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Asian tech: 5 key trends for the future

Technology

The COVID-19 outbreak has accelerated many of the technological shifts that were already underway prior to the crisis. As people shift to work, shop, learn and entertain themselves online, we identify five key technological trends that will reshape the global landscape post-covid and the role that Asian tech companies will play in this transformation.

1 THE GREAT LEARNING MIGRATION

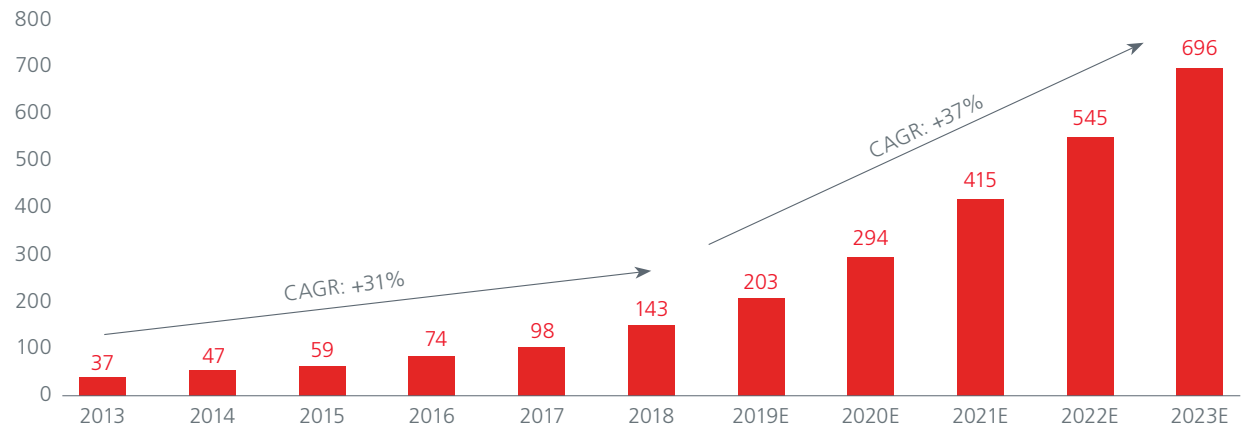
On-line learning became a global phenomenon when the coronavirus outbreak emptied schools. Even as schools reopen, on-line learning has gained greater acceptance and is increasingly seen as a cost-effective way to provide learning to all ages.

Eastspring's Shanghai-based A-share team believes that the scale of on-line learning in China is unparalleled given its population size, level of internet penetration and state of technological advancement. On-line learning is not new in China – on-line adult education has been growing since 2013 and accounts for about half of China's on-line education market today. However, the real growth in recent years has come from the K-12 (Kindergarten through 12th Grade) After-School Tutoring (AST) market. China's on-line K-12 AST market grew at a compounded average growth rate (CAGR) of 85% to RMB 30.2 bn from 2013 to 2018.

The potential for China's on-line learning market remains significant. At an expected enrolment of 65 mn students in 2020, AST penetration in China is still low (28%) compared to +70% in Taiwan/Japan/Korea and +85% in Hong Kong. According to Frost & Sullivan, the market size (by gross billing) of China's on-line education is expected to reach RMB 696 bn in 2023, up by more than two-fold from RMB 294 bn in 2020E. See Fig. 1. This growth is expected to be driven by on-line AST enrolment as 5G and technological development help to lower bandwidth costs and increase the competitiveness of on-line education. Frost & Sullivan forecasts China's on-line K-12 AST enrolment to grow at a CAGR of 65% from 2018 to RMB 367 bn in 2023E, making up half of China's on-line education market.

According to Bloomberg, there have been close to 100 Education Initial Public Offerings (IPOs) globally during 2010 – 2019, with China and Hong Kong accounting for the lion's share in the last three years. The higher awareness brought about by the coronavirus outbreak may raise the penetration of on-line learning especially in countries with large and geographically dispersed populations. This could potentially create more investment opportunities in Asia's on-line education sector.

Fig 1: China on-line education market size by gross billing, 2013 – 2023E (RMB bn)



Source: Frost & Sullivan. Citi Research. February 2020.

2 UNLOCKING THE (ASIAN) CLOUD

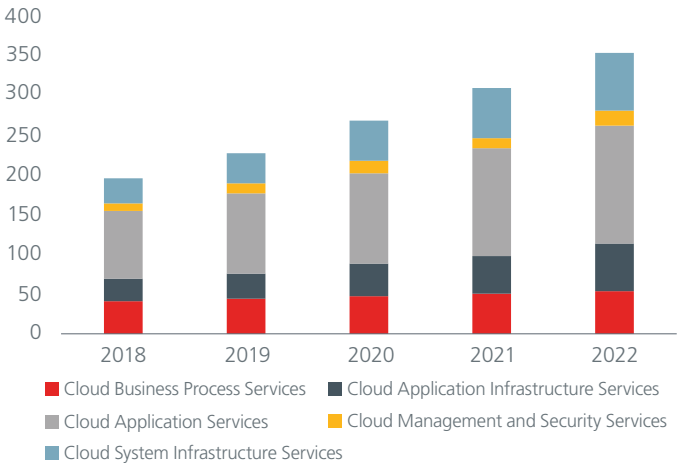
COVID-19 has also accelerated the adoption of cloud computing as companies prioritise enterprise resiliency, operational redundancy and resource flexibility. During the coronavirus outbreak, cloud computing enabled remote working for a variety of enterprises worldwide, where a dispersed team can access and leverage a unified work platform. Besides providing cost efficiencies from not having to buy or maintain computing infrastructure, cloud computing also offers faster connection speeds as well as more efficient deployments and upgrades of software as well as applications.

Global cloud service revenue is forecasted to reach USD 266.4 bn in 2020 and expected to grow 15% over the next two years. See Fig. 2. According to the International Data Corporation, building the infrastructure to support cloud computing now accounts for more than one-third of all technology spending worldwide.

With a 10.8% market share[1], China's cloud infrastructure services market is the second largest in the world, behind the US. The Chinese market is dominated by local companies, with Alibaba, Tencent and Baidu, being the three largest. The successful listing of Kingsoft Cloud in the US in May, where it raised more than USD 510 m in the midst of the pandemic, attests to the high growth potential investors see in China's cloud market.

According to **Eastspring's Shanghai-based China A-share team,** many Chinese cloud companies had offered their services such as video and audio chat tools for free during the pandemic, helping existing and new users to

Fig. 2: Worldwide public cloud service revenue (USD bn)



Source: Gartner. November 2019.

Source: [1]https://www.canalys.com/newsroom/canalys-china-cloud-infrastructure-Q4-2019

maintain operations. They also provided free access for research institutions to accelerate drug screening for potential vaccines. The team expects the Chinese cloud market to grow post the pandemic on the back of changed behaviours and as companies assess their business continuity plans and look to shift more applications to the cloud.

While China is expected to account for one-third of the cloud computing market in Asia Pacific in 2023, India and Japan are forecasted to make up the other one-third. The next biggest markets in the region are South Korea, Australia, Hong Kong and Singapore. For now, Amazon is still the largest cloud provider[2] in Asia Pacific. Alibaba is second, followed by Microsoft in third place.

Becoming a global leader in the cloud market requires global presence, technology expertise, a recognised brand name, extremely deep pockets and a long-term focus. China's ambitious cloud players appear to tick most of the boxes.

3 DATA CENTRE BOOM

The increasing adoption of cloud services, 5G and the IoT (Internet of Things) technologies has in turn generated a growing demand for data centres. Data centres are a core component of business operations, comprising of centralised warehouses (physical or virtual) used for the remote storage and processing of data and information. They provide the critical infrastructure that supports remote working, education and TV streaming.

Within Southeast Asia, Singapore has traditionally been the epicentre for public cloud players with new cloud services or regions typically being established in the nation-state first. With Amazon Web Services (AWS), Google Cloud Platform (GCP), Facebook and Alibaba Cloud present and expanding their data centre infrastructure in the country, Singapore is one of the most mature data centres markets in the world. That said, land shortage and zoning restrictions are potential challenges for Singapore in this data centre race. The largest cloud players have started deploying or announced plans to roll out new cloud regions in other parts of Southeast Asia, with Indonesia being one of the top spots. AWS will launch a cloud region in Indonesia by the end of 2021 or early 2022, while GCP is expected to launch its cloud in Jakarta in 2021. Not to be outdone, Alibaba Cloud launched its second data centre in Indonesia early this year, barely 10 months after the launch of its first data centre in the country.

According to **Ari Pitoyo, Chief Investment Officer, Eastspring Indonesia,** Indonesia is likely to see a 10-fold increase in data consumption over the last five years driven by the surge in platform providers ranging from e-commerce retailers, ride-hailing operators as well as Online Travel Agencies (OTAs). The rising digitisation trend across various verticals – mobile payment, digital banking and Software as a Service (SaaS) – should also contribute to increasing data consumption. At the same time, Ari highlights that traditional Indonesian businesses are embracing data analytics and hence generating more data. The Boston Consulting Group forecasts that the public cloud will boost Indonesia's GDP by an accumulative USD 36 bn over 2019 – 2023 while creating 345k jobs.

Besides Indonesia, Malaysia is also expected to grow its data centre business. Alibaba Cloud has been operating in Malaysia from Kuala Lumpur since 2017 and Microsoft is expected to launch an Azure Cloud region in Malaysia in 2021.
The multi-billion-dollar Southeast Asia data centre market is poised for major growth and is anticipated to more than double in value over the next four years, potentially taking over Europe as the world's largest data centre market by 2021.
See Fig. 3. Robust IT infrastructure, uninterruptible power supply and strong fibre connectivity are some of the key factors that have driven Southeast Asia's data centre market growth to date. In the case of Singapore, a skilled workforce and low tax environment have also helped.

Source: [2]Based on revenues generated during 4Q19.

Data centres are relocating to the region to be closer to their customers and businesses in order to maximise connectivity and lower latency. Increasingly, data protection regulations stipulate that certain types of data have to be stored domestically, requiring data centres to be set up locally. Malaysian government agencies and enterprise corporations for example, are required to have all their data stored within Malaysia. The Indonesian regulator also requires financial data belonging to Indonesians to be housed within Indonesia for privacy reasons.

Data centres consume large amounts of energy, generating a high carbon footprint as well as incurring significant electricity costs. To remain competitive, Asia's data centres will need to migrate to eco-friendly and renewable sources of energy as the energy source used to power data centres come into focus. It is likely that going forward, data centre operators will need to consider low heat emission building materials, heat pumps as well as other evaporative cooling mechanisms.[3]

Fig 3: Southeast Asia's data centres

Source: https://cloudscene.com/datacentres-in-asia-pacific

4 ROBOTS AT WORK

Automation and robotics are expected to be beneficiaries of **global supply chain shifts post COVID-19.** As companies move to dual supply chains – a practice of using two suppliers for a given product or component etc, capital stock (including robots) should increase for the same amount of output. With Asia currently accounting for 86%[4] of the global industrial robot installed base, re-shoring or a move "West" implies that US and Europe will start buying more robots as they expand their production bases. Given the higher wages and manufacturing costs in these countries, companies are also likely to look to automation to lower costs.

Robots will become easier to programme and install as machine learning tools make them smarter. Research and Development is also focusing on bringing human-robot collaboration to a higher level – enabling robots to respond to voice and gestures as well as to recognise the intent of human motions. Meanwhile, various institutions[5] are working on a standardised generic interface. This will allow industrial robots to connect to the Industrial Internet of Things and enable them to communicate with each other regardless of manufacturer. It will also potentially make robot leasing a viable solution for small and medium sized enterprises[6].

According to BofA Global Research, supply chain shifts to the west are taking place at a time when the size of the working population in these countries are shrinking. As such, there will be limited choice but to rely on automation. With a number of listed Japanese companies having large market shares in various robot categories, these Japanese robot manufacturers appear well placed to ride on this global trend. See Fig. 4.

Source: [3]Data Centre Market in Southeast Asia 2019-2023. Technavio. November 2019. [4]2018 numbers. IFR, BofA Global Research estimates.[5]VDMA and the Open Platform Communications Foundation (OPC). [6]International Federation of Robotics. Top Trends Robotics 2020.

Fig. 4: List of manufacturers with large market shares in selected product groups

	Key manufacturers
Linear/cartesian/gantry	IAI (Japan), Yamaha Motors (Japan), THK (Japan), NSK (Japan)
Collaborative	Universal Robots (Denmark), Kawasaki Heavy (Japan), KUKA (Germany), ABB (Switzerland), Fanuc (Japan)
SCARA	Seiko Epson (Japan), Staubli (Switzerland), Denso Wave (Japan), Mitsubishi Electric (Japan)
Wafer handling robots	Kawasaki Heavy (Japan), Yaskawa Electric (Japan), Brooks Automation (United States), Hirata (Japan), RORZE (Japan)
Glass substrate transfer robots	Nidec Sankyo (Japan), Yaskawa Electric (Japan), Hyundai Robotics (South Korea), RORZE (Japan), Nachi Fujikoshi (Japan)

Source: BofA Global Research

While Japanese robot manufacturers are currently key players in this space, **Eastspring's Shanghai-based investment team** highlights that China is also rapidly moving up the robotics value chain with advancements in both Research & Development as well as deployment. Chinese system integrators are currently driving chip design, software and Artificial Intelligence to real applications where users, typically industrial manufacturers, can fully exploit higher efficiencies, enjoy better consistency and improved cost structures brought about by robotic automation.

5 ENABLERS OF THE 5G RACE AND MORE

The fifth generation of mobile networks is expected to have a bigger impact on the global economy than any other previous iterations. By offering high speed, low delay and hyper connectivity, **5G technology promises to revolutionise the way we work, live and play.** It is estimated that 5G technology will contribute more than USD 13 trn to global output by 2035, representing 5% of global real output and generating 22.3 million jobs.[7]

It is therefore no surprise that the US and China are racing to play the leading role in 5G development. **Eastspring's Shanghai investment team** believes that spending on 5G infrastructure in China will provide meaningful growth potential for both domestic equipment makers and their Chinese suppliers. Specifically, they see strong domestic demand for Printed Circuit Boards (PCBs) and Radio Frequency (RF) components.

At the same time, the US' recent decision to prevent China's Huawei and its affiliates from buying semiconductor chips that are made or designed with US equipment highlights the important role that semiconductor chips play in this race. In fact, not just for 5G, semiconductors are enablers and beneficiaries of the other key technology trends we have highlighted in this article.

Remote working and ecommerce/home consumption, for example, will drive a corresponding increase in processing and bandwidth requirements, benefiting compute-levered semiconductor providers.

Source: [7]Omdia. Global sales activity across multiple industry sectors. March 2020.

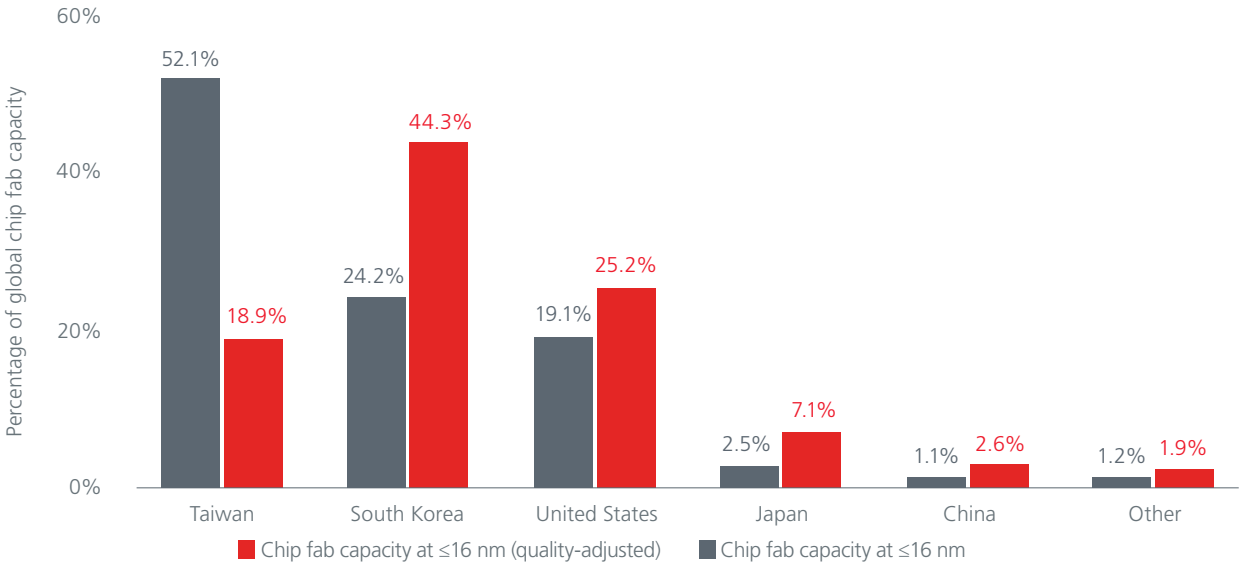
Working from home has highlighted the need for enterprise resiliency and is speeding the transition to the cloud. The need for better diagnostics, faster screening and population monitoring is likely to increase artificial intelligence investments in healthcare and smart cities. Increasing online gaming will require better gaming components. Furthermore, on-going trade tensions are pushing China and the US to a path of greater self-sufficiency and supply-side duplication. All of which creates more demand for specialised semiconductor chips.

The capability of semiconductor chips hinges on the size of their transistor – the computer circuit that performs calculations. Moore's Law observes that the number of transistors on the microchip doubles every 2 years as their size decreases with technological advancement. State of the art chips have the smallest transistors but the complexity and cost of producing state of the art chips imply that only a few companies can operate at or near the state of the art. Today, there are only 2 companies in the world that can manufacture the leading-edge 5 nanometre (nm) chip – Taiwan Semiconductor Manufacturing (TSMC) and Samsung Electronics (SEC). US-based Intel aims to reach 5 nm by 2023[8]. Taiwan and South Korea currently accounts for the lion's share of state of the art (<16 nm) global chip fabrication capacity. See Fig. 5.

Greg Kang, Eastspring Korea's Head of Research for Equities highlights that leading chip manufacturers such as SEC and TSMC are already using the cutting edge Extreme Ultraviolet (EUV) lithography technology which enables them to make smaller and faster chips at a lower cost. According to Greg, SEC and TSMC are planning to start the mass production of chips using EUV equipment from late 2020 or early 2021, which will accelerate the pace at which consumers can realise 5G's full potential.

Kevin Liu, Eastspring Taiwan's Head of Domestic Investments believes that the potential shifts in global supply chains are likely to benefit Taiwan's semiconductor supply chain.

Fig. 5: Global chip fab capacity by fab headquarters for state of the art (<16 nm) chips



Source: Data from "World Fab Forecast," SEMI, May 2019 edition. Quality adjusted – gives greater weight to the production of more advanced chips.

Source: [8]https://optocrypto.com/intel-plans-to-switch-over-to-7nm-in-2021-and-5nm-in-2023/.

Taiwanese foundries, led by TSMC, are widening the technology gap into 3 nm chip fabrication. Taiwan's leading Integrated Circuit designers for smartphones, power management and Wi-Fi are also riding on the Chinese government's localisation policy. Looking forward, if US' export bans on key technology inputs to China result in a US-China tech decoupling, Kevin believes that Taiwan chip suppliers will likely remain well-positioned. TSMC has recently committed to build a USD 12 bn 5 nm chip making plant in the US.

CAN'T IGNORE ASIA'S EDGE

Even as countries ease their lockdown restrictions, it is likely that human behaviour has been changed for good. The shift to cloud, digitalisation and automation brings opportunities for enhanced productivity, as well as new products and services. Investors will need to have exposure to these technological trends over the next decade. While a changing competitive and regulatory backdrop for technology implies that investors would need to be selective within the sector, they would be hard pressed to ignore Asia given its edge and growth potential in many of these applications.

This is the second of six articles in our Asian Expert Series which explores the future of Asia post-covid.

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