APAC Communications

A Guide

February 15, 2024

Contents

Figures

List of Tables

Letter of Instruction

The purpose of this Communications Guide is to provide a single source of opinion to assist you with media and government interactions. The Guide will be updated quarterly, or as a material need arises.

When interacting with Media and Government you should use your own voice, but demonstrate fidelity to the opinions, facts, policy positions, and themes provided here. Regardless of who is speaking, IBM's position should be the same. This is a major goal of this guide.

The organization of this guide is as follows.

1. Macro Issues. These are the "big" systemic issues driving the world-wide economy. We are not engaging in hyperbole or dramatics here. These issues drive the behavior of government policy makers and business executives as they look to shape social and business outcomes over the coming years. We need to understand these issues and "piggy back" on them to message in a way that resonates with policy makers and executives so that we may further our interests. Talking about a "cool" technology in a way that has no obvious nexus with skills, inflation, productivity, or digital transformation, is a waste of the slice of attention we can expect to get from policy makers and executives. It certainly doesn't set us up for a follow-on conversation, nor does it make us an "advisor" to them. We need to align our narrative to the issues that drive their decision making.

2. Asia Pacific (APAC). While each country has its issues and prioritizes them as it chooses, the region has a unique identity that emerges from the relations among the countries, as well as within the context of the regional organizations that they participate in. We should understand this and account for it in our messaging. APAC issues are different from European issues, which are different from America's issues.

3. Topical Issue Areas. The topical issue areas are set out for us by Corporate. There should be no surprises here.

4. Government Policy. As a large multinational corporation, IBM must engage with governments to promote polices and laws that do not restrict our ability to do business consistent with our offerings and interests; we must speak out against those that do. Each country requires our attention since the laws they establish may be injurious to our interests. We remain silent on issues not specifically called out here.

5. Country Specific Information. Here we offer pertinent, country-specific facts that you should be equipped with, in addition to policy information specific to the country.

Reviewers

The table below calls out the people responsible for creating the content for this guide and reviewing the finished product for quality and completeness. Please reach out to any of them with suggestions.

You may, however, use Selvi R (selvir@sg.ibm.com) as a single point of contact for your feedback.

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Country Metrics

No metric below is meaningful when considered in isolation. Each should be considered in conjunction with others to indicate the trajectory of an economy or market. For example, a large country (population) that consumes little energy is probably underdeveloped. This hypothesis is supported, or not, by looking at the % of urbanization and market size as a % of GDP. If % urbanization is low, but increasing, and market size as a % of GDP is small, the country is very likely underdeveloped. Does this mean that IBM should enter the market in anticipation of growth and opportunity? If HDI is high and corruption is low, then, perhaps, yes. If GDP Growth is high, then the case gets stronger.

Finally, each metric should be interpreted in relation to a benchmark, which can be another "like" country, or an advanced country. Everything is relative; moreover, trends over time matter a lot.

Metric and Meaning.

- Population. The most recent value reported by World Bank, Oxford Economics and U.S. Census Bureau. Large populations have the potential to produce large GDPs and support large markets for technology spend. It's a simple matter of math: more people working and producing wealth means a larger GDP. Large countries are attractive for this reason.

- Urbanization. The most recent value reported by Oxford Economics. High levels of

urbanization correlate with increased energy consumption and, therefore, economic development. High levels of energy use also implicate sustainability, because of the linkage between energy use and the consumption of fossil fuels.

- GDP. The most recent value of nominal GDP reported by Oxford Economics. The wealth created by a country in a reporting period.
- GDP Growth YtY. The most recent value of real GDP growth rates reported by Oxford. Consistent growth over a period of years speaks to the quality of the government.
- Extraction as a % of GDP. Oxford Economics. Government revenue, mostly comprising tax revenues on corporate, customs and excise duties, employee social security contributions, expenditures, income, property-related and others.
- IT Market Size. IDC. The size of the technology market that IBM can address. A large market is attractive to IBM, though a large market would likely be mature and, therefore, quite competitive.
- IT Market Size as a % of GDP. IDC. For developed digital economies, this metric should be 2% or better. Less than 2% suggests that the economy is underdeveloped. An underdeveloped economy by this measure suggests that the government is not modernizing, or its efforts have not taken hold.
- Human Development Index. United Nations Development Programme. A composite index of life expectancy, health, and education. A strong score is indicative of good governance and a population that can support economic growth. Look at this in conjunction with GDP Growth and Market Size as a % of GDP.
- Corruption Perception Index. Transparency International. Refers to an "abuse of entrusted power for private gain." High corruption is an impediment to economic growth because it makes multinational corporations wary of entering, remaining, or merely operating in the market.
- Imports + Exports as % GDP. Oxford Economics. Total trade as a percentage of GDP is indicative of the country's connection to, and reliance on, the global economy. A high score for this metric suggests a dependence on globalization. Countries dependent on globalization are less insulated from global and regional economic downturns.
- Energy Consumption. Our World in Data. Developed economies consume more energy than developing or underdeveloped economies. A low score here suggests an underdeveloped economy.
- Energy Consumption Per Capita. Our World in Data. Energy consumption per capita normalizes for population. A low score here suggests an underdeveloped economy.
- Industry, Primary, Secondary, Tertiary. United Nations Statistics Division. Industry's gross value added percentage of GDP based on Oxford Economics. Primary industry refers to the agricultural sector, while secondary industry pertains to manufacturing and processing, and tertiary industry refers to the service sector. The mix between primary,

secondary, and tertiary sectors is significant in understanding the stage of economic development of a country, with implications for productivity, employment, income, and vulnerability to economic shocks.

- Productivity. GDP output per hour of work based on Our World in Data. Higher productivity levels generally indicate that an economy is producing more goods and services per unit of input, which can translate into higher incomes, improved standards of living, and greater opportunities for economic growth.
- M1. Oxford Economics. Measurement of the total amount of money in circulation or money supply in an economy that includes the most liquid types of money, such as physical currency and coins in circulation, traveler's checks, and demand deposits held by commercial banks.
- M1 Velocity. Nominal GDP over M1 money supply based on Oxford Economics. Measurement of how quickly the money supply in an economy is being used to make purchases of goods and services.
- M1 CAGR. The 5-year compound annual growth rate of M1 money supply based on Oxford Economics. Measurement of the M1 money supply's average annual growth rate over a specific period, assuming that the growth rate is compounded each year.
- ICOR (Incremental Capital Output Ratio). Oxford Economics. Measurement of the efficiency with which capital investment is being used to generate economic growth. A lower ICOR indicates that capital investment is being used more efficiently, while a higher ICOR indicates that more capital is required to generate the same amount of growth.
- GDP Components. Oxford Economics. Breakdown of GDP into expenditure-related components, such as consumer spending, investment, government spending and net exports (exports minus imports). A high level of consumption spending may indicate strong consumer confidence and a robust economy, while high levels of government spending may suggest an expansionary fiscal policy.
- GDP Industry Segments. United Nations Statistics Division. Breakdown of GDP by key industries, such as services, transportation and communications, retain and whole sales, manufacturing, construction, mining and utilities and agriculture.

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Macro Issues

There is a small set of macro issues that we should be conversant with. These issues determine the structure of the macro economic system. Structural issues influence, if not determine, the choices that the system's actors (businesses and governments) make and, therefore, the performance of the actors and the system itself.

If you want to change the performance of the system, you need to affect the issues that define the system. This is no easy task and it is often beyond the ability of a single actor. So, we accept the international system as it is, but nevertheless realize that it will evolve over time as a result of the independent choices made by the many independent actors accumulating and (re)defining the system's (structural) attributes.

Choosing a strategy that fails to recognize how macro issues create system attributes that influence actor behavior and system (economic) outcomes is often a fruitless activity.

We believe the four issues below create the attributes that define the economic system we will operate in for the foreseeable future. Commercial strategy and, therefore, messaging should be devised in the context of an understanding of these issues. This is because CEOs and senior executives understand that these issues are driving competitive behavior (of governments and businesses), and they are looking for a rational response to this behavior that can be delivered through the adroit application of technology.

Demographics

Politically and economically, demographics is the seminal issue of the last 40 years. In the late 1980s when China opened up economically and entered the global economy unreservedly, the massive influx of labor exerted deflationary pressure on wages worldwide. China's impact was augmented by labor from India and Eastern Europe (as a result of the demise of the Soviet Union) entering the global economy at the same time.

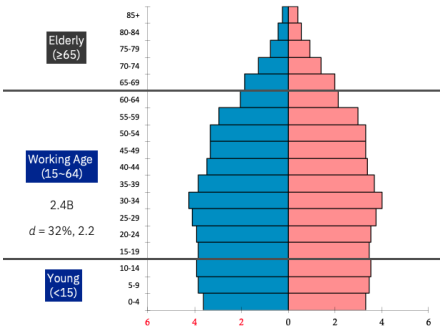


Figure 1: APAC Demographics

The impact of these events is clear and not controversial. The deflationary impact of a massive influx of labor allowed interest rates to remain low (globally) and capital to remain cheap as central banks injected massive liquidity into the global financial system. This confluence of factors induced strong economic growth worldwide. But, now, with the inverting of demographic pyramids, the party is over.

We are entering a period of reduced economic growth because of a shortage of labor. The dependency ratio (number of retirees per worker) is quickly increasing. Going forward, this will largely determine prospects for economic growth, especially in advanced economies, unless productivity is substantially improved. It's an open question about how big the impact of technology will be on economic growth. But technology will be a significant contributor to economic growth, if it is properly applied.

In the future, we should expect economic success or failure to be definitively signaled by changes in productivity. It is now clear that aging societies will be chasing increases in productivity as a means, perhaps the only means, to support economic growth.

Employment and Skills

Generally, employment presents two issues. First, as discussed above, the number of workers entering the work force is not enough to sustain current levels of economic growth, unless a significant positive change in productivity emerges. Second, the world (especially in advanced economies) has achieved a high level of digitalization in the last decade. This presents a problem, since of the fewer workers entering the work force, even fewer have the skills needed to sustain the digital progress made by the advanced economies; or, to help the emerging economies develop similarly.

More retirees per worker (higher dependency ratio) will likely portend massive shifts in government spending as government-provided healthcare and pensions consume greater portions of national budgets. Moreover, to the extent that geopolitical disruptions (Russia-Ukraine, U.S.-China) redirect spending toward defense and away from entitlements, extreme fiscal stress is likely to occur, with a corresponding negative impact on growth and, perhaps, a rise in social unrest and political instability. Economic populism may be found in this context.

Productivity, leveraged from the adroit application of technology, is one of the very few tools available to government policy makers and business leaders to mitigate the noxious effects of inflation and skills shortages.

Inflation

The inversion of demographic pyramids that we are witnessing will result in less labor generally, and less skilled labor in particular. This will cause labor-based inflation, which will trickle through the broader global economy. This in turn will put pressure on government-funded entitlements, absent a significant increase in productivity (or the reduction of the entitlements). It will also cause supply chains to reconfigure to embrace any remaining pockets of cheap labor. Technology is likely to have a mitigating impact here, but only if skills are available. This reinforces the need for skills programs everywhere.

Digital Transformation

The digital transformation of the world continues apace. Something on the magnitude of 65% of world GDP now comes from digitally transforming governments and enterprises. Increasingly, technology is used to automate business processes, thus reducing the need for labor, and as a means to ensure business resiliency — the latter an imperative identified as a result of the pandemic. Going forward, the ability of private enterprises to participate effectively in the global economy will correlate positively with their level of digital transformation; likewise, governments that fail to digitize services will run the risk of citizen backlash.

In the very near future, winners and losers are likely to be defined by the depth, breadth, and efficacy of their digital transformation. Losers are likely to have increasingly less access to economic opportunity and their prospects for economic growth will recede accordingly.

APAC

Metric	Value
Population	3.6T
Urbanization	52%
GDP (USD)	$29.6T
GDP Growth YtY	3.6%
Extraction as a % of GDP	17%
IT Market Size (USD)	$319B
IT Market Size as a % of GDP	1.2%
Imports + Exports as a % of GDP	61%
Energy Consumption 2021 (TWh)	67,246
Energy Consumption Per Capita 2021 (GWh)	41
Primary, Secondary, Tertiary Industry	7%, 30%, 56%
ICOR	19.1

*** Data for 2022

Table 1: APAC Political-Economic Indicators

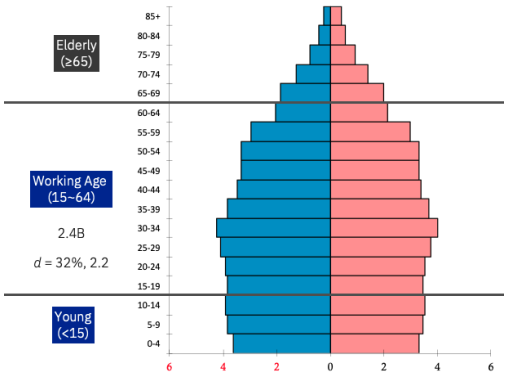


Figure 2: APAC Demographics

Macroeconomic Insights APAC

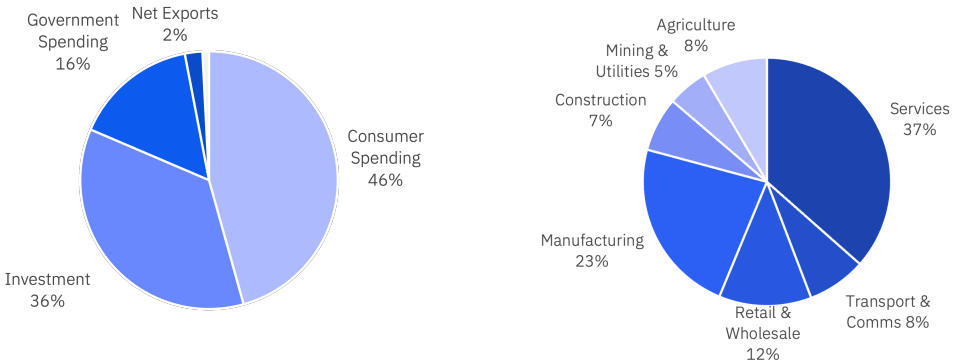
1. Inflation and Consumption. Annual inflation in APAC was 4.2% in 2022. Consumption was $17.56 trillion, up 1.5%.

2. Foreign Direct Investment (FDI). FDI inflows to APAC fell 13% in 2022, down to $720 billion.

3. IT Market. IBM-addressable IT market opportunity grew 12.9% in 2022. The market is expected to grow 11.4% in 2023 and 11.3% in 2024.

4. IBM Market Share. IBM is ranked #1 in APAC for non-x86 Servers in 1H22 (with 34% share), #10 for Total Servers (1.6%), and #11 for External Storage (2.4%). In 2021, IBM ranked #1 for TlS (8.5%), #3 for Consulting (2.7%), #4 in Software (3.3%) and #17 for Public Cloud (1%).

5. IBM's Year of Operation. IBM has been in APAC for over 90 years. Australia, the oldest location, opened in 1932.



(a) GDP Components

(b) Industry Segments

Figure 3: APAC GDP and Industry

Topical Areas

Digital Transformation

Digital transformation has become a significant driver of GDP growth for most economies across APAC, with those making the biggest investment now set to yield the benefits of stronger economic growth. Digitally transforming businesses and governments now deliver 65% or more of APAC GDP. Digital transformation is necessary to deliver on the goals of sustainability, because it reduces the input per unit of output produced. This has systemic repercussions along the entire supply chain as fewer inputs are needed, reducing energy requirements and, therefore, the consumption of fossil fuels across the entire supply chain.

Digital transformation takes a customer driven, digital first approach to all aspects of the business, from business models to customer experiences and processes, and operations. It uses artificial intelligence (AI), automation, hybrid cloud, and other digital technologies to leverage data and drive intelligent workflows, facilitate faster and smarter decision making, and enable real-time responses to market disruptions.

When digital transformation delivers on its promise, business velocity is increased, costs are reduced, and businesses are more resilient.

IBM's Point of View

1. The COVID-19 pandemic accelerated digital transformation across countries and industries. Companies embracing digital transformation and leveraging the full potential of disruptive technologies are reshaping customer value propositions and positioning their businesses for exponential growth.

   (a) During the pandemic financial institutions worked hard to identify gaps that impacted performance and then to scale secure solutions quickly, while managing costs and risks. This rapid digitization of financial services called for banks to be thoughtful about every aspect of their businesses and consider innovative solutions such as the journey embarked on by the Bank of Thailand (TH). The nation's central bank launched the world's first blockchain based platform for government savings bonds, issuing a total of US$1.6 billion within two weeks. Leveraging IBM blockchain technology on the highly secure IBM Cloud, the platform allows investors to benefit from speedy bond issuance, reducing a process that previously took 15 days down to two days. The efficiency provided by blockchain also reduces operational complexity and the overall cost of issuing bonds.

   (b) The Australian Government's Digital Transformation Agency (DTA) (AU) entered into a whole-of-government arrangement with IBM Australia in 2018. IBM helped the Australian Government accelerate its transformation of essential citizen services, cement economic recovery, and shape Australia's future success after the COVID-19 pandemic. The whole-of-government arrangement was renewed for a second five-year term in December 2022. Under this arrangement, IBM Australia helps the Australian Government drive accelerated adoption of innovative technology to modernize government services for Australians. Under the new arrangement, government agencies will continue to access IBM's suite of technology capabilities, including IBM Watson to help automate processes using AI, and IBM Cloud to securely store government data. Adopting sustainable practices are increasingly becoming a business imperative, and under the extended arrangement,

government agencies will have access to IBM's sustainability software suite as part of a pilot program to help turn their sustainability ambitions into action via data driven insights. Agency technologists will also be able to explore how emerging technologies such as quantum computing may be applied in various areas for the benefit of Australians. The engagement will also include working with IBM on data protection and encryption to better protect against future cybersecurity threats.

2. Hybrid cloud, AI, and consulting are the cornerstones of digital transformation for businesses across industries.

   (a) IBM Consulting and hybrid cloud provides the agility, scalability, and resilience required for enduring digital transformation success.

   - From cloud adoption to digital transformation and applications management, IBM Consulting has been helping SingHealth (SG)'s IT systems and infrastructure team keep the lights on for two decades. In addition to helping SingHealth implement several mission-critical SAP systems, the partnership has enabled the healthcare cluster to remain agile and navigate ongoing changes related to statutory compliance. SingHealth also worked with IBM Consulting and SAP Asia Pacific Japan to consolidate disparate HR programs into a single HR platform, implementing and migrating its applications from a legacy on-premises environment to the cloud. Now, SingHealth can focus on what matters most — using technology to drive innovation in healthcare and improve productivity and operational efficiency to produce the best patient outcomes.

   - Working with IBM Consulting, the energy company PETRONAS (MY) used elements from the IBM Garage™ methodology — co-create (design), co-execute (build), co-operate (scale) — to build UP, a digital solution hosted on the Microsoft Azure cloud platform. Serving the Malaysian oil and gas industry, the enterprise mobile app delivers strategic data to users' mobile devices, enabling them to complete projects up to 4x faster.

   - Mitsubishi Motor Philippines Corporation (MMPC) (PH) engaged IBM Consulting to lay the foundations for a vehicle management system on SAP S/4HANA. The system provides a centralized view of business operations, giving MMPC faster access to critical business data and speeding up processing times. It also delivers end-to-end visibility of vehicle data from production to the end customer, helping the company comply with regulatory reporting requirements.

   - IBM Consulting helped PT Holi Pharma (ID), Indonesia's leading pharmaceutical company, in successfully deploying RISE with SAP on Amazon Web Services. This enabled the company to move its mission-critical ERP workloads and processes to the cloud, providing faster insights into operations to support better decision making, significantly improving group-wide efficiency and production capacity.

   - The grab-and-go coffee chain Kopi Kenangan (ID) collaborated with IBM Consulting to implement RISE with SAP to reinvent customer experiences by

optimizing operations. This has enhanced operational efficiency, increased the accuracy of inventory controls, and improved monitoring of internal systems to support monthly financial reporting. The new system also boosted employee productivity and customer experience.

- Affin Bank (MY) collaborated with IBM to upgrade its tech infrastructure from IBM Power7 to IBM Power9 as part of its digital transformation journey.

- ABM Investama (ID) used IBM's data analytics in its mining operations to improve time to insight and enhance operational efficiency. The move to SAP S/4Hana on AWS helped ABM Investama achieve 90% faster reporting, allowing ABM to cut waste, protect margins, and respond to market changes quickly.

- Bank BTN (ID) collaborated with IBM Consulting to modernize its banking system through the IBM Cloud Governance methodology, ensuring security and compliance for cloud computing in the banking industry. The use of multi-cloud will enhance convenience and comfort in using bank services such as opening a savings account, making a deposit, and applying for credit to buy a house.

- IBM Ecosystem Partner Tetherfi Pte Ltd (SG) harnessed IBM Cloud to support a hybrid delivery model for 40% of its offerings. One of the examples that leveraged this model was during the COVID-19 pandemic. Tetherfi's Secure Work From Home solution was offered with an accelerated set up time when businesses needed to adopt remote working solutions almost instantaneously. With its updated hybrid offerings, Tetherfi can provide its users with a higher level of agility to run their offerings on-premises or in the cloud and drive consistent performances. The business also scaled its reach into new, previously untapped geographies beyond Southeast Asia, expanding further into Asia as well as the U.S.

- Data migration is a key step in digital transformation. IBM helped the automotive company FAW Volkswagen (CN) successfully upgrade from SAP ECC to SAP S/4HANA with an innovative data migration solution that was first applied in China. With this solution, it only took three days, instead of the usual 10 days, to efficiently and smoothly migrate its system data and upgrade its database. The upgrade significantly improved the operational agility of the entire enterprise, reducing operating costs, enhancing system stability, and laying the cornerstone for the next stage of the company's digital transformation.

- Parle Products (IN), the largest-selling biscuit brand in India, collaborated with IBM to advance the company's digital transformation journey. By deploying cloud and AI for business solutions during the engagement, Parle reduced sourcing costs, enhanced sales forecast accuracy, lowered the cost to serve, and optimized overall IT infrastructure.

- Equitas Small Finance Bank (IN) is collaborating with IBM Consulting to design and build a digital banking platform that delivers a modern and highly

secure experience to the bank's customers and partners. The collaboration aims to boost Equitas' digital product and service offerings as it evolves its business for a digital-first generation. Through this association, Equitas will embark on a high-speed path to leverage technology as a differentiator in its next phase of growth.

- ArcelorMittal Nippon Steel India (AM/NS India) (IN), a joint venture between ArcelorMittal and Nippon Steel — two of the world's leading steelmakers — has collaborated with IBM Consulting to reinvent mission-critical processes to boost agility and efficiency through digital transformation.

- GAIL (India) Limited (IN) took a major step towards complete digitization, centralization, and automation of its payment processes with the inauguration of its first state-of-the-art center for Vendor Invoice Management (VIM) - Shared Service Center (SSC) which has been partnered with IBM Consulting. Titled 'SARATHI,' the center is a modern facility that will serve as a pan-India hub for processing and managing vendor invoices. The GAIL center went live with SAP-OpenText's Vendor Invoice Management.

- BESTSELLER India (IN) has been collaborating with IBM Consulting to deliver key transformation projects aimed at building an intelligent and autonomous fashion landscape and rapidly fueling business growth. IBM Consulting consolidated its IT landscape on a robust and secure hybrid cloud platform, allowing it to take a tech-forward and data-driven approach to fuel growth.

(b) When combined with automation, AI can infuse intelligence and real-time decision making into any workflow. It can drive innovative, smart products, increase personalized customer and user experiences, optimize workflows for supply chain management, change management, and more.

- Wanyang Group (CN) leveraged IBM Cloud Pak for Business Automation to build up a unified business automation system that integrated and streamlined its various business workflows, KPI systems, and compliance rules across the company. This not only improved its management efficiency across business units, it also laid down a solid digital foundation for the company's 'go global' development plan.

(c) IBM helps clients digitally transform and in so doing differentiate themselves through increased business velocity, cost reduction, and greater business resilience. Ecosystem partners play a significant role.

IBM's Investments

1. Ecosystem investment to support digital transformation.

   (a) IBM's US$1 billion investment in ecosystem partners is designed to accelerate the delivery of value to our clients and help them succeed in their digital transformation journey.

(b) IBM's acquisitions of Databand.ai, Randori, Neudesic, Sentaca, and Envizi are instrument to our digital transformation drive.

2. With decades of commitment to APAC, IBM has established capabilities across the region.

   (a) In India, IBM has two research labs in Bengaluru and Gurgaon, two new software labs in Ahmedabad and Kochi, and APAC's first security command center, in Bengaluru.

   (b) IBM has Quantum Hubs in Australia and Singapore, and a 5G Industry 4.0 studio in Singapore. We will have the Quantum Computing Center in Korea in 2024.

IBM's Data Points

1. According to IDC, pandemic recovery has accelerated digitization, with 65% of APAC GDP coming from digitally transforming enterprises and governments. The APAC region is committed to spending more than US$46.6 billion on AI solutions by 2026, a significant increase from the US$20.6 billion spent in 2022, according to IDC.

2. In most countries in APAC, the economic value of digital trade to a country's GDP and internet economy has increased substantially faster than economic growth.

3. According to a study by the IBM Institute for Business Value, 60% of executives indicated that they used the time during the pandemic to dramatically accelerate their company's digital transformation. Moreover, 66% of executives said the pandemic allowed them to advance specific transformation initiatives that previously encountered resistance within their company.

IBM's Differentiation

1. IBM is a trusted consulting partner and a provider of technology, which puts us in a unique position since clients need both to drive their digital transformation.

2. IBM takes a holistic approach to providing secure hybrid cloud and AI solutions to support our clients' digital transformations. This includes enabling IBM Software to run as SaaS on IBM Cloud, as well as on hyperscale clouds.

3. With decades of commitment to APAC, IBM has established capabilities across countries. These include research labs, innovation spaces, centers of excellence, and cyber range and delivery centers to support the digital transformation journey of our clients.

4. IBM is committed to being a responsible technology innovator and digital transformation partner, guided by principles of trust and transparency, and support for a more inclusive society.

Looking Forward

1. Organizations are rethinking how they operate along the value chain to increase flexibility, strengthen cybersecurity, reduce environmental impact, and redefine how

humans and technology work together.

2. Cloud and AI will continue to become more important as performance differentiators as companies turn to application modernization, process automation, and infuse AI into business operations.

Artificial Intelligence

Today we are witnessing the rise of an innovative technology with the potential to radically transform business and society forever. That technology is artificial intelligence (AI).

Advances in machine learning (ML) and deep learning have led to significant progress over the past decade. But AI has also been challenging to scale and operationalize, as each new use case requires a new model to be designed and built using specific data.

According to the IBM Global AI Adoption Index 2023, although adoption continues to be a substantial focus for enterprises globally, with 42% reporting using AI in their organization, while an additional 40% are actively exploring the technology, only around half of AI projects make it from pilot to production.

However, Generative AI, which leverages powerful foundation models, changes that dynamic and makes massive AI scalability possible.

As foundation models are pre-trained on massive amounts of data, they can deliver huge acceleration in the AI development lifecycle, making it easier for businesses to focus on fine-tuning for specific use cases. As opposed to building custom natural language processing models for each domain, foundation models enable enterprises to accelerate the time to value from months to weeks. Within two years, we expect foundation models to power about a third of AI within enterprise environments. In our work applying foundation models in early tests, we have seen time to value of up to 70% faster than with traditional AI.

OpenAI recently showcased the impressive capabilities of generative AI by offering free access to ChatGPT, a generative AI chatbot that launched on November 30, 2022. (GPT stands for Generative Pre-trained Transformer and refers to a family of neural network-based Large Language Models developed by OpenAI).

The move generated widespread media attention, highlighting AI's huge potential while also raising concerns about its implications. This includes potential AI bias, consumers' rights to privacy, and whether AI systems use data — especially personal information — responsibly and securely. These go to the heart of one of the biggest challenges for AI adoption: gaining and keeping users' trust. As evidenced in the IBM Global AI Adoption Index 2023, enterprises exploring or deploying AI were most likely to express ethical concerns (23%) as one of the biggest barriers to adoption. By embedding ethical considerations in every step of AI's development, deployment, and usage, organizations can ensure their AI-based systems become a trusted and indispensable part of everyday life.

That approach can also help highlight the purpose of developing and implementing AI systems, which is to solve business and societal problems by augmenting, not replacing, human intelligence.

IBM's Point of View

IBM's AI point of view hinges on trust and enterprise readiness. With decades of experience in AI product development, consulting, and research, IBM helps clients apply AI to make their businesses more productive and innovative. IBM also has one of the most comprehensive portfolios to deploy ML in business.

IBM delivers AI for business and Watson is IBM's brand for AI. IBM provides a scaled set of AI capabilities that run anywhere on Red Hat OpenShift and integrate data scattered across hybrid cloud environments. Recently IBM launched watsonx, a new AI and data platform from IBM that is designed with the three critical elements of an AI strategy in mind. It empowers enterprises to scale and accelerate the impact of AI across the business, leveraging data wherever it resides. IBM software products are embedding watsonx capabilities across digital labor, IT automation, security, sustainability, and application modernization to help unlock new levels of productivity, performance, and agility for greater business value for clients. The platform has three components:

1. watsonx.ai is a next-generation enterprise studio to train, validate, tune, and deploy both machine learning and new generative AI capabilities powered by foundation models.

2. watsonx.data makes it possible for enterprises to scale AI workloads using all their data with a fit-for-purpose data store optimized for governed data and AI workloads, supported by querying, governance, and open data formats to access, and share data.

3. watsonx.governance helps customers create responsible, transparent, and explainable data and AI workflows by providing a toolkit that encompasses both data and AI governance capabilities like model management throughout the AI lifecycle.

At IBM, we are laser-focused on building foundation models targeted for businesses. As our models are trained with vetted data for legal and ethical requirements, both their provenance and training data are trusted. This means enterprises can safely fine-tune and extend them. Any data used in the process on watson.ai will never be shared with anyone else. Our foundation models are also trained on multiple types of business data, including code, time-series data, tabular data, geospatial data, semi-structured data, and mixed-modality data such as text combined with images.

In September 2023, IBM launched the first foundational models in our Granite series. These models are trained on business-relevant, pre-validated datasets targeted to specific industries and use cases, such as financial services, legal, IT, coding, and academic domains. By training models on enterprise-specialized datasets, we help ensure they are familiarized with industry-specific language and jargon, enabling them to make decisions grounded in relevant industry knowledge.

We also apply a wide range of other quality measures. These include searching for and removing duplication to improve the quality of output and using document quality filters to eliminate low-quality documents not suitable for training. Additionally, we deploy regular, ongoing data protection safeguards, including monitoring websites known for pirating materials or posting other offensive material.

Another example of our AI for Business offerings is IBM's watsonx.ai geospatial foundation model, built from NASA's satellite data. It is now openly available on Hugging Face, a recognized and trusted leader in open-source and a well-known repository for all transformer models. It is the largest geospatial foundation model on Hugging Face and the first-ever open-source AI foundation model built in collaboration with NASA.

Access to the latest data remains a significant challenge in climate science, where environmental conditions change almost daily. Despite growing amounts of data — estimates from NASA suggest that in 2024, scientists will have access to 250,000 terabytes of data from new missions — scientists and researchers still face obstacles in analyzing large datasets. Through our geospatial foundation model, we aim to widen access to NASA earth science data for geospatial intelligence and accelerate climate-related discoveries.

Underpinning all our efforts is IBM's dedication to advancing enterprise AI responsibly. We have developed a set of principles for using AI in an ethical, secure, and responsible manner, guiding the development and deployment of our enterprise-grade AI solutions. IBM believes that there are five fundamental properties of trustworthy AI: explainability, fairness, robustness, transparency, and privacy.

1. More than 40,000 clients across 20 different industries use IBM's cutting-edge AI capabilities.

   (a) The Singapore Civil Defense Force (SCDF) (SG) worked with IBM and partners, including the Infocomm Media Development Authority, Home Team Science and Technology Agency, and StarHub, to automate equipment inspection and ensure equipment readiness. This was achieved by leveraging IBM Maximo Visual Inspection to power its 5G-connected "smart" glasses. The aggregation of equipment tracking and maintenance data into a real-time dashboard provides SCDF's firefighters with the necessary data visibility to make smarter decisions.

   (b) Astra Daihatsu Motor (ID) implemented IBM Maximo Enterprise Asset Management to reduce downtime and maximize performance in controlling assets and maintaining infrastructure. In turn, this helps to reduce the risk of failure by up to 1%.

   (c) Siam Kubota (TH) leveraged IBM Planning Analytics with Watson, AI, and data analytics to transform its planning, budgeting, and forecasting analysis for the agriculture industry in Thailand. The single-view insights from multiple enterprise-wide sources allowed Siam Kubota to build accurate forecasts and respond to farming challenges more sustainably. Budget reporting time was cut from almost two weeks to less than one day, saving 90% of the time needed to complete forecasts, while the planning system processing is 80% faster.

2. IBM enables governments and public and private enterprises to accelerate AI adoption across all areas of their organizations.

   (a) IBM Software provides a portfolio of business-ready tools, applications, and solutions, including IBM Watson, IBM Cloud Paks, IBM Maximo, and more.

      - Woodside Energy (AU) engaged IBM Consulting to develop a model for transformation that could reduce operating expenses by approximately A$110 million per year. Woodside scaled its transformation, revamping its business-critical operations using IBM Garage and developing an innovative operating model — the Woodside Accelerator.

- Jollibee Group Foundation (JGF) (PH) teamed up with IBM to help farmers in the Nueva Ecija and Pangasinan provinces in the Philippines to improve crop yields with insights from The Weather Company. Working with IBM's Client Innovation Center, Philippines, JGF provided farmers with localized data to plan the planting season for better crop yields. JGF also tapped Central Luzon State University to help in the analysis and translation of the data and ensure that farmers without access to the internet and smartphones receive the weather data.

- Taiwan National Cheng Kung University Hospital (NCKUH) (TW) adopted IBM Cloud Pak for Data with a one-stop AI analysis platform, using cloud-native architecture to create a data governance framework and build its academic research database. Its research team conducted a proof of concept using the automation machine learning modeling function built into the data platform, and successfully shortened the research schedule and accelerated the output of researchers. The platform has also accelerated NCKUH's disease risk prediction and health management schedule.

- Hong Kong Shue Yan University (HKSYU) (HK) used IBM Watson Discovery for IBM Cloud Pak for Data to uncover insights that will enable it to boost and reinvent its liberal arts education model by making text analytics more meaningful and relevant to trending topics. HKSYU aims to use IBM Watson Discovery's AI-powered enterprise search technology to uncover meaningful research insights from documents, research papers, and business data, deepening its understanding of society and enabling it to find solutions to society's problems.

- The Sichuan Provincial Taxation Bureau (CN) applied IBM data governance software (IBM Watson Knowledge Catalog on Cloud Pak for Data) to build an intelligent knowledge graph to speed up the discovery of effective data, make data governance more efficient, and improve data quality. This will speed up and scale AI adoption across the organization.

(b) IBM Infrastructure, across IBM Z, Power Systems, and IBM Storage provides the building blocks of next-generation IT architecture, designed for enterprise AI workloads.

- Bank Mega Syariah (ID) modernized its core banking system by leveraging IBM Power, which improved performance by 300% and reduced power consumption by 120%.

- Agrobank (MY) modernized its core banking system with the IBM Power-based system to support small and medium enterprises and communities in the country. The new core banking system, implemented by Silverlake Axis, enables Agrobank to enhance the stability, security, and resilience of its operations while reducing overall business processing times and management workload by 50%.

- As mill expansion projects drove up IT workloads, the legacy infrastructure of

Tamil Nadu Newsprint and Papers Limited (TNPL) (IN) experienced capacity and performance bottlenecks. By moving its Oracle solutions to IBM Power Systems S922 servers and IBM Storage, TNPL plans to achieve its growth, operational efficiency, quality, and environmental goals.

- As multinational high-tech AI company Baidu (CN) launched innovative AI services, its data volumes skyrocketed. To reduce costs, increase efficiency, and meet data compliance requirements, the company engaged IBM to replace its legacy disk storage for cold data with a new solution based on IBM TS4500 Tape Libraries and IBM Storage software. The IBM cold data storage solution delivers 12 nines of reliability and cuts its operational costs by 80% — improvements that have far exceeded the customer's expectations, and also enabled its rapid growth in AI, self-driving vehicles, and so on.

- Horizon Robotics (CN) is a leading provider of energy-efficient computing solutions for advanced driver assistance systems and automated driving for consumer vehicles. To accelerate the training of its AI models and research and development (R&D) process, Horizon Robotics used IBM Storage Scale to build a unified data platform in its multi-cloud environment. This allowed the company to break down data silos, speed up response times across clouds, and reduce IT operation costs.

(c) IBM Consulting has more than 140,000 skilled professionals in more than 150 countries, serving as a trusted partner to build intelligent workflows powered by AI that transform core business.

- TM International Logistics (IN) worked with experts from IBM Consulting to move from SAP ERP on-premises to SAP S/4HANA on Microsoft Azure. This allowed the company to build real-time logistics services, enabling it to increase operational workflow efficiency based on AI insights and offer global delivery tracking to consumers and businesses worldwide.

(d) IBM Research has more than 3,000 researchers across the globe, providing a strong pipeline of cutting-edge AI and machine learning tools and applications that are made available to clients through IBM Software and Infrastructure portfolios.

- IBM renewed its research collaboration with the Indian Institute of Technology (IIT) in Bombay and the Indian Institute of Science (IISc) in Bangalore (IN) to transform and drive breakthrough innovations in the field of hybrid cloud and AI. IIT Bombay joined the IBM AI Horizon Network in 2018 to advance AI research in India, and in 2021, IBM and IISc Bangalore launched the IBM-IISc Hybrid Cloud lab to advance research in hybrid cloud technologies and drive breakthrough innovations in this area.

IBM's Investments

1. IBM has grown our AI-powered automation portfolio, including robotic process automation (RPA), through the acquisition of WDG Automation, and process mining through the acquisition of MyInvenio. To complement Watson AIOps, IBM

acquired Turbonomic and Instana to provide clients with application and infrastructure observability.

2. IBM launched our Environmental Intelligence Suite of AI-driven software that helps businesses address sustainability objectives and climate risks. The recent Envizi acquisition added sustainability performance software to help companies gather, analyze, and report on hundreds of factors related to their environmental impact.

3. IBM donated our AI Fairness 360 (AIF360) toolkit to the Linux Foundation and will "open source" our approach to AI ethics through the WEF-initiated Global AI Action Alliance. The donation will make IBM's resources and tools available, with consulting expertise, to organizations that engage with the Alliance. This is to advance responsible AI worldwide by enabling the larger community to come forward and co-create these tools under the governance of the Linux Foundation.

IBM's Data Points

1. According to the IBM Global AI Adoption Index 2023, many companies that are already exploring or deploying AI have accelerated their rollout of AI in the past two years, with 'Research and Development,' 'Workforce Upskilling,' and 'Building Proprietary AI Solutions' emerging as top investment priorities.

2. The Index shows that, besides a drop in China, as of November 2023, AI adoption across the APAC region continues to grow, with 29% of companies in Australia, 59% in India, 53% in Singapore, and 40% in South Korea using AI in their business. The adoption of AI in Chinese organizations was 50% (versus 66% in April 2023).

3. As the Index also shows, 50% of the organizations in Australia, 36% in China, 27% in India, 41% in Singapore, and 48% in South Korea are exploring the use of AI. This growth suggests AI is at a tipping point as organizations work to implement holistic, long-term AI strategies.

4. The Index reveals that Generative AI adoption is driven by enterprises already deploying AI in their business operations. 63% of companies currently deploying AI also report that they are implementing generative AI, compared to only 17% of companies only exploring AI.

5. Enterprises within the global Financial Services industry are most likely to be using AI, with nearly half reporting they have actively deployed AI, according to the Index.

6. Spending on AI systems in the region is predicted to increase from US$20.6 billion in 2022 to around US$46.6 billion in 2026, according to IDC.

7. The global generative AI market is approaching an inflection point, with a valuation of US$8 billion and an estimated CAGR of 35.6% by 2030.

IBM's Differentiation

1. IBM provides organizations with key capabilities needed to scale AI in four areas: natural language processing, trust, automation, and the ability to run anywhere across

any hybrid, multi-cloud environment.

2. IBM builds trust into our products and solutions by ensuring transparency and explainability of results at each stage of the AI lifecycle to recognize and mitigate bias and its impact on the AI system's output.

3. IBM is a one-stop shop for end-to-end AI-powered automation capabilities, including RPA, AIOps, software-defined networking, and more — all built on Red Hat OpenShift.

4. IBM's Watson Anywhere approach brings AI to wherever the data resides, regardless of how it is stored and without ever having to move it. This means a more unified data view, more consistency and flexibility, and better integration.

5. When comparing ChatGPT with Watson Discovery it is important to understand that ChatGPT is focused on conversational AI when it generates answers to questions. It is going to generate an answer for you based on the vast amount of trained data in its corpus. However, while being generative may have fun features like the capability to explain difficult subjects like quantum mechanics to children or generating a haiku about your favorite sports team, the generative nature opens the door to the creation of information that may not be factual or fully complete. Watson Discovery's primary focus is extracting information from large and complex documents with high accuracy to help automate business-critical decisions that require manual, human-in-the-loop processes like due diligence and contract understanding.

Looking Forward

The AI capabilities that impress us today will soon be exceeded by greater, more exciting advances to come. Possibilities that we are only beginning to imagine will become commonplace, and new technologies will lead to entirely new types of work. But to fully realize its potential and to be prepared for those future technologies, AI must be built on a foundation of trust and transparency.

Taking ethical shortcuts in AI may lead to profits in the short term, but this approach is laden with risk. Each time an organization falls short of the standards of trustworthy AI it represents a new obstacle to a future where as many people as possible benefit from this most transformational of technologies. The European Commission has already proposed a regulatory framework that could have a global, GDPR-style impact on the industry. Businesses that adhere to ethical principles in developing and using AI today will be better positioned for compliance with impending regulations and, potentially, will avoid the cost of redesigning or recreating models that were created without AI ethics principles and human values in mind.

IBM adheres to three fundamental principles in its development of AI:

1. The purpose of AI is to augment human intelligence. At IBM, we believe AI should make all of us better at our jobs, and that AI should augment, not replace human decision-making.

2. Data and insights belong to their creator. IBM clients' data is their data, and their

insights are their insights. We believe that government data policies should be fair and equitable and prioritize openness.

3. Technology must be transparent and explainable. Companies must be clear about who trains their AI systems, what data was used in training, and most importantly, what went into their algorithms' recommendations.

We believe these are essential principles if AI is to realize its full potential. If we get it right, the benefits will be enormous.

Organizations that stay grounded in the practical things AI can help them achieve — both short and long-term — are more likely to succeed. Chasing "moonshots" increases both complexity and risk, while placing a heavy burden on data and analytics teams whose energies are better directed to creating tangible business value using your most critical data.

IBM believes the best opportunities to derive benefits from AI today are:

1. **Digital labor.** AI is fundamentally about making things better for people. By putting AI to work across processes that are extremely complicated or where the day-to-day is extremely routine, you free your employees from repetitive work and help empower them to deliver faster outcomes and make better, data-driven decisions. Boosting employee productivity with AI and automation is about getting more out than you put in, but today's employees are frequently overloaded, juggling a multitude of apps while other tasks remain stubbornly manual. AI and automation solutions can help both increase productivity and reduce costs.

2. **Customer experience.** Customers today expect seamless experiences and fast answers to their questions, and companies that fail to meet these expectations risk falling behind. AI can help create exceptional customer care and empower customers to get what they need quickly and through self-service action, free employees to handle more complex requests.

3. **App development and IT Ops.** Watson Code Assistant leverages a watsonx foundation model that assists developers by generating code through a natural-language interface for the Red Hat Ansible Automation platform. It provides a simple, yet powerful, automation that enhances and improves developer productivity.

Automation

Automation addresses many of the key issues faced by businesses and governments today, including accessing skills and talent, reducing costs, and optimizing profitability.

Automation helps businesses combat labor shortages in general, and skilled labor shortages in particular. Replacing repetitive manual tasks with automation reduces labor costs while freeing up employees to work on higher-value tasks.

Automation also helps manage complex technology environments, reducing human error and the associated business and reputational costs resulting from unforeseen downtime or reduced access to services.

By leveraging automation, businesses can increase the agility of their processes and provide better customer experiences at speed and scale, which can contribute to revenue growth.

Automation supports a business's sustainability goals by decreasing the amount of input per unit of output and, therefore, driving a concomitant reduction in energy use and consumption of fossil fuel.

IBM's Point of View

1. With over 14,000 automation practitioners, 5,000 automation clients, and over 4,000 bots and runtime scripts deployed, IBM has the tools and expertise to automate business processes and IT operations across the whole organization.

   (a) Lembaga Tabung Haji (MY) implemented IBM Planning Analytics with Watson to streamline financial consolidation and planning.

   (b) PTT Trading (TH) uses IBM services to deploy AI and automation tech, including RPA to boost operations. RPA helped PTT cut billing time from 27,913 to 6,898 minutes within six weeks in the first phase. It expects net savings of 16.6 million THB within three years.

   (c) Ryman Healthcare (NZ) selected CorPlan and IBM Planning Analytics with Watson to help strengthen budgeting workflows and forecasting, and ease process-related issues across its 36 facilities.

   (d) Neusoft (CN), China's first publicly listed software company, embedded IBM App Connect in its solution to boost workflow automation in China's top-tier hospitals, increasing its patient satisfaction rate by 30%.

   (e) Automated Systems (H.K.) Limited (ASL), a global IT solutions and services provider based in Hong Kong and Macau and serving over 3,000 enterprise customers worldwide, chose IBM Instana Observability to optimize application performance. The AIOps solution offers a comprehensive way to monitor and manage server side and client side applications and performance metrics, allowing ASL to easily track and manage all applications with high transparency in a timely manner. It optimizes customer experience monitoring with detailed performance data and allows customers to view and visualize data analysis.

   (f) Yonyou Network Technology Company (CN) is a leading provider of enterprise cloud

services and software in China. It leveraged IBM Observability by Instana APM to improve the observability of its cloud native production environment. With Instana, Yonyou has deployed a new microservice operation and management platform on the iUAP platform to improve the observability of its production environment, speeding up troubleshooting by 10 times.

(g) FirstMeridian (IN), an end-to-end HR solutions provider, chose IBM Instana Observability to keep track of its expanding application landscape and monitor their performance. FirstMeridian experienced great success with the impressive capabilities of IBM Instana Observability upon deployment. The solution effectively mapped out the interdependencies of applications, providing comprehensive visibility for application developers and IT teams. This allowed them to promptly address code-level issues and respond proactively to alerts provided by the tool.

(h) DocTutorials Edutech (IN), a startup providing medical training to students, chose IBM App Connect, to expand with over 100 new public APIs that would help them manage the volume of applications coming in and deliver content seamlessly to all our students. The development time has reduced by 25% while the uptime of APIs has increased by 30%, giving students a consistent service experience.

2. IBM understands how automation intersects with other powerful technologies, such as the Internet of Things (IoT), blockchain, and the cloud. IBM has invested over US$10 billion in R&D to advance innovation in these areas.

3. IBM is the only company with a single platform for both business and IT automation, helping businesses to automate both effectively. A set of common AI and automation components power each IBM Cloud Pak and provide security-rich integrations between them — so businesses can build once and then reuse across their business and IT operations. IBM's automation strategy is to bring AI-powered automation technology to information-centric jobs with a platform strategy — a single solution that connects and automates business and IT together to accelerate revenue growth while controlling costs. Clients can purchase capabilities as needed to automate specific parts of their business and IT, all leveraging the same common set of AI-powered automation services.

(a) With the assistance of the IBM Customer Success Manager team, Suzhou Universal Chain (CN), a leader in the chain industry in China implemented IBM Cloud Pak for Business Automation's Business Automation Workflow (BAW) capabilities. This enterprise-level solution enabled the company to integrate its business systems and manage process approvals with full visibility of its business processes. Suzhou Universal Chain uses IBM Cloud Pak for Business Automation to establish a unified business-process-automation management platform. The platform's relatively simple development interface means the company's IT team can easily create new business processes in response to emerging business requirements. Other benefits include a fast development process, convenient and quick debugging, and simple deployment.

(b) Fortune Technology Company (CN), used IBM Cloud Pak for Business Automation to automate its manual IT processes, optimizing its financial business processes.

The company saw a 100% accurate execution of tedious, high-frequency, and low-value-added tasks, and saved 74% of labor hours invested in its invoicing and fund management operations.

IBM's Investments

IBM's IT automation portfolio has been bolstered by organic research, development, and strategic acquisitions and partnerships to expand key capabilities. These include:

1. IBM Cloud Pak for Watson AIOps and Watson Orchestrate — developed through research,
2. RPA — through the acquisition of WDG Automation process mining — through the acquisition of MyInvenio,
3. Application and infrastructure observability to complement Watson AIOps — through the acquisitions of Turbonomic and Instana,
4. Expanded ecosystem partnerships, including with companies such as ServiceNow and Flexera.

IBM's Data Points

1. It is estimated that AI-driven automation will create billions of dollars in labor value in 2022 alone. Moreover, 80% of intelligent automation early adopters expect to significantly outperform their competitors in profitability within three years, according to a study by IBM's Institute for Business Value.
2. CIOs in APAC countries report that 20% to 40% of organizational business processes have been automated, according to a study by IBM's Institute for Business Value. We believe this will increase significantly in the coming years in response to heightened cost pressure and labor shortages.
3. Some 58% of CIOs in the Association of Southeast Asian Nations (ASEAN), 68% in Australia and New Zealand (ANZ), 44% in South Korea, 62% in China, and 66% in India have cited automation as a planned technology investment.
4. Some 33% of CIOs in ASEAN, 56% in ANZ, 47% in China, and 41% in India have identified process automation as the area in which technology will have the greatest impact.

IBM's Differentiation

1. IBM is a one-stop shop for end-to-end automation. IBM has consulting expertise in process analysis and optimization, combined with an AI-powered automation portfolio that includes RPA, AIOps, software-defined networking, and more — all built on Red Hat OpenShift.
2. Forrester and Gartner rank IBM as a leader in digital process automation and intelligent business process management, based on our strong intelligent automation product roadmaps and numerous successful deployments with clients globally.

Looking Forward

1. IBM Research is focused on innovating to improve natural language processing, explainable AI, and more, to develop automation tools that can be more readily used by business workers across marketing, sales, and other specialized job families.

Data

Data is the raw material for digital transformation. By leveraging data as a strategic enterprise asset, companies can achieve a powerful source of competitive advantage and business growth. But today, most data remains unanalyzed, inaccessible, or untrusted. Enterprises need to be able to simplify access to data for all users, regardless of where it resides. Data that is clean, trustworthy, and accurate holds the key to unlocking new value through the insights derived from it. This is critical for business transformation. The most important role of data in an enterprise is to facilitate enterprise learning. Enterprises that leverage data in support of a rigorous, structured learning process will outperform their competitors over time. Those that learn the fastest always win.

IBM's Point of View

1. A digital-first enterprise strategy requires a data-first approach. A well-planned data strategy for a digital organization provides business transformation opportunities, cost reduction, improved engagement, and maximum flexibility in a multi-cloud environment.

2. A modern data architecture underpinned by a data platform approach helps orchestrate large sets of data in a hybrid cloud environment. It enables the building of automated workflows, business platforms, and experiences, which scales the value of data and accelerates AI initiatives.

   (a) Samsung Electro-Mechanics (KR) chose IBM's Cloud Pak for Data and Watson Knowledge Catalog solution to manage its data. Data integration, observability, master data management, data governance, and security were critical in developing a robust data platform that is connected, scalable, and able to support Samsung Electro-Mechanics' expanding international electronic components business. Today, Samsung Electro-Mechanics' data platform organizes data generated from multiple sources into systematic assets that can be easily shared, searched, and used through application programming interfaces across the organization. Personal and sensitive information is managed according to Samsung Electro-Mechanics' strict governance principles, and the data assets are continuously updated with newly generated data. The number of these data assets has grown from 500 to more than 2,500 and is still growing.

   (b) Samsung Electro-Mechanics and Hyundai Marine and Fire Insurance (KR) used new data fabric technology from IBM to build holistic visibility of its extensive customer data and actively support it to build reliable AI systems for data models and processing.

   (c) Yanfeng Auto International Automotive Technology Co., Ltd. (Yanfeng Auto) (CN), a leading automotive parts supplier, worked with IBM to accelerate its data-driven digital transformation, aiming to reduce costs, improve efficiency, and scale for company-wide innovation. With the support of IBM's Customer Success Manager team, Yanfeng Auto now automatically converts massive external general orders into internal orders, leveraging the natural language processing capability of IBM Watson Discovery. Using the Aspera Module of IBM Cloud Pak for Integration, the company efficiently transmits large volumes of data at high speed

between its headquarters and production workshops, establishing a predictable data foundation for its intelligent inventory platform. With the Event Streams Module of IBM Cloud Pak for Integration, Yanfeng Auto has overcome the operational bottlenecks from the open-source data extraction tool Kafka, simplifying the data extraction process. The Decision Optimization Module enables the company to intelligently estimate its manufacturing capacity and plan the purchase of core manufacturing equipment, reducing costs and increasing efficiency.

(d) Constance Hotels, Resorts and Golf (IN) worked with IBM to build a hybrid cloud architecture that would act as a central data warehouse and analytics platform, breaking down data silos and enabling rapid insight into global operations. Operational analysis for its individual hotels was accelerated from three weeks to a matter of minutes through staff using IBM Watson Analytics to explore data and create dashboards, instead of requesting data from the IT team and waiting for its delivery. Since the data in the IBM Db2 Warehouse on Cloud repository is refreshed several times a day, the insight obtained is always timely and relevant, thus supporting rapid decision making and helping to address any problems more quickly.

IBM's Investments

1. Software acquisitions such as Databand.ai, Randori, Envizi, Instana, and Turbonomic continue to bring talent and innovation that extend IBM's technology leadership in areas like observability, data fabric, security, and sustainability to help position us, our clients, and our partners for success.

IBM's Data Points

1. Businesses are drawing from more than 20 different data sources, with some wrestling with up to 500 data sources, according to IBM's Global AI Adoption Index 2021. In addition, 68% of data is not analyzed in most organizations and up to 82% of enterprises are inhibited by data silos.

2. Less than 40% of organizations have integrated their data across the enterprise, or designed and deployed an enterprise-wide data architecture, according to an IBM Cognitive Enterprise Study.

3. Some 98% of organizations already have data sovereignty policies in place, or have plans to implement a data sovereignty strategy. To achieve data sovereignty, 49% of IT decision makers are using hybrid cloud or regional cloud service providers as an alternative to the public cloud.

4. Organizations that are best positioned to build digital trust are more likely to see annual growth rates of at least 10% on their top and bottom lines.

IBM's Differentiation

1. IBM understands the complexity of business and we have deep industry expertise and the advanced technologies required to scale and help clients manage increasing amounts of data, with more efficiency.

2. IBM is uniquely positioned to help organizations adopt a data fabric architecture to centrally access, manage, and gain insights from vast amounts of data, regardless of where it resides, how it is stored, and without ever having to move it. This allows us to meet clients wherever they are in their data journey.

3. The ability to run IBM Watson anywhere is a major point of differentiation for IBM in the AI market. IBM Cloud Pak for Data and our work to help enterprises move toward a data fabric architecture is critical.

4. With IBM Software and IBM Consulting, we are already helping businesses around the world discover and unify disparate data sources with a data fabric architecture — regardless of where the information sits — bringing them together into one unified view to help leaders find, understand, and utilize data throughout the organization.

Looking Forward

1. The future of computing lies in a hybrid cloud environment. IBM is creating a hybrid data fabric that provides secure, governed data access from anywhere, enables self-service discovery of the right data at the right time, and takes a holistic view, minimizing total cost of ownership for AI and analytics.

2. By 2024, 60% of the data used within training AI models will be synthetically generated. IBM researchers are developing generative models to create strategic, synthesized training data for AI, and we've proven that models trained on this data can achieve the same level of accuracy as those trained on real data.

Hybrid Cloud

Hybrid cloud integrates public cloud services, private cloud services, and on-premises infrastructure, and provides orchestration, management, and application portability across all three. The result is a single, unified, and flexible distributed computing environment in which an organization can run and scale its traditional or cloud-native workloads on the most appropriate computing model. Hybrid cloud — and particularly hybrid multi-cloud — helps companies achieve technical and business objectives more effectively than public cloud or private cloud alone. In fact, according to a recent study, companies derive up to 2.5 times the value from hybrid cloud than from a single-cloud, single vendor approach.

IBM's Point of View

1. As enterprises modernize they need to move critical data and applications securely across multiple cloud environments. We see increased adoption of a hybrid, multi-cloud approach to host workloads — in the cloud or on-premises — to reduce risk and demonstrate compliance.

   (a) As part of its digital transformation journey, the engineering, logistics, and energy company ATCO (AU) engaged IBM and IBM company SXiQ to migrate its IT systems from an on-premises environment to Microsoft Azure. This eliminated the need for the company to manage its infrastructure and gave it the ability to deliver services more flexibly to both its business and customers. It also enabled ATCO to improve systems and processes, enhance the responsiveness and consistency of its service, eliminate cybersecurity concerns, and improve system performance, reliability, and availability.

   (b) Trans Digital Cemerlang (ID) partnered with PT Aegis to implement IBM Cloud, enhancing its billing system, delivering a differentiated customer experience, and driving business growth.

   (c) Taiwan's Shanghai Commercial and Savings Bank (SCSB) (TW) partnered with IBM Consulting and IBM Technology for its core banking transformation. This initiative involved migrating to a mid-layer platform built on Red Hat OpenShift with microservices architecture. SCSB plans to replace its legacy core system with Temenos to consolidate its Retail, Corporate, Trade, and Treasury Banking functions on a single platform. This will enable the bank to streamline its business and IT operations.

   (d) Taiwan High-Speed Rail Company (TW), uses IBM Cloud to develop, test, and integrate its existing front-end reservation service system to achieve seamless integration, increase its booking ratio, and improve customer experience. It is estimated that from 2021 to 2025, it can save 20% of the host performance usage fee.

   (e) Clearing Corporation of India Ltd (CCIL) (IN), a financial market infrastructure provider and a key player in the Indian financial system, collaborated with IBM to modernize its IT infrastructure, ensuring efficient clearing and settlement of trades executed on stock exchanges. CCIL decided to deploy IBM LinuxONE, a server that delivers IBM's leadership in performance and security with the openness of the

Linux operating system. Its architecture is uniquely designed to handle mission-critical tasks. IBM and Red Hat collaborated with CCIL to conduct an onsite proof of concept of the IBM LinuxONE server, which exceeded most parameters when compared to erstwhile systems, increasing customer confidence.

2. Clients want a vendor-agnostic solution that works with the entire range of their existing IT infrastructure, allowing them to develop once and deploy anywhere.

3. Each client journey to cloud is unique, with efforts focused on specialized application tasks, workloads, security, and compliance requirements, along with specific industry needs.

   (a) Payments provider Australian Settlements Limited (AU) collaborated with IBM and ISW to deliver IBM Safer Payments on ISW's managed platform-as-a-service model.

   (b) Bharti Airtel (IN) and IBM are working together to deploy Airtel's edge computing platform (deployed as a hybrid environment based on IBM Cloud Satellite and Red Hat OpenShift) in India, which will include 120 network data centers across 20 cities. Once deployed, the platform is designed to enable large enterprises across multiple industries, including manufacturing and automotive, to accelerate innovative solutions that deliver new value to their clients and operations securely at the edge. Maruti Suzuki India Ltd, India's largest passenger car maker, intends to use the edge platform to increase accuracy and efficiency for quality inspections on the factory floor.

IBM's Investments

1. As of December 2023, IBM has acquired 44 companies, including Databand.ai, Neudesic, SxiQ, Sentaca, and Bluetab.

2. IBM will invest US$1 billion over the next three years to advance our hybrid cloud ecosystem to support our partner global system integrators and independent software vendors, as well as provide clients with a seamless and secure journey to the cloud.

IBM's Data Points

1. Hybrid cloud is a US$1 trillion opportunity globally, with less than 25% of workloads on the cloud so far.

2. Gartner estimates that only about 15% of large enterprises in APAC have implemented hybrid cloud computing beyond its most basic approach.

3. According to IDC, 76% of organizations in APAC indicate that they will increase their cloud services in the next 12 months.

IBM's Differentiation

1. IBM has the industry expertise in mission-critical business processes, and the most qualified and experienced practitioners in the hybrid approach, to help clients rework

legacy applications. We have over 140,000 consultants who are skilled and experienced with hybrid cloud and cloud migration across 150 countries.

2. Trust can be built into every interaction through IBM's robust portfolio of data protection and security services. These services have been embedded into our hybrid cloud architecture to protect a client's processes, applications, and cloud services while managing compliance requirements.

3. At the heart of IBM's hybrid cloud platform approach is Red Hat OpenShift, which is the primary container environment for all of IBM's hybrid cloud offerings. It allows businesses to develop and consume cloud services anywhere and from any cloud.

4. IBM's automation, data, and integration tools can help clients fully implement intelligent workflows in their business. These tools run on Red Hat OpenShift through IBM Cloud Paks. They can run anywhere — on-premises, on public clouds, or in an integrated system.

5. IBM helps clients access and deploy a wide range of hybrid cloud innovations and technologies, helping them tap the unmatched pace and quality of innovations from the open-source community.

Looking Forward

1. As cyberthreats grow, security will be front and center, with enterprises increasingly adopting a hybrid, multi-cloud approach to mitigate vendor concentration risk.

2. Industry specific platforms will increasingly be adopted to help enterprises balance innovation with stringent compliance protocols.

3. IBM hybrid cloud research will address the primary challenges of hybrid cloud by driving agility through AI and automation, creating a seamless hybrid cloud platform, establishing a holistic approach to security and compliance, and enabling flexible, composable computing. This allows infrastructure, compute, storage, and networking to be abstracted from their physical locations and managed by software through a web-based interface.

Quantum Computing

Quantum computing is a rapidly emerging technology that harnesses the laws of quantum mechanics to solve problems too complex for classical computers. Quantum-centric supercomputing is at the point at which classical and quantum computing work seamlessly together to solve the different parts of complex computing problems that are best suited to each one's respective strengths and capabilities. Quantum-centric supercomputing is set to revolutionize global industries and governments' investment in material discovery, logistics optimization, and machine learning, among many areas of research.

IBM's Point of View

1. IBM is advancing quantum computing across three pillars: robust and scalable quantum hardware; cutting-edge quantum software to orchestrate and enable accessible and powerful quantum programs; and a broad global ecosystem of quantum-ready organizations and communities. As access to quantum systems and open research are critical for accelerated learning, skills development, and implementation and advancement of quantum computing, we are expanding our network and systems across APAC to foster a truly global quantum economy.

   (a) The University of Melbourne is the only university-based IBM Quantum Hub in Australia and New Zealand with cloud-based access to IBM's quantum computing systems. It can also undertake application R&D with IBM scientists and engage in training and skills-building workshops with IBM.

   (b) Yonsei University (KR) joined the IBM Quantum Network and signed a memorandum of understanding with IBM in 2021 on quantum computing research. In July 2022, the university signed an agreement to build the Yonsei-IBM Quantum Computing Center. With the signing, South Korea will have the world's fifth IBM Quantum Computing Center after Germany, Japan, Canada, and the U.S. It contributes to IBM's goal of building national quantum ecosystems, developing workforces, and advancing quantum R&D on national and global scales.

   (c) LG Electronics (KR) joined IBM Quantum Network and aims to explore applications of quantum computing to support big data, AI, connected cars, digital transformation, IoT, and robotics applications.

   (d) National University of Singapore (NUS) (SG) and IBM have embarked on a three-year collaboration to find ways to use quantum computing to solve real world problems and train quantum scientists.

   (e) IBM signed three memoranda of understanding with three entities engaged with the Ministry of Electronics and Information Technology (MeitY) (IN) to advance and accelerate innovation in AI, semiconductor, and quantum technology for India. This body of work aims to accelerate India's comprehensive national strategy for AI, strengthen efforts to be self-reliant in semiconductors, and advance its National Quantum Mission.

   (f) IIT Madras (IN) is the first Indian institution to join the IBM Quantum Network to advance quantum computing skills development and research in India.

(g) BosonQ Psi (BQP) (IN) has joined the IBM Quantum Network startup program and intends to experiment and develop quantum algorithms for engineering simulations on quantum systems. Collaborating with established researchers from universities, R&D labs, and end-user industries, BQP intends to boost the performance of complex engineering simulations using Qiskit libraries, simulators, and IBM quantum systems via the cloud.

2. Developing revolutionary quantum technology comes with responsibility to address its security implications. Once the potential of quantum computers is fully realized, all past, present, and future classical data and systems that are not protected with quantum-safe cryptography will become vulnerable. Hence, IBM is continuously developing new quantum-safe standards.

   (a) In September 2022, GSMA announced the formation of the GSMA Post-Quantum Telco Network Taskforce, with IBM and Vodafone as initial members. It will help define requirements, identify dependencies, and create the roadmap to implement quantum-safe networking, mitigating the risks associated with future, more powerful quantum computers. In February 2023, GSMA published the Post Quantum Telco Network Impact Assessment: an in-depth analysis of the quantum security threats facing the telecommunications industry and a detailed, step by step list of potential solutions to prepare for these threats.

   (b) In May 2023, IBM announced its new IBM Quantum Safe technology: a comprehensive set of tools and capabilities, combined with IBM's deep security expertise, designed as an end-to-end solution to be made available as organizations, including governmental agencies, prepare their quantum-safe journey towards the post-quantum era. IBM also unveiled its IBM Quantum Safe Roadmap to help clients understand and support them through this security transition. This is IBM's first blueprint that charts the technology milestones towards increasingly advanced quantum-safe technology, which is engineered to help organizations address anticipated cryptographic standards and requirements through crypto-agility and protect systems against emerging vulnerabilities. The IBM Quantum Safe Roadmap and technology will expose organizations to their existing cryptographic landscape so they can begin to address changes that may be necessary to thrive in the post-quantum era.

IBM's Investments

1. In 2016, IBM was the first company to offer access to a quantum computer over the cloud.

2. In 2017, IBM was the first company to offer commercial universal quantum computing systems via the IBM Quantum Network, to research and explore how quantum will help a variety of industries.

3. In 2017, IBM released our open-source software development kit, Qiskit, to enable students, developers, and domain experts to build the necessary tools and libraries to program quantum computers — even on quantum computer architectures other than

IBM's.

4. In 2021, IBM unveiled our 127–quantum bit (qubit) 'Eagle' processor, a breakthrough in tapping into the massive computing potential of devices, based on quantum physics.

5. In 2021, the IBM Quantum Accelerator for enterprise was launched, offering resources to businesses at any point on their journey to quantum readiness.

6. In 2022, IBM unveiled Osprey, a 433-qubit processor, which is the largest quantum processor to date.

7. IBM's education initiatives and partnerships amount to an investment of over US$100 million in the last five years to support open quantum computing education.

8. In May 2023, IBM announced a 10-year, US$100 million initiative with the University of Tokyo and the University of Chicago to develop a quantum-centric supercomputer powered by 100,000 qubits, which is expected to be deployed by 2033.

9. In December 2023, IBM announced that the company intends to engage with Keio University, The University of Tokyo, Yonsei University, Seoul National University, and The University of Chicago to work together to support quantum education activities in Japan, Korea, and the United States. IBM intends to deliver educational offerings, in combination with contributions from each of the participating universities, to advance the training of up to 40,000 students over the next 10 years to prepare them for the quantum workforce and promote the growth of a global quantum ecosystem.

10. In December 2023, IBM debuted IBM Quantum Heron, the first in a new series of utility-scale quantum processors with an architecture engineered over the past four years to deliver IBM's highest performance metrics and lowest error rates of any IBM Quantum processor to date.

11. In December 2023, IBM unveiled IBM Quantum System Two, the company's first modular quantum computer and cornerstone of IBM's quantum-centric supercomputing architecture.

IBM's Data Points

1. Some 20% of organizations are expected to budget for quantum computing projects by the end of 2023.

2. In terms of IBM's roadmap, Boston Consulting Group and IBM see over US$3 billion in near-term value creation, with the 1,121-qubit IBM Quantum Condor processor being an inflection point in 2023.

3. IBM quantum machines have been used by more than 100,000 users who have run more than 6.5 million experiments, resulting in more than 100 academic papers.

4. More than 340 courses are being taught using IBM Quantum's tools and learning platform in 120 countries, educating over 3 million people. More than 15,000 students have participated in Qiskit events.

IBM's Differentiation

1. IBM has on-premises IBM Quantum System One systems for IBM Quantum Network clients in Germany and Japan, with plans to install systems in Korea, Canada, and the U.S. IBM currently operates the world's largest fleet of quantum computers available (on IBM Cloud), with more than 20 quantum systems being used every day by clients, partners, and developers.

2. IBM has the largest and most extensive commercial quantum program and ecosystem. Around the world, it has more than 400,000 users and over 190 organizations pursuing quantum computing across industries including healthcare, automotive, banking, and finance.

Looking Forward

1. The IBM Quantum Roadmap details the next steps on our path to a 4,000-qubit processor in 2025.

2. In order to guide our mission to realize quantum-centric supercomputing, IBM is expanding our industry-defining roadmap out to 2033 for a decade worth of quantum innovation. The roadmap highlights improvements in the number of gates that our processors and systems will be able to execute. Starting with a target of Heron reaching 5,000 gates in 2024, the roadmap lays out multiple generations of processors, each leveraging improvements in quality to achieve ever-larger gate counts. View the extended IBM Quantum Development Roadmap through 2033, and the IBM Quantum Innovation Roadmap through 2029.

3. IBM is advancing the field of quantum error mitigation through improvements in hardware and software. This will greatly enhance the computational power of quantum devices and offers a practical path to quantum advantage where quantum computers will outperform classical computers on practical tasks.

4. As quantum computers grow more powerful, it is crucial that technology providers take steps to protect their systems and data against a potential future quantum computer capable of decrypting today's security standards. From offering the z16 system with quantum safe technology, to contributing algorithms in connection with the National Institute of Standards and Technology's (NIST) goal for standardization by 2024, IBM offers technology and services with these security capabilities.

Security

Every country, every industry, and every organization is vulnerable to ransomware attacks. Aside from the obvious impacts on productivity and profitability from security breaches, the damage to companies' trust and reputation can be just as severe and often lasts longer than the immediate financial impacts.

Cyberattacks come in many forms, including malware — such as ransomware, phishing, and denial-of-service attacks — and identity-based attacks. However, they're most often criminally or politically motivated. The United Nations Office of Drugs and Crime notes that cybercrime has evolved into the 21st century's highest-profile type of organized crime. Four out of five attacks are orchestrated by highly skilled criminal rings.

According to IBM Security's 2024 X-Force Threat Intelligence Index, Asia-Pacific was the third most-attacked geography in 2023, accounting for 23% of incidents X-Force responded to globally, with Australia being the most targeted country in the region (23%).

IBM's analysis also found an emerging global identity crisis as cybercriminals double down on exploiting user identities to compromise enterprises worldwide. In 2023, cybercriminals saw more opportunities to "log in" versus hack into corporate networks through valid accounts – making this tactic a preferred weapon of choice for threat actors.

Exploiting valid accounts has become the path of least resistance for cybercriminals, with billions of compromised credentials accessible on the Dark Web today. In 2023, X-Force saw attackers increasingly invest in operations to obtain users' identities globally – with a 266% uptick in infostealing malware, designed to steal personal identifiable information like emails, social media and messaging app credentials, banking details, and crypto wallet data.

This "easy entry" for attackers is harder to detect, eliciting a costly response from enterprises. According to X-Force, major incidents caused by attackers using valid accounts were associated with nearly 200% more complex response measures by security teams than the average incident – with defenders needing to distinguish between legitimate and malicious user activity on the network. IBM's 2023 Cost of a Data Breach Report found that breaches caused by stolen or compromised credentials required roughly 11 months to detect and recover from – the longest response lifecycle than any other infection vector.

Phishing remained the top initial access vector in the Asia Pacific region, with 36% of incidents in 2023. However, identity-based threats will likely continue to grow as adversaries leverage generative AI to optimize their attacks. In 2023, X-Force observed over 800,000 posts on AI and GPT across Dark Web forums, reaffirming these innovations have caught cybercriminals' attention and interest.

Globally, manufacturing ranked as the number one most-attacked industry in 2023. It was also the most-attacked industry in Asia Pacific for the second year in a row, with the region experiencing the highest percentage of incidents (54%). Manufacturing organizations are an attractive target for extortion because they have extremely low tolerance for downtime. The finance and insurance, and transportation industries tied for second, accounting for 12% of cases each, while education was third at 8%.

Businesses that focus on incident response and have the right teams and plans in place to act quickly after being attacked can reduce the severity of a data breach, and its economic

and reputational impact.

When businesses adopt a zero-trust security strategy, which assumes that security is already compromised, unauthorized access to sensitive data is prevented. That's because zero trust continuously validates the conditions for connection between users, data, and resources.

At the same time, working with ecosystem partners and suppliers that have a complementary strategy, approach to risk, and ability to deliver results can also help organizations get more value from their cybersecurity strategy.

Working with ecosystem partners enables both specialization and the ability to capitalize on shared investments such as hyperscale infrastructure and services. It is also where organizations can find opportunities to address new risk vectors, develop a more comprehensive shared responsibility model, and harness open innovation to unlock new value propositions.

IBM's Point of View

1. IBM Security is an intelligence-driven business — we work with clients to apply real-time analytics to safeguard their operations.

   (a) Nova Group (VN) leveraged IBM QRadar, a centralized security information and event management (SIEM) solution, to protect its assets from cyberattacks.

   (b) JG Summit Holdings (PH), one of the largest conglomerates in the Philippines is partnering with IBM to actively enhance its cyber defense. IBM's Security Operations Center, which provides 24x7 response services, is the key security foundation for JG Summit.

   (c) Freight services provider Yunda (CN) had more than 32,441 outlets and 200,000 couriers at the end of 2021. Yunda processes large shipment volumes — 18,402 billion parcels in 2021 — and massive amounts of personal information each day. With such a significant footprint, the company has made security a critical component of its business. Yunda has built a consolidated security architecture to help protect billions of parcels annually — and the customer data tied to each one. The architecture responds to security incidents six times faster with IBM's QRadar, a modular security suite that protects critical data for its couriers and stops misconduct in real-time.

2. IBM believes that the future of security is an open, connected, integrated platform approach — leveraging open standards, AI, and automation to connect security tools and data across the hybrid cloud, with capabilities for seamless integration with managed services.

   (a) Data Action (AU) hosts an IBM QRadar SIEM solution on high-performance IBM FlashSystem storage. The IBM QRadar SIEM is an open security platform that provides intelligent insights across hybrid environments to automate security tasks by accurately parsing and normalizing logs to detect and prevent internal and external security threats. Using a combination of QRadar index optimization

capabilities and a reliable storage platform, Data Action has significantly reduced common query run times from minutes to seconds and achieved faster security event analysis that improves incident triage and response.

(b) Inspira Enterprise India Limited (IN), a global cybersecurity risk management and digital transformation service provider, modernized its Security Operations Center to provide Managed Security Services to small and medium enterprise customers across industries. They chose the IBM QRadar SIEM solution to oversee the security information and event management needs of their managed security service. The QRadar technology offers Inspira a holistic view of the customer networks that it monitors alongside AI-backed threat detection and log analysis. This allows Inspira to rapidly detect advanced security threats in their customer's network with real-time analytics, changing their defense strategy from reactive to proactive by using accurate and contextual threat data.

3. IBM Security helps clients manage and govern risk that supports today's hybrid cloud environments. Ponemon Institute's Cost of a Data Breach Report 2023 cites 82% of breaches involved data stored in the cloud. Organizations must look for solutions that provide visibility across hybrid environments and protect data as it moves across clouds, databases, apps, and services. IBM Security Guardium helps you uncover, encrypt, monitor, and protect sensitive data across more than 19 hybrid cloud environments to give you a better security posture.

   (a) United Family Healthcare (CN) uses IBM QRadar to fully visualize its cybersecurity risks and threats. With IBM's customized security dashboard, executives can easily observe high-risk security incidents occurring at its sites across the country as they happen, making it easier to assess the source and impact of the problem and respond quickly.

   (b) Saraswat Bank (IN) has embarked on a zero-trust security strategy with the adoption of identity context-related controls with IBM Security Verify Governance and Access solutions.

IBM's Investments

1. IBM Security includes over a dozen acquisitions and more than US$2 billion in dedicated R&D. Acquisitions include Guardium, BigFix, Q1 Labs, Trusteer, Fiberlink, CrossIdeas, Lighthouse, and Resilient Systems.

2. In 2016, IBM announced a US$200 million investment in building a new part of our portfolio focused on incident response. Today, a significant part of that investment has modernized and created new facilities within our global network of IBM X-Force Command Centers, formerly referred to as 'Security Operation Centers.'

IBM's Data Points

1. The United Nations Office of Drugs and Crime notes that cybercrime has evolved into the 21st century's highest-profile type of organized crime. IBM's analysis found that over 80% of attacks are orchestrated by highly skilled criminal rings with access to

shared data, tools, and expertise.

2. The global average cost of a data breach in 2023 was US$4.45 million, a 15% increase over three years. For Asia Pacific countries in 2023, the average cost of a data breach was US$3.08 million in ASEAN, US$3.48 million in South Korea, US$2.70 million in Australia, and US$2.18 million in India.

3. According to IBM Security's 2024 X-Force Threat Intelligence Index, Asia-Pacific was the third most-attacked geography in 2023, accounting for 23% of incidents X-Force responded to globally, with Australia being the most targeted country in the region (23%).

4. Phishing remained the top initial access vector in the Asia Pacific region, with 36% of incidents in 2023.

5. Globally, X-Force saw attackers in 2023 increasingly invest in operations to obtain users' identities globally – with a 266% uptick in infostealing malware, designed to steal personal identifiable information like emails, social media and messaging app credentials, banking details and crypto wallet data.

6. Manufacturing ranked as the number one most-attacked industry, globally, in 2023. It was also the most-attacked industry in Asia Pacific for the second year in a row, with the region experiencing the highest percentage of incidents (54%). The finance and insurance, and transportation industries tied for second, accounting for 12% of cases each, while education was third at 8%.

7. IBM's 2023 Cost of a Data Breach Report found globally, organizations that used Security AI and automation experienced, on average, a 108-day shorter time to identify and contain a breach. They also reported US$1.76 million lower data breach costs compared to organizations that didn't use these capabilities.

IBM's Differentiation

1. IBM Security has 8,000 subject matter experts focused on security, 17,500 clients in over 130 countries, 36 IBM Security locations across the world, and over 10,000 security-related patents.

2. IBM Security Services manages over 150 billion events a day, with more than 3,700 clients worldwide in over 130 countries. IBM is the world's largest enterprise security vendor.

3. IBM Security is ranked as a leader across 14 different analyst reports from Gartner, Forrester, IDC, and others (KuppingerCole, Frost and Sullivan, and Ovum) for our innovation in early threat detection, adaptation to the customer environment, and strong market presence.

4. IBM Security X-Force is a renowned team of security researchers and elite experts skilled in security testing and offensive security, incident response, intelligence and remediation, spam, malware analysis, and more. IBM X-Force Red is an elite group of security professionals and ethical hackers who help businesses discover vulnerabilities in their

computer networks, hardware, and software applications before cybercriminals do.

Looking Forward

1. The industrialization of cybercrime has led to shorter attack lifecycles, which puts more pressure on security teams for a quicker response time.

2. Ad hoc adoption of cloud technologies has created a more complex IT landscape to secure, with gaps in visibility and data being spread across multiple tools, cloud, and on-premises infrastructure. An increasingly fragmented security market, shift to cloud, and growth of hybrid cloud requires a new approach to security.

3. To achieve a more connected security ecosystem, the industry must rally behind common, open-source tooling and work together to create more interoperable technologies.

4. While cybersecurity has previously been seen as a cost, many decision-makers also now recognize that it can play a key role in spearheading strategic transformation programs. They understand that successfully managing cyber risk can improve the efficiency of an organization's IT and cybersecurity teams while also minimizing the costs associated with threat mitigation and recovery. At the same time, organizations that are less sensitive to cyber risks are more resilient and less vulnerable to disruptions that may prevent them from executing their long-term strategy. This is a critical enabler of successful transformation and growth.

Based on the research, IBM X-Force produced the following recommendations for enterprises:

- **Reduce blast radius.** Organizations should consider implementing solutions to reduce the damage that a data security incident could potentially cause by reducing the incident's blast radius- namely the potential impact of an incident given the compromise of particular users, devices, or data. This could include implementing a least privileged framework, network segmentation, and an identity fabric that extends modern security and detection and response capabilities to outdated applications and systems.

- **Stress-test your environments and have a plan.** Hire hackers to stress-test your environment and identify the existing cracks that cybercriminals could exploit to gain access to your network and carry out attacks. Also having incident response plans that are customized for your environment is key to reducing the time to respond, remediate, and recover from an attack. Those plans should be regularly drilled and include a cross-organizational response, incorporate stakeholders outside of IT, and test lines of communication between technical teams and senior leadership.

- **Adopt AI securely.** Organizations should focus on the following key tenets to secure their AI adoption: secure the AI underlying training data, secure the models, and secure the use and inferencing of the models. It's paramount to also secure the broader infrastructure surrounding AI models. IBM recently introduced a comprehensive Framework for Securing Generative AI to help organizations prioritize defenses best on the highest risk and potential impact.

Sustainability

Sustainability is defined as the processes and actions through which humankind avoids the depletion of natural resources to keep an ecological balance that maintains the quality of life of modern societies. In addition to natural resources, we also need social and economic resources. Sustainability is not just environmentalism. Embedded in most definitions of sustainability, we also find concerns for social equity and economic development. Sustainability is made up of three pillars: the economy, society, and the environment. These pillars are also referred to as profit, people, and planet.

IBM's Point of View

1. IBM helps customers align sustainability goals to business objectives while complying with increasing regulatory demands.

   (a) Sarawak Energy Berhad (MY) is using the IBM Envizi platform to gain insights into its carbon footprint. By using Envizi's dashboards and performance-based sustainability analytics, the energy operator can identify opportunities for improvement.

   (b) IBM Korea supported the transformation of Lotte Biologics (KR)' enterprise asset management (EAM) platform in Lotte Biologics' Syracuse plant using the IBM Maximo Application Suite (MAS). IBM's asset and workflow management solution, MAS leverages AI, IoT, and analytics technologies to optimally manage the performance of various facilities across Lotte Biologics' organization from a single, unified platform. IBM's MAS will be used to monitor and inspect manufacturing facilities and oversee work processes to ensure compliance. By using EAM capabilities included in MAS, Lotte Biologics will also be able to analyze data from each facility to plan maintenance and perform predictive maintenance based on each facility's condition.

   (c) EGAT (TH), an agency that oversees Thailand's power security under the Ministry of Energy, has expanded the use of IBM Maximo and AI-powered asset management solutions to all its power plants to improve their operational efficiency. On top of decreasing inventory carrying costs by 30% over 15 months, the investment lowered the cost of purchasing new equipment, reduced unnecessary space utilization, and extended strategic asset lifecycles. The virtual management of its inventory, together with the use of machine learning, allows EGAT to see the health score and life of each component in real time, which helps to minimize unplanned downtime, disruption, and asset failure. Predictive maintenance has also reduced the time that EGAT's inspectors need to spend on monitoring assets. The increased efficiency has reduced EGAT's carbon footprint, helped drive more sustainable operations, and comply with Thailand's energy sector 'Carbon Neutrality' regulation.

   (d) Downer (AU), a leading integrated services company, is collaborating with IBM to improve the efficiency, reliability, and carbon footprint of its rail and transit systems, which serve a significant portion of the Australian public transport system, with IBM Maximo.

   (e) SHUTO Technology (CN) used IBM Maximo to build an intelligent equipment and

asset management (EAM) platform for a leading petrochemical enterprise in China. Advanced defect and fault management tracking and the construction of a fault knowledge base improved the client's equipment efficiency and asset management. Since the EAM went live in 2023, the equipment failure rate has decreased by 50%.

(f) Nobo Technologies (CN), the technology arm of China's leading auto parts supplier, Nobo Auto, deployed IBM Engineering Lifecycle Management to streamline its R&D processes and solidify tools to improve R&D quality. IBM worked with Nobo Technologies to create an engineering lifecycle management system for multiple product lines and vehicles, bringing Nobo one step closer to its goal of reducing costs by 10%.

(g) The Nature Conservancy India (IN) is using IBM Sustainability Accelerator to build a public information platform to help eliminate crop residue burning in North India, meeting its goal of improving agricultural sustainability and public health, and reducing climate change impact.

2. We operationalize sustainability end to end, with data-driven innovation and a comprehensive and growing portfolio of industry-leading consulting and technology capabilities.

3. Our practical approach integrates and automates quality environmental, social, and governance (ESG) data into daily workflows with speed and scale — across physical, digital, and supply chain domains — delivering true insights in a verifiable and auditable way.

(a) To obtain robust ESG insights and achieve its goal of reaching net zero, Growthpoint Properties Australia (AU) uses the IBM Envizi ESG Suite. This solution captures data from 60 different properties, allowing Growthpoint to manage it on a single platform.

(b) Melbourne Water (AU) streamlines its sustainability reporting to create a single system of record for energy use and ESG performance. The utilities provider replaced its legacy system with the IBM Envizi ESG Suite to help proactively manage its portfolio of transactional energy data and to eliminate the data retention and reporting challenges hindering its sustainability efforts.

(c) Melbourne Water (AU) is also using IBM Maximo solutions to shift from time-based maintenance to condition-based maintenance for storm water management. As technology is deployed to monitor more pit grates, Melbourne Water expects to save thousands of staff hours and estimates of cost savings range from tens of thousands to hundreds of thousands of dollars per year.

(d) Yuanta Commercial Bank Co., Ltd. (TW) has partnered with IBM to build a new cloud native automated green e-loan system with ESG functions. This enhances its capabilities and competitive edge on four fronts — legal compliance, data integration, risk management, and business innovation.

IBM's Investments

1. IBM has a track record of setting precedents with environmental and social commitments for over 50 years. Currently, we have 21 environmental commitments including achieving net-zero greenhouse gas (GHG) emissions by 2030 and diverting 90% of non-hazardous waste (by weight) from landfill and incineration by 2025.

2. IBM acquired Envizi, a leading data and analytics software provider for environmental performance management, to help organizations accelerate sustainability initiatives and achieve environmental goals. IBM was Envizi's client.

3. IBM and 12 other companies are the first members of the MIT Climate and Sustainability Consortium formed to accelerate the large-scale, real world implementation of solutions to climate change.

4. IBM launched the Environmental Intelligence Suite, an AI-powered SaaS solution that helps business leaders plan for and respond to critical weather and environmental conditions while better understanding and controlling their impact on the planet.

IBM's Data Points

1. Four out of five CEOs expect sustainability investments to improve business results in the next five years, according to an IBM Institute for Business Value study. Yet only 23% say they are implementing sustainability strategies across their organization.

2. Some 47% of APAC CEOs rank sustainability among the top three greatest challenges for their organizations in the next two to three years.

3. It is estimated that the data center industry currently uses around 1% of the world's electricity, and usage could reach double digits by 2030. Between 1.8% and 3.9% of the world's GHG emissions are attributable to the ICT industry.

4. The HFS Top 10: Sustainability Services 2022 Report, an analysis of consulting, technology, business, and broader sustainability services firms, ranked IBM as a leader.

IBM's Differentiation

1. IBM believes that technology is a critical enabler to meeting ESG targets both internally and externally. We put our belief into action through goals and commitments, client solutions and research, advocacy, and coalitions.

2. IBM helps customers align sustainability goals to business objectives while complying with increasing regulatory demands. We operationalize sustainability end to end with data-driven innovation through a comprehensive portfolio of industry-leading consulting and technology capabilities. These include IBM Cloud, Z16, Envizi, Environmental Intelligence Suite, Turbonomic, Tririga, and Maximo.

Looking Forward

1. Data and AI will continue to accelerate the sustainability journeys of enterprises. The challenge of designing, commercializing, and adopting successful innovations will require

significant investment and endurance from the business and ecosystem leadership.

2. As companies around the word focus on reducing GHG to deliver on their net-zero commitments, the requirement for robust data and analytics to support this journey will continue to intensify.

Ecosystem

The rapid acceleration of digital transformation that occurred during the COVID-19 pandemic, which is set to continue for the foreseeable future, has increased the importance of a partner ecosystem to meet the technology demands of businesses and governments. No one vendor has access to all the skills, talent, technology, and innovation required to drive the volume and scale of client transformation taking place across our region and the world. Partnering for client success is the new reality, with technology vendors that embrace a broad and diverse ecosystem of partners set to deliver the most successful outcomes for clients.

IBM's Point of View

1. The IBM ecosystem is integral to our growth. We updated our go-to-market model to help streamline the way partners build, service, and sell with IBM.

2. IBM Partner Plus, launched in early 2023, introduces a new way for IBM to deliver value to new and existing partners by helping them gain skills, grow faster and earn more. Through the revamped approach, Partners now have access to the same badges and selling enablement materials as IBMers — at no cost — and can access these materials through a new learning hub designed to drastically improve and simplify the digital experience.

3. IBM's unique open hybrid cloud platform, with RedHat OpenShift and IBM Cloud Paks provides the greatest opportunity for partners looking to grow with IBM and drive transformative change for clients.

   (a) PortalNet (TH) teamed up with IBM to help Thailand's Metropolitan Electricity Authority (MEA) reduce power outages and extend the lifespan of its critical assets using AI-powered enterprise asset management (EAM) solution IBM Maximo Application Suite.

   (b) IBM partner PT&T (PH) helped Wilcon Depot, a leading home improvement and construction supplies retailer in the Philippines, ensure 24/7/365 productivity, make better decisions, and provide customers with a great experience by helping them scale their enterprise resource planning (ERP) software on IBM.

   (c) Earlier in 2023, the Singapore Land Authority (SLA) (SG)'s Digital Conveyancing Portal (DCP) reached a new milestone with the appointment of Tech Mahindra as IBM's system integrator to deploy automation, analytics, security and intelligent asset management technology to develop secure e-payment and digitized documents and signatories for conveyancing process for all types of properties by 2026.

   (d) The Royal Melbourne Hospital (AU) digitized its healthcare facilities management with IBM and IBM partner Trixi. During the first two months after go-live, it managed 26,393 service requests from two hospitals and over 30 other sites, and replaced many paper-based facilities management processes.

   (e) Dubber (AU), an IBM partner and leader in global cloud-based call recording services and voice AI, has been working with IBM to develop a cloud-based solution using IBM Watson Speech to Text. It helps support over 40 million minutes of conversation each month and delivers AI-driven transcription in less than one

minute.

(f) IBM partner Atos SE (CN) launched a new Security Operations Center (SOC) service, backed by IBM QRadar, to simplify the fight against cybercrime. The SOC service costs approximately the equivalent of 1.5 full-time employees, compared to staffing an internal team, which would require seven to eight full-time employees. The center enables Atos to provide small and mid-sized customers with 24x7 security monitoring and protection.

(g) Alibaba Cloud (CN), the digital technology and intelligence backbone of China's Alibaba Group, has partnered with IBM to jointly develop security solutions for enterprises in the APAC region. The solutions integrate IBM QRadar SIEM and IBM Security QRadar SOAR with Alibaba Cloud's security capabilities, providing services such as real-time reporting and centralized visibility in the cloud environment. This enables clients to detect security risks, including ransomware, insider threats, and cloud attacks.

(h) IBM partner Tata Consultancy Services (TCS) (IN) expanded its global alliance with IBM to help clients accelerate their digital and cognitive enterprise transformations. The IBM Enterprise Cloud Architecture Unit that TCS has established as part of this expansion includes technical professionals from both companies working together to develop solutions that help clients migrate workloads across applications, analytics, data estates, and platforms. These solutions use IBM Cloud Paks, enterprise-ready containerized software solutions running on Red Hat OpenShift.

(i) Through our partnership with ASUS (TW), a global technology leader and a top-five device manufacturer, IBM and ASUS are unlocking greater value for clients through security innovation. A key aspect of this collaboration is the inclusion of the IBM Security QRadar Enterprise Detection and Response solution, marking ASUS's first enterprise-ready security offering.

IBM's Investments

1. IBM is investing US$1 billion in our ecosystem to support GSI and ISV partners to provide clients with a seamless and secure journey to the cloud, and to play a much bigger role in fulfilling the many needs of our clients.

2. Since we launched our new partner program in 2021, we have increased the number of technical specialists by 35% globally to support partners.

3. IBM Consulting is strengthening strategic partnerships with SAP, Salesforce, Adobe, and others, as well as forging new partnerships with companies like ServiceNow and Celonis.

4. IBM has increased our channel account team by 100% in APAC. These resources do not compete with partners, but rather focus on supporting them to meet the needs of their clients.

IBM's Data Points

1. Currently, two-thirds of IBM's revenue in APAC comes from this channel.

2. Worldwide, we work with 55,000 ecosystem partners. In APAC, IBM maintains direct relationships with fewer than 100 clients, meaning that our primary route to market is through our ecosystem partners.

3. In the last two years, the number of partners generating revenue for our hybrid cloud offerings has doubled.

4. In Q1 2022, IBM signed US$2 billion with ecosystem partners and achieved 50% growth in our strategic partnerships with AWS, Microsoft, Salesforce, and more.

IBM's Differentiation

1. No other company can provide the level of support, resources, and expertise to help partners get to market faster and grow their businesses.

2. In 2022, we've doubled down on our commitment to the IBM ecosystem, integrating partners into our go-to-market model, increasing their resources and improving their digital experience. In fact, we've taken the next step in that commitment by announcing a revamped approach to skilling, giving partners the same access to education and hands-on training that IBM sellers hold.

3. We are giving partners and clients the flexibility and market access they need to run workloads seamlessly in any environment they like. Over 4,200 partners in APAC benefit from co-marketing investment by IBM to help develop marketing and demand generation activities.

Looking Forward

1. Digital transformation will continue to accelerate rapidly, and enterprises will need to build resilience and adaptability. IBM Consulting, together with our product teams and ecosystem partners, can work together to help clients address these challenges.

2. The increased number of cyberthreats and the need for greater cyber resilience present an opportunity for IBM's strongest collaboration with our ecosystem partners as we work to implement new zero-trust strategies for greater visibility across fragmented IT environments.

3. IBM understands emerging trends for startups and new ISVs. We can help bring innovation from the startup ecosystem to our enterprise customer base through partnerships and collaboration.

Government Policy

IBM Issue Brief: International Trade Policy

COVID-19 created unprecedented disruptions in the global economy, the full impact of which will not become clear for years to come. Companies of all sizes grappled with how to conduct business, reach customers, and maintain supply chain operations in the face of national lockdowns and travel restrictions. As a result, one of the lasting consequences of this crisis has been the accelerated digitization of the global economy, driven by cross-border data flows.

But even as the data flows and digital technologies became more essential to the global economy, there are increasing calls for "data sovereignty", mirroring renewed criticism of free trade and globalization. Concerns by governments and individuals about the safety, security, and use of data, underscore the urgent need for new approaches to engender trust and confidence in the digital economy.

Trade agreements and similar international cooperative mechanisms can be critical components to this effort. The Indo-Pacific Economic Framework (IPEF) negotiations, G-7 Data Free Flows with Trust initiative and the U.S.-EU Trade and Technology Dialogue all provide avenues for governments, working with the private sector, to strengthen the digital trade "rules of the road" that will govern the post-COVID global economy. To that end, IBM has recommended a concrete set of digital trade provisions designed to strike the balance between safeguarding innovation and engendering trust in the data economy by:

- Enabling the free flow of data
- Protecting source code and algorithms and prohibiting forced technology transfers
- Ensuring technology choice and encouraging open architectures
- Fostering innovative encryption products
- Ensuring non-discriminatory treatment of digital products and new services
- Prohibiting digital customs duties and
- Fostering reskilling and STEM education

Data driven technologies are becoming more essential to our daily life and work. Leadership from policymakers and trade negotiators in developing the next generation of digital trade principles will help ensure these technologies are used responsibly and with clear purpose. This example can set standards for future bilateral and multilateral agreements that will create the environment of trust essential for the digital economy.

IBM Issue Brief: Cloud Policy

IBM believes any public policy around cloud computing and "tech sovereignty" must ensure that the ultimate choice, and control, resides with the customer. The user of cloud services should be able to take a risk based approach to decide where, when and how their data is used, stored, accessed, or moved. Forced localization by government intervention of any

aspect of cloud computing may greatly reduce its security and resiliency.

Accordingly, we strongly support policies that adhere to these five principles:

1. **Choice.** Policies should enable a risk based approach to data privacy and security in the cloud where enterprise users of cloud services can make informed decisions on where and how to store, move, access, and share data. Such decisions can be based on organizations' risk appetite, specific use cases, data type, and business drivers and security needs and not be required as part of cloud laws or security certifications.

2. **Security.** Taking a "technical mechanisms"-first approach (leveraging tools that allow for strengthened data safeguarding and users to keep full control of their encryption keys) is key to strengthen security and resiliency. Cross-border sharing of threat information and monitoring of networks from various locations drives more positive security outcomes. Policies should also leverage existing globally recognized security standards and certification regimes to avoid duplication of effort and diluting focus and resources.

3. **Trust.** Enterprise users of cloud service providers should be able control and safeguard their data by leveraging strong privacy protections and tools, including encryption of their data, without fear of government "backdoor" access. Policies should be clear that any government request for data should be directed to the user, not the cloud provider. Policies should acknowledge the differences between cloud service provider business models and tailor regulatory obligations proportionate to the risk level that data-driven business models pose to consumers.

4. **Harmonized.** Policies should enable the free flow of data across borders, avoid residency requirements and support bilateral/multilateral data agreements. Policies should also avoid conflicting with other nations' law such that cloud service providers' legal compliance in one country does not amount to a violation of law in another.

5. **Future proofing.** Policies should be "tomorrow ready" to address technological heterogeneity, service and data migration needs, and quantum computing. We support policies that recognize a shared responsibility model looking to the future to enable interoperability and data portability, and that prioritize investment and action today to begin to migrate to industry agreed upon standards for post quantum cryptography (PQC).

IBM Issue Brief: Artificial Intelligence Policy

IBM believes AI is an important technological tool that will help accelerate economic growth, increase societal well-being, and enhance U.S. national competitiveness. For those benefits to be captured, however, it is imperative that people have trust in the technology.

To that end, IBM supports policies that advance trustworthy AI, and which establish clear, risk based guardrails tailored to the roles and capabilities individual organizations play in the broader AI developmental lifecycle. For example, AI developers may be better positioned to address certain concerns associated with early stage development of AI models, whereas

organizations deploying AI systems may be better equipped to address issues related to the consumer facing impact of these technologies. Before crafting more specific rules and regulations, policymakers should be aware of the many differences — in capabilities and responsibilities — that exist within this broad and diverse ecosystems of actors.

Rules governing AI should be premised on a "precision regulation"-approach — tailoring regulations to a specific and observable set of harms that address problems in a discrete, targeted manner, to avoid the unintended consequences that often accompany more broad-based regulatory approaches. One area that IBM believes is ripe for a precision regulation approach to AI is the development of rules governing impact assessments for various risk levels of AI systems. AI impact assessments should be based on the intended use-case application(s), end-user(s), how reliant the end-user would be on the technology, and the level of automation.

Recent advancements in the use of foundation models — AI models trained on unlabeled data to perform general functions, such as text or image generation, rather than for a specific purpose — have significantly expanded the capability and ubiquity of AI systems. Of course, the advancements can pose various risks, but this does not warrant a fundamental departure from a risk based approach.

Governments should create policies that:

- Take a risk based approach that assigns primary responsibility to deployers, not developers
- Ensure any efforts to regulate foundation models / general purpose AI are proportionate and technically feasible
- Promote harmonization and alignment across interdependent regulations globally
- Support the development and use of impact assessments for high risk AI systems;
- Promote and accelerate collaborative efforts with industry and academia to create definitions, benchmarks, frameworks, and standards for trustworthy AI systems
- Formalize best practices around evaluation and disclosure for foundation models / general purpose AI that can help in the responsible deployment of AI.

IBM Issue Brief: Cybersecurity Policy

Governments around the world are responding to the cyber threat landscape with increased focus on incident reporting, vulnerability monitoring, baseline cybersecurity requirements, and corporate governance. To be effective, cybersecurity polices must be technically feasible and targeted. Overly broad and cumbersome rules waste resources and stymie the nimbleness and innovation needed to understand, mitigate, and respond to the changing threat environment. We encourage governments to:

- **Enable a harmonized policy environment at the national and global levels.** Before developing new policies, regulators should first seek to reduce the complexity

or confusion of compliance burdens by leveraging international standards. This is to harmonize regulatory cybersecurity requirements, including for critical infrastructure. Harmonization is needed at the national level across agency and sectors, as well as globally. Geo-specific requirements and localization policies conflict with cybersecurity best practices.

- **Take a responsible approach to incident reporting legislation.** Incident reporting legislation should focus on reporting confirmed cyber incidents in the prevailing 72 hours reporting timeframe and provide confidentiality and liability protections for reporting entities. Disclosure of vulnerabilities is not the same as reporting and should be provided through VDM programs and best practices of prioritizing and not disclosing details about vulnerabilities before they are appropriately patched and fixed.
- **Promote resilient software supply chain through industry-led standards.** Providing greater security through understanding and insight into the components of the software (sometimes called a "software bill of materials") is helpful for developers who rely on them to identify and address vulnerabilities. Focus should be on their use, not a mere reporting requirement.
- **Avoid new corporate governance requirements that could weaken security and resiliency.** Corporate boards already ensure appropriate management of cyber risk as part of their fiduciary and oversight role. Any additional requirements should be created in consultation with industry to not inadvertently misdirect resources and create new risks.
- **Avoid applying consumer-focused cybersecurity policies to enterprise engagements, where the facts and risks may be different.** Regulators should take a risk based approach to cybersecurity, taking into consideration the facts, circumstances, and sophistication of buyers, when developing cybersecurity requirements. Applying the same requirements for consumer products to the enterprise space is inefficient and ineffective.

IBM Issue Brief: Privacy and Data Policy

A privacy framework should be globally consistent but tailored to local needs to reduce fragmentation, increase compliance, and enhance interoperability with privacy laws of other countries. Policies should account for the different levels of risk posed by distinct data-driven business models. As stated in Precision Regulation for Data-Driven Business Models, data monetization business models have incentive structures and other high risk elements that create a significantly higher likelihood of causing harm to consumers than low risk business models. Policies should also:

- **Enable cross border data flows.** There is a need to ensure that as data flows across borders freely, it remains adequately protected, in accordance with the obligations undertaken and the commitments made at the point of collection. Organizations must be accountable and should have the flexibility to determine how to best meet this requirement. Privacy laws need to facilitate such flexibility instead of restricting data

flows and/or dictating rigid and complex data transfer mechanisms.

- **Promote responsible use of and legal grounds for data processing.** Legal grounds for processing of personal data include (but are not limited to): processing on the basis of consent, for the purpose to provide a requested good or service, to fulfill contractual obligations, to process data in an employment relationship, for legitimate interests, for research purposes, or for public interest use (such as fraud detection, cybersecurity, health and safety protection, or to ensure compliance with other laws). If privacy laws govern personal data of employees and its processing, these laws must consider the unique needs of employers to facilitate hiring decisions, monitor productivity and assess personnel. For example, by providing a sufficient legal basis for processing employee data.

- **Place the principal responsibility for protecting personal data and privacy on data controller.** Primary accountability should be placed on the data controller that collects and uses the data, with few obligations (such as reasonable security standards) on the data processor other than abiding by contractual requirements.

- **Promote anonymization and pseudonymization of personal data.** Anonymized (and de-identified) data should not fall under the scope, as it should not be considered personal information. This includes the process of anonymization itself.

- **Adopt a risk based approach.** Risk assessments of harms and benefits associated with specific uses of personal data should be used to tailor risk mitigations. The approach should provide flexibility on how to implement protection controls with a focus on the development of emerging technologies. Codes of conducts, certificates, and other mechanisms of self- and co-regulation should be implemented in a risk based privacy framework.

- **Reduce administrative fines and penalties for entities that institute accountability frameworks.** Entities that adhere to accountability frameworks should be afforded safe harbors where a commitment to protecting data privacy and security is evident.

IBM Issue Brief: Quantum Computing

The world is on the cusp of another computer revolution. It is driven by the convergence of powerful technologies: quantum computing, high performance computing and artificial intelligence. As governments look to get ahead and lead in this next revolution, policymakers should consider the following recommendations:

- **Export controls.** IBM supports the establishment of multi lateral export controls with U.S. global allies that do not restrict the development of quantum technology between and among like minded countries. In turn, IBM supports the restriction of key national security technologies such as quantum computing to D1 export controlled countries (for example, China or Vietnam) consistent with the Export Administration Regulations (EAR).

- **Quantum safe encryption standards.** Accelerate and corral efforts around the National Institute of Standards and Technology (NIST) recognized IBM quantum safe cryptography protocol standards for cybersecurity. NIST recommendations are globally recognized. Therefore, there is an opportunity to effectively promote our tools and services, with U.S. allied nations to establish a quantum safe infrastructure.

- **Accelerate quantum science and the development of mission-based quantum applications, with National Quantum Initiative reauthorization as a big first step.** We support the continued funding for fundamental research in quantum technology. Our next steps must zero in on significant investments in the development of mission critical application in areas such as chemistry, battery technology, and logistics. Increased government funding for access to cloud based and on premises quantum systems are paramount. Government funding and usage are historically the foundations and catalysts for emerging technologies' commercial development.

- **Educate, diversify, and grow a high performing workforce.** Support both our domestic (that is, U.S. National Q-12 Education Partnership) initiatives to build a robust ecosystem of industry, academic, and government practitioners. This will grow the supply chain of contributors needed for the industry. Development of a skilled workforce remains an ongoing challenge. Without focused attention and action, the gaps will only widen in the near-term.

- **Government's focus as a convening power.** The power of government communication and cooperation among U.S. allies involved in developing quantum computing technology and its associated marketplace is paramount. Long term success will require the involvement of the greater allied community. There is a need for continued engagement among international partners to ensure a vibrant, fair, and competitive market that nurtures scientific and economic opportunities.

IBM Issue Brief: Workforce Policy

After a sustained period of liberalization of employment rules worldwide, we are seeing governments' policy agendas increasingly leaning toward protecting employees and enabling organized labor.

The Biden administration is pursuing union and worker-friendly agendas across all areas of policy from international trade to union organizing in the U.S. A most recent example is the proposal to ban non-compete agreements. Countries such as Mexico, Romania, and Colombia are reducing employers' flexibility and increasing union leverage. Unions are having success in their priorities being reflected in multilateral institutions such as the ILO, OECD, and the United Nations.

The most important venue for IBM is the European Union, which is continuing to intensify and expand its already comprehensive regulation of employment. Organized labor is having a strong influence on the EU's approach, and governments in EU member states have become more accepting of additional employment rules.

The EU has increasingly focused on regulating the relationship between employers and its

employees. Examples include rules on telework, work life balance, and the right to disconnect. New technologies and more flexible ways of working are seen as a risk to workers' rights and therefore ripe for regulation. We fully support regulation that ensures employees' rights; however, EU employment rules are often too prescriptive. The result is a growing compliance burden and interference with our workplace culture that is based on trust and flexibility.

The EU is advancing regulatory agendas on the use of AI in employment that will make it increasingly difficult for IBM to deploy technology in human resources processes. EU policymakers do not sufficiently recognize the benefits of technology. Policymakers are adopting more sweeping regulatory measures when their focus should be on use cases where workers' rights are significantly at risk.

The EU is also seeking to increase the say of employees in business decisions. For example, on restructuring and the use of AI. We fully support existing information and consultation processes already established by EU and national rules. Increasing employee influence would stop necessary management decisions from being taken in a timely and efficient way. EU institutions are also pushing for a greater role for organized labor, as they perceive that workers' rights are better safeguarded if they are represented collectively. IBM cooperates with trade unions in some but not every EU member state. Increased unionization in our EU operations would slow business change and reduce management prerogative. Achieving this result through legislative would contradict the voluntary nature of collective representation.

The EU institutions and Member State governments should:

- Ensure regulations take account of employers' and employees need for flexibility by being principles based rather than prescriptive.
- Restrict employment regulations to areas where there are significant risks to workers.
- Ensure regulations allow for the development of different ways of working and use of technology at the workplace.
- Avoid rules which oblige union representation in companies.

IBM Issue Brief: Tax Policy

The Organization for Economic Co-operation and Development (OECD) has been leading a tax reform project to ensure that global corporations with over US$800 million in annual revenues, pay a minimum amount of corporate tax (15%) on income earned in countries where they compete. Since 2021, over 130 countries (including the U.S.), have agreed in principle to implement a global minimum tax regime, referred to as Pillar Two. There is a second OECD proposal called Pillar One, which would reallocate more of the profits of the world's largest most profitable companies, to market countries. Pillar Two is further along than Pillar One, which faces growing opposition from developing countries.

For the Pillar Two rules, the OECD continues to provide guidance for how countries should implement the minimum tax regime into national laws, sometime in 2024, but this could slip as countries continue to negotiate. The U.S. is not fully on board, as Congress (notably the GOP-controlled House and GOP Senators) challenges the Biden Administration for not

having engaged with it during negotiations that would significantly change U.S. tax rules. The U.S. Treasury did not get approval from Congress before agreeing to the Pillar Two tax regime despite it requiring Congressional implementing legislation.

Specifically, Pillar Two allows governments to "top-up" the tax rates of multinationals, their own as well as foreign, to 15%. This is when companies are paying less than 15%. For those governments that do not adopt Pillar Two rules, there is a backstop mechanism that allows them to collect some of the top-up tax in any country in which a company operates. It is this extra-territorial surcharge that some governments, including the GOP Congress, find troubling.

The minimum taxes of Pillar Two and evolving guidance are complex and would apply even though the U.S. has a minimum tax — the GILTI, or global intangible low-taxed income, that was enacted in 2017. The GILTI is not aligned with the OECD minimum tax design, so U.S. companies would pay GILTI as well as new minimum tax under Pillar Two. American companies have complained to the U.S. Treasury, and in a recent hearing on March 10 with Secretary Yellen, House Ways and Means Committee Chairman Jason Smith (R-MO) and colleagues, it was stated that Congress would consider retaliatory measures against countries that would claim the U.S. tax base, under the proposed Pillar Two backstop rules.

IBM's Position

Over the years, IBM has worked to influence the OECD project seeking principals based global consensus on reforming international tax rules, but we do not agree with current Pillar Two rules that we believe will result in double taxation, and considerable compliance burdens from new extensive reporting information requirements.

Since the OECD continues to issue guidance interpreting its Pillar Two Rules, we continue to work to mitigate their impact, as well as work with Congress and the Department of Treasury. While we would not want to see retaliatory measures that would bring tax and trade tensions, we will work with Congress to continue vocal opposition to the discriminatory effects of Pillar Two, notably the backstop rule.

IBM Issue Brief: Anti-Trust/ Tech Regulation

Over the past quarter century, our society and economy have undergone historic changes. The advent of the Internet opened the door to incredible opportunities and promised a new age of social and economic betterment of people globally.

New digital technologies and platforms have created unprecedented advantages in network effects and data collection, shaping markets in profound ways. Many of these practices are made possible by the increasing social and economic reliance on data collection in digital markets. And while data has helped fuel the emergence of high quality, low priced goods and services, the unforeseen consequences — such as the ease of data collection and the proliferation of harmful, illegal content online — should worry us all. As explained in Precision Regulation for Data-Driven Business Models, data monetization business models are particularly concerning because incentive structures and other elements of high risk data-driven business models create a significantly higher likelihood of causing harm to consumers

than low risk data-driven business models.

IBM Policy Priorities:

- Seek to avoid spill over effects of rules aimed at platform market power. Policies designed to reign in dominant data platforms should be crafted with precision to not impede businesses providing innovative, competitive products/services and greater choice, especially in the cloud market. For example, we supported the EU's Digital Market Act, which does just that.

- Advocate for focused right to repair policies that target consumer, not enterprise products. Policies that require providing firmware, maintenance manuals, and other intellectual property, repair parts, and more to independent repair providers should exclude business-to-business/business-to-government contracts and to access to trade secrets.

- Call for the reform of platform immunity protections (US Section 230) by promoting a reasonable care standard. IBM supports requirements for providers of interactive computer services that host and make information available to the public to exercise reasonable care when moderating for harmful, illegal content to receive immunity from liability for harms stemming from that content. These reforms should not undermine cybersecurity protections, such as encryption.

- Support empowering antitrust regulators with greater resources for enforcement actions. Additional resources could help regulators take more action to restore competition in digital data platform markets and help ensure competition continues.

Country Specific Information

Australia

Metric	Value	Percentile (Global)	Median (Global)
Population	26M	51	22M
Urbanization	86%	76	74%
GDP (USD)	$1,699B	84	$335B
GDP Growth YtY	3.7%	53	3.7%
Extraction as a % of GDP	26%	41	30%
IT Market Size (USD)	$49B	91	$3.6B
IT Market Size as a % GDP	3.3%	88	1.6%
Human Development Index 2021	0.95	97	0.74
Corruption Perceptions Index	75	93	40
Imports + Exports as a % GDP	49%	23	92%
Energy Consumption 2021 (TWh)	1,578	82	547
Energy Consumption Per Capita 2021 (GWh)	61	92	32
Primary, Secondary, Tertiary Industry	3.1%, 21%, 68%	55, 42, 58	3.1%, 24%, 67%
Productivity 2019	61	79	36
M1 Velocity (M1 5-Year CAGR)	1.3 (-12.6%)	43 (17)	1.6 (-8.4%)
ICOR	7.1	14	1.4

*** Data for 2022

Table 2: Australia Political-Economic Indicators

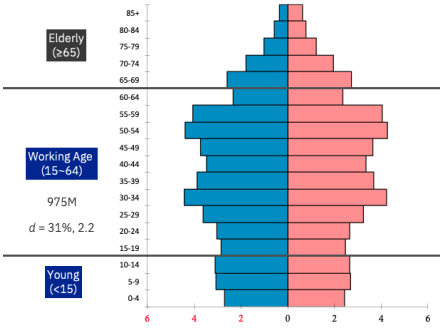


Figure 4: Australia Demographics

Macroeconomic Insights

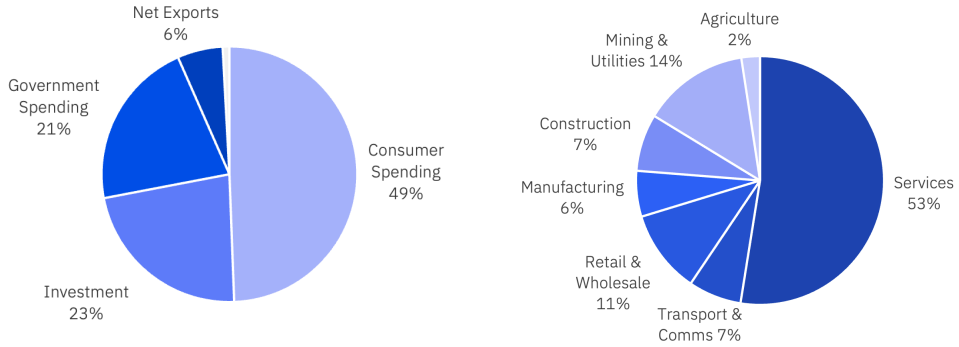
1. Inflation and Consumption. Annual inflation in Australia was 6.6% in 2022. Consumption was $1.2 trillion, up 2.5%.

2. Foreign Direct Investment (FDI). FDI inflows to Australia rose 170% in 2022, up to $67 billion. IT competitors continue to invest in cloud infrastructure buildout.

3. IT Market. IBM-addressable IT market opportunity grew 10.4% in 2022. The market is expected to grow 7.0% in 2023 and 6.7% in 2024.

4. IBM Market Share. IBM is ranked #1 in Australia for non-x86 Servers in 1H22 (with 78% share), #5 for External Storage (8.4%) and #6 for Total Servers (7.3%). In 2021, IBM ranked #4 in Software (4.5%), #5 for TSS (5.8%), #7 for Consulting (2.4%) and #11 for Public Cloud (1.6%).

5. IBM's Year of Operation. Founded in 1932. 92nd year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 5: Australia GDP and Industry

AI and Emerging Tech

On AI: In early 2023, the Australian government released its "Safe and Responsible AI in Australia" discussion paper for public comment. IBM made a submission to this process and also ensured that IBM's point of view was reflected in the submissions of leading business associations.

IBM presented our viewpoint on AI regulation and the IBM's governance model to the Minister, the Department of Industry, Science and Resources' AI Regulation team, and the National Artificial Intelligence Center (National AI Center). IBM is also a member of the National AI Center's Think Tank, which will make recommendations to the government as it considers the policy framework required to ensure the responsible use of AI in Australia. The Minister is expected to announce his response to the consultation process by the end of 2023.

On quantum computing: In May 2023, the Australian government announced its National Quantum Strategy following a period of public consultation, in which IBM participated. The strategy aims to promote the development of a world-leading quantum industry in Australia. It includes commercialization funds for startups, postgraduate students, and other skill-development initiatives, innovation programs, and international partnerships. It also allocates funding for 'new industry-ready quantum technologies' from the National Reconstruction Fund, with priority being given to local startup companies, including those with strong university links. IBM is working with the CSIRO regarding our quantum computing capabilities and looking at partnership opportunities.

Data Sovereignty

The Hosting Certification Framework (HCF) applies to service providers that deliver or manage hosting services for Australian government customers. This includes the facilities hosting government data, its systems, and supply chains. Service providers, including providers of data center facilities and cloud service providers, are required to obtain HCF certification to host sensitive government data. IBM has been fully certified at the highest strategic level for two of its three data center offerings. It was proposed that the HCF be expanded to SaaS providers but IBM and other industry players raised serious concerns about the practicality of this approach. The extension of the HCF to SaaS is now officially "on hold". This is a good outcome for IBM.

Electronic Surveillance Reform: The Australian government has introduced reforms to streamline Australia's electronic surveillance laws. The government legislation aims to create a single, streamlined, and technology-neutral Act that regulates telecommunication interception, covert access to stored communications, and the use of listening and tracking devices. IBM has contributed to this process to ensure that it aligns with IBM's approach to the responsible use of data and transparency with clients.

Digital

National Data Security Action Plan (April 2022): The Australian Government released a discussion paper covering (1) making data more secure; (2) making custodians of data more accountable; and (3) giving individuals more control over their data. This currently operates

in relation to the energy and telecommunications sectors and is likely to be extended to other industries. IBM is broadly supportive provided, that it does not become too onerous for IBM or its clients to implement.

Privacy and Cybersecurity

The Attorney-General's review of the Privacy Act (1988) (Privacy Act) started in late 2019 with the aim of comprehensively evaluating privacy regulation in Australia. Following a wide-ranging consultation process in which IBM was fully engaged, the Australian government released its response to the consultation process in September 2023. The government has proposed several major changes to the Privacy Act, the vast majority of which align with the changes sought by IBM, including:

1. An expanded definition of personal information, including geolocation and genomic information
2. Distinguishing between controllers and processors of information, aligning with other jurisdictions
3. A new requirement that data use must be "fair and reasonable," aiming to stop firms from deceptively collecting and using people's personal information
4. Extending the Privacy Act to small businesses (which are currently exempt), following a further consultation process and support package for the small business sector
5. Immediate removal of the exemption allowing small businesses to use facial recognition or trade in personal information
6. A new personal right to sue for breaches of privacy, along with the creation of a statutory tort for serious breaches, bringing Australia in line with other OECD countries
7. Rights, similar to current EU privacy laws, enabling individuals to:
   (a) Request personal information erasure
   (b) Object to information collection
   (c) Request corrections
   (d) Remove sensitive, inaccurate, out-of-date, incomplete, irrelevant, or misleading information from search results.
8. A right to request "meaningful information" about how automated decisions with legal or other significant effects are made, emphasizing transparency regarding information collected using AI and the algorithms used
9. Strengthening of consent, defining consent as voluntary, informed, current, specific, and unambiguous, with the ability to be easily withdrawn
10. Consultation on creating a criminal offense for malicious re-identification of de-identified information with the intention to cause harm to another person or obtain an illegitimate

benefit.

Several states also have privacy laws, and the review recommends establishing a Commonwealth, state, and territory working group to harmonize key issues relating to privacy laws. The next step in this process is for the Australian government to draft legislation for further input by industry, with IBM actively participating in this process.

Australia has introduced a comprehensive range of cybersecurity laws and regulations over the past decade, but these have tended to be managed by different departments and have contained substantial overlap. These initiatives have included legislation that places obligations on providers of critical infrastructure and systems of national significance. IBM is subject to a range of new reporting and internal assessment obligations under this regime and has worked closely with the Department of Home Affairs and the Digital Transformation Agency to implement them. Some of these obligations overlap with the cloud hosting obligations outlined above.

In 2023, the Australian government announced a review of the cybersecurity regime and broader ecosystem in Australia to improve coordination and consistency. IBM welcomes greater coordination and the streamlining of obligations for companies such as IBM, which have complex infrastructure and operational systems. IBM fully participated in the review's consultation process. The government's response is expected before the end of 2023.

Procurement

There are no major issues with procurement policy in Australia, although there are requirements that government contractors employ a percentage of Aboriginal and/or Torres Strait Islander staff for large contracts. Currently, there are insufficient numbers of appropriately skilled Aboriginal and Torres Strait Islander people for IT companies to meet this requirement, so it is not being enforced. To address this issue, IBM has implemented a strategy designed to build a pipeline of skills by running priority programs for Aboriginal and Torres Strait Islander students. These programs are conducted in partnership with Federation University in Victoria, Charles Sturt University in New South Wales (NSW), and Edith Cowan University in Western Australia (WA). This strategy aligns with IBM's Reconciliation Action Plan.

Skills

There is a critical skills shortage in Australia across all sectors, with the IT sector experiencing particularly high skill shortages. IBM has strong partnerships for skills development with Federation University in Victoria, Charles Sturt University in NSW, and Edith Cowan University in WA. IBM's SkillsBuild program is also being rolled out across the country, with several localized projects focusing on cybersecurity. In NSW and the Australian Capital Territory, IBM has partnered with the veterans' organization, Soldier On. There is also a plan to extend these projects into WA. These projects are well-regarded by the Australian government.

Trade and Market Access

Australia is one of 14 countries participating in the Indo-Pacific Economic Framework (IPEF) and has remained very supportive of the framework's trade pillar, which covers digital trade. This is notwithstanding some nations becoming less supportive of the framework in recent times.

In addition to IPEF, Australia continues to be a strong supporter and leading participant in digital trade discussions in the region. The Australia-Singapore Digital Economy Agreement (DEA) continues to be the gold standard for DEAs. Australia is also very active in the World Trade Organization, taking a leading role in initiatives such as the Joint Initiative on E-Commerce. It also played a key role in extending the moratorium on customs duties on electronic commerce, which it would like to make permanent. Australia is actively pursuing the extension of this moratorium in the lead-up to formal discussions in 2024.

Sustainability

Australia is a party to the Paris Agreement, which came into force in 2016. The Paris Agreement aims to strengthen the global response to the threat of climate change by:

1. Holding the increase in the global average temperature to well below 2 degrees above pre-industrial levels
2. Pursuing efforts to limit the temperature increase to 1.5 degrees.

Under the Paris Agreement, Australia must submit emissions reduction commitments known as Nationally Determined Contributions (NDCs). Australia's most recent update commits the country to reduce its emissions to 43% below 2005 levels by 2030. The Powering Australia plan is the Australian government's plan to reduce emissions while creating jobs and cutting power bills. Australia's strategy to achieve this includes:

1. Restoring Australian leadership on climate change
2. Backing industry, agriculture, and carbon farming
3. Reducing transport emissions, including by making electric vehicles more affordable
4. Investing A$20 billion in the electricity grid to support more renewables
5. Helping communities benefit from solar banks and batteries.

The Australian government encourages businesses, industries, and consumers to reduce their emissions through various programs and initiatives, including:

1. The Emissions Reduction Fund provides incentives for organizations and individuals to adopt new practices and technologies to reduce their emissions and store carbon
2. Climate Active encourages Australian businesses to become carbon neutral by awarding the Climate Active Carbon Neutral Standard certification
3. The Renewable Energy Target aims to reduce emissions by encouraging more electricity

generation from renewable sources

Singapore-Australia Green Economy Agreement: In October 2022, Singapore and Australia enhanced their commitment to cooperate to create a "green economy" under their trade agreement. The green economy agreement includes new programs to incentivize sustainable agriculture and green shipping corridors. The seven areas of cooperation are:

1. Trade and investment
2. Standards and conformance
3. Green and transition finance
4. Carbon markets
5. Clean energy, decarbonization, and technology
6. Skills and capabilities
7. Business engagements and partnerships.

Under this agreement, both countries have committed to reducing tariff and non-tariff barriers to the trade of environmental goods and services to promote cross-border trade in clean energy goods and services. Other highlights include a partnership to promote business engagements and trade and investment in green sectors, as well as research collaboration in areas such as alternative proteins and lithium battery recycling. The agreement will support the transition of both countries to net-zero emissions, boost growth, and create jobs in the green sector.

China

Metric	Value	Percentile (Global)	Median (Global)
Population	1427M	99	22M
Urbanization	64%	29	74%
GDP (USD)	$17,958B	98	$335B
GDP Growth YtY	3.0%	86	3.7%
Extraction as a % of GDP	17%	23	30%
IT Market Size (USD)	$149B	98	$3.6B
IT Market Size as a % GDP	0.9%	42	1.6%
Human Development Index 2021	0.77	59	0.74
Corruption Perceptions Index	45	64	40
Imports + Exports as a % GDP	38%	14	92%
Energy Consumption 2021 (TWh)	43,249	96	547
Energy Consumption Per Capita 2021 (GWh)	30	78	32
Primary, Secondary, Tertiary Industry	7.7%, 31%, 54%	78, 79, 24	3.1%, 24%, 67%
Productivity 2019	12	12	36
M1 Velocity (M1 5-Year CAGR)	1.7 (-0.2%)	56 (99)	1.6 (-8.4%)
ICOR	58.5	3	1.4

*** Data for 2022

Table 3: China Political-Economic Indicators

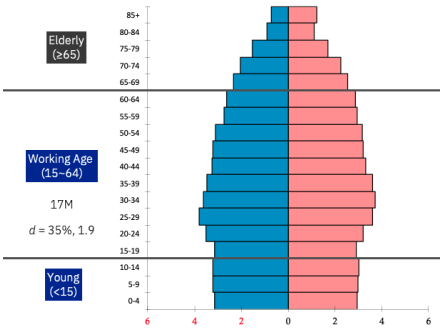


Figure 6: China Demographics

Macroeconomic Insights

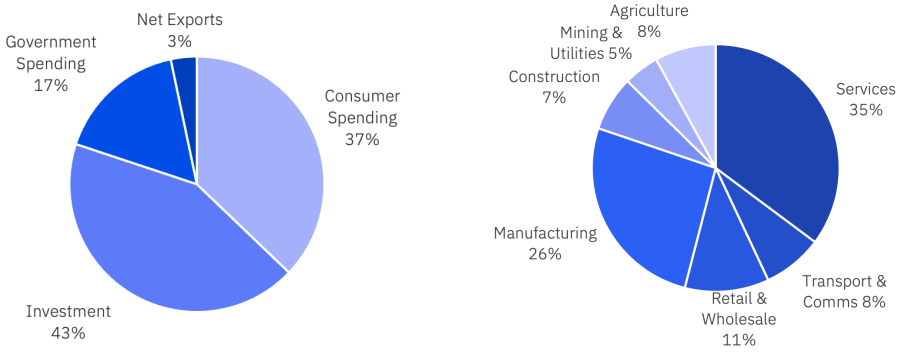
1. Inflation and Consumption. Annual inflation in China was 1.97% in 2022. Consumption was $9.6 trillion, down 0.3%.

2. Foreign Direct Investment (FDI). FDI inflows to China increased by 4.5% in 2022 to $189 billion, led by growth in the high-technology industry.

3. IT Market. IBM-addressable IT market opportunity grew 13.7% in 2022. The market is expected to grow 14.1% in 2023 and 13.9% in 2024.

4. IBM Market Share. IBM is ranked #5 in China for non-x86 Servers in 1H22 (with 2.2% share), #13 for External Storage (0.4%) and #16 for Total Servers (0.1%). In 2021, IBM ranked #1 for Consulting (2.4%), #2 for TSS (6.5%), #8 in Software (2.0%) and #22 for Public Cloud (0.2%).

5. IBM's Year of Operation. Founded in 1984. In 40th year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 7: China GDP and Industry

AI and Emerging Tech

In July 2023, the Cyberspace Administration of China (CAC), together with the National Development and Reform Committee (NDRC), the Ministry of Education (MoE), the Ministry of Science and Technology (MoST), the Ministry of Industry and Information Technology (MIIT), the Ministry of Public Security (MPS), and the National Radio and Television Administration (NRTA), released the Interim Measures for the Administration of Generative Artificial Intelligence Services. These came into force on August 15, 2023. The measures make it clear that providers of generative AI services with public opinion attributes or social mobilization effects must conduct security assessments according to the state's relevant provisions. Providers must also follow the relevant procedures for the record-filing, changing, and cancellation of algorithms, in accordance with the Provisions on the Administration of Algorithm-based Recommendations in Internet Information Services.

Data Sovereignty

The CAC released its Provisions on Regulating and Promoting Cross-border Data Flow (Draft for Comments) in September 2023. This gives data handlers the green light over the next 12 months for the free cross-border transfer of personal information (PI) not collected or generated within the territory of China, where the number is less than 10,000 people. If an entity expects to provide the PI of 10,000 to 1,000,000 people to another country in the next 12 months, it must file a standard contract for PI export (known as an SCC) with the local provincial-level cyberspace department or pass the PI cross-border transfer certification process.

Digital

The Central Committee of the Communist Party of China and the State Council issued the General Plan for the Development of Digital China early in 2023. Designed as a top-level framework for digital development, the plan focuses on the next steps for China's digital economy, digital government, and digital society. More specifically, it aims to consolidate the "two foundations" of China's digital infrastructure and data resource system while promoting the integration of digital technology. At the same time, it sets out plans for building a digital economy while considering the implications for China's political system, culture, society, and ecology — a "five-in-one" construction, in other words. It also aims to strengthen the "two major capabilities" of China's digital technology innovation system and digital security shield. Finally, the plan sets out ideas for optimizing the "two environments" of domestic and international digital development. In short, the plan follows a "2+5+2+2" framework.

Privacy and Cybersecurity

The CAC has also released Measures for the Administration of Compliance Audit of Personal Information Protection (Draft for Comments). These state that data handlers who process the PI of 1 million people or more must carry out a compliance audit of PI protection at least once a year. Other PI handlers must carry out a compliance audit of PI protection at least once every two years.

The CAC, MIIT, MPS, and China National Certification and Accreditation Administration (CNCA) jointly released the updated Catalogue of Critical Network Devices and Specialized

Cybersecurity Products (Catalogue V2.0) on July 4, 2023. The Catalogue V2.0 includes four critical network devices and 34 specialized cybersecurity products. As the document makes clear, the cataloged products can be sold or provided only after they pass the security certification or security test as per China's cybersecurity laws.

The State Council has also released a set of Commercial Cryptography Regulations, which came into force on July 1, 2023. These outline the critical information infrastructure for commercial cryptography that must be secured by laws, regulations, and the State's relevant rules. The regulations also make it clear that security assessments of commercial cryptography applications must be carried out by the State Council or an authorized commercial cryptography testing body.

The regulations also state that the State Cryptography Administration (SCA) must review and appraise all commercial cryptography technologies. These include cryptographic algorithms, cryptographic protocols, and any key management mechanisms used in network and information systems that need to be secured by commercial cryptography, as required by China's laws, regulations, and the State's relevant rules.

The SCA has also released its Administrative Measures for Security Assessment of Commercial Cryptography Applications. These state that operators of "important network and information systems" must use commercial cryptography to protect the systems and carry out a security assessment of the application of commercial cryptography at least once a year.

Procurement

The State Council released its Opinions on Further Optimizing the Foreign Investment Environment and Intensifying Efforts to Attract More Foreign Investment on August 13, 2023. This document provides 24 policies or measures in six areas. A key focus is to ensure that MNCs and domestic companies can participate in government procurement activities equally. The measures also aim to support MNCs in participating in standard-setting on an equal footing, while ensuring that they can enjoy equal access to supporting policies in accordance with laws. In addition, the document contains a set of actions designed to accelerate revisions to the Government Procurement Law and sets out ways to conduct a targeted inspection on whether businesses have been granted equal access to government procurement. It also describes how to investigate and handle illegal and irregular acts of differentiated treatment to foreign-invested enterprises and publicly announce typical cases of violation at appropriate times.

Skills

Talent development is a key part of the Chinese government's strategy to achieve innovation-driven growth and modernization. China invests heavily in education from primary to tertiary levels and places a strong emphasis on vocational training. Currently, it has more than 200 million skilled workers, about a third of whom are highly skilled. Last year, the central government published guidelines for "building a highly skilled workforce in the new era." Following these directions, many local governments issued concrete policies and programs to strengthen skills training and encourage the inflow of highly skilled workers. Along with plans to promote its digital economy and foster cutting-edge emerging

technologies such as AI and semiconductor production, the country also outlined actions to help foster skilled talent in these areas. China has also increased efforts to woo and retain overseas talent within its borders. Earlier this year, China published 24 measures easing the requirements for foreign employees to work and live in China. Incentives have also been provided by both central and local governments to encourage highly skilled talents to relocate to China to participate in local research projects.

Trade and Market Access

China's Ministry of Commerce (MOFCOM) Bureau of Industry, Security, Import, and Export Control published its No.1 Announcement of the Unreliable Entity List Working Mechanism in 2023. Two U.S. companies (Lockheed Martin Corporation, and Raytheon Missiles and Defense) selling arms to Taiwan island were placed on the list. This is the first time since September 2020 that China has created such a list. Companies on the list will be barred from doing business in or with China, risking heavy fines and other penalties for defying the ban.

The State Administration for Market Regulation (SAMR) recently released its draft Regulations on Fair Competition Review for comment. The regulations mandate that any fair competition review should be under the leadership of the Communist Party of China (CPC) while clarifying how to implement such a review. They set out requirements for establishing fair competition review coordination mechanisms at the national and local levels and specify personnel and funding support, use of IT, and competition advocacy. The new regulations also improve existing review procedures by specifying requirements in four areas: market access and withdrawal, the free flow of commodities and factors, effects on production and operation costs, and effects on production and operation activities. It also states that administrative organs, while seeking comments on policies and measures, should specifically hear the comments on fair competition review.

Sustainability

Nine government departments, including the SAMR, NDRC, MIIT, and the Ministry of Ecology and Environment (MEE), recently jointly released a plan for establishing and improving the standards and metering system for carbon emission peaking and achieving carbon neutrality. This plan has been developed to support China's carbon 3060 goal from standardization and metrology perspectives. China is planning to build several carbon metering centers, create no less than 200 reference materials or samples, and put in place at least 1,000 national standards and industry standards. The plan provides an overall framework for the standards and metering system for carbon emission peaking and carbon neutrality.

Hong Kong

Macroeconomic Insights

1. Inflation and Consumption. Annual inflation in Hong Kong was 1.7% in 2022. Consumption was $34.9 billion, down 0.9%.

2. Foreign Direct Investment (FDI). FDI inflows to Hong Kong fell by 15.7% in 2022 to $188 billion, led by growth in the finance industry.

3. IBM's Year of Operation. Founded in 1984. In 40th year of operations as of 2023.

Data Sovereignty

Hong Kong's Innovation, Technology, and Industry Bureau and CNNIC signed a Memorandum of Understanding (MOU) on Facilitating Cross-boundary Data Flow Within the Guangdong-Hong Kong-Macao Greater Bay Area in June 2023. The MOU sets security rules for the cross-border flow of data within the Greater Bay Area to ensure the safe and orderly flow of data in the region.

Privacy and Cybersecurity

The Personal Data (Privacy) Ordinance (PDPO) was passed in 1995 and, excluding certain provisions, took effect in December 1996. It is one of Asia's longest-standing and comprehensive data protection laws. Based on the OECD's Guidelines on the Protection of Privacy and Transborder Flows of Personal Data published in 1980, it ensured Hong Kong had an adequate level of data protection to retain its status as an international trading center and meet its human rights treaty obligations.

Major amendments were made to the PDPO in 2012. The most significant of these was the introduction of direct marketing provisions and other additional protections to cope with new privacy challenges and address public concerns.

In 2021, the Hong Kong Government made further amendments to the PDPO. These amendments were designed to combat "doxing" (revealing someone's personal details online). They criminalized doxing acts and conferred statutory powers on the Privacy Commissioner for Personal Data statutory to issue cessation notices and restrict disclosure of personal details. The amendments also conferred power to conduct criminal investigations and institute prosecutions for doxing cases.

The PDPO is applicable to both the private and the public sectors. It is technology-neutral and principle-based. The Data Protection Principles contained in Schedule 1 of the PDPO outline how data users should collect, handle, and use personal data. These are complemented by other provisions imposing further compliance requirements.

India

Metric	Value	Percentile (Global)	Median (Global)
Population	1422M	98	22M
Urbanization	36%	5	74%
GDP (USD)	$3,380B	94	$335B
GDP Growth YtY	6.9%	88	3.7%
Extraction as a % of GDP	9%	6	30%
IT Market Size (USD)	$30B	88	$3.6B
IT Market Size as a % GDP	1.0%	44	1.6%
Human Development Index 2021	0.63	31	0.74
Corruption Perceptions Index	40	53	40
Imports + Exports as a % GDP	49%	24	92%
Energy Consumption 2021 (TWh)	9,728	92	547
Energy Consumption Per Capita 2021 (GWh)	7	61	32
Primary, Secondary, Tertiary Industry	-	-	3.1%, 24%, 67%
Productivity 2019	9	6	36
M1 Velocity (M1 5-Year CAGR)	2.9 (-9.3%)	78 (43)	1.6 (-8.4%)
ICOR	3.2	34	1.4

*** Data for 2022

Table 4: India Political-Economic Indicators

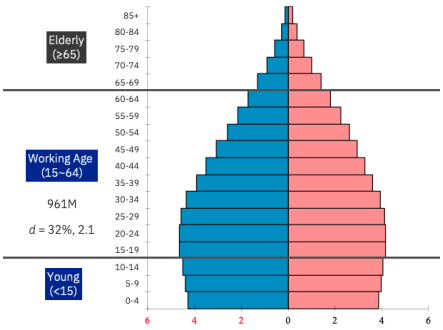


Figure 8: India Demographics

Macroeconomic Insights

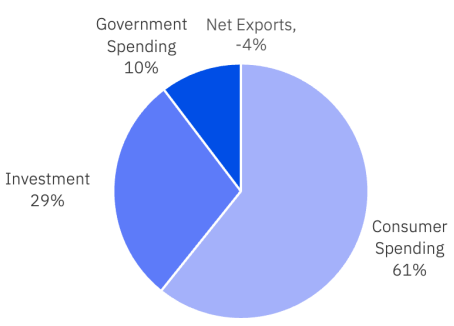
1. Inflation and Consumption. Annual inflation in India was 6.7% in 2022. Consumption was $2.42 trillion, up 9.4%.

2. Foreign Direct Investment (FDI). FDI inflows to India rose 18% in 2022 to $93 billion. About a quarter of this went to the computer hardware and software industry.

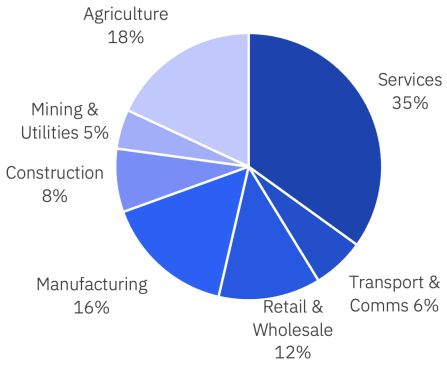
3. IT Market. IBM-addressable IT market opportunity grew 16.1% in 2022. The market is expected to grow 11.3% in 2023 and 11.4% in 2024.

4. IBM Market Share. IBM is ranked #1 in India for non-x86 Servers in 1H22 (with 43% share), #6 for External Storage (7.5%) and #8 for Total Servers (2.4%). In 2021, IBM ranked #2 for TSS (7.6%), #3 for Consulting (3.4%), #5 in Software (3.1%) and #9 for Public Cloud (1.2%).

5. IBM's Year of Operation. IBM first started its operations in India in 1951. After a period out of the country, IBM re-opened in 1993.



(a) GDP Components



(b) Industry Segments

Figure 9: India GDP and Industry

AI and Emerging Tech

India recognizes the importance of AI and has launched several initiatives to foster its development. The National AI Strategy aims to make India a global AI leader by focusing on research and development, skills enhancement, and creating a robust AI ecosystem. At the same time, initiatives like the Global Partnership on Artificial Intelligence (GPAI), India.Ai, AI Garage, AI4ALL, and Atal Innovation Mission are nurturing AI startups and promoting innovation.

The Indian AI industry is predicted to be worth US$28.8 billion by 2025, expanding at a CAGR of 45%, according to a National Association of Software and Service Companies (NASSCOM) analysis. This surge is being helped by the increasing adoption of AI in sectors such as healthcare, finance, retail, agriculture, and manufacturing.

IBM is providing a credible voice on AI regulation and initiatives in India. It works with key ministries and is also participating in three key government and five industry association committees. IBM speakers also take part in prominent AI conferences.

India has approved an outlay of US$700 million for a National Quantum Mission to capitalize on quantum technology's potential value for the nation. The Ministry of Electronics and Information Technology (MeitY) is one of the organizations leading the implementation of this mission.

In December 2021, the Government of India unveiled a Programme for the Development of Semiconductors and Display Manufacturing Ecosystem in India, with an outlay of US$10 billion. It has also established the India Semiconductor Mission (ISM) to formulate strategies for developing a comprehensive semiconductors and display ecosystem. The ISM acts as a driving force when it comes to implementing the Programme for the Development of Semiconductors and Display Manufacturing Ecosystem.

Data Sovereignty

After receiving approval from both houses of Parliament and obtaining the President's assent in early August 2023, the Digital Personal Data Protection Bill of 2022 officially became the Digital Personal Data Protection Act, 2023 (DPDP Act). This Act is now in effect and governs the processing of digital personal data in India, regardless of whether the data was originally collected in digital or non-digital format and subsequently digitized. This legislation is designed to bolster data protection and accountability for corporations such as internet companies, enterprises that create mobile applications, and businesses that handle Indian citizens' data. It's worth noting that the DPDP Act will have implications for India's trade negotiations with other nations. It aligns with global data protection standards, taking inspiration from models such as the EU's GDPR and China's PIPL. The government is currently in consultation with the industry over rulemaking processes for the DPDP Act.

IBM has provided our point of view to several associations on key issues such as significant data fiduciary, cross-border data transfers, consent management, and more.

Digital

The upcoming Digital India Bill will replace the Information Technology Act, which is over two decades old. It will provide comprehensive oversight mechanisms for India's digital landscape and outline a framework for the regulation of emerging technologies. The government is working on a draft of the Digital India Act, which will be released soon for industry consultation.

The Digital India Bill may bring in guardrails against AI algorithms and offer opt-out rights. These provisions will be aimed at bolstering algorithmic accountability — albeit with riders — and empowering citizens to opt out from being subjected to an algorithm's decisions.

Privacy and Cybersecurity

Privacy Law: India enacted its new privacy law — the Digital Personal Data Protection Act, 2023 (DPDP Act) — on August 11. The Act will replace the relevant provisions of the Information Technology Act, 2000, Information Technology (Amendment) Act, 2008, and the Information Technology (Reasonable Security Practices and Procedures and Sensitive Personal Data or Information) Rules, 2011.

The law will come into effect on a date to be decided by the central government, which is authorized to determine different dates for entry into force of various provisions of the legislation. The government is consulting on separate rules to give effect to various provisions of the DPDP Act.

In the interim, businesses will have to ensure that their data systems and practices continue to comply with the provisions of current laws while also preparing for the entry into law of the DPDP Act.

Cybersecurity: The Indian government is planning to unveil a national cybersecurity strategy in India for the next five years. This will include components of an action plan encompassing the whole ecosystem, which should open up a huge opportunity for the industry to innovate in this space. The government is working on several initiatives here, including a 'National Malware Repository.' A research-driven approach is vital for such projects, and the industry has significant room to contribute here.

In its latest publication of directives, effective June 2022, the Indian Computer Emergency Response Team (CERT-In) mandated that companies must report all cybersecurity incidents to it within six hours of being made aware of the incident or becoming aware of their own accord. Service providers, intermediaries, data centers, companies, and government organizations must keep logs of all their ICT systems and maintain them securely for a rolling period of 180 days. For every service provider transaction record, accurate information must be maintained in such a way that individual transactions can be reconstructed. These records need to be maintained for five years.

Procurement

In early August 2023, the government restricted the import of laptops, servers, tablets, and personal computers with immediate effect and notified the public that imports would only be allowed against a valid license for restricted imports. IBM worked with other industry

players on proposals to delay the import restriction start date to 1 November 2023.

During a recent visit to India, IBM CEO Arvind Krishna highlighted this issue in meetings with key stakeholders. IBM also participated in deliberations with various ministers and other senior government figures to discuss the restriction in an "ease of doing business" context.

As a result of these interventions, the government has moved away from imposing a licensing regime to an import management system with no import or license curbs for now.

Skills

The Government of India is currently focused on bridging digital skill gaps in emerging technology areas such as AI, cloud, cybersecurity, and quantum. The government has launched the Indian Semiconductor Mission (ISM), and there is a push to develop capacity in skills such as semiconductor design.

IBM and the Ministry of Skill Development and Entrepreneurship (MSDE) have signed eight memoranda of understanding with its various departments to provide curated courses. These collaborations will focus on co-creating curricula and providing access to IBM's learning platform, IBM SkillsBuild. The aim is to help create skilled learners at school and higher-education levels. The collaborations will also focus on passing on vocational skills in emerging technologies such as AI (including generative AI), cybersecurity, cloud computing, and professional development skills.

Non-CSR: IBM recently renewed its research collaboration with the Indian Institute of Technology (IIT) in Bombay and the Indian Institute of Science (IISc) in Bangalore to help create breakthrough innovations in the fields of hybrid cloud and artificial intelligence (AI). Through these collaborations, IBM aims to support innovation and provide practical solutions to complex global challenges by drawing on the intellectual talents of students, faculty, and industry researchers. By pushing the boundaries of knowledge and exploring new approaches, the collaborations seek to enhance various aspects of technology and contribute to a more advanced and efficient future.

In 2022, the Indian Institute of Technology (IIT) Madras joined the IBM Quantum Network to advance quantum computing skills development and research in India. As a member of the IBM Quantum Network, IIT Madras has cloud-based access to IBM's most advanced quantum computing systems. It can also draw on IBM's quantum expertise to explore practical applications of realizing the wide-ranging benefits of this technology for business and society. IBM has signed an agreement with IIT Madras for Quantum research and skilling. The Union Minister of State and the Minister of Electronics and IT also helped to launch IBM's recent white paper on Quantum.

In Tamil Nadu, IBM is working to equip final-semester engineering students at Anna University with project-based experiential learning on emerging technologies that can enhance their employability skills.

In Bangalore, IBM has facilitated demonstrations and training sessions for federal and state ministers, ministry officials, as well as public sector units. We have carried these out through

our Cyber Range IBM Cybersecurity Hub in the state, which includes an IBM Security Command Center and Security Operations Center.

India's Initiatives on the International Stage: India will establish a "Global South Center of Excellence (CoE)" to find developmental solutions for less industrialized and middle-income countries.

The new institution will undertake research on best practices in different nations, with the aim of implementing and scaling these in developing countries. India has highlighted the example of how a digital public goods sector can be developed and supported by the government in fields such as electronic payments, health, education, and e-governance — a topic likely to be highly beneficial for many other developing countries.

Under the CoE, India will also launch a "Global South Science and Technology Initiative" to share its expertise in areas such as space technology and nuclear energy with other developing nations.

Trade and Market Access

The Government of India is currently pursuing multiple bilateral Free Trade Agreements (FTAs) with different countries. India successfully concluded FTAs in 2023 with Australia and the UAE, amongst others, and is now focused on pursuing agreements with the UK and the EU.

India is participating in the Indo-Pacific Economic Framework (IPEF) on three out of the framework's four pillars — Supply Chain, Tax and Anti-Corruption, and Clean Energy. The government has been organizing multiple stakeholder consultations through industry associations to gather feedback on the proposed framework. IBM regularly engages with the government through these forums, sharing our position on issues including digital trade and the supply chain. We will also be providing input on upcoming FTA-related talks between India and the EU.

The World Trade Organization's (WTO's) customs moratorium on electronic transmission is due to lapse in the next few months. WTO members convening in February 2024 for the 13th WTO Ministerial Conference may decide to make the lapse permanent or temporarily extend the moratorium further. In this regard, the Government of India has sought input from selected industry associations.

IBM provided input on the need for the WTO moratorium to continue for Electronic Transmissions (ETs) during a recent industry consultation organized by the National Association of Software and Service Companies (NASSCOM). IBM advocated for the permanent extension of the moratorium on ETs. We cited the benefits of this extension for India to help attract investments and provide an enabling ecosystem for emerging technology companies to thrive in the country.

Under the Initiative on Critical and Emerging Technology (iCET) framework that is currently in place between India and the U.S., India is especially focused on sectors such as semiconductors, Quantum, biotechnology, and 5G/6G. India and the U.S. also recently held a series of G2G discussions on aspects such as developing resilient global semiconductor supply

chains, strengthening R&D in 5G/6G technologies, and enabling scientific and technological research collaborations in biotechnology.

In terms of engaging with industry under the iCET framework, the U.S. National Science Foundation (NSF) and India's MeitY recently invited proposals from the private sector to foster academic and industrial collaboration. The areas to be covered are semiconductor research, next-generation communication systems, cybersecurity, sustainability and green technologies, and intelligent transportation systems.

In September, India and the U.S. conducted a mid-term review of the iCET so they could continue to drive momentum for the initiative's next annual review, due in early 2024. Overall, there is limited scope for industry to provide inputs on bilateral or multilateral agreements such as the IPEF and the iCET.

Sustainability

India has made significant progress in renewable energy capacity installation, ranking fourth in the world in 2022. The Government of India has implemented comprehensive policy measures to encourage renewable energy. These include setting capacity targets, launching improvements to administrative processes, outlining incentives for the domestic production of solar technologies, and ramping up the production of green hydrogen. However, reliance on coal power continues to be a drag on India's ambition. The government is pushing for increased domestic coal production and aims to build substantial new coal power capacities between 2027 and 2032 under its latest electricity plan. India also wants to increase its Liquefied Natural Gas (LNG) imports. With the current policies, India will overachieve its NDC targets, so it could then set a stronger target. The government's aim of reaching net-zero carbon emissions by 2070 is reflected in the 2023 budget, showcasing a commitment toward a greener and sustainable future. The major initiatives include:

1. The National Green Hydrogen Mission
2. Energy Transition and Energy Storage Projects
3. Renewable Energy Evacuation
4. Green Credit Programme
5. PM-PRANAM and GOBARdhan: Promoting Sustainable Development and Circular Economy
6. Bhartiya Prakritik Kheti Bio-Input Resource Centers and MISHTI
7. Coastal Shipping and Vehicle Replacement for a Greener Economy.

India's stance at COP28 centers around the importance of adaptation and equity in addressing climate change. Along with other developing countries, it is pushing for a new global climate finance target, acknowledging the growing costs of addressing and adapting to climate change.

Indonesia

Metric	Value	Percentile (Global)	Median (Global)
Population	276M	94	22M
Urbanization	58%	23	74%
GDP (USD)	$1,319B	79	$335B
GDP Growth YtY	5.3%	27	3.7%
Extraction as a % of GDP	13%	8	30%
IT Market Size (USD)	$5B	54	$3.6B
IT Market Size as a % GDP	0.4%	27	1.6%
Human Development Index 2021	0.71	40	0.74
Corruption Perceptions Index	34	39	40
Imports + Exports as a % GDP	45%	17	92%
Energy Consumption 2021 (TWh)	2,221	85	547
Energy Consumption Per Capita 2021 (GWh)	8	62	32
Primary, Secondary, Tertiary Industry	12.8%, 30%, 47%	93, 73, 19	3.1%, 24%, 67%
Productivity 2019	12	14	36
M1 Velocity (M1 5-Year CAGR)	4.5 (-11.0%)	90 (26)	1.6 (-8.4%)
ICOR	2.9	35	1.4

*** Data for 2022

Table 5: Indonesia Political-Economic Indicators

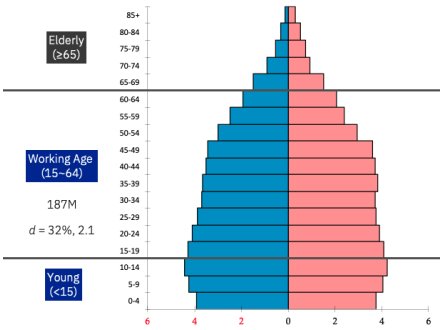


Figure 10: Indonesia Demographics

Macroeconomic Insights

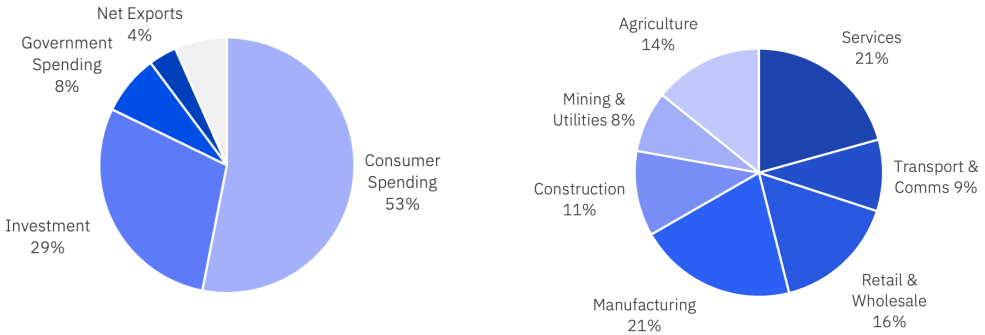
1. Inflation and Consumption. Annual inflation in Indonesia was 4.2% in 2022. Consumption was $800 billion, up 3.9%.

2. Foreign Direct Investment (FDI). FDI inflows to Indonesia rose 2% in 2022 up to $22 billion.

3. IT Market. IBM-addressable IT market opportunity grew 15.7% in 2022. The market is expected to grow 15.9% in 2023 and 14.9% in 2024.

4. IBM Market Share. In 2020, IBM is ranked #1 in Indonesia for non-x86 Servers (with 70% share), #5 for External Storage (8.5%), ranked #5 in Software (5.8%). In 1H21, IBM ranked #1 in TSS (14%) and #4 for Consulting (2.8%).

5. IBM's Year of Operation. Founded in 1937. In the 87th year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 11: Indonesia GDP and Industry

AI and Emerging Tech

The Indonesian government published its National Artificial Intelligence Strategy 2020–2045 (National AI Strategy) in August 2020. This roadmap outlines a national approach to AI adoption, with a strong focus on developing ethical frameworks, talent, infrastructure, and industry collaboration. The Indonesian government has also identified five priority sectors that would benefit from adopting AI – namely health, the public sector, research and education, agriculture, transport, and planning (that is, smart cities). The National Innovation and Research Agency (BRIN) is responsible for coordinating and executing the strategy's initiatives.

The National AI Strategy takes its lead from the government's Making Indonesia 4.0 roadmap, which describes how Industry 4.0 can be used to grow the country's economic competitiveness. It delineates key challenges to competitiveness in the Indonesian ecosystem and suggests ways to address them. It also identifies seven industry focus areas for the government: food and beverage, automotive, chemical, textiles, electronics, pharmaceuticals, and medical devices. Together, these sectors contribute up to 70% of Indonesia's manufacturing GDP and 65% of manufacturing exports. They also employ 60% of Indonesia's industrial workers. The roadmap emphasizes that extensive digital infrastructure is needed and outlines how the adoption of digital technologies, specifically in automation and analytics, could help improve efficiency and boost productivity. It also suggests reforms to improve business efficiency, incentivize technology investments, and promote sustainability.

Recently, the Ministry of Communications and Informatics of Indonesia (KOMINFO) invited IBM to engage in a meaningful dialogue regarding the formulation of strategic insights for ethical AI. As the executive regulatory body, KOMINFO plans to unveil a ministerial decree focused on AI ethics in 2024.

Data Sovereignty

Indonesia has a strong stance on data sovereignty. Indonesia Government Regulation No. 71 (GR 71) stipulates that all public sector data must be managed, stored, and processed within the country. Service providers offering digital services to any public sector institution in Indonesia – be it federal or local – have to comply with data localization requirements. The government has also embarked on an ambitious national data center (NDC) initiative. Under the NDC, four data centers will be built around the archipelago to create a secure and robust environment for storing consolidated public sector data. The first data center will be located in Cikarang, West Java, and will be operational in October 2024. The procurement process for the second data center in Batam is underway. KOMINFO is collecting submissions on how to regulate and manage public sector data, what data should be managed under the NDC, and what data third-party centers should be able to hold. Under Article 21 of the GR 71, private companies can choose to manage, process, and store data either inside or outside the territory of Indonesia. Under the Financial Services Authority of Indonesia (OJK) Regulation No. 13/POJK.03/2020, banks can seek approval from the OJK to locate their electronic systems outside Indonesia.

Digital

The Digital Indonesia Roadmap 2021–2024 outlines the government's strategic approach to holistic digital transformation for the nation. It aims to coordinate government and private sector efforts, growing Indonesia's digital infrastructure and accelerating the adoption of new technologies in the nation's public sector, economy, and society.

KOMINFO is in the process of conceptualizing Indonesia Digital Vision 2045, a comprehensive national blueprint that harmonizes the interests of diverse sectors. These include trade and retail, financial services, manufacturing, agriculture, maritime, Information Communications Technology (ICT), tourism, logistics, education, and healthcare.

Within ICT, the government is honing in on digital government, the digital economy, and digital society. To do so, it will focus on four ICT cornerstones – data and security, digital research and development, the acquisition of digital talent, and the development of policy and regulation. This forward-thinking endeavor will encompass both intermediate (up to 2030) and long-term (2045) objectives. It will also align the objectives of KOMINFO, core coordinating ministries, and other agencies. The Indonesian government's strategy for digital development within ICT includes success metrics in the form of key performance indicators. KOMINFO anticipates that its collaboration across industries, and with companies such as IBM, will help propel the nation toward a thriving, digitally empowered future.

Privacy and Cybersecurity

The Indonesia Personal Data Protection (PDP) Bill was passed by Parliament on October 17, 2022 – as of November 2023, it was awaiting the President's signature for enactment into law. The PDP Bill echoes the European Union's General Data Protection Regulation (GDPR) in that it applies to all foreign and domestic organizations, both public and private, that process the personal data of Indonesian citizens, amongst other activities. It also imposes conditions for cross-border data transfers that are similar to those described in the GDPR. For example, the transfer of personal data must be to a country that has adequate data protections in place, similar to Indonesia's. Data controllers must also provide assurances to those whose data it holds that legally binding personal data protection is available to them. In addition, they must obtain consent before transferring personal data abroad.

KOMINFO is preparing a Draft Regulation on how the PDP Law will be implemented. This is expected to provide clearer guidelines on some elements of data processing that have yet to be touched on in the bill. The Draft Regulation is an extensive document, spanning over 180 pages and comprising 245 articles. Importantly, it doesn't just function as a guideline but holds legally binding authority – businesses must follow its provisions. This means it's critically important to gain a clear understanding of the document, especially as the PDP Law will extend beyond national boundaries. The Draft Regulation makes provision for extraterritorial application, covering individuals, public bodies, and international organizations that process personal data both within and outside of Indonesia's jurisdiction. While it is clearly intended to apply within Indonesia and for Indonesian citizens residing abroad, the Draft Regulation has not yet provided detailed guidelines on how to determine the specific circumstances in which legal consequences are relevant. In short, the scope of extraterritorial application is still unclear.

A key focus of the Indonesian government is the nation's cybersecurity status. In 2022 the OJK issued Regulation No. 11/POJK.03/2022 on the Implementation of Information Technology by Commercial Banks. This was part of wider reforms by the OJK related to data, technology, risk management, collaboration, and institutional setting regulations. All of these reforms have been designed to boost Indonesia's digital banking transformation. The OJK followed Regulation No. 11/POJK.03/22 with the release of the OJK Circular Letter No. 29/SEOJK.03/2022 on Cybersecurity and Resilience for Commercial Banks. This gives more details on how best to implement the regulation in a way that safeguards digital transformation processes.

President Joko Widodo also established Presidential Regulation No. 47/2023 concerning the National Cybersecurity Strategy and Cyber Crisis Management on July 20th, 2023. The regulation consists of 35 articles on Indonesia's national cybersecurity strategy. These set out focus areas and a roadmap for strengthening the National Cybersecurity Action Plan under the mandate of the State Cyber and Crypto Agency (BSSN).

Procurement

The government's procurement of IT products and services is managed through the National Public Procurement Agency (LKPP). Vendors are required to register and comply with the requirements of the LKPP to qualify for participation in government sourcing and tenders. The LKPP also runs an online e-catalog website. Due to restrictions on the type of business license accorded to IBM, we are not allowed to transact directly with the government except for the provision of professional services. Most of our business with the government is done through local business partners.

Local content value (TKDN) for government procurement is covered by Presidential Regulation No. 16/2018 Regarding Government Procurement of Goods/Services. Article 66, paragraph 5 states that procurement of imported goods with unqualified TKDN value [such as IBM's products] is allowed under the following circumstances:

1. The goods cannot be produced domestically yet; or
2. The domestic production volume is unable to meet the demand.

This is further strengthened by Presidential Regulation No. 12/2021.

Skills

There are approximately 1.09 million workers employed in Indonesia's ICT sector. Indonesia produces between 40,000 to 50,000 ICT graduates (2017 APTIKOM data).

A World Bank study from 2019 predicted that between 2015 to 2030, Indonesia would experience a shortage of 9 million ICT workers – which translates to about 60,000 workers a year. These numbers are general estimates, and the definition likely includes digitally savvy workers in other industry sectors.

In its effort to address the skills shortage, the government has introduced several initiatives, including the Kampus Merdeka Program, managed by the Ministry of Education. Another initiative is the Digital Talent Scholarship program managed through KOMINFO. This

program features academies, including the Vocational School Graduate Academy, the Thematic Academy, the Professional Academy, the Government Transformation Academy, the Digital Entrepreneurship Academy, and more.

Trade and Market Access

Indonesia is a signatory of several regional and international agreements that incorporate digital trade principles. It is also a participant in the Regional Comprehensive Economic Partnership and the Indo-Pacific Economic Framework.

As a member of the Association of Southeast Asian Nations (ASEAN), the Indonesian government is a party to agreements such as the ASEAN Agreement on Electronic Commerce and the ASEAN Digital Integration Framework. Indonesia is also taking an active role in negotiating ASEAN's Digital Economy Framework Agreement (DEFA), negotiations for which began in September 2023. Since the COVID-19 pandemic, the government has focused on developing a local capacity for manufacturing and avoiding reliance on global supply chains. This is leading to more emphasis on local content requirements (TKDN).

However, with startups in Indonesia increasingly establishing a regional presence, the government is keen not to impede FDI coming into the country. For this reason, it is also working to ensure its digital trade rules are consistent with global practices.

In a distinct development in 2022, the Ministry of Finance – or more specifically, the Directorate General of Customs – introduced a new mandate through the Finance Ministry Regulation No. 190/2022 (PMK 190). This regulation delineates that specific intangible goods transmitted electronically, including software, operating systems, or digital tools, are now subject to import duties and require a formal declaration. However, Indonesia's customs continue to enforce a 0% import duty for each of these digitally intangible mandatory declarations in accordance with the World Trade Organization's moratorium on the imposition of customs duties on electronic transmissions.

Sustainability

The Indonesian government manages its sustainability agenda through the National Green Growth Program (GGP), which is coordinated by the Ministry of National Development Planning (BAPPENAS).

The GGP supports Indonesia in realizing green growth that can simultaneously reduce poverty and increase social inclusion, environmental sustainability, and resource efficiency. In terms of overarching goals, Indonesia aims to reach net-zero emissions by 2060 and is committed to halting and reversing deforestation.

President Widodo initiated Indonesia's carbon emission credit trading in September 2023, aligning with the nation's sustainability objectives. This groundbreaking development aims to finance reductions in greenhouse gas emissions and position Indonesia as a significant player in the global carbon trade. Inaugural trading involved 13 carbon credits, representing nearly 460,000 metric tonnes of carbon dioxide equivalent (CO2e) from PT Pertamina Geothermal Energy projects in North Sulawesi. These credits were initially priced at 69,600 rupiah (US$4.51) per tonne. Distinguished buyers included major Indonesian banks such as

BCA and Bank Mandiri, as well as entities from the mining sector. Initially, the trading will operate on a voluntary basis, with the government planning to introduce national pollution regulations, including a potential carbon tax. Indonesia is also committed to adopting international standards and expediting efforts for mutual recognition in foreign markets to facilitate the sale of its carbon credits abroad. The emission trading system's transactions are meticulously recorded through blockchain technology.

Korea

Metric	Value	Percentile (Global)	Median (Global)
Population	52M	70	22M
Urbanization	82%	65	74%
GDP (USD)	$1,670B	83	$335B
GDP Growth YtY	2.6%	36	3.7%
Extraction as a % of GDP	27%	48	30%
IT Market Size (USD)	$22B	82	$3.6B
IT Market Size as a % GDP	1.3%	49	1.6%
Human Development Index 2021	0.93	90	0.74
Corruption Perceptions Index	63	83	40
Imports + Exports as a % GDP	97%	58	92%
Energy Consumption 2021 (TWh)	3,445	88	547
Energy Consumption Per Capita 2021 (GWh)	66	94	32
Primary, Secondary, Tertiary Industry	1.8%, 32%, 62%	36, 80, 38	3.1%, 24%, 67%
Productivity 2019	41	55	36
M1 Velocity (M1 5-Year CAGR)	1.6 (-7.7%)	52 (64)	1.6 (-8.4%)
ICOR	-3.8	71	1.4

*** Data for 2022

Table 6: Korea Political-Economic Indicators

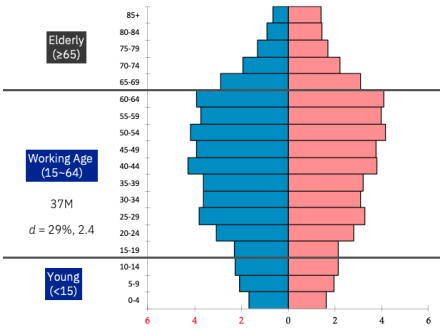


Figure 12: Korea Demographics

Macroeconomic Insights

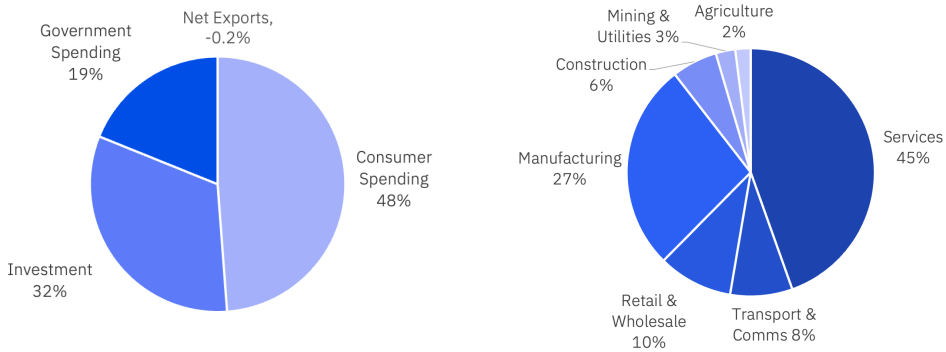
1. Inflation and Consumption. Annual inflation in Korea was 5.1% in 2022. Consumption was $1.12 trillion, down 3.8%.

2. Foreign Direct Investment (FDI). FDI inflows to Korea fell 18% in 2022 to $18 billion.

3. IT Market. IBM-addressable IT market opportunity grew 9.9% in 2022. The market is expected to grow 6.7% in 2023 and 5.8% in 2024.

4. IBM Market Share. IBM is ranked #1 in Korea for non-x86 Servers in 1H22 (with 52% share), #6 for External Storage (4.3%) and #7 for Total Servers (2.8%). In 2021, IBM ranked #2 for TSS (16.1%), #3 in Software (4.3%), #7 for Consulting (2.0%) and #14 for Public Cloud (0.9%).

5. IBM's Year of Operation. Founded in 1967. In the 57th year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 13: Korea GDP and Industry

AI and Emerging Tech

On quantum computing: The Korean Government has included quantum technology in the list of 120 policy tasks in the national agenda announced in 2022. In addition, both the ruling and opposition parties have quantum technology bills before the National Assembly. IBM is lobbying for the government to support quantum ecosystem participants using advanced technology. The ruling party's bill was passed in October 2023, and the Ministry of Science and ICT is expected to issue the government decree in 2024.

On AI semiconductor: The Korean government reviewed the implementation plan to secure technology and create initial market demand in order to leap forward as an AI semiconductor powerhouse based on the 2020 AI semiconductor industry development strategy. The government plans to invest a total of US$700M from 2022 to 2026 to secure super-gap technology in the entire cycle of AI semiconductors, including new devices, design, and software. In addition, the government plans to support R&D projects promoted to secure world-class technology and lead to the commercialization of Korean-made AI semiconductors.

Data Sovereignty

In Korea, with the background of the revision of the Personal Information Protection Act and the Credit Information Protection Act in 2020, the My Data project began to be implemented in January 2022. The My Data business was pursued with the purpose of establishing data sovereignty by allowing individual consumers to directly decide the scope of their financial data provision and control access approval. Accordingly, if consumers consent, it is possible to provide various customized services by integrating and analyzing personal financial information scattered across various financial companies.

Digital

The Ministry of Science and ICT, and the Ministry of Interior, Korea announced that they would establish Digital Platform Government Committee under the president's jurisdiction from July 1, 2022. The digital platform government is a key pledge of the new Korean President Yoon. The newly established Digital Platform Government Committee will promote the provision of preemptive and customized services to the public, implement scientific administration based on artificial intelligence and data, and create an innovative ecosystem through public, corporate, and government cooperation.

The Korean government ranked first in the 2019 Digital Government Index, which was conducted by the OECD. In addition, it ranked second in the 2020 UN E-Government Development Index and first in the 2020 Bloomberg Digital Transformation Country rankings.

Privacy and Cybersecurity

From 2022, Information Security Disclosure is started to be recommended by the Korea Internet and Security Agency (KISA), which is the affiliated agency with the Ministry of Science and ICT, Korea. The disclosure requires information security investment, information security personnel status, information protection-related certification, evaluation, inspection, and other information security activities. The purpose of this official disclosure is to ensure users' security-conscious corporate options and to increase

safety. Multinational companies including IBM had discussions with KISA and persuaded them that it could be difficult to clarify the quantitative part as a global company, and it would be good to describe the qualitative part in a descriptive manner and present examples for Korean companies to benchmark.

Procurement

Korea is an established member of the World Trade Organization's Government Procurement Agency (GPA) protocols, with non-discriminatory government procurement procedures.

Korea's GPA commitments include:

1. "Threshold" amounts by certain Korean government agencies and provincial authorities
2. Procurement commitments in the services and construction industries
3. A prohibition against offsets as a condition for awarding contracts
4. A provision allowing suppliers to pursue alleged violations through GPA-defined bid challenge procedures.

U.S. companies interested in Korean government procurement must work with Korea's Public Procurement Service (PPS). Korea has launched its Korea On-line E-Procurement System (KONEPS) at www.g2b.go.kr. In part, this system includes:

1. A single window for public procurement, showing the entire process
2. Bids which are valid for at least 45 days
3. Bids must be published with a summary in English, including the subject matter of the contract, the deadline for submission of tender, and the address and contact point from which full documents relating to the contract may be obtained.
4. The complete procurement process, with specifications and requirements.

Skills

Quantum computing manpower: In 2023, IBM and the Ministry of Science and ICT hosted a Quantum Computing Leadership Program to foster the growth of quantum technology skills in Korea. IBM Quantum provided an immersive learning experience for quantum computing researchers, postdocs, and graduate students from South Korean companies and universities at IBM's Thomas J. Watson Research Center in Yorktown, New York. The Minister of Science and ICT, Korea requested for continuous cooperation with IBM including the workforce program, during his visit to Yorktown in September 2023.

Cybersecurity personnel: The Korean government announced a plan to train 100,000 cyber workers for five years by 2026. The government said it will expand the university's cyber major course and foster 100,000 talents (40,000 new manpower supply and 60,000 incumbent, capacity-building education placements) through the best development personnel and white hacker development system. The Ministry of Science and ICT plans to expand the domestic cyber workforce by about 40,000 from 124,000 in 2021 to 163,000 in 2026. These cyber

personnel respond to cyberattacks such as development of security products and services to protect information assets, establishment, and management of security policies, and response to accidents.

Trade and Market Access

In March 2022, South Korea and Singapore finalized the Digital Partnership Agreement signed in December 2021. This is Korea's first digital trade agreement, and it includes norms for trade between countries conducted electronically, such as facilitation of e-commerce, activation of digital business, and cooperation in the fields of new digital technologies such as AI and fintech. However, it is evaluated by the industry that it is rather insufficient compared to the standards set by the Singapore-Australia and Singapore-UK Digital Economy Agreements.

Sustainability

The Korean Government, led by the Ministry of Environment, announced the 2050 Carbon Neutral Strategy 2021. Under the principles of contributing to global climate action, laying the foundation for sustainability and carbon-neutral society, and encouraging actions at all levels of stakeholders, Korea's 2050 vision has been established as follows.

1. The Republic of Korea moves towards the goal of carbon neutrality by 2050.
2. The Korean New Deal will serve as a stepping stone to reach carbon neutrality by 2050.

Korea will harness green innovation and advanced digital technologies to create synergies between the Green New Deal and the Digital New Deal, the two pillars of the Korean New Deal. Korea will also take decisive action especially in supporting and investing in the development of innovative climate technologies to achieve carbon neutrality by 2050. The strategy outlines the following five key elements that will guide Korea's policy making, social transformation and technological innovations for its green transition:

1. Expanding the use of clean power and hydrogen across all sectors, including energy, industry, transport, building, waste, farming, and carbon sinks
2. Improving energy efficiency to a significant level
3. Commercial deployment of carbon removal and other future technologies
4. Scaling up the circular economy to improve industrial sustainability
5. Enhancing carbon sinks.

Malaysia

Metric	Value	Percentile (Global)	Median (Global)
Population	34M	56	22M
Urbanization	78%	57	74%
GDP (USD)	$406B	55	$335B
GDP Growth YtY	8.8%	22	3.7%
Extraction as a % of GDP	17%	19	30%
IT Market Size (USD)	$8B	64	$3.6B
IT Market Size as a % GDP	2.0%	67	1.6%
Human Development Index 2021	0.80	68	0.74
Corruption Perceptions Index	47	66	40
Imports + Exports as a % GDP	141%	78	92%
Energy Consumption 2021 (TWh)	1,151	78	547
Energy Consumption Per Capita 2021 (GWh)	34	82	32
Primary, Secondary, Tertiary Industry	6.7%, 34%, 56%	76, 85, 28	3.1%, 24%, 67%
Productivity 2019	25	29	36
M1 Velocity (M1 5-Year CAGR)	2.5 (-5.9%)	71 (81)	1.6 (-8.4%)
ICOR	2.2	42	1.4

*** Data for 2022

Table 7: Malaysia Political-Economic Indicators

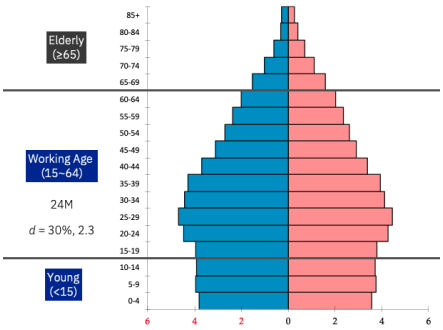


Figure 14: Malaysia Demographics

Macroeconomic Insights

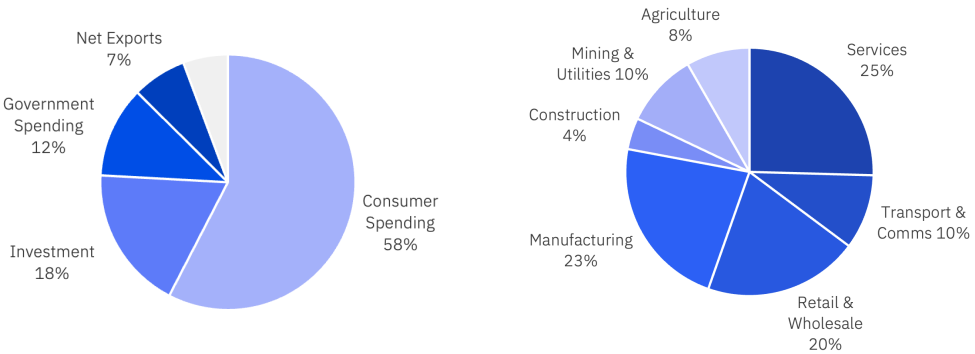
1. Inflation and Consumption. Annual inflation in Malaysia was 3.4% in 2022. Consumption was $281 billion, up 6.7%.

2. Foreign Direct Investment (FDI). FDI inflows to Malaysia fell 19% in 2022 to $15 billion. The services sector receives the most FDI, followed by manufacturing.

3. IT Market. IBM-addressable IT market opportunity grew 11.1% in 2022. The market is expected to grow 9.3% in 2023 and 9.3% in 2024.

4. IBM Market Share. In 2020, IBM is ranked #1 in Malaysia, for non-x86 Servers (with 78% share), #4 for External Storage (11%) and #4 in Software (6.5%). In 1H21, IBM ranked #3 in TSS (8.5%) and #6 for Consulting (2%).

5. IBM's Year of Operation. Founded in 1961. In the 63rd year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 15: Malaysia GDP and Industry

AI and Emerging Tech

The Ministry of Science and Technology (MOSTI) published the National Artificial Intelligence Roadmap on August 9, 2022. The roadmap outlines a plan to create an ecosystem of artificial intelligence innovation for the development of AI, which utilizes the quadruple helix approach that is anchored on the principles of A.I. The government realizes that adoption of A.I must be anchored on a principle of augmentation to enhance capabilities.

The government also introduced the National Blockchain Technology Roadmap on the same day to outline the approach of adoption of Blockchain Technology in industry sectors. These roadmaps are designed to focus government resources to help catalyze the growth and adoption of artificial intelligence and blockchain in the Malaysian ecosystem through the combined efforts of both the public and private sector.

Data Sovereignty

The Malaysian government takes a pragmatic approach when dealing with Data Sovereignty. There is no specific legislation that mandates data localization except for operating guidelines that govern government data. This is consistent with the approach undertaken by governments around the world when dealing with data that impacts national security. Malaysia's focus in driving foreign direct investment in the technology sector helps shape the debate around data sovereignty. The advent of the Multimedia Super Corridor in 1996 and the introduction of the Communications and Multimedia Act of 1996 helped shaped the formulation of digital policies that was aimed at driving FDI's and also the growth of the domestic ICT sector through supporting an open digital economy.

Digital

In February 2021, the government introduced the Malaysia Digital Economy Blueprint. The purpose of the blueprint is to coordinate the digital transformation efforts of the Malaysian government. This would be achieved by driving the adoption of digital technologies in the public sector, and promoting the participation of the private sector in adopting digital technologies for innovation and productivity growth.

Key components of the blueprint focused on digital infrastructure investments in increasing national broadband participation, and the growth of 5G networks in Malaysia. At the same time, the development and rollout of digital government services are a key feature. This is in addition to the introduction of digital payments to help facilitate government transactions. The plan also outlines a strong emphasis on moving up to 80% of public data to hybrid cloud by end of 2022, and for Big Data, A.I and IoT to be adopted accordingly. Emphasis on talent and cybersecurity are also described in the blueprint.

Privacy and Cybersecurity

Malaysia's Personal Data Protection and Privacy Act 2010 (PDPA) is the de-facto regulation affecting all matters related to the management of sensitive personal information by the commercial sector. Designed around seven personal data protection principles, it is consistent with other data protection laws around the world.

As of 2022, proposals for amendments to the PDPA are scheduled to be tabled to parliament

for debate and consent. The proposed amendments include the mandatory appointment of a data protection officer by data controllers, and a 72-hour data breach notification requirement. A data portability component and the introduction of negative list approach towards cross border data transfers are also proposed.

Procurement

Procurement of IT products (hardware/software) and services by government entities are done through tenders or direct-sourcing requests. The government maintains an online procurement portal known as e-perolehan (https://www.eperolehan.gov.my).

To qualify as a supplier to the government for products and services, companies must apply for a certificate issued by the Ministry of Finance. IBM in Malaysia transacts with the government through our local business partners.

Skills

Similar to other countries in the APAC region, technology skills are in high demand. Due to the Multimedia Super Corridor (MSC) initiative in 1996, a lot of focus has turned to the area of talent.

In an April 2021 study conducted by the Malaysia Digital Economy Corporation (MDEC), digital job vacancies were at 56,000 compared to 19,000 in April 2020. The top 10 in-demand digital skills identified by LinkedIn included Cloud Computing, Analytics, and Programming.

In Malaysia, the skills issue is viewed from two lenses. One is the training and development of industry-relevant skills to students in institutions of higher learning. This is addressed through collaborations by industry with universities, polytechnics and community colleges managed by MDEC and the Ministry of Higher Education.

The other is re-skilling of the current workforce. The MDEC Digital Talent Survey 2021, found that 85% of companies recognize the need to reskill their employees. The impact of COVID-19 drove digital adoption in companies and consequently the shift towards digital drove additional demand for digitally skilled workers.

Trade and Market Access

Malaysia is a signatory of the Regional Comprehensive Economic Partnership (RCEP) and the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP). Due to its reliance to external trade, the government has always promoted a trade-friendly stance in its policy decision. In terms of digital trade, Malaysia is in discussions with certain countries to develop Digital Economy Partnerships, which are consistent with its aspirations to strengthen the contribution of the digital economy to the national GDP.

Malaysia is also a member of the Indo-Pacific Framework and seeks to focus its participation on the grouping from the perspective of supply chain resilience and capacity development. Malaysia puts a strong focus on ensuring that high value technology FDI's continue to come into Malaysia with the introduction of the National Investment Aspiration (NIA) program that seeks to reform its incentives-based structure to drive investments from foreign and domestic investors.

As a member of ASEAN, Malaysia are party to such instruments such as the ASEAN Agreement on Electronic Commerce and the ASEAN Digital Integration Framework.

Sustainability

The approach undertaken by the Malaysian government to incorporate the sustainability agenda is done through the incorporation of ESG principles in the 12th Malaysia Plan (12MP) which spans between 2021-2025.

Advancing Sustainability is one of the three themes in the 12MP. It aims to guarantee continuous economic growth while protecting the environment and continuing Malaysia's commitments to global targets. This theme builds on two game changers, namely circular economy and integrated water resources management, critical in fulfilling the goal of building a better, greener and fairer Malaysia in the post-COVID era.

The overarching goal set by the Prime Minister is the national carbon neutrality goal by 2050. The government aims to introduce tax and non-tax incentives for the green economy to push for a structured approach in driving energy transition initiatives and increased investments in renewables as part of the energy mix.

New Zealand

Metric	Value	Percentile (Global)	Median (Global)
Population	5M	21	22M
Urbanization	86%	74	74%
GDP (USD)	$241B	41	$335B
GDP Growth YtY	2.7%	59	3.7%
Extraction as a % of GDP	36%	65	30%
IT Market Size (USD)	$8B	65	$3.6B
IT Market Size as a % GDP	3.5%	90	1.6%
Human Development Index 2021	0.94	93	0.74
Corruption Perceptions Index	87	99	40
Imports + Exports as a % GDP	53%	28	92%
Energy Consumption 2021 (TWh)	210	60	547
Energy Consumption Per Capita 2021 (GWh)	41	87	32
Primary, Secondary, Tertiary Industry	6.7%, 13%, 73%	74, 15, 78	3.1%, 24%, 67%
Productivity 2019	45	65	36
M1 Velocity (M1 5-Year CAGR)	2.7 (-11.4%)	74 (22)	1.6 (-8.4%)
ICOR	-8.3	86	1.4

*** Data for 2022

Table 8: New Zealand Political-Economic Indicators

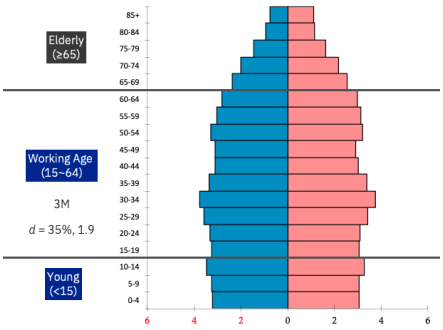


Figure 16: New Zealand Demographics

Macroeconomic Insights

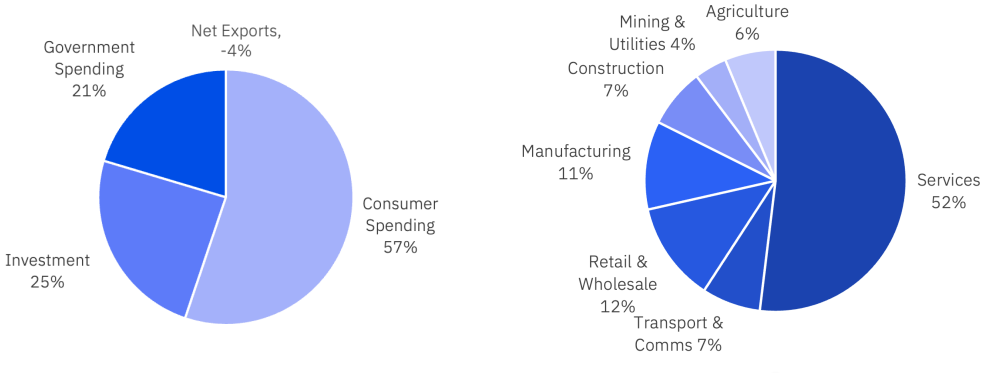
1. Inflation and Consumption. Annual inflation in New Zealand was 7.2% in 2022. Consumption was $189 billion, down 2.8%.

2. Foreign Direct Investment (FDI). FDI inflows to New Zealand rose 71% in 2022 up to $7.8 billion.

3. IT Market. IBM-addressable IT market opportunity grew 12.4% in 2022. The market is expected to grow 7.9% in 2023 and 7.1% in 2024.

4. IBM Market Share. In 1H21, IBM ranked #3 in TSS (8.3%) and #6 for Consulting (1.9%).

5. IBM's Year of Operation. Founded in 1955. In the 69th year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 17: New Zealand GDP and Industry

AI and Emerging Tech

New Zealand has a small but thriving technology industry. The New Zealand government is proactively looking at ways to promote opportunities for the burgeoning AI industry, with a particular focused on the responsible use of AI. This includes establishing a National AI Forum to consider how best to promote the sector, although no formal recommendations have yet been made.

The New Zealand government is also very engaged in the international debate on AI, and has:

1. Adopted the Organisation for Economic Co-operation and Development's (OECD) Principles on Artificial Intelligence, which include public policy and strategy recommendations for governments to ensure the ethical and responsible use of AI
2. Established the Algorithm Charter for Aotearoa New Zealand — a tool that government agencies can use to assess the ethical and legal implications of using algorithms in their decision-making processes
3. Entered into the Digital Economy Partnership Agreement with Singapore and Chile, which establishes new rules and guidance on digital trade and emerging issues such as AI.

Between 2019 and 2022, New Zealand was also the sponsor government of the World Economic Forum's Reimagining Regulation in the Age of AI initiative. This research project was a multi-stakeholder, evidence-based policy project that examined issues and possible governance frameworks for AI regulation. It was structured around three focus areas:

1. Obtaining a social license for the use of AI through an inclusive national conversation
2. Developing an in-house understanding of AI to produce well-informed policies
3. Effectively mitigating risks associated with AI systems to maximize their benefits

In June 2022, the project released a white paper called "A Blueprint for Equity and Inclusion in Artificial Intelligence," which outlined principles and strategies for an Inclusive by Design approach to AI that companies, governments, education institutions, and society can use in considering the development and deployment of AI.

Data Sovereignty

In recent years, New Zealand has attracted significant investment in data center infrastructure to meet the needs of certain types of government and medical organizations. Other considerations are also at play, particularly the Māori data sovereignty policies, which expressly recognize the rights and interests that Māori have in relation to their data, This data has special protections and, in most cases, must be stored onshore. New Zealand also offers a stable regulatory environment and comparatively green electricity to power energy-intensive data centers, making it attractive for companies wishing to meet energy-efficiency goals.

Digital

In 2022, the OECD published a report that found that New Zealand has room to boost its relatively low productivity level by removing the structural bottlenecks holding back the expansion of its digital sector and digital innovation. In particular, the report found that New Zealand was affected by severe specialized ICT skills shortages due to COVID-19-related border restrictions and a weak domestic pipeline of these skills, partly attributed to New Zealand students' poor achievement in mathematics.

The report also found that some government regulations had not kept pace with technological change and digital innovation aimed at limiting risk, and they have failed to prevent harmful activities. More intensive use of digital tools was also constrained by the lack of high-speed Internet connections in rural areas and financial support for small businesses. Meanwhile, poor coordination between export promotion and innovation support prevented young firms that were investing in digital innovation from reaping high returns by exporting their goods and services.

Following the report's release, the New Zealand government developed a Government Digital Strategy and a Digital Action Plan. This comprehensive plan aimed to advance the government's goals of trust, inclusion, and growth. The action plan, with a five-year time horizon and an annual "refresh," enables it to remain responsive to emerging technologies and policy challenges.

The action plan included 11 flagship initiatives covering a broad range of issues, ranging from infrastructure to cybersecurity, skills, and Māori innovation capacity. It also outlined initiatives for building a national digital "brand" and creating a more trusted digital environment on the global stage. While this policy has achieved some of its objectives, challenges in digital skills and connectivity persist, particularly in regional areas.

Privacy and Cybersecurity

The Privacy Act 2020 (the Act) is New Zealand's key legislation relating to data protection. It has relatively strong protections, and New Zealand was one of the first jurisdictions to receive an "adequacy decision" from the European Commission in 2012. The adequacy status was retained following the full implementation of the Act, despite some concern from the European Commission that fines outlined in the Act were not as large as the commission would have preferred.

Cybersecurity is a priority of the New Zealand government's Digital Strategy and Action Plan, and the government has identified a wide range of initiatives and community programs to further enhance the level of cybersecurity across government, industry, and the broader community.

Procurement

New Zealand's government Procurement Rules aim to support good market engagement, leading to better outcomes for agencies, suppliers, and taxpayers.

A key focus of the rules is the importance of open competition — giving all businesses the chance to participate and providing them with enough time to respond to opportunities

properly. The rules also help to:

1. Align New Zealand procurement practices with international best practices
2. Encourage more strategic procurement approaches
3. Foster competition and innovation, resulting in better solutions
4. Promote broader environmental, social, cultural, and economic outcomes.

These rules align with the government's expectations that procurement can be leveraged to achieve broader outcomes. They also focus on promoting public value and include explicit requirements for agencies to incorporate or consider priority outcomes as part of their procurement opportunities. The government's priority outcomes are:

1. Increasing New Zealand businesses' access to government procurement
2. Growing the size and skill level of the domestic construction sector workforce
3. Improving conditions for workers on government contracts
4. Supporting the transition to a net-zero emissions economy and assisting the government to meet its goal of a significant waste reduction.

Like many countries, the New Zealand government has introduced measures to support and encourage local New Zealand businesses, especially Māori IT businesses. However, these measures are not anti-competitive, and IBM has no significant issues with the New Zealand government's procurement regime.

Skills

There is a widely recognized skills shortage in New Zealand across all sectors, including IT. The New Zealand government has embarked on some substantial skills development programs. It has also reopened its border to skilled immigration following the COVID-19 pandemic. Nevertheless, the lack of appropriate skills — particularly digital skills — remains a significant challenge to the growth of the digital economy.

Trade and Market Access

New Zealand has long been a strong and active trading nation. It is one of 14 countries participating in the Indo-Pacific Economic Framework and is a strong supporter of the digital trade pillar. However, agriculture — particularly sheep, beef, and dairy farming — are large and critical industry for New Zealand. Therefore, its Free Trade Agreements, including the recent agreement with the EU, have been particularly focused on these sectors.

IBM has been operating in New Zealand for many decades, and there are no market access issues for us.

Sustainability

In 2022, the New Zealand government released its first Emissions Reduction Plan, outlining how the country will reach its proposed "emissions budget," An emissions budget is defined

as the total quantity of emissions that is allowed to be released during an emissions budget period. New Zealand's legislated 2050 emissions reduction targets are:

1. Net zero greenhouse gas emissions (except biogenic methane)
2. A 24 to 47% reduction in biogenic methane.

New Zealand has also set a target to reduce its net emissions to 50% below its gross 2005 levels by 2030. This corresponds to the National Determined Contribution (NDC) provisional budget of 571 Mt CO2-e over the period 2021 to 2030. The current domestic emissions projections released by New Zealand's Ministry of the Environment indicate that under current policy settings and assumed future conditions, New Zealand is unlikely to meet its NDC provisional budget through domestic action alone. The government has proposed further domestic action supplemented by offshore mitigation to address this shortfall.

Following a general election in October 2023, New Zealand now has a Center-Right Government, formed under the leadership of the National Party's Chris Luxon. The National Party will require support from ACT New Zealand (also known as the ACT Party) to form and maintain a government. While this is a change of direction after the previous Labour Government, which governed for three terms, the new government is unlikely to make substantive changes in relation to the topics discussed in this section.

Philippines

Metric	Value	Percentile (Global)	Median (Global)
Population	116M	86	22M
Urbanization	48%	14	74%
GDP (USD)	$404B	53	$335B
GDP Growth YtY	7.7%	58	3.7%
Extraction as a % of GDP	16%	17	30%
IT Market Size (USD)	$5B	55	$3.6B
IT Market Size as a % GDP	1.3%	51	1.6%
Human Development Index 2021	0.70	39	0.74
Corruption Perceptions Index	33	36	40
Imports + Exports as a % GDP	73%	40	92%
Energy Consumption 2021 (TWh)	511	69	547
Energy Consumption Per Capita 2021 (GWh)	4	59	32
Primary, Secondary, Tertiary Industry	8.9%, 23%, 61%	81, 52, 37	3.1%, 24%, 67%
Productivity 2019	10	9	36
M1 Velocity (M1 5-Year CAGR)	3.0 (-10.5%)	80 (30)	1.6 (-8.4%)
ICOR	9.5	9	1.4

*** Data for 2022

Table 9: Philippines Political-Economic Indicators

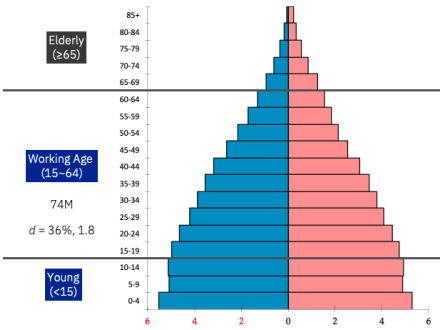


Figure 18: Philippines Demographics

Macroeconomic Insights

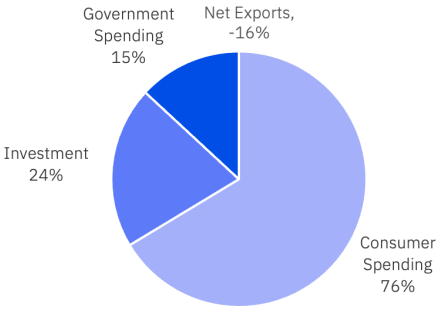
1. Inflation and Consumption. Annual inflation in the Philippines was 5.8% in 2022. Consumption was $368 billion, up 2.7%.

2. Foreign Direct Investment (FDI). FDI inflows to the Philippines fell 27% in 2022 up to $9 billion.

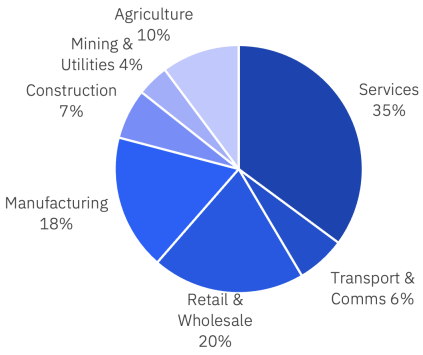
3. IT Market. IBM-addressable IT market opportunity grew 16.3% in 2022. The market is expected to grow 16.7% in 2023 and 17.3% in 2024.

4. IBM Market Share. In 1H21, IBM is ranked #1 in TSS (5.3%) and #6 for Consulting (1.1%).

5. IBM's Year of Operation. Founded in 1937. In the 87th year of operations as of 2023.



(a) GDP Components



(b) Industry Segments

Figure 19: Philippines GDP and Industry

AI and Emerging Tech

In 2017, the Department of Information and Communications Technology released its Cloud First Policy which promotes cloud computing as the preferred technology for government administration and the delivery of government services.

In May 2021, the Department of Trade and Industry released the National Artificial Intelligence Roadmap which aims to accelerate the adoption and utilization of AI in the country to advance industrial development, generate better quality entrepreneurship, and higher-paying opportunities for Filipinos. Through the AI roadmap, they hope to establish the Philippines as an AI center for excellence in the region that is backed by a local talent pool and vibrant innovation and entrepreneurship ecosystem. The roadmap also seeks to establish a private sector-led National Center for AI Research (NCAIR) which will serve as a shared hub for AI research.

Data Sovereignty

In 2022, the Department of Information and Communications Technology amended its Cloud First Policy, first issued in 2017, to clarify the government's policy on data sovereignty, a concept that was confused with the concept of data residency in the previous version. The amended policy clarifies that data sovereignty refers to the application of Philippine laws over foreign laws to data owned or processed by the Philippine government or any entity that has links to the Philippines.

As to data residency, no restrictions are placed in general on government data stored or processed in the cloud, except for "highly sensitive" government data which are required to be stored in-premise within the Philippine territory or other territories over which the Philippines exercises sovereignty or jurisdiction.

Digital

The E-Government Masterplan 2022 serves as the blueprint for a harmonized government information system to achieve a "One Digitized Government" with the following objectives:

1. Optimize government operations
2. Engage citizens
3. Transform services
4. Empower government employees.

The National ICT Ecosystem Framework of 2017 serves as the blueprint for the harmonization and coordination of national ICT plans, programs and projects, with 6 strategic thrusts:

1. Participatory E-Governance
2. Industry and Countryside Development
3. ICT User Protection and Information Security

4. Improved Public Links and Connectivity
5. Resource Sharing and Capacity Building through ICT
6. Enabling and Sustainable ICT Development.

The National Broadband Plan aims to improve internet and wi-fi connectivity throughout the country.

Privacy and Cybersecurity

The Data Privacy Act is the primary law governing data privacy in the Philippines. The Act indicates that it is the policy of the State to protect the fundamental human right of privacy of communication while ensuring free flow of information with an end in view to promote innovation and growth. The Act recognizes the vital role of information and communications technology in nation-building, and the inherent obligation of the State to ensure that personal data in the information and communications systems in the government and in the private sector is secured and protected. There are no data localization requirements nor restrictions placed on cross-border flow of data. The National Privacy Commission is the independent body tasked to administer and implement the provisions of the Act.

The National Cybersecurity Plan was released in 2017 with the following primary goals:

1. Assuring the continuous operation of the country's critical infostructures, public, and military networks
2. Industry and Countryside Development
3. Implementing cyber resiliency measures to enhance the ability to respond to threats before, during and after attacks
4. A cybersecurity educated society.

Procurement

Domestic preference is the general policy in government procurement. The law on government procurement (Republic Act No. 9184) requires eligible bidders to be Filipino citizens or Filipino corporations, i.e. with at least 60% equity owned by Filipinos. Foreign participation in government procurement is allowed on exception basis where:

1. Goods to be procured are not available from local suppliers
2. There is a need to prevent situations that defeat competition or restrain trade
3. The foreign supplier comes from a country which grants reciprocal rights to Filipino suppliers
4. Provided under treaty or international or executive agreement.

For the procurement of consulting services, foreign consultants may be hired if local consultants do not have sufficient expertise. The law on government procurement also calls

for the lowest calculated and responsive bid, and has complex procedures and significant paperwork requirements.

Skills

The Philippine Digital Workforce Competitiveness Act was enacted into law in July 2022. The law establishes an Inter-Agency Council for Development and Competitiveness of Philippine Digital Workforce which is authorized to enter into public-private partnership with experts, industry associations, private companies and other stakeholders in the formulation and implementation of training, skills development, and certification programs. The law also provides a framework for the development of the digital workforce to ensure that Filipinos are equipped with digital skills and 21st century skills.

Trade and Market Access

The Philippine market is generally open to foreign trade and investments. Foreigners can invest up to 100% ownership unless restricted by the Constitution or other special laws as enumerated in the Foreign Investment Negative List. Foreign investment has been liberalized in recent years with the amendment of 3 critical laws:

1. The Amended Retail Trade Liberalisation Act reduces the minimum paid-up capital for foreign retailers to PHP25M from PHP125M and the minimum investment requirement per store to PHP10M from PHP43M
2. The amended Foreign Investment Act allows foreign investors to own small and medium-sized enterprises with a reduced minimum paid-up capital of less than PHP5M, down from PHP10M
3. The amended Public Service Act allows foreign investors to have 100% ownership in telecommunications, airlines, and airways, except for public utilities such as electricity transmission and distribution, water and petroleum pipelines, sewerage companies, seaports, and public utility vehicles.

The Philippines is one of 14 countries joining the Indo-Pacific Economic Framework (IPEF), and is the first country to sign up to all four pillars of the IPEF:

1. Trade
2. Supply chains
3. Clean energy, decarbonisation, and infrastructure
4. Tax and anti-corruption.

The Philippines is also a member of the World Trade Organization, and has several bilateral and multilateral trade agreements with neighboring countries in APAC, as well as countries in Europe and the Americas.

Sustainability

The Philippines has integrated the United Nations' Sustainability Development Goals (SDG) into the Philippine Development Plan (PDP) which lays down the foundation for inclusive growth, a high-trust and resilient society, and a globally competitive knowledge economy. The PDP is accompanied by the Public Investment Program which contains a list of priority projects and programs to achieve the goals under the PDP. The Philippines also launched the Partnership Framework for Sustainable Development (PFSD) with the United Nations that maps collaboration areas for PDP priorities.

Following the passage of the Climate Change Act in 2009, the Philippines adopted the National Framework Strategy on Climate Change (NFSCC) in 2010. In line with the guiding principles of the NFSCC, the National Climate Change Action Plan (NCCAP) was formulated, laying down seven priorities for action: food security, water sufficiency, ecological and environmental stability, human security, climate-friendly industries and services, sustainable energy, and knowledge and capacity development.

The Philippines also adopted the Sustainable Finance Framework to support its sustainability commitments, and to set out how it intends to raise Green, Social or Sustainability Bonds, loans and other debt instruments. The Sustainable Financing Instruments will fund eligible social and green projects that conform to internationally recognized sustainable finance principles.

Singapore

Metric	Value	Percentile (Global)	Median (Global)
Population	6M	26	22M
Urbanization	100%	99	74%
GDP (USD)	$467B	59	$335B
GDP Growth YtY	3.6%	87	3.7%
Extraction as a % of GDP	14%	12	30%
IT Market Size (USD)	$19B	81	$3.6B
IT Market Size as a % GDP	5.1%	97	1.6%
Human Development Index 2021	0.94	94	0.74
Corruption Perceptions Index	83	97	40
Imports + Exports as a % GDP	337%	97	92%
Energy Consumption 2021 (TWh)	958	77	547
Energy Consumption Per Capita 2021 (GWh)	161	99	32
Primary, Secondary, Tertiary Industry	0.0%, 25%, 72%	10, 60, 77	3.1%, 24%, 67%
Productivity 2019	55	71	36
M1 Velocity (M1 5-Year CAGR)	2.0 (-5.1%)	65 (86)	1.6 (-8.4%)
ICOR	2.2	41	1.4

*** Data for 2022

Table 10: Singapore Political-Economic Indicators

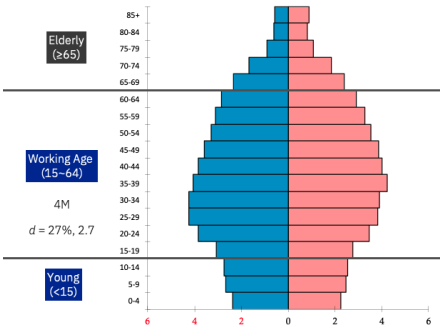


Figure 20: Singapore Demographics

Macroeconomic Insights

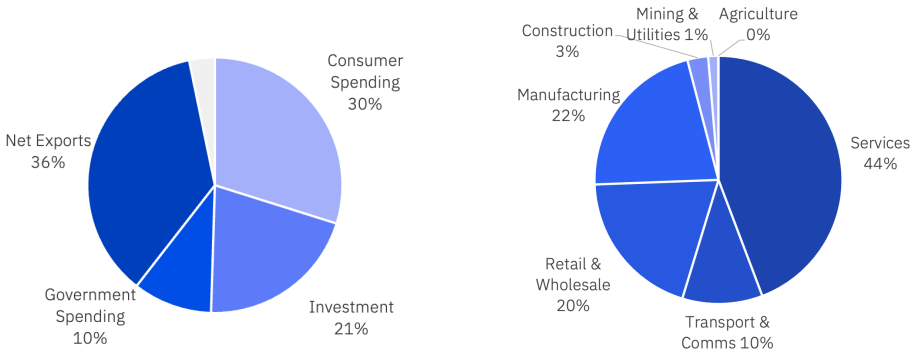
1. Inflation and Consumption. Annual inflation in Singapore was 6.1% in 2022. Consumption was $186 billion, up 9.0%.

2. Foreign Direct Investment (FDI). FDI inflows to Singapore rose 2% in 2022 up to $141 billion.

3. IT Market. IBM-addressable IT market opportunity grew 13.2% in 2022. The market is expected to grow 8.1% in 2023 and 9.8% in 2024.

4. IBM Market Share. IBM is ranked #1 in Singapore for non-x86 Servers in 1H22 (with 52% share), #5 for Total Servers (2.5%) and #6 for External Storage (7.3%). In 2021, IBM ranked #3 for TSS (8.5%), #4 in Software (4.7%), #4 for Consulting (4.0%) and #6 for Public Cloud (3.0%).

5. IBM's Year of Operation. Founded in 1953. In the 71st year of operations as of 2023.



(a) GDP Components

(b) Industry Segments

Figure 21: Singapore GDP and Industry

AI and Emerging Tech

On AI: IBM is pleased to see the Singaporean government's continued commitment to promoting its world-class approach to AI governance. Just as the Model AI Governance Framework helped establish Singapore as a global leader in risk-based, precision AI regulation, the upcoming ASEAN AI Guide (led by the Singaporean government) can help cement the region's position as a preeminent player in the AI policy space. We are also pleased to see that this guide aligns closely with other leading AI frameworks, such as the United States' NIST AI Risk Management Framework. International cooperation will be a key feature in ensuring that the adoption of this critical technology is effectively balanced with appropriate AI guardrails.

Singapore's InfoComm Media Development Authority (IMDA) also launched the AI Verify Foundation in June 2023. This aims to develop an AI Verify testing tool for the technology's responsible use by harnessing the collective power and contributions of the global open-source community. The Foundation will boost AI testing capabilities and assurance to meet the needs of companies and regulators globally. The AI Verify Foundation has seven premier members—Aicadium, Google, IBM, IMDA, Microsoft, Red Hat, and Salesforce—who will set strategic direction and develop an organizational roadmap. The Foundation also has more than 60 general members. As part of our ongoing commitment to ethical AI, joining the AI Verify international pilot was a natural step for IBM.

On quantum computing: Singapore has been a pioneer in quantum technologies through its investments in the Center of Quantum Technologies and the Quantum Engineering Program (QEP). The National University of Singapore (NUS) also joined the IBM Quantum Network in 2020 as a Quantum Innovation Center (QIC). Since then, IBM has supported the Singapore ecosystem in various ways, providing training, organizing conferences in partnership with QEP, and co-hosting hackathons, among other things. However, we have also observed that in recent years, other QICs around the world have powered ahead of Singapore in areas such as student and workforce education, industry adoption, and access to quantum computing capacity. We are in discussions with the Singapore Government to help create a vibrant ecosystem for quantum computing. Here, emerging ideas include developing a pan-ASEAN/ANZ Quantum-centric High-Performance Computing Center together with the National Supercomputing Center.

Data Sovereignty

Personal Data Protection Regime:

An amended Personal Data Protection Act 2012 (PDPA) came into force in Singapore on 1 February 2021. It includes minor clarifications on what constitutes significant harm for mandatory data breach reporting, defenses for egregious mishandling of personal data, and ways that organizations may provide the business contact information of their data protection officers. Provisions relating to increased financial penalties took effect from 1 October 2022. The Personal Data Protection Committee of Singapore (PDPC) has also updated its Advisory Guidelines on the amended PDPA. In August 2023, the PDPC called for public consultation on the proposed advisory guidelines on the use of personal data in AI recommendation and decision systems.

Digital

The Digital Government Blueprint, updated in December 2020, aims to leverage data and new technologies for a digital economy and society as part of the government's efforts to build Smart Nation Singapore.

Privacy and Cybersecurity

Cybersecurity Act: In April 2022, the Cybersecurity Agency of Singapore (CSA) launched a Licensing Framework for Cybersecurity Service Providers. In March 2022, the CSA announced it would be reviewing the Cybersecurity Act 2018 (Cybersecurity Act) to better address risks resulting from increased reliance on digital infrastructure and services. The Cybersecurity Act amendments will expand the scope of the Act to cover Foundational Digital Infrastructure (FDI) and its providers. This is not applicable to IBM. The CSA has also updated its Cybersecurity Code of Practice (CCoP) to help owners of critical information infrastructure better respond to and defend against risks and cyber threats. Following industry consultations, the CSA published its updated CCoP in July 2022.

Skills

Due to the shortage of tech skills in Singapore, the government has introduced new work visa rules to attract top foreign talent. In sectors where skills are in especially short supply, tech professionals will soon be eligible for five-year visas—up from two to three years — with a shorter processing time for employment passes. The government is also working closely with local industries to groom tech talent through training programs. IBM is invested in this area through various initiatives such as IBM SkillsBuild, Red Hat Certified Engineer, and our Industry 4.0 programs.

SkillsFuture Singapore (SSG) is also refining its funding framework for training to help it achieve better manpower outcomes. From 2024, workers will no longer get subsidies from SSG for most non-certifiable courses. The Minister of Education also recently announced a roadmap for Singapore's adult education sector to help it reach its goal of retraining at least half a million working adults a year.

Trade and Market Access

Singapore's extensive free trade agreements (FTA) and transparent administrative system have been credited with accelerating the country's transformation to a first-world economy. The country's 15 bilateral and 12 regional FTAs and digital economy agreements (DEAs) include some of the largest combined trade agreements in the ASEAN-China, ASEAN-India, and ASEAN-Hong Kong trade blocs. These provide Singapore-based businesses with access to preferential markets and free or reduced import tariffs, as well as enhanced intellectual property regulations.

DEAs are part of the Singapore government's strategy to strengthen underlying infrastructure and build up its footprint as a global tech and e-commerce hub while adding to the country's extensive FTA network. Singapore's Digital Economy Partnership Agreement (DEPA) with New Zealand and Chile came into effect on January 7, 2021. DEPA was first signed in June 2020 and is the world's first 'digital only' trade agreement. On February 25, 2022, Singapore and the United Kingdom signed the UK-Singapore Digital Economy

Agreement (UKSDEA), the first digitally-focused trade deal ever signed by a European nation. In addition to the DEPA and UKSDEA, Singapore has signed the following DEAs: The Singapore-Australia Digital Economy Agreement; The EU-Singapore Digital Partnership; and The Korea-Singapore Digital Partnership Agreement.

Singapore is also very active within the World Trade Organization (WTO). It takes a leading role in initiatives such as the joint statement on the WTO's Initiative on Electronic Commerce and is pushing to make permanent the moratorium on customs duties on electronic transmissions.

Sustainability

Launched in February 2021, the Singapore Green Plan 2030 (Green Plan) seeks to galvanize a whole-of-nation movement and advance Singapore's national agenda on sustainable development. Spearheaded by five ministries — the ministries of Sustainability and the Environment, Trade and Industry, Transport, National Development, and Education — and with whole-of-government support, the Green Plan sets out targets for the rest of this decade that are both ambitious and concrete. It looks to strengthen Singapore's commitments under the UN's 2030 Agenda for Sustainable Development and the Paris Agreement, and position Singapore to achieve its long-term net-zero emissions aspiration as soon as is viable.

The plan also includes green growth opportunities, including the creation of jobs in sectors such as green finance and carbon services. It also aims to increase the public sector green bonds issuance to SGD$35 billion by 2030. The Singapore Green Bond Framework was published in 2022. At the same time, it looks to accelerate the adoption of Electric Vehicles by increasing the number of charging points near homes. While allowing carbon tax-liable businesses to use carbon credits to offset up to 5% of taxable emissions from 2024, there will also be an increase in carbon tax. The government will continue to invest in science and technology to unlock possibilities for a low-carbon future. So far, SGD$220 million has been allocated for research and development in resource circularity and water technologies under the Urban Solutions and Sustainability domain in the Research, Innovation and Enterprise 2025 plan (known as RIE2025).

The Accounting and Corporate Regulatory Authority and Singapore Exchange Regulation (SGX RegCo) are proposing mandatory climate-related reporting for public and large private companies. These disclosure standards will align with the International Financial Reporting Standards and the recently published International Sustainability Standards Board standards. Under the current regulations, only listed companies from certain sectors such as finance, agriculture, food, forest products, and energy are required to provide climate reporting, aligned with the Task Force on Climate-related Financial Disclosures. The new proposal, however, will extend this obligation to all listed issuers, overseas companies, business trusts, and real estate investment trusts starting from fiscal year 2025. Non-listed companies with revenues of at least SGD$1 billion will begin reporting from FY2027. In addition, the regulators plan a review in 2027. This will extend the climate disclosure requirements to non-listed companies with revenues of at least SGD$100 million, with the change set to commence around FY2030. A consultation into the new mandatory climate-related reporting rules closed on September 30, 2023.

Taiwan

Metric	Value	Percentile (Global)	Median (Global)
Population	24M	50	22M
Urbanization	80%	59	74%
GDP (USD)	$762B	73	$335B
GDP Growth YtY	2.4%	69	3.7%
Extraction as a % of GDP	14%	10	30%
IT Market Size (USD)	$8B	66	$3.6B
IT Market Size as a % GDP	1.2%	47	1.6%
Human Development Index 2021	-	-	0.74
Corruption Perceptions Index	68	86	40
Imports + Exports as a % GDP	132%	72	92%
Energy Consumption 2021 (TWh)	1,376	80	547
Energy Consumption Per Capita 2021 (GWh)	58	92	32
Primary, Secondary, Tertiary Industry	1.6%, 39%, 57%	33, 88, 29	3.1%, 24%, 67%
Productivity 2019	46	67	36
M1 Velocity (M1 5-Year CAGR)	0.8 (-5.5%)	16 (84)	1.6 (-8.4%)
ICOR	-15.3	95	1.4

Data for 2022

Table 11: Taiwan Political-Economic Indicators

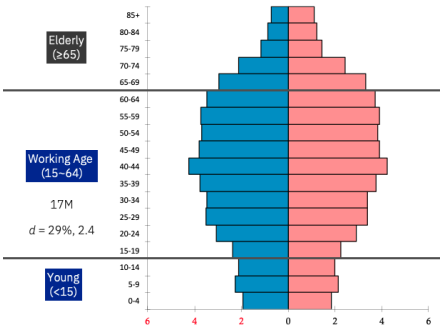


Figure 22: Taiwan Demographics

Macroeconomic Insights

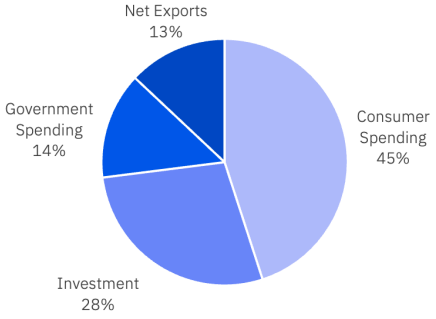
1. Inflation and Consumption. Annual inflation in Taiwan was 2.9% in 2022. Consumption was $448 billion, up 0.3%.

2. Foreign Direct Investment (FDI). FDI inflows to Taiwan rose 92% in 2022 up to $10 billion, led by growth in the high-tech industry.

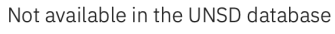
3. IT Market. IBM-addressable IT market opportunity grew 14.1% in 2022. The market is expected to grow 10.7% in 2023 and 10.5% in 2024.

4. IBM Market Share: In 2021, IBM ranked #3 in Selected Software (9.6%). In 1H22, IBM ranked #1 in Consulting (7.1%), #1 in TSS (27.6%).

5. IBM's Year of Operation. Founded in 1952. In the 72nd year of operations as of 2023.



(a) GDP Components



(b) Industry Segments

Figure 23: Taiwan GDP and Industry

AI and Emerging Tech

In 2018, the Taiwanese government launched the Taiwan AI Action Plan to align with President Tsai's national policy directive of "Digital Nation, Smart Island", and to explore the opportunities associated with AI. The plan aims to establish Taiwan as a leader in AI by:

1. Cultivating AI talent
2. Promoting Taiwan as a leader in AI
3. Building Taiwan into an innovative AI hub
4. Liberalizing laws and opening test grounds
5. Transforming industry with AI, in both the public and private sectors.

Data Sovereignty

Since July 2018, the National Development Council has overseen the implementation of the Personal Data Protection Act (2015) (PDPA) and coordinated relevant matters among different government authorities. The PDPA is administered by central, local, municipal, and county government authorities. These authorities regulate the business operations of non-government agencies in each industry. The Taiwanese government is working to create a single agency to act as the primary regulator of the PDPA.

Digital

The Ministry of Digital Affairs is responsible for developing strategies to guide Taiwan's approach to developments in the tech space. These strategies focus on:

1. Smart government development strategy
2. Service resilience of the cloud generation
3. National digital development research
4. Government digital service guidelines and website service management
5. Government Accessible Web Check
6. My e-Government Portal
7. Common government application services
8. Digital government competency cultivation
9. Government digital infrastructure.

Privacy and Cybersecurity

Since 2001, the Executive Yuan Council's National Information and Communication Security Taskforce has launched cybersecurity initiatives at four-year intervals to increase Taiwan's

cybersecurity preparedness. The aim of the task force's Phase Six Development Program (2021–2024) is to build an active defense base network to support a resilient, secure, and smart country. Considering the breadth of Taiwan's information and communication service applications and its major technological innovation policies, cybersecurity plays a key role in protecting national security and socioeconomic interests. To respond to international trends and new forms of cyber threats, Taiwan's Ministry of National Defense and the National Information and Communication Security task force manage Taiwan's cybersecurity capacity and monitor potential risks.

Procurement

The Government Procurement Act (2000) is the primary legislation regarding government procurement in Taiwan. The Act controls how private enterprises participate in infrastructure projects, aiming to improve the level of public service, expedite social economic development, and encourage private participation in infrastructure projects.

Skills

Following lobbying from Taiwan's Ministry of Labor (MOL), the nation will host the WorldSkills Asia Competition 2025. The MOL places great importance on international exchange and collaboration. In line with this, the Taiwanese government established the second WorldSkills Capacity Building Center in the world. The center is a platform for skills exchange, hosting workshops, and supporting training with experts from Taiwan and around the world.

Trade and Market Access

In 2021, Taiwan was the world's 16th largest exporter of merchandise. Under its New Southbound Policy, the nation is focused on deepening ties with the 10 Association of Southeast Asian Nations member states, as well as a further six South Asian countries, Australia, and New Zealand. Currently, Taiwan is a leading player in the world's information and communication technology industry and a major supplier of goods across the industrial spectrum. Taiwan ranks close to Poland and Sweden in terms of its nominal gross domestic product (GDP). Its GDP per capita, expressed as purchasing power parity, is similar to that of Austria or the Netherlands.

Sustainability

The Executive Yuan Council established the National Council for Sustainable Development (NCSD) in August 1997 to pursue global sustainable development with other countries. The organizational structure of the NCSD was amended in November 2021 to improve operational efficiency. As a result, 17 working groups and a Task Force for the Promotion of a Nuclear-Free Homeland were created based on Taiwan's 18 sustainable development goals. These groups were later divided into four major work areas under the supervision of the four deputy executive officers. The Task Force on Climate Change and Net Zero Emissions Transition was also created to achieve net-zero emissions by 2050. The task force is staffed by the Environment, while the secretarial duties are conducted by the National Development Council.

Thailand

Metric	Value	Percentile (Global)	Median (Global)
Population	72M	79	22M
Urbanization	52%	15	74%
GDP (USD)	$496B	63	$335B
GDP Growth YtY	2.6%	9	3.7%
Extraction as a % of GDP	15%	15	30%
IT Market Size (USD)	$8B	63	$3.6B
IT Market Size as a % GDP	1.7%	60	1.6%
Human Development Index 2021	0.80	65	0.74
Corruption Perceptions Index	36	44	40
Imports + Exports as a % GDP	134%	74	92%
Energy Consumption 2021 (TWh)	1,378	81	547
Energy Consumption Per Capita 2021 (GWh)	19	69	32
Primary, Secondary, Tertiary Industry	6.2%, 31%, 60%	72, 77, 34	3.1%, 24%, 67%
Productivity 2019	15	15	36
M1 Velocity (M1 5-Year CAGR)	3.6 (-8.4%)	87 (52)	1.6 (-8.4%)
ICOR	-11.4	92	1.4

*** Data for 2022

Table 12: Thailand Political-Economic Indicators

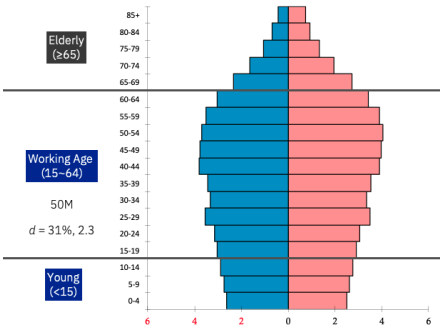


Figure 24: Thailand Demographics

Macroeconomic Insights

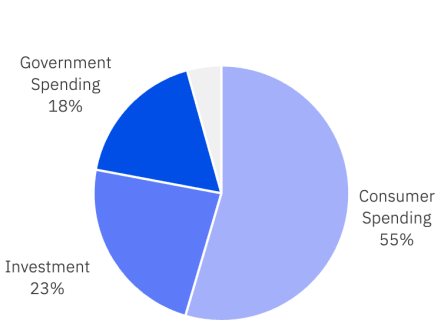
1. Inflation and Consumption. Annual inflation in Thailand was 6.1% in 2022. Consumption was $358 billion, up 0.3%.

2. Foreign Direct Investment (FDI). FDI inflows to Thailand fell 28% to $10.4 billion.

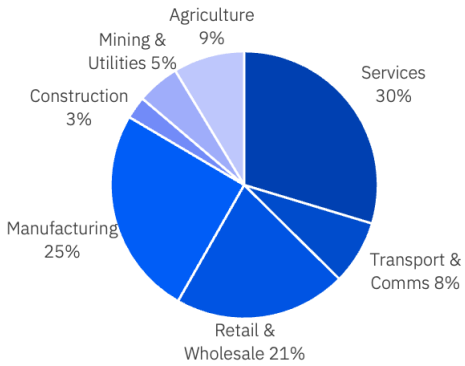
3. IT Market. IBM-addressable IT market opportunity grew 9.2% in 2022. The market is expected to grow 9.4% in 2023 and 9.2% in 2024.

4. IBM Market Share. In 2020, IBM is ranked #1 in Thailand for non-x86 Servers (with 84% share), #4 for External Storage (6%), ranked #4 in Software (9.2%). In 1H21, IBM ranked #2 for Consulting (3.8%), #4 in TSS (6.8%).

5. IBM's Year of Operation. Founded in 1952. In the 72nd year of operations as of 2023.



(a) GDP Components



(b) Industry Segments

Figure 25: Thailand GDP and Industry

AI and Emerging Tech

The government of Thailand approved the Thailand National AI Strategy and Action Plan 2022-2027 on July 26, 2022. The plan envisions for an effective ecosystem to promote AI development and application to enhance the economy and quality of life by 2027. Five key strategies were outlined in the plan: (1) AI ethics, (2) development of a national infrastructure for sustainable AI development, (3) talent development, (4) driving innovation and technology development in AI, and (5) driving adoption of AI in the private and public sector.

Data Sovereignty

The government of Thailand takes a pragmatic approach towards data sovereignty. Consistent with the approach undertaken by governments in the region, public sector data that has national security implications is considered under the control of government and is required to be stored in-country.

Digital

The Thai government's approach towards the digital economy is embedded in its strategic 20-year plan that was introduced in 2016, known as Thailand 4.0. In it, the vision of achieving a high-income economy will be driven by 10 targeted industries. The first five industries are aimed at leveraging the current strengths inherent in Thailand, which are: next generation autos, intelligent electronics, advanced agriculture and biotechnology, food processing, and tourism.

The second set of five industries are aimed at developing a new industrial base for growth namely, digital, robotics and automation, aviation and logistics, biofuels and chemicals and healthcare/medical hub.

The mandate of managing the digital economy falls within the Ministry of Digital Economy and Society.

Privacy and Cybersecurity

The Thailand Personal Data Protection Act (PDPA) came into effect on May 27, 2019, but was only fully enforced starting June 1, 2022. This is the first Thai law to govern data protection and is considered comparable to the European General Data Protection Regulation (GDPR). The data protection obligations under the PDPA apply to all organizations that collect, use, or disclose personal data in Thailand or of Thai residents, regardless of whether they are formed or recognized under Thai law, and whether they are residents or have a business presence in Thailand. This extraterritorial scope of the PDPA represents a significant expansion of Thailand's data protection obligations to cover all processing activities relating to Thailand-based data subjects.

Procurement

The Thai government adopts a standardized approach towards government procurement for IT products and services that is similar to governments in the ASEAN region. The

government maintains an e-procurement portal that centralizes all procurement that is done by the federal government. Unique to the Thai government the default language is Thai.

Skills

The Thai government faces similar challenges to the other countries in the ASEAN region when it comes to talent. The digital skills gap is due to suoply and demand discrepancies. Therefore, the Ministry of Higher Education, Science, Research and Innovation (MHESI) Thailand has embarked on the "Lift Skill Thai Labor Force Project", which is an initiative to gain a better understanding of the current challenges and identify programs that will address those challenges.

The overall approach of the Thai government is to facilitate collaboration between the public and private sector. This is to ensure that digital skills programs are incorporated into the learning process, helping to create a digitally literate workforce to meet the needs of Thailand 4.0.

Trade and Market Access

The Thai economy has a strong export base. They are well known for their position in the global supply chain for automotive products and electrical and electronic consumer goods. Therefore, the policy stance is trade friendly. They are a member of the Regional Comprehensive Economic Partnership (RCEP) and Indo-Pacific Economic Framework (IPEF).

They are in discussions with Singapore to progress a Digital Economy Partnership Agreement. As a member of ASEAN, they are party to such instruments such as the ASEAN Agreement on Electronic Commerce and the ASEAN Digital Integration Framework.

Sustainability

The Government of Thailand adopts the Sufficiency Economy Philosophy (SEP) in its approach towards crafting and implementing sustainability policy. The SEP was formulated by the late King Bhumipol Adulyadej. It is a guideline that stresses the importance of three core principles of moderation, reasonableness and prudence when assessing and developing policy that is built on a foundation of knowledge and virtues.

This has helped the Thai government to incorporate the sustainability agenda. In terms of its goals, Thailand aims to achieve carbon neutrality by 2050 and net-zero greenhouse gas emissions by 2065.

Vietnam

Metric	Value	Percentile (Global)	Median (Global)
Population	98M	84	22M
Urbanization	39%	9	74%
GDP (USD)	$407B	57	$335B
GDP Growth YtY	8.0%	15	3.7%
Extraction as a % of GDP	17%	22	30%
IT Market Size (USD)	$2B	42	$3.6B
IT Market Size as a % GDP	0.5%	31	1.6%
Human Development Index 2021	0.70	40	0.74
Corruption Perceptions Index	42	57	40
Imports + Exports as a % GDP	186%	88	92%
Energy Consumption 2021 (TWh)	1,199	79	547
Energy Consumption Per Capita 2021 (GWh)	12	64	32
Primary, Secondary, Tertiary Industry	12.0%, 33%, 48%	92, 81, 20	3.1%, 24%, 67%
Productivity 2019	7	5	36
M1 Velocity (M1 5-Year CAGR)	1.4 (-9.4%)	48 (40)	1.6 (-8.4%)
ICOR	3.4	28	1.4

*** Data for 2022

Table 13: Vietnam Political-Economic Indicators

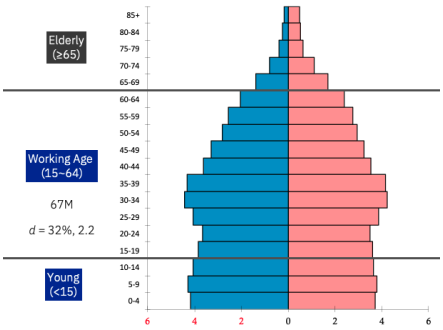


Figure 26: Vietnam Demographics

Macroeconomic Insights

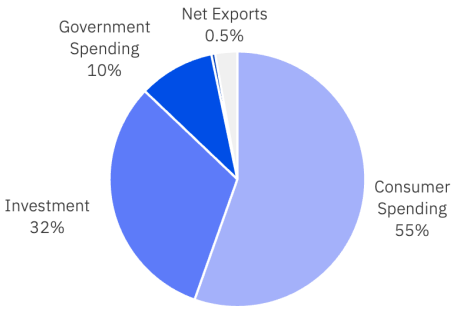
1. Inflation and Consumption. Annual inflation in Vietnam was 3.2% in 2022. Consumption was $263 billion, up 9.3%.

2. Foreign Direct Investment (FDI). FDI inflows to Vietnam rose 15% in 2022 up to $15.7 billion.

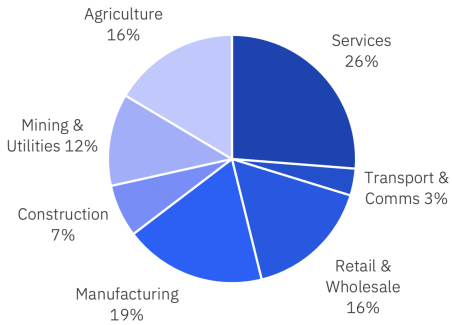
3. IT Market. IBM-addressable IT market opportunity grew 15.5% in 2022. The market is expected to grow 14.8% in 2023 and 14.2% in 2024.

4. IBM Market Share. In 1H21, IBM is ranked #3 in TSS (6.5%) and #9 in Vietnam for Consulting (1.7%).

5. IBM's Year of Operation. Re-established in 1996. In the 28th year of operations as of 2023.



(a) GDP Components



(b) Industry Segments

Figure 27: Vietnam GDP and Industry

AI and Emerging Tech

In August 2021, the government of Vietnam introduced the National Strategy on Research, Development and Application of Artificial Intelligence till 2030. The goal is to transform Vietnam into an AI hub in ASEAN by 2030.

The strategy is built on five pillars: (1) establishment of a legal framework to govern AI, (2) development of infrastructure to support AI R&D and applications, (3) development of an AI ecosystem, (4) promotion of AI adoption, and (5) an emphasis on international cooperation and collaboration for AI.

Data Sovereignty

The government of Vietnam maintains an approach that is similar to the other governments in the ASEAN region. Data that the government deems to be in the public interest (national security and financial), must be stored in country. This is reflected in the recent Cybersecurity law. Due to the nature of the government in Vietnam, it is safe to assume that the government maintains a strong approach towards data sovereignty.

Digital

The government of Vietnam approved the National Strategy for Digital Economy, Digital Society Development (2025-2030) in April 2022. In it, the government is aiming to transform Vietnam from a lower-middle income country in 2025 to an upper-middle income country by 2030, and a high income country by 2045.

The government intends to ensure that 20% of the GDP will come from the Digital Economy, and that by 2030, 80% of enterprises would use e-contracts and subsequently 50% for SME's. They are also looking to ensure that 70% of their population of working age will be trained with basic digital skills.

Privacy and Cybersecurity

Although the right to privacy is a constitutional right in Vietnam, there is currently no comprehensive data protection law in Vietnam. Instead, rules and regulations on personal data protection can be found in several laws such as the Civil Code and the Law on Cyberinformation Security, Law on Electronic Transactions, and the Law on Telecommunications. In 2021, the Ministry of Public Security (MPS) released a draft Decree on Personal Data Protection. The draft Decree sets out principles of data protection, including purpose limitation, data security, data subject rights, and the regulation of cross-border data transfers. It is unclear when the draft Decree will be adopted.

The Law on Cybersecurity was enacted into law in 2018 and imposes data localization and local office requirements on local and offshore enterprises. In August 2022, the government issued Decree 53, which provides implementing rules to the Cybersecurity Law governing: (1) localization requirements for data determined to be critical to national security, and (2) authority granted to the MPS to take-down illegal content.

Procurement

The IT procurement regime in the government of Vietnam is governed by the Law on Public Procurement (43/2013/QH13) and Decree 63 (63/2014) which contains stipulations related to the selection of contactors. Since the government of Vietnam is a significant recipient of Official Development Assistance (ODA) loans and grants, regulations that impact sourcing is dependent on the agreements made between donor agencies and the government.

Government procurement practices can be characterized as a multi-layered decision-making process that is reflective of the nature of government in Vietnam.

Skills

Similar to its neighbors, Vietnam faces a digital skills deficit that impacts growth of the digital economy. As part of the national strategy for digital economy development, the government has mandated that the Ministry of Education and Training (MOET) and the Ministry of Information and Communications (MIC) to take on the role of accelerating interventions in developing the digital skills ecosystem.

Therefore, in the end of 2021, the MCI and MOET announced a collaboration to digitally transform the education sector. In 2021, it was estimated that Vietnam had a demand for 450,000 IT workers and supply was at 430,000 people. In 2022, the forecast was projected to be 530,000. Therefore, collaboration between ecosystem partners is vital to bridge the gap.

Trade and Market Access

Vietnam is a key beneficiary of the trade war between the United States and China. Significant investments have been made by FDI's that were based in China to diversify their supply chain into Vietnam. When it comes to digital trade, the scenario becomes more complex. The introduction of the recent law on Cybersecurity would impact the commitments made by Vietnam as a signatory of the Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP) because of the data localization requirements.

The recent trend of protectionist tendencies would threaten the potential for Vietnam's growth of the digital economy because Vietnam is an outsourced developer hub for companies in the region and around the world. Therefore, consistent advocacy to ensure that the government of Vietnam adopt digital friendly policies has to be sustained by MNCs based in Vietnam. Vietnam is a signatory of CPTPP, Regional Comprehensive Economic Partnership (RCEP), and Indo-Pacific Economic Framework (IPEF). As a member of ASEAN, they are party to such instruments such as the ASEAN Agreement on Electronic Commerce and the ASEAN Digital Integration Framework.

Sustainability

The Government of Vietnam focuses its sustainability agenda through the lens of the economy. The government issued Decision 687, which is a development plan on Vietnam's Circular Economy. Combined with the Law on Environmental Protection, introduced in early 2022, the government aims to adopt the circular economic model that is based on a

three-pillar system. This involves a "make-use-recycle" model, helping with waste reduction and lowering resource extraction.

In terms of the goals set out by the government, they intend to recycle 85% of Vietnam's plastic waste, and reduce the dumping of plastic waste into the waters of Vietnam by 50%. They are also committed to achieve net-zero carbon emissions by 2050.

Acquisitions

As of December 2023, IBM has acquired 44 companies to strengthen its hybrid cloud and artificial intelligence (AI) capabilities.

1. StreamSets and webMethods (Dec 18, 2023) - Part of IBM Software. StreamSets is a cloud-native DataOps and data ingestion platform which allows enterprises to achieve consistent access and delivery of data across a wide spectrum of data sources and types. StreamSets also facilitates the design of smart data pipelines and the ingestion of real-time and batch data. webMethods is an integration and API management platform. The integration platform, deployed both on-prem and in the cloud, offers B2B integration, managed file transfer, and provides a modern API gateway to manage, monitor, and monetize APIs. StreamSets will add data ingestion capabilities to watsonx, IBM's AI and data platform, while webMethods will give clients and partners additional integration and API management tools for their hybrid multi-cloud environments.

2. Equine Global (Oct 31, 2023) - Part of IBM Consulting. Equine Global is an Indonesian-based ERP specialist and cloud consulting services provider. Founded in 2009, Equine Global consists of four operating companies that specialize in ERP implementations, application development, and data management and analytics.

3. Manta Software Inc. (Oct 24, 2023) - Part of IBM Software. Founded in 2016, Manta is a world-class data lineage platform that helps give businesses visibility into their data environments by delivering a comprehensive map of data flows, sources, transformations, and dependencies.

4. Apptio Inc (Aug 10, 2023) - Part of IBM Software. Apptio Inc. is an established, growing, and profitable leader in financial and operational IT management and optimization (FinOps) software, with over 1,500 clients, serving more than half of the Fortune 100.

5. Agyla SAS (Jun 14, 2023) - Part of IBM Consulting. Founded in 2013, Agyla SAS delivers cloud platform engineering services, helping clients build mission-critical hybrid cloud infrastructure and applications. Agyla SAS consultants have deep expertise with key hybrid cloud ecosystem partners, with over 100 certifications in Amazon Web Services (AWS), Microsoft Azure, and more, and Agyla SAS is an AWS advanced consulting partner.

6. Polar Security (May 16, 2023) - Part of IBM Security Software and Services. Polar Security is an innovator in technology that helps companies discover, continuously monitor and secure cloud and software-as-a-service (SaaS) application data — and addresses the growing shadow data problem. This is the 5th acquisition in 2023.

7. NS1 (February 28, 2023) – Part of IBM Software. NS1 is a leading provider of network automation SaaS solutions that are designed to enable businesses to deliver content, services and applications to millions of users while helping optimize performance, reliability, security, and cost.

8. StepZen (February 8, 2023) – Part of IBM Software. Founded in 2020, StepZen Inc developed a GraphQL server with a unique architecture that provides an easier way for developers to build GraphQL APIs quickly and with less code.

9. Databand.ai (2022) – Part of IBM Software. Databand.ai is a product-driven technology company that provides a proactive data observability platform, which empowers data engineering teams to deliver reliable and trustworthy data. Databand.ai removes bad data surprises such as data incompleteness, anomalies, and breaking data changes by detecting and resolving issues before they create costly business impacts.

10. Dialexa (2022) – Part of IBM Consulting. Dialexa delivers a suite of digital product engineering services, helping organizations create transformative products to drive business outcomes. Dialexa has deep experience delivering end-to-end digital product engineering services consisting of strategy, design, build, launch, and optimization services across cloud platforms including AWS and Microsoft Azure.

11. Envizi (2022) – Part of IBM Software. Envizi is a leading data and analytics software provider for environmental performance management. Envizi's software automates the collection and consolidation of more than 500 data types and supports major sustainability reporting frameworks. Envizi's solutions help streamline the management of these tasks as part of broader Environmental, Social and Governance (ESG) reporting initiatives, while also providing users with valuable sustainability insights to inform business strategy.

12. Neudesic (2022) – Part of IBM Consulting. Neudesic provides a full scope of digital transformation services across advisory, application development, cloud migration, DevOps, integration, data engineering, data visualization and hyper-automation. As a top Microsoft global solution partner, Neudesic has deep expertise in technology transformation and delivering Microsoft Azure cloud services to clients across the health and life sciences, financial services, energy and utilities, professional services, and retail industries.

13. Octo (2022) – Part of IBM Consulting. Octo is a U.S.-based IT modernization and digital transformation services provider exclusively serving the U.S. federal government. This includes defense, health, and civilian agencies.

14. Randori (2022) – Part of IBM Security Software and Services. Randori is a leading attack surface management (ASM) and offensive cybersecurity provider. Randori is a hacker-led company, with software to help security teams discover gaps, assess risks, and improve their security posture over time by delivering an authentic attack experience at scale. Designed to help security teams zero in on previously unknown exposure points, Randori's unique attack surface management solution considers the logic of an adversary based on real-world attacks. It is the only one to prioritize based on the level of risk as well as the attractiveness of an asset to potential attackers using their proprietary scoring system.

15. Sentaca (2022) – Part of IBM Consulting. Sentaca is a leading telecom consulting services and solutions provider. Sentaca's team of highly experienced technology consultants across the U.S. and Canada build and migrate mission-critical applications on leading cloud service providers and open-source platforms like Red Hat OpenShift and OpenStack. Sentaca has supported digital transformation, next-generation networks, and improved consumer experience for communications service providers

(CSPs) and media companies since its founding in 2008.

16. Bluetab Solutions Group (2021) – Part of IBM Consulting. Bluetab is an IT Services boutique serving large corporations in the highly specialized data solutions space: data strategy, data management, data analytics and data cloud services.

17. BoxBoat Technologies (2021) – Part of IBM Consulting. BoxBoat Technologies is the premier DevSecOps and digital transformation consultancy, helping commercial and public sector enterprises achieve digital transformation by delivering software faster. BoxBoat's core competencies include aiding customers with a customized strategy for the adoption of Kubernetes, cloud-native technologies, and automation.

18. Catalogic Software's ECX Copy Data Management business (2021) – Part of IBM Software. Catalogic Software is a proven provider of data protection, copy data management and data resiliency solutions. With smart data protection solutions, Catalogic helps clients backup, recover, manage, and protect their data across their enterprise and cloud environments.

19. McDonald's McD Tech Labs (2021) – Part of IBM Software. Under McDonald's, the world's largest restaurant company, and IBM's agreement to further accelerate the development and deployment of Automated Order Taking (AOT), IBM will acquire McD Tech Labs, which was created to advance employee and customer facing innovations.

20. MyInvenio (2021) – Part of IBM Software. MyInvenio is a process mining software company. MyInvenio's unique capabilities to automatically analyze processes and create simulations reveal inefficiencies, bottlenecks and tasks that can benefit from automation, to help organizations significantly reduce their operating costs and improve customer service.

21. Phlyt (2021) – Part of IBM Software – Red Hat. Phlyt is a Toronto-based consulting company that provides expertise, products, and toolkits to help organizations adopt cloud-native technologies. The Phlyt team is focused on developing cloud-native applications and helping organizations to deliver software more effectively and with a faster time to market.

22. ReaQta (2021) – Part of IBM Security Software and Services. ReaQta is a top-tiered AI autonomous detection and response platform with advanced automated threat-hunting features, built by an elite group of cybersecurity experts and AI/ML researchers. As experts in AI and behavioral analysis, ReaQta's proprietary dual-AI engines provide organizations across all industries with autonomous, real-time and fully customizable endpoint security, minus the complexity.

23. Rego Consulting Corp's Adobe Workfront Consultancy (2021) – Part of IBM Consulting. Founded in 2007, Rego has grown into one of the largest projects and portfolio management (PPM), work management, and Agile consulting firms in the world. It has guided more than 650 organizations including 60% of Fortune 100 companies and 70% of Fortune 20 companies. Their expert practitioners have also trained over 600,000 end-users on topics ranging from Clarity Portfolio Management

and Resource Management in Adobe Workfront to Scaled Agile in Rally and more. A leading Adobe Workfront partner, Rego has been recognized as the Adobe Workfront Partner of the Year in 2020 and 2021 and has achieved Adobe Workfront Specialization.

24. StackRox (2021) – Part of IBM Software – Red Hat. StackRox is a leader and innovator in container and Kubernetes-native security software. StackRox's software provides visibility and consistency across all Kubernetes clusters, helping to reduce the time and effort needed to implement security while streamlining security analysis, investigation and remediation.

25. SXiQ (2021) – Part of IBM Consulting. SXiQ is an Australian digital transformation services company specializing in cloud applications, cloud platforms and cloud cybersecurity. SXiQ works with leading Australian enterprises, as well as the Australian operations of global Fortune 2000 companies, to successfully migrate and modernize their cloud infrastructure and applications across multiple industries. This includes financial services, consumer products, energy, healthcare, and the public sector. SXiQ also works with clients to monitor and optimize their spending on cloud resources, helping enterprises unlock greater value from their cloud investment to realize cost savings of 20% or more.

26. Taos (2021) – Part of IBM Consulting. Taos is one of the largest multi-cloud consulting and managed services firms in North America. It has 30 years of experience with leading brands across technology, financial services, healthcare, retail, transportation, and education. A leading adopter of public cloud technologies, Taos forged strong partnerships with Amazon Web Services, Google Cloud Platform, and Microsoft Azure to deliver data center migration, platform engineering and hybrid cloud-managed services.

27. Turbonomic (2021) – Part of IBM Software. Turbonomic is an application resource management (ARM) and network performance management (NPM) software provider. Turbonomic provides businesses with its ARM software that simultaneously optimizes the performance, compliance, and cost of applications in real time.

28. Volta Networks' Volta Elastic Virtual Routing Engine (VERVE) Software business (2021) – Part of IBM Software. Volta Networks is a cloud-native virtual routing start-up.

29. Waeg (2021) – Part of IBM Consulting. Waeg is a leading Salesforce consulting partner in Europe. Waeg provides a full spectrum of Salesforce consulting services, from digital strategy advisory, business-to-business commerce, marketing automation and customer experience design to implementation and managed services. With over 400 Salesforce certifications, Waeg holds expert distinctions in Salesforce's Navigator Program in manufacturing, Pardot, and Salesforce B2B commerce and is a specialist across all clouds and the Healthcare and Life Sciences industry.

30. 7Summits (2021) – Part of IBM Consulting. 7Summits is a leading Salesforce consultancy with more than a decade of experience helping companies across industries solve complex business problems by designing and developing inno1vative digital

experiences that put customers, employees, and partners at the core. 7Summits leverages the latest Salesforce solutions to build intuitive, intelligent, and connected experiences that translate to business results.

31. Expertus Technologies (2020) – Part of IBM Consulting. Expertus Technologies Inc. is a Montreal-based fintech company and a pioneer in cloud solutions for the financial services industry. More than 1,000 entities including banks, credit unions, regulatory agencies and corporates around the globe process an average of over US$50 billion daily on its payments platform. Expertus is also one of the largest North American services bureaus of the Society for Worldwide Interbank Financial Transactions (SWIFT), the vast network used by banks and other financial institutions to manage money transfers and treasury transactions.

32. Instana (2020) – Part of IBM Software. Instana is an application performance monitoring and observability company. Instana provides businesses with the capabilities to manage the performance of complex and modern cloud-native applications no matter where they reside. Instana's enterprise observability platform automatically builds a deep contextual understanding of cloud applications. It also provides actionable insights to indicate how to best prevent and remedy IT issues that could damage the business or reduce customer satisfaction such as slow response times, services that are not working or infrastructure that is down.

33. Nordcloud (2020) – Part of IBM Consulting. Nordcloud is a European leader in cloud implementation, application transformation and managed services. From Gartner's Magic Quadrant to The Financial Times' league table of fast-growing European companies, Nordcloud is recognized as a leader in public cloud services. It is one of the few providers triple certified in Amazon Web Services, Google Cloud Platform and Microsoft Azure.

34. Spanugo (2020) – Part of IBM Software. Spanugo is a U.S.-based provider of cloud cybersecurity posture management solutions. They have a deep understanding of the security and compliance that highly regulated enterprises like banks, hospitals, and telecoms require when hosting their workloads in a public cloud.

35. TruQua Enterprises (2020) – Part of IBM Consulting. TruQua Enterprises is an IT services and consulting SAP development partner that specializes in delivering finance and analytics solutions to Fortune 500 companies. TruQua specializes in roadmap strategies, project implementations, post-go-live support, and software solutions in the areas of SAP Central Finance (CFIN), S/4HANA Finance for Group Reporting, SAP Analytics Cloud, SAP Cloud Platform, machine learning and other SAP intelligent technologies.

36. WDG Automation (2020) – Part of IBM Software. WDG Automation is a Brazilian software provider of robotic process automation (RPA). WDG Automation provides RPA, intelligent automation (IA), interactive voice response (IVR), and chatbots primarily to customers in Latin America. The WDG Automation technology is designed for business users to create automations using a desktop recorder without the need of IT. These software robots can run on-demand by the end-user or by an automated

scheduler.

37. Red Hat (2018) – Part of IBM Software. Red Hat is the world's leading provider of enterprise open-source software solutions, using a community-powered approach to deliver reliable and high-performing Linux, hybrid cloud, container, and Kubernetes technologies. Red Hat helps customers integrate new and existing IT applications, develop cloud-native applications, standardize on our industry-leading operating system, and automate, secure, and manage complex environments. Award-winning support, training, and consulting services make Red Hat a trusted adviser to Fortune 500 companies. As a strategic partner to cloud providers, system integrators, application vendors, customers, and open-source communities, Red Hat can help organizations prepare for the digital future.

38. Resilient Systems (2016) – Part of IBM Security Software and Services. Resilient Systems is a leader in security incident response solutions. Resilient Systems' incident response platform automates and orchestrates the many processes needed when dealing with cyber incidents. This enables clients to respond and mitigate cyber incidents more quickly while helping minimize their exposure.

39. CrossIdeas (2014) – Part of IBM Software. CossIdeas provides identity and access governance solutions to help enable organizations to achieve their compliance, audit, and access risk management objectives.

40. Lighthouse (2014) – Part of IBM Security Software and Services. Lighthouse Security Group, LLC is a premier provider of cloud-based Identity and Access Management (IAM) services. Lighthouse Security Group's Gateway platform protects identity and data in an increasingly complex IT environment where more company information is being stored in the cloud and accessed from mobile devices. Lighthouse Security Group is a subsidiary of long-time IBM Business Partner Lighthouse Computer Services, Inc.

41. Fiberlink (2013) – Part of IBM Software. Fiberlink Communications is a mobile management and security company. MaaS360 by Fiberlink is the trusted enterprise mobility management solution to customers worldwide from Fortune 500 companies to small businesses. Instantly accessible from the web, MaaS360 is easy to use and maintain and provides the flexibility organizations need to fully embrace mobility in every aspect of their business.

42. Trusteer (2013) – Part of IBM Security Software and Services. Trusteer, Ltd. is a privately held leading provider of endpoint cybercrime prevention solutions. It helps protect organizations against financial losses, data breaches, frauds, and advanced security threats. Hundreds of organizations and millions of end users rely on Trusteer to protect managed and unmanaged endpoints against exploitation and compromise by online threats often invisible to legacy security solutions.

43. Q1 Labs (2011) – Part of IBM Security Software and Services. Q1 Labs' advanced analytics and correlation capabilities can help detect and flag actions that deviate from prescribed policies and typical behavior with a view across an organization's network, applications, user activity, mobile endpoints, and physical security devices including

both cloud-based and on-premise sources.

44. BigFix. (2010) – Part of IBM Software. BigFix software provides a single IT management platform that gives organizations visibility, control, and automation across their computing endpoints to manage critical applications for systems lifecycle, vulnerability assessment, energy-efficient computing, and configuration and security compliance. HCL Technologies (HCL) completed the acquisition of select IBM software products including BigFix in 2018. HCL is a leading global technology company that helps global enterprises re–imagine and transform their businesses through digital technology transformation.

Glossary

Artificial Intelligence. Artificial intelligence is a multidisciplinary field encompassing subfields of machine learning and deep learning that leverages computers, machines, and robust datasets to mimic the problem-solving and decision-making capabilities of the human mind.

ASEAN. The Association of Southeast Asian Nations, or ASEAN, was established on 8 August 1967 in Bangkok, Thailand, with the signing of the ASEAN Declaration (Bangkok Declaration) by the Founding Fathers of ASEAN: Indonesia, Malaysia, Philippines, Singapore, and Thailand. Brunei Darussalam, followed by Vietnam, Laos, Myanmar, and Cambodia joined subsequently. Today ASEAN is composed of 10 member countries.

Composable Computing. In a composable computing system, infrastructure, compute, storage, and networking are abstracted from their physical locations and managed by software through a web-based interface, enabling flexible resource allocation and optimization.

Corruption. Abuse of entrusted power for private gain. High corruption impedes economic growth because it makes multinational corporations wary of entering, remaining, or merely operating in the market.

Data Fabric. Data fabric is an architecture that simplifies and facilitates the end-to-end integration of various data pipelines and cloud environments through the use of intelligent and automated systems, allowing for more holistic, data-centric decision making.

Data Sovereignty. Data sovereignty is defined as data being subject to privacy laws and governance structures from within the jurisdiction where it is generated or collected.

Digital Transformation. Digital transformation means adopting a customer-driven, digital-first approach to all aspects of a business, from its business models to customer experiences to processes and operations. It uses AI, automation, hybrid cloud, and other digital technologies to leverage data and drive intelligent workflows, faster and smarter decision making, and real-time response to market disruptions. And ultimately, it changes customer expectations and creates new business opportunities.

Energy Consumption. Energy refers to primary energy, the energy input before the transformation to forms of energy for end-use, such as electricity or petrol for transport. Developed economies consume more energy than developing or underdeveloped economies. A low score here suggests an underdeveloped economy.

Extraction. Government revenue, mostly comprising tax revenues on corporate, customs and excise duties, employee social security contributions, expenditures, income, property-related, and others.

Human Development Index. A composite index of life expectancy, health, and education by the United Nations Development Programme. A strong score is indicative of good governance and a population that can support economic growth. Look at this in conjunction with GDP Growth and Market Size as a % of GDP.

Hybrid Cloud. Hybrid cloud is a single, unified, and flexible distributed computing environment that integrates public cloud services, private cloud services, and on-premises

infrastructure. It enables orchestration, management, and application portability across all three, so an organization can run and scale its traditional or cloud-native workloads on the most appropriate computing model.

ICOR (Incremental Capital Output Ratio). Measurement of the efficiency with which capital investment is being used to generate economic growth. A lower ICOR indicates that capital investment is being used more efficiently, while a higher ICOR indicates that more capital is required to generate the same amount of growth.

Indo-Pacific Economic Framework for Prosperity. An economic initiative developed to enhance collaboration between the United States and its partners in the Indo-Pacific region on a range of economic issues, including trade, investment, infrastructure development, and digital connectivity.

Industry, Primary, Secondary, Tertiary. Industry's gross value added percentage of GDP. Primary industry refers to the agricultural sector, while secondary industry pertains to manufacturing and processing, and tertiary industry refers to the service sector. The mix between primary, secondary, and tertiary sectors is significant in understanding the stage of economic development of a country, with implications for productivity, employment, income, and vulnerability to economic shocks.

IT Market Size. The size of the technology market that IBM can address. A large market is attractive to IBM, though a large market would likely be mature and, therefore, quite competitive.

M1. Measurement of the total amount of money in circulation or money supply in an economy that includes the most liquid types of money, such as physical currency and coins in circulation, traveler's checks, and demand deposits held by commercial banks.

M1 Velocity. Nominal GDP over M1 money supply. Measurement of how quickly the money supply in an economy is being used to make purchases of goods and services.

OpenShift. OpenShift, developed by Red Hat, is a Kubernetes container platform that provides a trusted environment to run enterprise workloads. It extends the Kubernetes platform with built-in software to enhance app lifecycle development, operations, and security. With Red Hat OpenShift, organizations can build, modernize, and deploy applications at scale; and consistently deploy workloads across hybrid cloud providers and environments.

Population. Total number of people living in a particular region. Large populations have the potential to produce large GDPs and support large markets for technology spend. It's a simple matter of math: more people working and producing wealth means a larger GDP. Large countries are attractive for this reason.

Productivity. GDP output per hour of work. Higher productivity levels generally indicate that an economy is producing more goods and services per unit of input, which can translate into higher incomes, improved standards of living, and greater opportunities for economic growth.

Quantum Computing. Quantum computing is a rapidly-emerging technology that harnesses the laws of quantum mechanics to solve problems too complex for classical computers.

Sustainability. Sustainability is the processes and actions through which humankind avoids the depletion of natural resources to keep an ecological balance that maintains the quality of life of modern societies. Sustainability in business refers to a company's strategy to reduce this negative environmental impact resulting from their operations in a particular market and is typically analyzed against environmental, social, and governance (ESG) metrics.

Urbanization. Measurement of the proportion of a population living in densely populated areas, commonly defined as cities or towns with significant economic and social activities. High levels of urbanization correlate with increased energy consumption and, therefore, economic development. High levels of energy use also implicate sustainability, because of the linkage between energy use and the consumption of fossil fuels.

Zero Trust. Zero trust is a framework that effectively protects an organization's most valuable assets by assuming that a complex network's security is always at risk of external and internal threats. It helps organizations strategize a thorough approach to counter those threats.

End of Content