifying regulatory compliance for businesses expanding in Mexico and beyond. Analysts project it will boost Mexico's GDP by $11 billion by 2030.

- Saudi Arabia aims to attract significant investment in data centers through initiatives like the US$100 billion Project Transcendence. The Saudi Data Centre Fund 1 also aims to attract $20 billion in investment by 2030 for the construction of hyperscale data centers.

- Australia is working to streamline the planning and approval processes for data center development at the federal and state level. Significant investments from major international players like Google (Digital Future Initiative), AWS, and Microsoft in AI computing and hyperscale cloud infrastructure demonstrate the attractiveness of the Australian market.

Partnerships on subsea and terrestrial cables. Subsea and terrestrial cables are the backbone of the modern Internet, and are essential to the growth and resilience of modern economies.

- Through supportive actions and partnerships, Google has recently announced a number of significant cables through the Pacific Connect initiative, which creates new US-APAC connectivity.

- Google's Africa Connect initiative now includes both Umoja, the first ever fiber optic route to directly connect Africa with Australia and Equiano, our private subsea cable that connects Africa with Europe.

Energy solutions. AI infrastructure requires significant amounts of power for training and operation, so it is important for governments and industry to work together to unlock electricity infrastructure capacity, which can advance economic growth and competitiveness while enabling achievement of decarbonization goals.

- Regional, transparent, and competitive wholesale electricity markets like those that exist in Chile can help reduce costs, increase reliability, and enable interconnection of new clean energy resources in these economies. Markets like Japan and countries in Southeast Asia can replicate these models to unlock growth. Further, investing in development of new transmission in these and other markets can unlock access to growth.

- Singapore, which hosts over 70 data centers, has pioneered a Green Data Center Roadmap to address both the growing demand for data centers and the environmental challenges that come with them.

- Singapore's electricity market has been progressively liberalised and restructured- creating competitive wholesale and retail markets. Competition has led to more efficient generation technologies, and consumers are also able to enjoy competitive prices and a range of retail options. These market settings have positioned Singapore to begin importing carbon free energy from its ASEAN neighbors in the near future.

- The European Union's Electricity Market Design, built on the principles of an integrated internal energy market, focuses on incentivizing investments in clean energy while delivering on energy reliability and affordability. The recently announced EU Clean Industrial Deal and the Affordable Energy Action Plan introduce structural reforms that can further support these objectives.

Fostering secure and resilient AI infrastructure. Governments and businesses have a responsibility to work together to safeguard AI systems from cyberattacks, and to ensure that those who protect and defend critical infrastructure have best-in-class AI tools to help carry out their mission.

- Singapore, Japan and Australia have taken the lead to establish partnerships between AI companies, security experts, and governments to combat threats and improve security globally, including through initiatives like the Coalition for Secure AI.

- The UAE government launched the National Cloud Security Policy in 2023 to set clear principles for the practice and delivery of secure cloud services and addressing the challenges in the cloud services landscape.

II. Economies Leading on AI Skilling and AI Deployment

Building an AI-ready workforce calls for a collaborative, society-wide effort involving government, the private sector, and educational institutions aimed at building three levels of AI fluency: (1) ensuring that all workers and students have fundamental AI skills; (2) helping governments, traditional industries, and small businesses use and adapt AI tools at work; and (3) building deep technical expertise to develop AI technology and shape how it evolves. Countries have taken several major steps to meet these needs over the past year:

Driving government adoption of AI. One of the most important steps that governments can take to spur AI adoption is by setting a positive example on AI skilling and adoption by ensuring that all public sector workers have the skills they need on AI, and deploying AI across a wide variety of public sector use cases.

- Singapore has been proactive in integrating AI into the public sector across multiple agencies and use cases, including using it to monitor disturbances in its urban rail systems and support job searches and matching

- Saudi Data & AI Authority's (SDAIA) Open Data Strategy looks to make non-sensitive government data accessible, particularly for SMBs and AI startups. The government's Open Data Portal aggregates datasets from over 400 government data-sharing services, enabling predictive analytics and automating workflows, especially in healthcare, logistics, and financial services.

- The UK government is pursuing a "Scan, Pilot, Scale" approach to AI adoption in the public sector, appointing AI leads, rapidly developing prototypes, and scaling successful pilots for use across government services. For example, the National Health Service (NHS) is leveraging AI tools for predictive analytics in patient care and resource planning.

Integrating AI into primary education. Many governments have created guidelines for school systems to use AI and build AI literacy and critical thinking on AI, while scaling up personalized learning initiatives.

- In 2023, Australian Education Ministers approved the Australian Framework for Generative AI in Schools that provides guidance on understanding, using, and responding to generative AI in school-based education.
- Korea has combined traditional elementary and middle school textbooks with intelligent tutoring systems, conversational AI, and speech recognition.
- Ireland's Adapt, a research program supported by the Irish government, has partnered with Google to lead the AI Literacy in the Classroom program to boost AI literacy among secondary school teachers.

Incorporating AI curriculum at universities. To meet the growing demand for AI expertise, universities worldwide are expanding AI education through the development of specialized curricula, frequently in partnership with the private sector.

- The UAE has created the Mohamed bin Zayed University of Artificial Intelligence (MBZUAI) as the world's first graduate-level, research-based AI university.
- Germany is building 150 new university labs dedicated to AI research, expanding data centers, and making complex data public data sets for AI experimentation more accessible.
- The AI Institute of the South African Department of Communications and Digital Technologies promotes the uptake of AI and the development of local technology solutions, including through academic institutions that will serve as Centers of Excellence and hubs for the application of AI within each sector of the economy.

Developing certified credentials for AI skills. As the pace of technological change accelerates, it will become increasingly important for people to gain skills quickly and have those skills recognized through credentials.

- Through the Career Certificates program, Google is working globally to boost on-demand training for in-demand tech skills, including working with governments and more than 550 universities across Latin America to offer a continuously updated portfolio of learning resources to ensure students are ready to seize the opportunities created by new technologies.
- The Korean government has promoted lifelong digital learning and workforce AI transformation, launching in 2024 the "AI-Digital (AID) 30+" program for 660,000 people of 30 and older.

Preparing SMEs to use AI. Governments are setting up platforms and programs to enable SMEs to test AI use cases and build AI talent.

- In the Netherlands, the Dutch AI Coalition (NL AIC) provides AI development, education, and training for students and employees working in innovative SMEs and semi-public organizations, reportedly doubling the number of SMEs that develop or adapt AI into their work.
- Chile's national Ruta Digital program provides AI-skilling courses to smaller businesses.
- In Singapore, the AI Makerspace platform provides access to resources for AI experimentation such as white labeled AI solutions, curated datasets, and supercomputing resources.
- In Korea, a public program called "Value-buy" provides information and education, and expands distribution channels to online platforms for SMEs interested in adopting digital and AI tools.
- Australia has committed $12 million to incentivize AI practitioners to engage with regional businesses to develop AI solutions for regional problems and established AI Adopt Centres that offer SMEs low-interest loans and grants to support AI-driven transformation.

III. Economies Leading on Policy Frameworks to Spur Innovation and Competitiveness

Developing a supportive policy environment is one of the most important steps that governments can take to drive innovation and investment around AI. The broader goal of governments should be to drive responsible innovation; mitigate risks; build public confidence in AI technology; and enable economies to fully harness the economic, scientific, and societal benefits of AI. At the same time, policymakers should guard against taking actions that risk stifling innovation by creating barriers to entry for startups, slowing down research and development, and ultimately hindering the potential for AI to address critical challenges in areas like healthcare and climate change.

Risk-based approaches to AI. Many jurisdictions are taking a risk-based approach, recognizing that not all AI uses pose the same risks, and that AI policies should be calibrated to the level of risk that specific AI applications pose, as well as the opportunity costs of not using AI.

- For example, the US, UK, Singapore, and Japan have pioneered smart AI policy approaches that address risks while maximizing opportunity, including through the US NIST Risk Management Framework, the UK's 'Pro-innovation approach to AI regulation', Singapore's Model AI Governance Framework, and Japan's AI Governance Guidelines.

- By comparison, other economies, like the EU, have articulated nominally risk-based frameworks but then deviated from that approach in certain ways, such as by broadly regulating AI at the model level. There is a risk that overbroad or misaligned regulation could hinder the development and deployment of beneficial AI systems while doing little to benefit AI customers and end users – with some companies recently delaying product launches in the EU due to regulatory uncertainty.

Codes of conduct and guidelines. A growing number of economies have published codes of conduct and principles and standards to help promote responsible AI use in supply chains and commercial ecosystems. Such codes provide guidance to AI developers while remaining flexible as the technology continues to evolve quickly.

- Singapore has created a new Model Governance Framework for Generative AI that provides practical suggestions for model developers and policymakers to govern AI systems, while Singapore's Infocomm Media Development Authority (IMDA) has developed an AI Verify tool that enables businesses to review their conformity with emerging AI governance principles. Japan has played a leading role in driving action on AI safety through development of the G7 Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems.

Fair use and text & data mining (TDM) exceptions: Several economies, including the US, Israel, Japan, Singapore, and the EU have recognized the importance of copyright laws that allow for researchers and innovators to use copyright-protected material under certain circumstances – commonly referred to as limitations and exceptions – without having to seek permission from the copyright holder.

- Fair use in the United States and Israel is a flexible legal standard that appropriately balances the interests of rights holders and promotes innovation by enabling copyrighted works to be used for transformative purposes.

- Japan's "non-enjoyment" statute recognizes that it must be permissible to use a work when the person's purpose is not to personally enjoy the work, but simply for use in data analysis.

- Singapore's Copyright Act similarly recognizes that copies made in the course of computational data analysis are permitted.

- The EU's Copyright Directive (2019) adopted provisions on TDM for both research and commercial uses, while at the same time enabling right holders such as publishers to "opt-out" via machine-readable means.

- The UK government is exploring copyright reforms to support AI model training, with a focus on expanding the existing TDM exception to bolster UK's competitiveness in AI.

Competitiveness Assessments. Many governments are actively evaluating whether their regulatory frameworks are calibrated to harness opportunity and investment related to AI.

- The recent European Commission-sponsored Draghi Report underscore the detrimental impact of innovation-stifling policies on economic growth and competitiveness. The Report recommends that "a fixed period of at least six months should be devoted to systematically assessing and stress-testing all existing regulation by sector of economic activity."

- Many nations utilize regulatory impact assessments, frequently overseen by dedicated government bodies like Australia's Office of Impact Analysis and the US's Office of Information and Regulatory Affairs.

- Governments can readily adopt the OECD's 2020 principles for regulatory impact assessment.

AI sandboxes. AI regulatory sandboxes provide controlled environments for companies and researchers to experiment with new AI technologies and test compliance with AI regulations, learn in real-time, and refine both AI applications and policies.

- Singapore and Korea have already proposed AI regulatory sandboxes to enable businesses to experiment with new products and services and regulators to consider different regulatory frameworks. Governments can also catalyze AI innovation through secure partnerships, incentives, and safe harbors for companies to develop and test programs for AI harms and explore remedies.

- The EU has called for EU Members to establish "at least one AI regulatory sandbox at the national level, which shall be operational by 2 August 2026." These Sandboxes are intended to provide for a controlled environment that fosters innovation and facilitates the development, training, testing and validation of innovative AI systems for a limited time before they are placed on the market or put into service, which may include testing in real-world conditions.

- In 2024, the Spanish government launched its AI Regulatory Sandbox – the first since the EU AI Act entered into force, with the aim of assisting SMEs and startups in testing compliance with high-risk AI system obligations under the EU AI Act, prior to its implementation.

Conclusion: Driving Investment in AI Through Smart Approaches to Infrastructure, Workforce, and Policy

AI has already begun to support inclusive economic growth and transform industries across the globe.

The policy brief has examined a series of steps that governments can take – and have taken – to support AI infrastructure, workforce preparedness, and innovation and adoption.

- To reap the full benefits of AI innovation, governments should create a supportive environment for public and private-sector investment in AI infrastructure, including cloud infrastructure, subsea cables, compute capacity, and data.
- These investments in AI infrastructure should be paired with smart public-private approaches to build the workforce of the future, and initiatives to deploy AI in the public sector and across traditional industries and small businesses.
- Finally, governments should ensure that their policy frameworks help spur innovation and AI-driven competitiveness, rather than inhibiting these goals.

Governments that excel in these three areas will be the most successful in attracting AI investment. By cultivating an ecosystem where businesses can confidently invest, innovate, and partner, these governments can catalyze the rapid development and adoption of AI. Ultimately, these efforts will determine which societies derive the most benefit from this transformational technology.

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