



SINGAPORE—A LEADING GLOBAL INNOVATION HUB

Five key elements of Singapore's thriving innovation ecosystem and future trends to guide decision-makers

Singapore offers a favorable environment for digitization, successfully managing business continuity to drive digital growth and providing interconnection solutions to accelerate innovation—even more essential in the post-COVID-19 world.

Singapore spearheads global innovation

As the world grapples with the fallout from COVID-19, countries and businesses must build innovation ecosystems in conjunction with accelerating digital transformation. New approaches on how to manage business continuity, how to drive growth and interconnection, and how to accelerate digitization are essential now. This requires cross-border and cross-industry collaboration and thinking. The good news is that Singapore is one of the world's most advanced nations in digital innovation, adoption and transformation.

Its "Smart Nation" vision is helping Singapore stride ahead as it carves out its future in the post-COVID-19 world.

Why is Singapore seen as an innovation hub of Asia-Pacific?

Reliable, fast and affordable digital connectivity

Singapore is a top performer in terms of digital adoption and showcases the most favorable environment for digitization, according to Cisco's Global Digital Readiness Index.¹ Singapore's leading digital performance is due to the widespread availability of reliable, fast and affordable digital connectivity across the island, combined with the early adoption of technology more broadly and the successful implementation of ICT infrastructure including 5G development plans and a fiber network rollout.

Collaborative problem-solving

Singapore is also renowned for its sophisticated innovation ecosystem that helps facilitate digital adoption and transformation. It successfully brings several stakeholder groups together to solve problems, create opportunities, co-design and co-create solutions, and digitize. According to Enterprise Singapore, on average, more than 50,000 new businesses—including SMEs, subsidiaries of MNCs, and startups—are formed in Singapore every year.²

Intellectual property protections

Enterprises are increasingly setting up in Singapore to capitalize on Singapore's ecosystem with a robust intellectual property rights framework that nurtures and protects innovation. Further government schemes are in place to drive access to technology, capital and talent.

¹ https://www.cisco.com/c/dam/en_us/about/csr/reports/global-digital-readiness-index.pdf

² <https://www.smeportal.sg/content/smeportal/en/stages/plan/2017/why-entrepreneurs-are-choosing-singapore.html>



The ecosystem is thriving and interconnected—it's a key reason why businesses flock to the red dot to set up and tap into the opportunities that the ecosystem itself presents.

Interconnected infrastructure

Building an innovation ecosystem like this requires interconnection, capabilities, problem-solving and experimentation culture, strategic partnerships and the right technology infrastructure and architecture too. Shifting from a siloed and closed view of problem-solving, to exploring innovation with new partners and leveraging strategic alliances to generate new ideas, allows for opportunities including new business models that integrate the value of a range of partners.

Global partnerships

Singapore is also entering several digital trade agreements in a move to bolster its digital economy efforts further. More recently, Singapore announced a Digital Economy Agreement with Australia—a crucial step in creating a flourishing ecosystem and promoting increased digital trade between the two countries. Singapore also entered a Digital Economy Partnership Agreement (DEPA) in January 2020 with Chile and New Zealand over a common set of rules, standards and guidelines for global digital trade and commerce.

In the post-COVID-19 world, government and businesses alike are shifting to an innovation ecosystem-centric model. In this paper, we explore the five key elements of Singapore's thriving ecosystem and outline what is next for leaders to create a robust digital framework and future themselves.

“Many companies are looking to digital paths, particularly right now to support trade and also to support going to market.”

Bruce Gosper, Australian High Commissioner to Singapore.

Singapore's 5-point innovation framework

Singapore leads the way in global innovation, digital transformation and collaborative partnerships. In 2019, Singapore reclaimed its spot as the world's most digitally competitive economy, an accolade it last won in 2010. This kind of recognition is another reminder of how digitally smart the nation is. Singapore's rise to the top highlights its advanced technological and digital infrastructure, availability of skilled labor and the efficacy of setting up new businesses. Thousands of companies choose to set up their innovation hubs and operations in Singapore each year.

Here are the five elements that make Singapore a truly smart digital nation:

- 1. A robust innovation ecosystem well equipped for a digital world.** Singapore is well equipped for a post-pandemic digital economy with a sophisticated innovation ecosystem in foreign exchange, financial services (especially payments) and evolving pharmaceutical industry. Singapore continually drives digital transformation in every sector, and this has set Singapore apart from its regional neighbors.
- 2. A digital framework underpinned by connectivity.** Singapore is one of the region's most highly connected nations, allowing transactions to take place quickly, securely and smoothly. Singapore was ranked fourth in the world in Huawei's Global Connectivity Index for its strong scores in digital infrastructure and industry connectivity.³
- 3. Modern digital infrastructure and a 5G network.** Singapore is renowned for being an early adopter of digital infrastructure. More recently Singapore announced its plans for rolling out 5G services nationwide and has a clear aim to have this done by 2025. Starhub, Singtel and M1 will build Singapore's standalone cloud-based 5G infrastructure.⁴
- 4. Multilateral digital partnerships and agreements.** Singapore has built its thriving innovation ecosystem on partnerships and it continues to carve out its global hub status by developing digital agreements with multilateral partners. This allows Singapore to connect with the world's leading innovators and access an expanding global knowledge economy.

³ <https://www.huawei.com/minisite/gci/en/country-profile-sg.html>

⁴ <https://www.imda.gov.sg/news-and-events/Media-Room/Media-Releases/2020/Singapore-Forges-Ahead-with-Nationwide-5G-Rollout>



5. Fostering a change culture for a digital future.

A post-pandemic digital economy will inevitably present further collaborative opportunities for businesses and governments alike to come together to innovate and digitize. While COVID-19 has expedited digital adoption in many sectors, stakeholders must be ready for more technological growth and continual learning, adaptation and experimentation.

Regional stability fosters an innovative environment

Singapore is rated as the world's 14th global startup ecosystem, and local connectedness is one of its strongest traits.⁵ Prime Minister Lee Hsien Loong first announced Singapore's Smart Nation vision initiative in late 2014 with a clear purpose to harness technology and data to solve real problems that will make a difference to people's lives, across the whole of society.

Since then, the government has launched several critical initiatives designed to support the country's broader smart vision further. It has built the underlying infrastructure on which applications and services can be developed, such as the National Digital Identity, which will allow people to log in securely to access government services online.

The government has also launched projects to address real-world problems and started experimental projects for Singapore to learn quickly about whether novel technology, such as artificial intelligence, will fail or succeed. Truly fostering an entrepreneurial mindset and culture, Singapore is one to watch in areas including AI, blockchain, advanced manufacturing and robotics, health and life sciences, and the fintech sector.

Singapore's long-term smart nation strategy and vision is paying off now as the island city-state is well poised to emerge from the crisis more robust and more resilient. Prior to COVID-19, there was some adoption of digital transactions in public transport and eateries, but now there is a near full-scale digitalization by businesses because of COVID-19.

Rapid adoption of digital technology

Social distancing has forced an increase in cashless transactions, remote working, home-based e-learning, e-commerce, telehealth services, and even cleaning robots and drone delivery services in recent times. Singapore witnessed a 30 percent surge in internet exchange traffic, with the country currently seeing one of the highest overall in the world. The current shift in digital consumption patterns has never been so drastic in such a short period.⁶

Singapore government's investment in a Fortitude Budget of over SG\$500 million has helped local businesses in their digital transformation efforts. The pandemic has accelerated the utilization of digital systems such as e-payments, online food and services, telecommuting and virtual events. The government has also implemented a suite of digital tools such as tracking solutions, check-in systems, and portals to help disseminate timely and accurate information to Singaporeans and to enable agencies to manage the crisis better.⁷

To overcome the devastating economic impact of COVID-19, the government further invested SG\$250 million to help businesses digitize alongside digital platform application providers, such as developing offline-to-online (O2O) business models to access new domestic revenue streams and international demand.

A digital framework underpinned by interconnection

The government continues to drive its digital agenda, ramping up in all areas as it further future-proofs its digital efforts. For example, the Digital Industry Singapore (DISG) Office encourages public and private partnerships to help companies digitize more quickly in keeping up with the rapid pace of technical change.

DISG will bring broader benefits to Singapore's digital ecosystem, including the creation of 10,000 new jobs, in areas like engineering, software development and automation. They will offer training in artificial intelligence, cybersecurity, data science and networking engineering, and help further digitize Singapore and strengthen businesses' capability in developing new solutions in cloud computing, AI and payments.

⁵ <https://startupgenome.com/blog/singapore-startup-ecosystem#:~:text=Startup%20Genome's%202019%20Global%20Startup,one%20of%20its%20strongest%20traits>

⁶ <https://www.straitstimes.com/tech/internet-data-traffic-spikes-in-spore-as-more-work-from-home>

⁷ <https://www.tech.gov.sg/products-and-services/responding-to-covid-19-with-tech/>



Digital investment spurs future growth

This digital investment follows Singapore's push for more digital technology and automation, including the installation of robotics, particularly in the healthcare and construction industry. Singapore is second only to South Korea in terms of installation of industrial robots, with 488 robots per 10,000 employees, according to an International Federation of Robotics report.

As Singapore heavily invests in its digital plan, it has also invested significantly in the underlying infrastructure to ensure that it can facilitate increasing digital trade. According to the *Global Interconnection Index (GXI) Volume 3*, a report from Equinix that measures the growth of digital economy, Singapore is renowned for its interconnectedness and anticipates an interconnection bandwidth growth of up to 47% CAGR. Singapore's high ranking is due to strong scores in digital infrastructure and industry connectivity, especially relating to ICT expenditure, the percentage of population covered by mobile networks, ICT access and usage, smartphone penetration rate, and ICT laws.

Foundations for innovative technologies

Singapore has laid the foundation to support the growing demand for high-growth technologies such as cloud computing, AI and IoT. According to the GXI report, Singapore ranks highly in Cloud & IT services, Telecommunications, Manufacturing, Energy & Utilities and Digital Media. Singapore is far ahead of other ASEAN countries and above the global average with its indicators.

A secure environment for global trade

Singapore's digital framework is also the key to digital transactions to take place smoothly. Global trade is key to Singapore's overall economic performance, making it imperative to have a digital framework in place that boosts trading activities and irons out issues like electronic invoicing and payments, data sovereignty and booking of transactions.

Having a clear digital framework on data sovereignty, trade transactions and other issues, underpinned by a global interconnection platform like Platform Equinix®, enables businesses to connect to evolving digital ecosystems more readily, resulting in higher productivity and efficiency.

“We have witnessed the growth of many startups that are leveraging Platform Equinix, having initially connected to it as an entry point and further utilizing the platform and our ecosystems to rapidly scale their business as it matures. For example, a Singapore fintech could scale their international reach with us and instantly reach Frankfurt, New York, Tokyo, Sydney, Hong Kong—the list goes on. It is our digital infrastructure that allows us to do this as we have ecosystems in all major verticals and have cloud providers like AWS, Google and Alibaba as part of our ecosystem also.”

Yee May Leong, Managing Director, South Asia, Equinix

Digital infrastructure and a 5G Network

Singapore is an early adopter of digital infrastructure. More recently Singapore announced its plans for rolling out 5G services nationwide with a clear aim to have this done by 2025. As part of this infrastructure push, the Infocomm Media Development Authority (IMDA) confirmed that three of Singapore's telecoms operators, Starhub, Singtel and M1, had won contracts to build a standalone cloud-based 5G infrastructure.⁸ Secure and resilient 5G networks will soon become the backbone of Singapore's digital economy. The plan is for the IMDA to build sustainable 5G business use cases and develop strong manpower capabilities to utilize 5G technologies, thus paving the way for a vibrant 5G ecosystem in Singapore.⁹

As traditional forms of connectivity are reaching their natural limits, it is expected that more than half of Singapore will have 5G mobile network coverage by the end of 2022. 5G networks are expected to be at least 100 times faster than current 4G networks, cut latency to less than one-thousandth of a second, have the ability to connect 1,000 times as many devices,

8 <https://www.imda.gov.sg/news-and-events/Media-Room/Media-Releases/2020/Singapore-Forges-Ahead-with-Nationwide-5G-Rollout>

9 <https://www.imda.gov.sg/news-and-events/Media%20Room/Media%20Releases/2020/Singapore%20on%20track%20to%20develop%20vibrant%205G%20ecosystem%20underpinned%20by%20a%20world-class%20secure%20and%20resilient%205G%20infrastructure>



and drive a significant increase in network traffic. A full-fledged 5G network will also revolutionize several industries from healthcare to transportation, in supporting critical applications, and more IoT-driven technology applications such as driverless car navigation and remote surgery, which require a constant connection without lag.

Investing in IoT technologies

Singapore's undersea cables will further aid with the significant increases in data volumes bought about by more investment in IoT technologies. Massive IoT will drive a 1000x increase in device density per square kilometer. To effectively manage increasing strains of surging data volumes, Equinix works with technology providers like Nokia and Ericsson to support 5G, hosting their services for mobile operators or enterprises using private mobile networks.

Communications and Information Minister S. Iswaran said that 5G networks are an important investment in Singapore's digital infrastructure, "It has become very apparent how important digital infrastructure is, and the kind of resilience and flexibility it affords us, especially in situations like what we are in right now."¹⁰

Singapore's digital infrastructure and upcoming 5G network will undoubtedly create sustainable economic and social value as industries and business models continue to digitally transform, unlock new careers and skills, and offer new level of hyper-connectivity to consumers.

Multilateral digital partnerships and agreements

Singapore has built its thriving innovation ecosystem on partnerships. And it continues to carve out its global hub status by continuing to develop multilateral partnerships and digital agreements.

Free trade agreements (FTA), for example, link the city-state to rules-based frameworks with high standards of transparency, sustainability and data privacy. By participating in free trade agreements such as the Comprehensive and Progressive Agreement for Trans-Pacific Partnership and the EU-Singapore FTA, Singapore achieves maximum interconnectivity with the world's leading innovators, enabling access to an expanding global knowledge economy. Through

partnerships with six other like-minded countries through these partnerships to keep supply chains and trade routes open, Singapore ensures the continued flows of goods and essential supplies. It has a basis from which to build greater connectivity, which is especially important once the outbreak is over.

Singapore has also entered several digital trade agreements in a move to bolster its digital economy efforts further. More recently, Singapore announced a Digital Economy Agreement with Australia—a crucial step in creating a flourishing ecosystem and promoting increased digital trade between the two countries. Singapore also entered a Digital Economy Partnership Agreement (DEPA) in January 2020 with Chile and New Zealand over a common set of rules, standards and guidelines for global digital trade and commerce. These partnerships will help Singapore stay nimble in its international trade strategy.

“Platform Equinix connects our 220 data centers globally across 63 metros, which we are adding to every year. The power of interconnection is that enterprises come into our community and grow and accelerate their business by connecting to the ecosystems within our platform. Equinix is the place where we connect opportunities. Many cloud startups started with us and have grown up with us. Zoom's CEO once said that Zoom wouldn't exist without Equinix because we connect them to all the different infrastructures and the sectors they need to enable connectivity, collaboration, communication in a very secure manner.”

Yee May Leong, Managing Director, South Asia, Equinix

¹⁰ <https://www.straitstimes.com/tech/singtel-joint-starhub-m1-venture-win-licences-to-build-two-nationwide-5g-networks>



Private and public companies alike see private interconnection to partner ecosystems as a critical enabler in accelerating their digital journeys. Adapting a connectivity-first framework—such as an Interconnection Oriented Architecture® (IOA®), a proven and repeatable strategic approach which Equinix has developed based on leading global deployments—companies in Singapore and throughout Southeast Asia can leverage interconnection and colocation to directly and securely interconnect people, locations, clouds and data.

Vendor-neutral interconnection solutions such as those on Platform Equinix are critical in overcoming such difficulties and connecting dense ecosystems of clouds, networks and businesses over high-speed, low-latency and virtualized connections to allow for more significant partner innovation and collaboration.

As digitization changes the face of commerce and trade, Singapore is forging new forms of cross-border linkages, creating opportunities for our businesses to thrive in the digital economy.

Fostering the right culture for a digital future

A post-pandemic digital economy will inevitably present further collaborative opportunities for businesses and governments alike to come together to innovate. While COVID-19 has expedited digital adoption in many sectors, stakeholders must be ready for more technological growth and continuous learning and adaptation.

Future-proofing for the new world requires leaders to develop agile businesses by acquiring core competencies to achieve digital maturity and break silos. The global pandemic has sparked changing consumer behaviors, new workplace models and changing channel partner dynamics, and it looks as though a return to what it was like is not on the cards. It is about the new future.

However, enterprises will encounter challenges in adopting digital technologies in non-conductive work environments. Technology serves as an additional enabler but only works in an environment that is open to change and digital resilience. Organizations must create a culture of digital adoption across the board to enhance employee and customer experience.

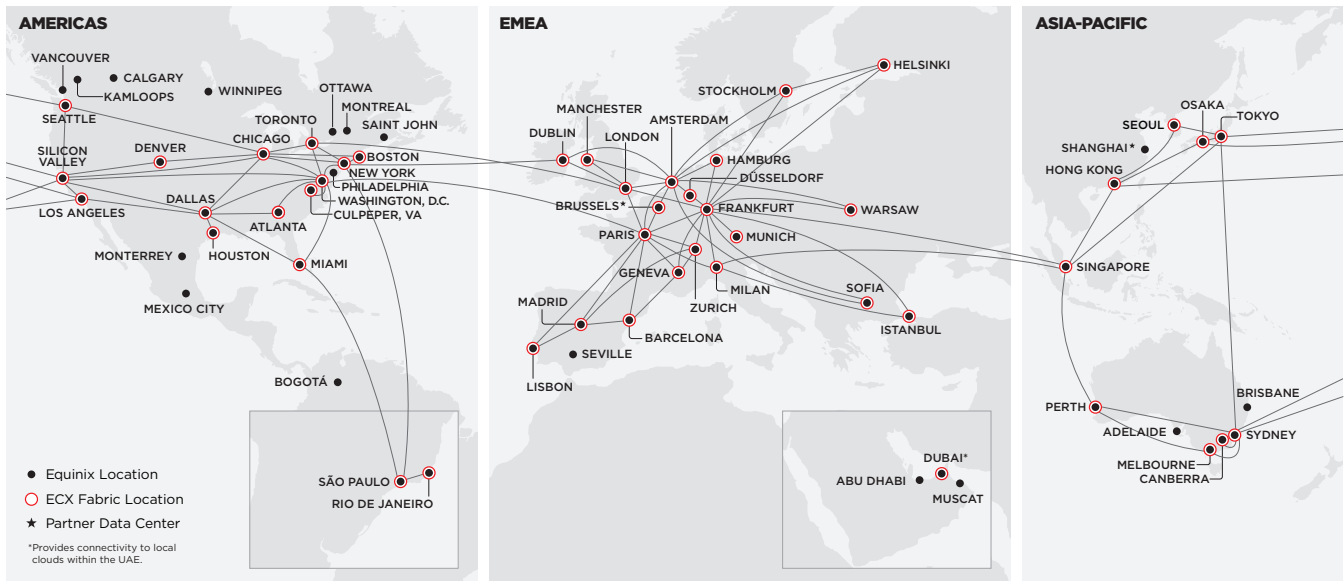
Companies must be operationally ready also to absorb the government's digital initiatives, relief measures and future-forward investments to keep up with the digital growth of the nation.

Having a supportive regulatory framework and a healthy investment environment is only the first step towards embracing digital transformation in the economy. Businesses must remain competitive, and hence, Singapore's workforce needs to be comfortable working alongside technology and embracing new skills and job opportunities that arise from digital transformation. Solving digital challenges comes down to the mindset of the workforce.

With government platforms like SkillsFuture, the Singapore workforce must recognize the opportunity to adapt their skills, build a digital knowledge foundation and forge new career paths. Continuous learning, agility and adaptability need to become the new mantra for businesses and employees in the modern world. Companies must place employees at the core of their digital transformation journey, or they will not only struggle to keep up with customer demands and to shifting market conditions, but they will also threaten to slow down the pace of technology advancement.

“Digital trade has been on the agenda since 1988. It wasn't until 2017 that it really took a substantial step forward in negotiation. Now there are the beginnings of negotiation on standard e-commerce exploded by Australia, Singapore and Japan. We are in a good position to accelerate even further just as COVID is accelerating the digital agenda. You can see what is happening with e-commerce.”

Bruce Gosper, Australian High Commissioner to Singapore.



What's next?

Business leaders in Singapore are leading in a smart nation that offers a robust innovation ecosystem, a strong digital agenda, modern digital infrastructure, fast internet connectivity and multicountry digital agreements. So how can leaders take these learnings and develop their own thriving innovation ecosystem and robust digital agenda?

Be ready for the digital frontier.

Technology will fundamentally change business models and the workforce as we know it. Yet the adoption of new technologies is of no value if those technologies are not working optimally for an organization and its customers. Leaders must adapt to the new digital infrastructure by partnering with interconnection ecosystems connecting across the world.

By interconnecting on Platform Equinix, businesses can bypass the public internet and instead, use direct physical and virtual interconnections for more reliable, fast and secure performance. An important first step to building your own innovation ecosystem is to understand where your organization falls on the innovation maturity scale. Define your digital priorities. Do they include finding talent, inspiring and boosting your team with new ideas, understanding trends, attracting and identifying startups, or developing suppliers?

Develop strategic partnerships in line with your digital goals.

In order to become a market innovator and disruptor, companies need to build a network of partners to meet their varied needs. Consider partnerships with startups, investors, universities, researchers or government organizations. Ensure those partners all meet using an interconnected approach; otherwise, they will be relying entirely on the public internet.

That is why Equinix has evolved from a traditional data center to a digital infrastructure company with a rich channel ecosystem that allows organizations to thrive. Interconnection has allowed leaders to streamline multiparty/multimachine information exchange for increased agility, flexibility and scalability in meeting evolving demands.

Further, the right interconnection framework will facilitate more open innovation with your partners and third parties. From cloud computing to the edge, the right infrastructure will close the distance, allowing companies to collect and manage data at the source and enabling the adoption of new solutions such as 5G and greater IoT capacity.



Develop a real-time problem-solving culture.

When you leverage technology frameworks, incorporate aspects such as IoT to enhance your ability to solve problems in real time. For example, when Zoom faced an unexpected surge in demand for video conferencing during the onset of COVID-19, the company rose to the challenge by accelerating its digital transformation efforts, powered by interconnection to expand its worldwide presence. Zoom has been able to provide its growing base of customers with direct, secure and high-performance access to its video, voice, webinar and chat services.

Invest in interconnection technology infrastructure via Platform Equinix.

Technology investment is a key part of your connected innovation network. As we look to make the shift from crisis management to reaching the next normal, technology will be the key to closing the divide. Direct physical and virtual interconnection services deliver more reliable and secure performance with much lower bandwidth costs compared to public broadband networks. They help businesses to collaborate directly with customers, partners and employees to securely enable nimble innovation, resulting in faster time to market and the flexibility to adapt to changing conditions. The stronger the investment strategy, the higher the impact on driving innovation-led outcomes, and subsequently greater revenue.

“Get on the innovation train, or you’re going to be hit with it—and it’s much better to be part of it and knowing where your destination is than having it be taken out from the side.”

Teena Pisarov, MD, Virtus Health



Power Your Digital Leadership at Equinix

Equinix is the world’s digital infrastructure company. Digital leaders harness our trusted platform to bring together and interconnect the foundational infrastructure that powers their success. We enable our customers to access all the right places, partners and possibilities they need to accelerate advantage. With Equinix, they can scale with agility, speed the launch of digital services, deliver world-class experiences and multiply their value.