

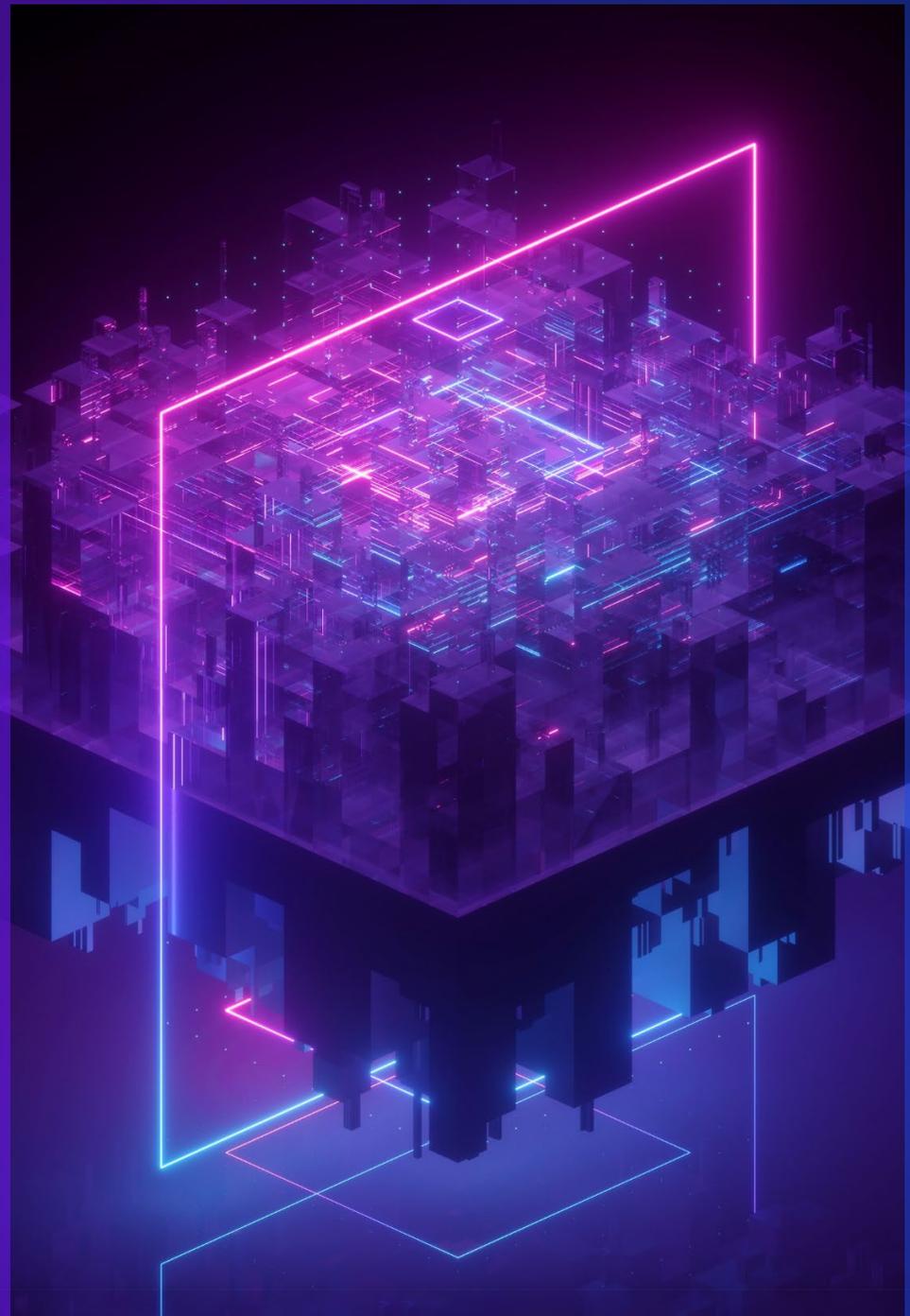


Powering Asia's Innovation Economy

An outlook on the Asian
start-up ecosystem



Special report produced by KPMG for ATxSG



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Foreword

Asia has always been seen as a long-standing centre of trade, especially for manufactured goods. Even today, the key manufacturing powerhouses are located within Asia, and this has played an important factor in fuelling Asia’s economic growth through the years¹. However, with the rise of digitalisation from around the world, this long-held tradition is changing. The demand for digital services is now one of the key drivers of economic growth, especially as technology becomes a critical tool in addressing current issues the world is facing, such as disruptions in supply chains, tackling climate change and improving urban life. As consumers become more affluent, Internet penetration will also rise significantly. The emerging economies of Asia are becoming increasingly digital, with an estimated additional 200 million coming online via mobile internet through the pandemic², from 1.09 billion in 2019 to 1.29 billion in 2021, and this is projected to grow further to 1.5 billion in 2025³.

Push towards a digital economy

To support a digitalising economy, there must also be adequate infrastructure to encourage new innovation. Governments in Asia are pushing for the development of smart cities, with the rise of 5G and Internet-of-Things (IoT) enabling greater connectivity and improving optimization across various industries. Digital twins will also allow these new developments to be replicated virtually and acts as a platform to testbed these new solutions, helping to drive this push towards digital nations. The combined effects of increased digitalization and connectivity and the rise of the mass-affluent in Asia have also spurred the rise of Web 3 products and emerging technologies in Asia. The younger demographic, with their increasing spending power and digital presence, is pushing Web 3 gaming to new heights, while the working class is increasingly looking towards having fully digital customer journeys for financial services products and services especially after the Covid-19 pandemic.



1. *WealthTech: Looking ahead*, KPMG & Endowus
2. *Digital societies in Asia Pacific: Progressing towards digital nations*, GSMA Intelligence
3. *The mobile economy Asia Pacific 2022*, GSMA Intelligence



With the demand to go fully digital, digital enterprise solutions which are real-time and auditable, usually built on blockchain and blockchain infrastructure products, will be key to providing these new customer experiences. Having artificial intelligence (AI) integrated into the customer journey, especially in an age with more people going online, will allow data to be easily stored and consolidated. One major advantage is the generation of key insights through analysis algorithms and machine learning (ML), which can be used to thoroughly understand the client and in turn result in better business outcomes. Using AI to understand the customer has been adopted across various industries, from financial services to education and even government work. In particular, AI has enabled the rise of hyper-personalization, allowing companies to provide customers with a truly bespoke experience. While the developed economies of Asia have been paving the way in this area since as far back as 2017, the emerging economies are now embarking on this journey.

Growth of ESG technology

Apart from digital services, another growing sector within Asia is ESG technology. The region is fertile ground for this, as Asia is a large emitter of carbon emissions given its position as a manufacturing and trade hub. With climate change now at the forefront and greater scrutiny from consumers and investors, there is a greater push for transparency and accountability for companies on their ESG metrics across their entire business model. This growing climate awareness has opened up much more opportunities for ESG tech and ESG fintech adoption from corporates and financial institutions. With these emerging trends, our report takes a deep dive into the start-up ecosystem in Asia, identifying head and tailwinds which have shaped it, including key sectors that have come to the fore in recent times. Looking at key demographic and financial indicators across the region and spotlighting specific countries, we explore the challenges and opportunities for start-ups, with recommendations on how they can be better supported.



Executive summary

Key takeaways

▶ Asia’s venture capital market displays strong long-term growth prospects

Despite venture funding in Asia looking suppressed in 2023 due to the existing global economic turmoil and high interest rates, with Q1 2023 seeing a continued slowdown in venture financing, there remains cautious optimism across Asia for Q2 2023. Key macro-economic indicators are showing strong potential growth. Strong players in the start-up ecosystem are likely to survive the current funding crunch, and emerge with stronger unit economics and more robust business models.

▶ Increasing digitalization of emerging economies will likely be a key driver of growth for technology start-ups in Asia

With its relatively nascent markets and the rapid rise of digital penetration in Asia, the region is positioned as a key market for digital and technology start-ups. The inflows of wealth, as seen from the growing number of high-net-worth-individuals, more family offices setting up in Asia and the rise in spending power of the affluent middle class provides a ready market for these start-ups to penetrate. With strong governmental support for the development of infrastructure-wide solutions, there are many available resources for start-ups across sectors to scale at quick pace.

▶ Innovation, support and collaboration needed to bring out start-ups’ potential

There is high potential for soonicorns (soon-to-be unicorns) to emerge across the sectors featured in this report. As catalysts for growth differ across sectors, the development of start-ups is dependent on whether the right conditions are met. Start-ups will require different types of support based on the sectors and markets they operate in, and innovation and collaboration between stakeholders to create a conducive ecosystem for start-ups will be critical. With climate change a top-of-mind concern in Asia, expect to see ESG tech and green fintech on the rise in the near term. Emerging technologies like Web 3 and AI will likely see growing adoption across Asia.



What is a "soonicorn" ?

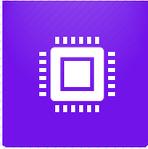
Soonicorn, coined from the phrase 'soon to be unicorn', is a start-up that is projected to be approaching 'unicorn' status, or US\$1 billion in its valuation. While a unicorn in the start-up space has a widely-accepted definition, the definition of a soonicorn is not as clear cut with the focus largely on the potential of a start-up in hitting its 'unicorn' status. Many people have tried to define a soonicorn in concrete terms and while there have been similarities and differences, the criteria have generally revolved around these areas. They are:

- ▶ Privately owned
- ▶ Technology focused
- ▶ Primarily funded by an angel investor, or a venture capital (VC) fund, often marquee investors with a strong track record

Some other definitions also focus not just on the start-up's valuation, but also on their key characteristics. These include:

- ▶ Product capable of achieving hypergrowth with doubling of revenue every 3 to 4 years and a CAGR of 20-40 percent ¹
- ▶ Completed their last round of funding with...
 - Either US\$600-800m post-money valuation²
 - at least US\$453 m (£400m) post-money valuation, within the last 2 years³

For the purposes of this report, we define soonicorns as start-ups that are:

-  ▶ **Privately owned**
-  ▶ **Technology focused**
-  ▶ **Primarily funded by an angel investor, or a VC fund, often marquee investors with a strong track record**
-  ▶ **Post money valuation between US\$400m – 800m**



1. You know of unicorns, but what about soonicorns and if Malaysia has any in 2021, Vulcan Post
2. Suddenly everyone wants to be a soonicorn, CTech
3. From startup to soonicorn: The UK's future unicorn companies, 2022, Beauhurst

Market overview and analysis



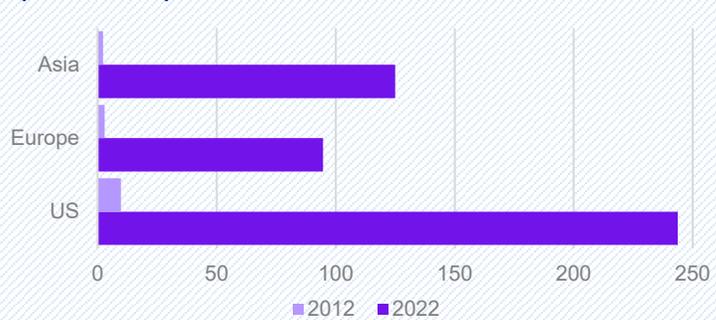


Geographic trends

Growth of start-up ecosystem in Asia

Over the last decade, the region's start-up ecosystem has evolved significantly. With the growth of start-ups leading to a more holistic, robust and collaborative environment, it has spurred the creation of new, innovative ventures and in turn drawing more investments into the space. In 2022, private equity and VC firms invested over US\$125 billion in start-ups in Asia, which is an approximate 56-fold increase over the past decade. By comparison, the amount of capital invested within the same period in Europe and the United States-based start-ups increased by approximately 33 and 23 times respectively¹. The increase in investment activity in Asia over the last decade, coupled with demographic trends, presents immense growth opportunities not only for start-ups already based in the region, but also for foreign venture-backed companies who are looking to expand to Asia.

Capital invested into start-ups by regions (in billions)¹



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*

Growing young population and skilled workforce

Asia is home to more than 4.7 billion people, including 750 million between between the ages of 15 – 24 years². The top five countries with the highest youth population in South Asia, namely India, Pakistan, Bangladesh, Sri Lanka, and Afghanistan, have a combined youth population of over 300 million, which is approximately one-fifth of each country's total population. Likewise, the five most populous countries in Southeast Asia (Indonesia, Philippines, Vietnam, Thailand, and Myanmar) have a young population of over 90 million in total, accounting for an average of about 17 percent of each country's population³. The constantly expanding pool of young talent in the region provides a skilled and technologically-proficient workforce for the region. Their higher spending power can also boost spending, thus fuelling growth in the region.

Youth population in Asia ²



Source: The Economic and Social Commission for Asia and the Pacific (ESCAP), The demographic dividend: An economic development opportunity



1. Pitchbook data
2. The demographic dividend: An economic development opportunity, The Economic and Social Commission for Asia and the Pacific (ESCAP)
3. Youth in South and Southeast Asia: A common denominator, Australian Institute of International Affairs



Snapshot of Asia's wealth

Asia is poised to be a fertile market for the financial services industry, with increasing intraregional trade and a growing number of affluent individuals based in the region. The region's strong economic prosperity in recent years has led to the rise in the number of high-net-worth-individuals (HNWIs) flocking here,

and the region has also seen intraregional trade growing 50 percent between 2019 and 2022¹. Taken together, these factors present many opportunities for the financial services sector to cater to an increasing pool of investors who prefer customised solutions for their banking needs.

- * 1. *The future of the global economy lies in Asia demand*, Nikkei Asia
- 2. *Asia 2050, realising the Asian century*, Asian Development Bank
- 3. *Digital wealth management in Asia Pacific*, KPMG
- 4. *Asia's family offices: Singapore vs Hong Kong – which city is better?*, Citywire



Rising affluent population in Asia
 With a fast-growing percentage of affluent consumers, Asia's projected per capita income could increase by six times by 2050 in purchasing power parity terms (PPP) to match Europe's levels today².



Asia projected to double its share of global GDP to 52 percent in 2050 by current standards².



15 million HNWI's
 The second-largest concentration in the world, after North America. The HNWI population is projected to grow by 39 percent by 2024, which is the growth forecast globally³.



Growth of family offices setting up in Asia
 The demand from HNWI's has led to the emergence of more family offices in Asia particularly in financial hubs such as Singapore which is home to 25 percent of family offices in Asia⁴.

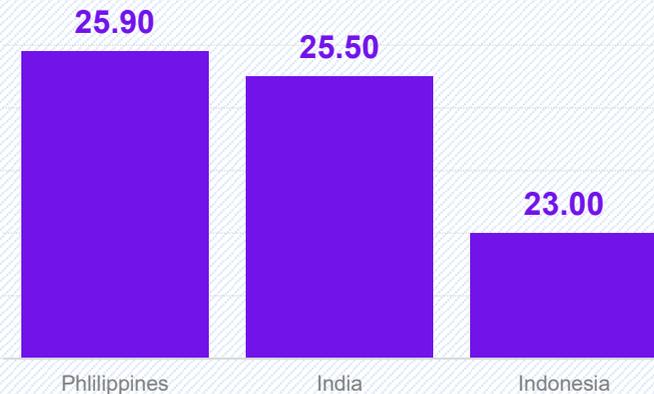


Geographic trends

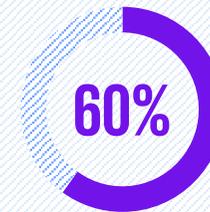
Expanding online economy

The most promising growth prospects lie in industries that take advantage of the significant growth in Asia's online economy. The region is home to some of the world's largest and most dynamic digital markets, with China, India, and Southeast Asia leading the way in terms of e-commerce, digital payments, and mobile penetration¹. Asia now accounts for roughly 60 percent of the global online retail sales², and this figure is projected to grow, with countries such as the Philippines, India and Indonesia likely to see their e-commerce sector expand by 25 percent, 25.5 percent and 23 percent per year, respectively³. This is fuelled by the massive rise in new digital consumers in Southeast Asia with around 60 million individuals joining this group since the start of the pandemic². This means they have utilized at least one online service, be it purchasing groceries, receiving food deliveries, engaging in online entertainment or managing finances. Overall, there are now 350 million digital consumers in Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam⁵. Two-thirds of people in Asia use mobile services and there is still room for further expansion in the region's digital consumption, particularly in Southeast and South Asia. This means there is still fertile ground for entrepreneurs in Southeast and South Asia to tap on when it comes to pushing out new digital products and tools.

Projected e-commerce retail annual growth³ (Percentage Growth from 2021)



2 out of 3 use Mobile Devices in Asia



Share of global online retail sales

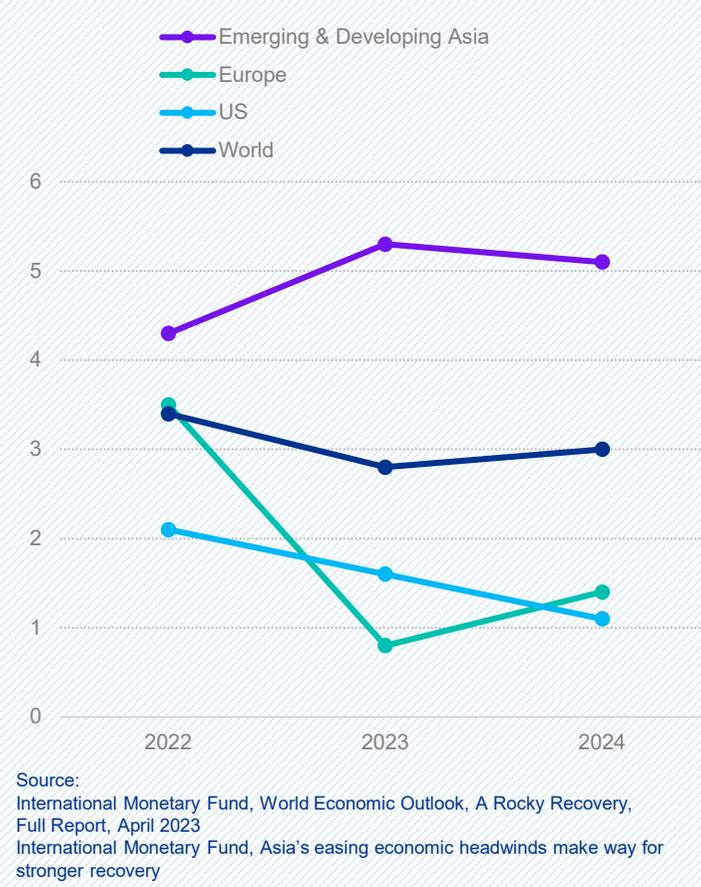
Source: World Economic Forum, How digitalization is making South and Southeast Asia engines of growth



Signs of encouraging economic growth

Asia's economy is poised to expand by 5.3 percent in 2023, up from the forecast of 4.9 percent growth for the region this year¹. This is more than the expected expansion of the US (1.6 percent) and Europe (0.8 percent)¹. The rebound in China's economic activity will provide a fresh momentum for Asia's growth which is projected to increase to 4.7 percent⁴ this year. With its easing of anti-virus measures and reopening, China's growth forecast in 2023 was upgraded to 5.2 percent, up from the last year's 2023 forecast of 4.4 percent. It is predicted that China and India will be responsible for more than 50 percent of the world's economic growth this year, and other countries in Asia will contribute a further 25 percent. Cambodia, Indonesia, Malaysia, the Philippines, Thailand, and Vietnam are all returning towards pre-pandemic economic growth. Inflation is expected to ease this year and next, gradually moving back to pre-pandemic levels, which bodes well for the region's economies as it will encourage price stability, enhance purchasing power, and in turn foster economic growth.

Economic outlook projections¹ (Real GDP, annual percentage change)



1. World Economic Outlook, A Rocky Recovery, Full Report, April 2023, International Monetary Fund
2. Southeast Asia tops worldwide ecommerce growth, Practical Ecommerce
3. How digitalization is making South and Southeast Asia engines of growth, World Economic Forum
4. Asia's easing economic headwinds make way for stronger recovery, International Monetary Fund
5. COVID's striking impact on Southeast Asia's digital economy, Nikkei Asia



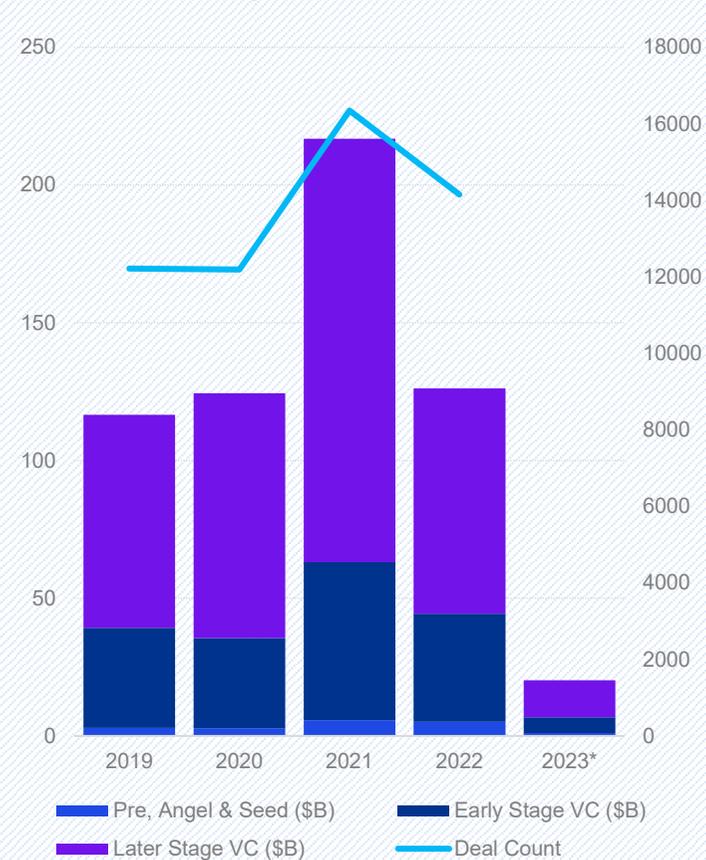
Fundraising trends

Overview of funding in Asia's start-up ecosystem

Venture funding in Asia has largely followed global trends. The first quarter of 2023 saw the same market correction observed over the second half of 2022, with quarterly deal counts returning to 2020 levels. Given the headwinds in the global economic markets, rising interest rates and cost of capital, the funding boom seen in 2021 will no longer be the norm as investors become increasingly prudent.

Start-ups are increasingly forced to prove they have strong unit economics and a robust business model, with the share of funding towards pre-series and angel funding trending down from over 36 percent in 2019 to a low of 24 percent in Q1 2023. Instead, later stage venture funding is increasing, with the deal count share growing from 22 percent in 2019 to 37 percent in Q1 2023. Despite median deal sizes for early stage VC dropping slightly from US\$4.93m to US\$4.72m, the median for post money valuations rose from US\$20.3 m in 2022 to US\$29.51m in Q1 2023. This corresponds to 45.4 percent increase vs a CAGR of 11.5 percent from 2019 to 2022. Early stage investors are no longer jumping in at the first opportunity, but are instead waiting for a mature product with a proven marketplace. In contrast, the valuations of later stage VC deals have been trending downwards from the peaks of 2020 and 2021, as investors grow sceptical of sky-high valuations. This is consistently reflected in the median deal size, as later stage VC deal sizes continue their downward trend¹.

Venture financing in Asia (in US\$ billion)¹



1. Pitchbook data

Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*

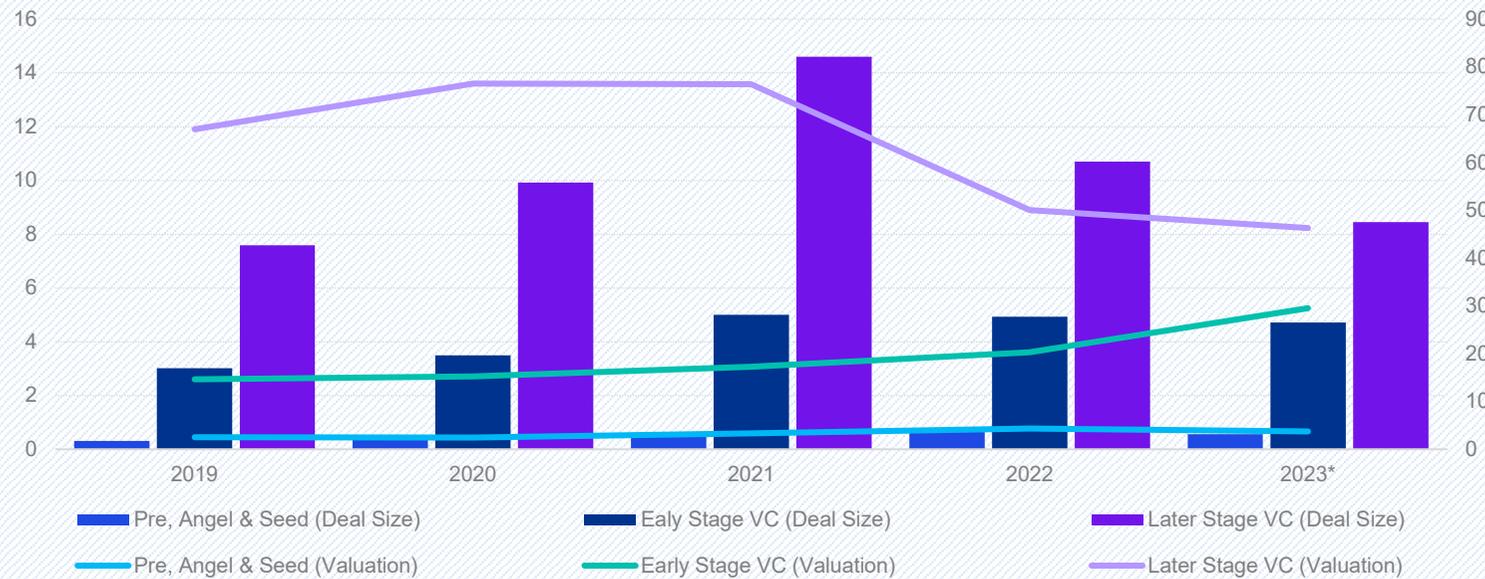


Looking ahead

Many investors remain cautiously optimistic on Asia’s potential, with a view that the recent slowdown in start-up fundraising is a necessary market correction to weed out the ones lacking strong fundamentals, ultimately benefitting the ecosystem in the long run. Those who have been circumspect about investing capital in recent years, up until 2021, will have ample funds available to

invest in companies at valuations that they consider to be more reasonable. Start-ups with strong business models and are close to achieving profitable unit economics are highly likely able to weather the funding crunch. A consolidation of the market, with the exits of weaker companies, is healthy for the ecosystem, and a bright future awaits the strong players.

Median deal sizes and post valuation (in US\$ million), by deal type¹

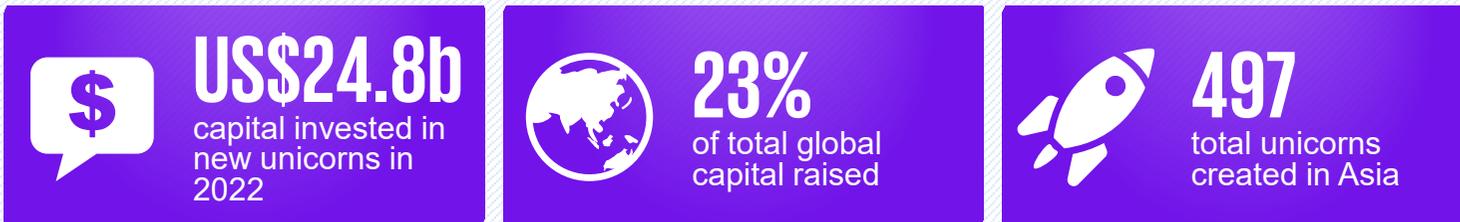


Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



Unicorn landscape in Asia

Asia snapshot



1. Pitchbook data
2. Number of Korean unicorn companies reaches 22 in 2022, Ministry of SMEs & Startups, South Korea
3. Venture Pulse Q3'22 report, KPMG
4. Private equity in SE Asia: H2 2022 review, Deal Street Asia

The growth of billion-dollar companies in Asia slowed down in 2022, with only 75 new unicorns minted¹. Even though this is a significant drop compared to the previous year which saw 151 new unicorns, it remains higher than pre-2021 levels. Of the 75 new unicorns, 43 hailed from China, 19 from India, and 7² from South Korea. Companies in sectors such as electric vehicles (EVs), ESG and manufacturing hardtech in China, as well as those in India's fintech and e-commerce sectors, also attracted significant attention. Some of the newly-minted unicorns include EV manufacturer GAC Aion (China), game platforms developer Games24x7 (India), and financial and accounting platform Korea Credit Data (South Korea).

These 75 new unicorns attracted US\$24.8 billion in investments, which is 23 percent of the total global capital raised¹. On valuation, the region's new unicorns were only worth US\$149.7 billion in 2022 (9 percent of global valuation), compared to the US\$1.2 trillion valuation (51 percent of global valuation) of Asia's new unicorns in 2021.

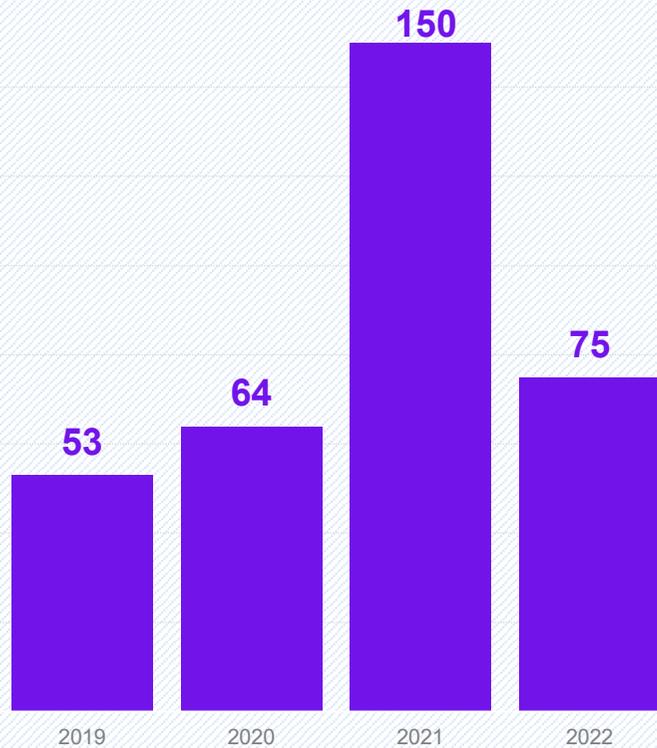
Median funding raised and valuations of new unicorns have also decreased consistently over the years.

It is expected that the slowdown of new unicorn creation will continue into 2023 due to several challenges such as high inflation and rising interest rates, a slowdown of initial public offering (IPO) exits, and expected down rounds. As of Q1 2023, only five new unicorns were added, accounting for US\$2.1 billion in capital raised from the US\$6.6 billion funding deals across different regions. This brings the total number of unicorns in Asia to 497¹.

While the Asian unicorn market may have slowed down and VC investment remained soft in 2022, there were encouraging developments in 2022, which may bode well for 2023. These include the closing of two funds amounting to US\$3.2 billion by Qiming Venture Partners², as well as the successful closing of five Southeast Asia focused funds totalling US\$1.96 billion³.

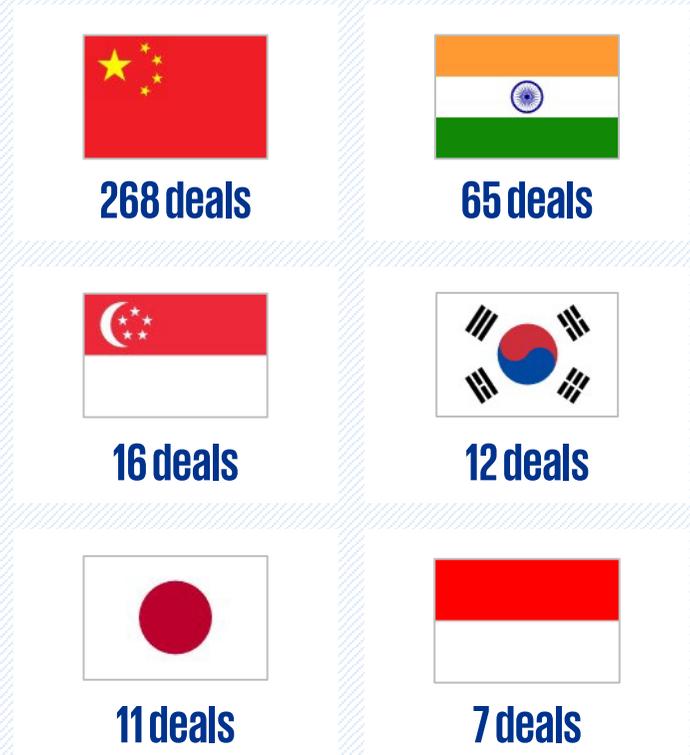


New unicorns in Asia¹



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*

Top 6 unicorn deals by country¹



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. Pitchbook data

**10 unicorns added in 2022, ranked by valuation¹**

	Name	Business	Valuation (US\$)	Unicorn as at	Jurisdiction
1	▶ GAC Aion	Manufacturer of electric vehicles.	14.4B	Mar 22	China
2	▶ Industrial Cloud Manufacturing	Developer of intelligent industrial software	4.4B	Apr 22	China
3	▶ Voyah Car Technology	Developer and manufacturer of smart electric vehicles	4.1B	Nov 22	China
4	▶ Lishen Battery	Manufacturer and developer of lithium-ion batteries intended for electronics, power tools, transportation, and energy storage systems.	3.1B	Feb 22	China
5	▶ Yeastor Microelectronics	Developer and retailer of memory control chips designed to provide storage solutions to enterprises.	3.1B	Jan 22	China
6	▶ Beneunder	Manufacturer of sun protection umbrella, rain umbrella and sun protection clothing.	3.0B	Jan 22	China
7	▶ Shougangzhixin	Manufacturer of metallurgical equipment.	2.9B	Dec 22	China
8	▶ Tridge	Developer of an online agri-tech trading platform	2.7B	Aug 22	South Korea
9	▶ Fujian Deer Technology	Developer and manufacturer of electronic wet chemicals used in semiconductor production	2.6B	Sep 22	China
10	▶ Prismlab	Developer and manufacturer of 3D printing technology and equipment.	2.6B	Aug22	China

* 1. Pitchbook data as at 25 April 2023

Sector analysis





Spotlight on sectors

This section spotlights specific key sectors which have grown in prominence over the last few years, highlighting their overarching trends. While not intended to provide a comprehensive view of all major sectors for start-ups in Asia, it provides a basis for understanding some of the most recent developments in the Asian start-up ecosystem.



ESG tech

As the region takes steps to tackle climate change amidst regulatory reporting requirements, opportunities for start-ups and investors will arise as companies and investors embrace the need to accurately measure and report emissions, implement and manage smart renewable energy systems, and establish green financial solutions to cover the cost of these initiatives.



Fintech

Investment in the fintech sector in Asia may be slowing down due to economic uncertainty and investors tightening purse strings. However, growth is optimistic in areas such as payments, embedded finance, digital and open banking, and digital wealth management, driven by factors such as the rise of instantaneous payments and the increasing demand for digital solutions. The fintech industry is also experiencing a shift towards more personalized investing products and services, as the emerging and expanding middle class in Asia increasingly looks to take charge of their own finances.



Agritech

Agritech investments in Asia are growing, with strong potential for long-term investment opportunities in areas such as urban farming, water technologies, agriculture carbon markets, crop insurance, and farmer advisory. The fight against climate change and the need for resilient and inclusive food supply chains has driven take-up rates of agritech solutions, especially in emerging markets across Asia, particularly in Indonesia and India, where agriculture plays a significant role in the economy.



Digital health

In the post pandemic era, there has been an increased demand for remote health services, or healthtech, in the mass consumer market. The increasing focus on talent acquisition and retention in various industries is leading to a greater demand for employee wellness providers, driving a shift towards business-to-business (B2B) and business-to-business-to-consumer (B2B2C) models. With the tightening funding market, a new paradigm is emerging as partnerships with corporates will be a key factor of growth in this space.



This section spotlights specific key sectors which have grown in prominence over the last few years, highlighting their overarching trends. While not intended to provide a comprehensive view of all major sectors for start-ups in Asia, it provides a basis for understanding some of the most recent developments in the Asian start-up ecosystem.



Smart cities

Smart city solutions are largely government driven, with start-ups playing an enabling role in providing hardware and software solutions. Developed Asian countries like Singapore and China are key markets given their high levels of digitalisation and technical expertise. Singapore has implemented key projects such as digital identity (SingPass) and the Smart Town framework to optimise resource allocation and energy efficiency. Meanwhile, China has installed a large number of IoT sensors and is implementing large-scale software solutions like City Brain to solve traffic congestion. Sectors such as IoT, digital twins, mobility, and autonomous vehicles are poised for growth in Asia.



Web3

The global Web 3 markets have experienced fluctuations in recent years, but they have ultimately grown from pre-2020 levels. Notably, Asian markets have established advanced regulatory frameworks for digital assets to restore confidence in the market. Six out of the ten biggest cryptocurrency and blockchain markets are located in Asia, with Vietnam being particularly important due to its active community of enthusiasts. Additionally, non-fungible tokens (NFTs) and Web 3 gaming are up-and-coming markets that will be driven by Asia. Apart from gaming, the metaverse, and smart contracts, enterprises that utilize blockchain for traceability are some of the new ventures to watch in the region.



Artificial intelligence

AI is expected to be a primary driver of technology and innovation in the coming year. Asian countries, including Singapore, China, Japan, and South Korea, have kickstarted AI initiatives with substantial funding from both the private and public sectors. Furthermore, leading technology companies in Japan and South Korea have filed the highest number of AI patents. Other Asian nations, such as Malaysia and Thailand, are also striving to be disruptors by developing their own AI roadmaps. As digital adoption rates in Asia continue to soar, AI is being increasingly incorporated into daily usage for automation, cost reduction, and the provision of personalised insights and predictions.



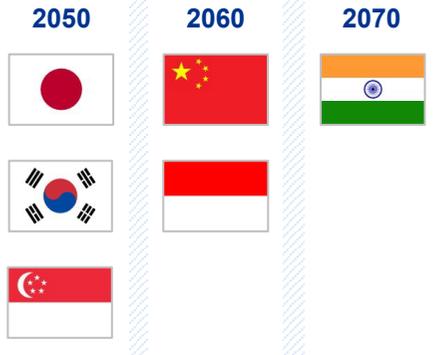
ESG tech

Climate change and the urgent need for sustainable solutions in Asia

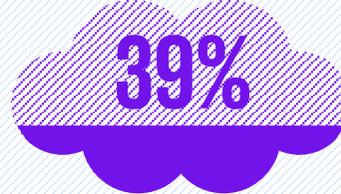
Due to its geographical layout, Asia is more vulnerable to the physical risks of climate change than any other region. With most countries within Asia situated close to the equator, these countries are more susceptible to wide fluctuations in temperatures, with temperatures in Asia rising at a rate twice as fast as the global average. With the developing nations in Asia being largely dependent on agriculture, rising sea levels from global warming poses a huge threat to the livelihood of many

Asian populations, as rising sea levels can cause the erosion of arable land in low-elevation coastal zones and pose a significant risk to rural incomes, food security, and commodity exports. Megacities, including Mumbai, Dhaka, Bangkok, Ho Chi Minh City, Jakarta, and Shanghai, are at risk of being submerged¹. While Asia is disproportionately impacted by the consequences of climate change, it is also a major contributor to the problem, with the top five greenhouse gas emitters in Asia² collectively contributing to almost 39 percent of the world's greenhouse gas emissions.

Net zero targets



Amount of global GHG emissions contributed by top five emitters in Asia



5 out of 10

of the world's top GHG emitters are in Asia



Asia’s fight against climate change

Countries in the region are now pumping in investments to transit to renewable energy sources needed to sustain their growing populations. As such, governments are now under pressure to meet climate goals, while businesses and investors are also feeling the heat and finding ways to integrate ESG considerations into their operations.

There has been a strong push and support from the Singapore Government to help companies go green. In April 2023, the Monetary Authority of Singapore announced that Singapore will expand its focus to include transition finance by mapping out clear definitions and encouraging innovation and extending grants to help high-carbon companies become greener via long term initiatives. The revised plan involves allocating US\$11.2 million

(SGD15 million) to extend and improve sustainable bond and loan grant schemes until 2028³. The plan also includes adding transition bonds and loans to the grant schemes, as well as extending the Insurance Linked Securities Grant for three more years until the end of 2025 to defray the cost of issuing catastrophe bonds that focus on Asia’s risks³.

The need for ESG tech solutions

The urgency to mobilize green and transition finance across the region will result in the need for sustainable solutions to be scaled up and accelerated, and for new green technologies, alongside stronger governance processes, to be developed by leveraging on reliable and accurate ESG-related data. These are opportunities that investors and ESG start-ups can tap on.



1. *Asia’s climate emergency, International Monetary Fund*
2. *Global historical emissions, Climate Data*
3. *MAS expands green finance plan to quicken decarbonisation of economy, The Straits Times*



The rise of Asia's ESG tech

For the purposes of this report, we define ESG tech as start-ups that:

- ▶ Leverage on data and technology
- ▶ Catalyze on ESG transformation across industries
- ▶ In pursuit of decarbonization and broader societal progress

To date, more than 5,000 investors have participated in close to 3,700 deals from an estimated number of 1,500 ESG tech start-ups¹. The largest deal to date was US\$3 billion, secured by GAC Aion, an EV manufacturer in China. 2022 saw a sharp drop in ESG tech investments in Asia, amounting to US\$6.56 billion across 583 deals compared to the US\$16.16 billion across 636 deals generated in 2021¹. Despite this, the decrease in deal volume was only marginal, as volume of deals for seed and early-stage funding increased by 13 percent¹ for the same period. This trend favouring lower ticket sized deals is expected to continue through 2023, reflecting growing awareness and interest among early-stage funds to back sustainable and environmentally-friendly investments.

In 2022, numerous start-ups in clean technology, and climate software-as-a-service (SaaS) solutions received funding. Thirteen of the newly-minted unicorns in Asia were classified as cleantech, including manufacturers of EVs and critical system enablers like Jinsheng New Energy (a lithium battery recycler) and Synosynergy (a hydrogen fuel cell manufacturer).

Overview of ESG tech in Asia to date



~1500 ESG tech start-ups



~3700 deals



13% 2021 seed & early-stage funding deals



8% 2021 ESG tech deals

Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



Subsectors to watch in Asia

► Supply chain traceability

Manufacturers in Asia, which account for nearly 48.5 percent of the worldwide manufacturing output, are facing external pressures from their buyers to report their emissions data and take necessary actions to help reduce carbon emissions. This trend presents opportunities for start-ups and data companies to develop data models and analytics that can pool data from presently fragmented systems, streamline emissions reporting, and accurately report progress. Yet, many of these manufacturers embedded in Asia's supply chain are small and medium-sized businesses who may lack the expertise or the financial muscle to independently put in place decarbonization initiatives, which brings up the thorny issue of who should pay for any solutions. Hence, solutions for SMEs must be coupled with a business model that aligns incentives between buyers and suppliers, and lower upfront investment costs for SMEs in order to get these businesses onboard.

► Nature preservation

The loss of natural capital in the region could result in a significant economic impact, with much as 63 percent (US\$19 trillion)¹ of the region's GDP at risk. This is higher than the global average of over 50 percent, representing US\$44 trillion of

economic value generation at risk resulting from nature loss². This highlights the urgent need to address the region's rising biodiversity crisis, presenting commercial opportunities for start-ups to develop solutions that can accurately verify the legitimacy of carbon projects, such as how much greenhouse gases emissions it can reduce. These solutions can also be targeted at tracking deforestation and destructive practices in forests, or find ways to restore marine ecosystems.

► Sustainability disclosures

In response to mounting ESG mandates, businesses are seeking solutions that can help them manage and mitigate ESG risks, comply with regulations, and improve their reputations. Financial institutions, for example, are partnering with ESG solutions and data providers that can help monitor their asset portfolio's performance against their committed ESG goals and ensure that climate disclosures are aligned with the International Sustainability Standards Board's (ISSB) standards. For example, some of these solutions that businesses are turning to include disclosure platforms that can pool together data on ESG reporting and risk standards, allowing its clients to meet these ESG standards hassle-free.



1. *How to address Asia Pacific's biodiversity crisis and encourage nature-positive growth, 2021, World Economic Forum*
2. *50% of the global economy is under threat from biodiversity loss, 2022, World Economic Forum*



► Disaster technologies

The region is more vulnerable to the physical risks of climate change than any other region. Six out of the 10 most climate-vulnerable countries in the world are in South and Southeast Asia – including Myanmar, the Philippines, Bangladesh, Pakistan, Thailand, and Nepal³. The countries most negatively impacted are often the ones with the least resources to mitigate and adapt to the effects of global warming, and in times of natural disasters, could suffer significant economic and social impact. Therefore, there are significant opportunities for companies with technologies that can aid in climate adaptation, facilitate humanitarian aid and save lives during and post-disasters.

► Clean energy technologies

Renewable energy technologies, such as solar photovoltaic and wind, have advanced significantly, making the adoption of these proven technologies commercially viable and even cheaper than non-renewables in some regions. Renewables-based electricity is now the cheapest power option in most regions, with global weighted average leveled cost of electricity of utility-scale PV plants declining by 85 percent between 2010 and 2020⁴. However, only 28.41 percent of the region's energy mix is powered by renewables, while Southeast Asia's share of electricity from renewables is below 20 percent⁵. This presents a significant opportunity for start-ups with innovative business models that can help businesses adopt greener technologies.



3. *Climate change affects Asia disproportionately; S'pore facing high risks but prepared to combat it, 2022, The Straits Times*
4. *World energy transitions outlook, 2022, International Renewable Energy Agency*
5. *Energy mix, Our World In Data*

**Top 10 ESG tech start-ups under US\$800m, ranked by post valuation¹**

A	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ SinoHyKey	Manufacturer of renewable energy designed for hydrogen fuel cell.	461.88M	China
2	▶ APB	Developer and manufacturer of all-polymer batteries made to monitor and control distributed energy resources.	361.04M	Japan
3	▶ OMC	Developer of energy infrastructures to extract energy from renewable sources.	112.86M	India
4	▶ Trende	Operator of an online energy retailing platform offering low-cost renewable energy to residential customers.	105.78M	Japan
5	▶ Sedemac	Manufacturer of mechatronic products for use in small engines and to power trains.	89.90M	India
6	▶ Sustech	Developer of decarbonization platform and energy management platform	77.88M	Japan
7	▶ Updater	Provider of a natural energy retail services to make renewable energy production hassle-free.	77.03M	Japan
8	▶ Xurya	Developer of solar asset management platform	69.50M	Indonesia
9	▶ Devidayal Solar Solutions	Manufacturer of cold chain solutions	54.02M	India
10	▶ Vflow Tech	Developer of a flow batteries battery designed to develop and store energy by employing vanadium redox couples.	49.93M	Singapore

* 1. Pitchbook data as at 25 April 2023

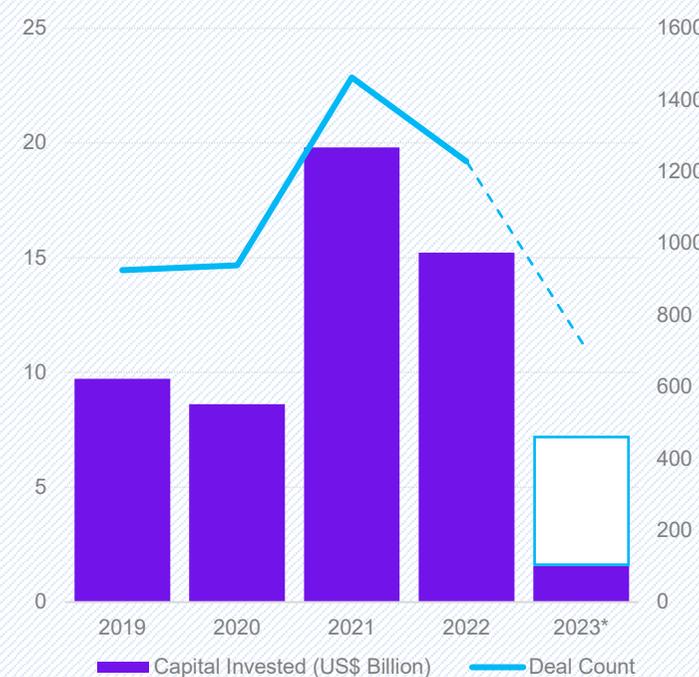


Fintech

Fintech investment in Asia saw a drop in 2022, with total investment activity down to US\$15.2 billion in 2022 compared to its height of US\$19.8 billion in 2021. The trend continued in Q1 2023, with only US\$1.57 billion invested across 170 deals¹. As global economic markets continue to remain uncertain and as interest rates continue to rise, this subdued investment activity is expected to continue, as investors become increasingly prudent with their capital and prioritise strong solutions in their investment theses. Proportion of corporate participation in deals remains relatively consistent with quarters, showing that capital is becoming scarce all around.

With pandemic restrictions affecting the Chinese market, big ticket VC transactions were largely from India, including a US\$330 million round raised by Indian SME financing solutions provider Oxyzo and a US\$216 million round raised by Indian personal loans provider Money View¹. Q1 2023 saw continued restraint from the Chinese market, as the country battled a major COVID-19 wave following its reopening, with just US\$56.3 million invested across 20 deals, following the downward trend observed, with US\$2.57 billion in 2021 and US\$874 million in 2022. A new trend to watch for in Asia is embedded finance, which is becoming a power source for the ever-growing e-commerce and retail scene. The embedding of financial services, such as payments and insurance within some of these 'super-apps', is helping to create seamless customer journey and encouraging new distribution channels.

Capital invested & deal count for Fintech in Asia¹



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. Pitchbook data





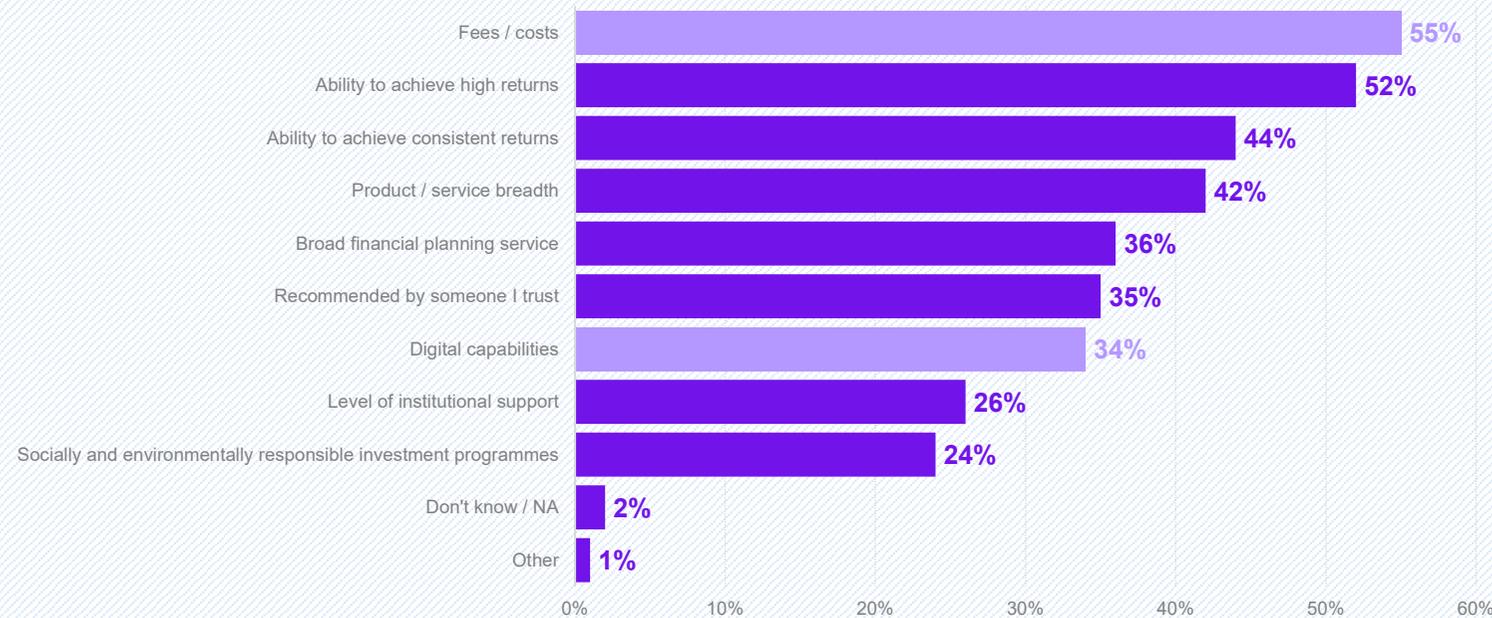
With the growing mass-affluent class in Asia and increasing demand for low-cost digital solutions, wealthtech is seeing its day in the sun. 55 percent of millennials consider costs as a key consideration when choosing a wealth manager, with more than a third of millennials also factoring in a firm's digital capabilities². With robo-advisors and digital portfolio managers gaining traction,

investment vehicles such as exchange-traded funds, equities, derivatives are no longer only available via a wealth manager, but are instead readily accessible through these digital investment platforms. In particular, asset classes such as real estate which were once inaccessible are now easily within reach through alternative investment platforms.



2. Getting personal: How wealth firms can attract and retain the modern investor, considerations when choosing an advisor (age 35-54), Refinitiv

Millennials & Gen X's considerations when choosing an advisor²



Source: Refinitiv, Getting personal: How wealth firms can attract and retain the modern investor, considerations when choosing an advisor (age 35-54)



Subsectors to watch in Asia

► Payments

The rise of instantaneous, domestic transactions within Asia has led to increased adoption of these payments methods. Singapore’s PayNow has seen 5.5 million bank accounts linked, with S\$46 billion in payments moving through PayNow. Built upon FAST payment rails, PayNow has become a widely adopted payment method, with 3rd party payment solutions like Stripe and HitPay integrating PayNow into their payment gateway. But PayNow is just one of many such services, with more such as with Malaysia’s DuitNow, Thailand’s PromptPay, and India’s UPI in the region. The unique selling point of these systems is its ability to allow for instantaneous, real-time transactions all at a tap of a button. These payment rails are also seeing more integration, with PayNow linking to PromptPay¹ in 2021, and to DuitNow² and UPI³ in 2023. Looking ahead, such instantaneous transactions not just domestically but across borders will continue to gain traction. The globalization of these payment systems is likely to become the next big trend in this space, as more real-time payment platforms develop and integrate across the different markets.

► Embedded finance

The pandemic was a strong catalyst for Asian markets to develop embedded finance. With Southeast Asia alone home to 430 million unbanked, but with more than half of these people having smartphone access⁴, the opportunity to bring financial services to the unbanked population is massive. Embedded payments offerings are the most common, with Adyen an example of a European payment provider coming to Asia⁵ to tap on this opportunity. Embedded lending is also gaining traction, with Buy Now Pay Later solutions allowing customers to access new products and services, but also allowing merchants to tap onto a wider customer base. Superapps like Grab and Gojek, which also offers services such as payments and travel insurance, are slowly becoming more commonplace. With regulators and governments showing support for the growth of such solutions, such as through the provision of digital banking licenses to non financial-services players, the heyday of embedded finance is near.



1. Singapore and Thailand launch world’s first linkage of real-time payment systems, Monetary Authority of Singapore
2. Launch of cross-border QR code payments connectivity between Singapore and Malaysia, Monetary Authority of Singapore
3. Launch of real-time payments between Singapore and India, Monetary Authority of Singapore
4. Global Findex database 2021
5. Southeast Asia payments guide, Adyen



► Digital and open banking

As consumers continue to expect higher standards of convenience and flexibility for their banking needs, the demand for open banking and digital banking solutions will continue to grow. Digital banking solutions are increasingly conscious of the need to provide a full suite of digital services, reducing the need for physical branch visits. Open banking enables new distribution methods such as giving third-party financial service providers access to banking products, while open finance will allow banks to access financial information. Both of these strategies will not only help increase financial access for the unbanked and underbanked, but also allow banks to adopt alternative Know-Your-Customer methods, tapping into these communities as new customer segments.

► Digital wealth management

Instead of working exclusively with a wealth manager, retail investors are now gravitating towards customised services, with data showing that 65 percent of millennials are willing to pay more for personalised investing products and services⁶. As the emerging middle class in Asia prefers taking charge of their own finances, accessing various investment markets, such as equities, bonds and even real estate in a transparent, and price-sensitive manner is becoming of paramount importance. Digital wealth management tools such as Endowus and Syfe allow the casual retail investor to manage their own investments in a personalised manner, with robo-advisors and provisioned insights providing informed decisions with their investments.



6. How wealth firms can attract and retain the modern investor, Refinitiv



▶ Top 10 fintech start-ups under US\$800m, ranked by post valuation¹

	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ Thunes	A cross-border payment network to facilitate the transfer of funds between payment systems.	776.00M	Singapore
2	▶ Stockbit	An investment platform sharing stock-related ideas, news, and other financial platform in real time.	768.40M	Indonesia
3	▶ STORES	An e-commerce service platform	768.33M	Japan
4	▶ Nansen	A blockchain analytics platform	749.90M	Singapore
5	▶ Oxyzo	Provider of financial services to help grow small and medium enterprises into large enterprises.	740.69M	India
6	▶ Neo Capital	Provider of loan and wealth management services.	722.46M	China
7	▶ KreditBee	Operator of an online micro-lending platform to provide hassle-free financing	700.00M	India
8	▶ Jupiter	Developer of digital banking application to help users track their expenses.	650.99M	India
9	▶ INDmoney	Developer of AI and machine-learning based wealth management and advisory platform designed to cater to the needs of investors	650.00M	India
10	▶ M2P Fintech	Developer of a payments-as-a service platform designed to encompass all retail payment assets	601.00M	India

* 1. Pitchbook data as at 25 April 2023



Digital health

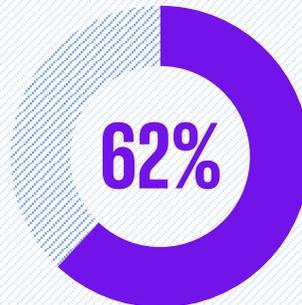
Funding overview in the digital health sector

Funding has normalized since 2021, when excess capital was abundant amongst VCs post pandemic. Digital health funding value in Asia has dropped 33 percent from 2021, from US\$8.2 billion to US\$5.49 billion in 2022¹. Valuations are indicative of more conservative investor behavior, as seen from the smaller average deal sizes and consolidation of deals, driving start-ups to develop more robust business models. The dip in funding amount

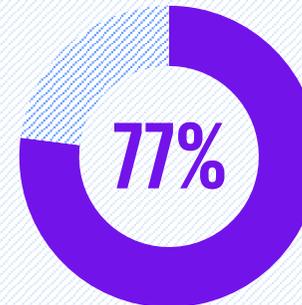
across Asia has been driven by factors such as the drop in Chinese venture funding due to pandemic regulations as well as economic uncertainties that have been putting pressure on the global economy. As many grapple with rising interest rates and the economic slowdown, consumers have also been cutting down on spending. Start-ups need to have strong unit economics and business models in order to weather what has been termed as a "funding winter".



fall in digital health funding in Asia from 2021 to 2022



of acquisitions in 2022 were in Asia Pacific



of existing venture partnerships are in Asia Pacific

* 1. Asia Pacific digital health ecosystem report 2022, Galen Growth



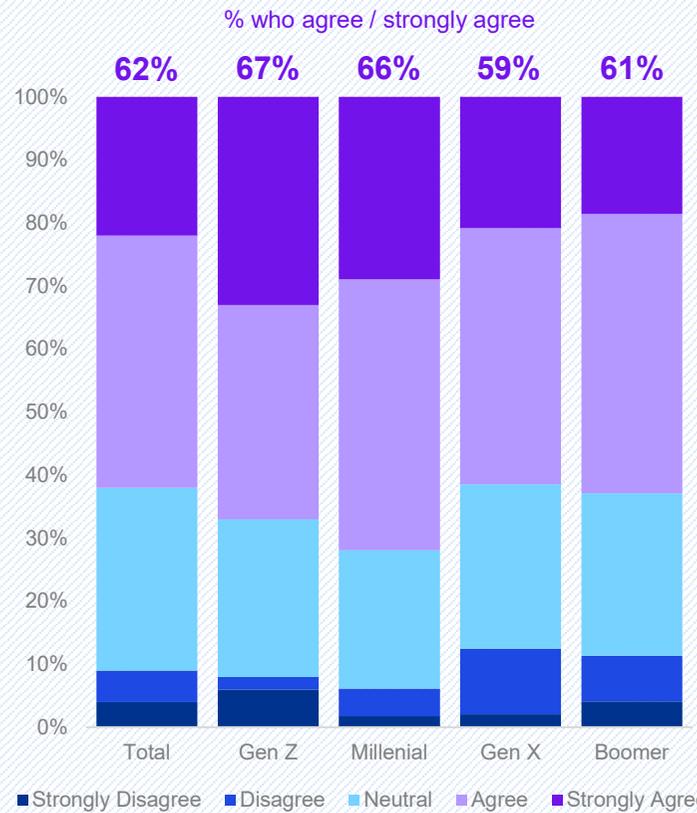
Increasing demand for digital health

Since the Covid-19 pandemic, there has been a growing inclination towards digital health services. This has led to increasing demand for healthtech solutions, such as non-contact health services for the mass consumer market. Secondly, with more people concerned about health and wellbeing post-pandemic, employees may also demand more from employers when it comes to health and wellness benefits. Employers who want to retain and attract talent may find ways to offer comprehensive health benefits and seek out health providers to do so. This is driving a dynamic shift in digital health from D2C towards B2B and B2B2C models, in contrast to early 2021 when ventures were shifting towards D2C business models to capture consumer spending.

Looking ahead

Despite the growth in the digital health space, start-ups will have to grapple with the reality that the funding market is cooling and there may be challenges to secure satisfactory deals. From a broader regional view, a consolidation of the market is occurring as smaller ventures struggle to secure funding on suitable terms and may choose to band together to pool resources, with 62 percent of acquisitions in Asia Pacific in 2022 being venture to venture. Partnerships with corporates will be a key factor in the growth of ventures, with 77 percent of existing venture partnerships in Asia Pacific being venture-corporate partnerships, especially in this tightening funding market.

Importance of employee well-being support programs while considering next job²



Source: KPMG, CEO outlook 2022



2. CEO outlook 2022, KPMG
3. Report: Over 60 percent of employees surveyed indicate well-being support as top priority when seeking employment, Paychex and Future Workplace



Subsectors to watch in Asia

► Bioinformatics

The Asia Pacific bioinformatics market is projected to grow at a CAGR of 13.7 percent from 2022 to 2028, driven by factors such as government funding for genomics projects, rising incidences of cancer, and increasing applications of Next-Generation Sequencing (NGS) in cancer research. New players and start-ups, as well as the expansion of use cases in the bioinformatics, is also another growth driver for the segment. China, which was a dominant player in Asia’s bioinformatics market in 2021, is also seeing increasing demand for genetic sequencing and new advancements in the technology. Despite the advancements so far, the underrepresentation of Asian genomes has hindered research in population and medical genetics, resulting in precision medicine disparities for individuals of Asian heritage². As a result, this gap presents a potential growth opportunity for bioinformatics start-ups.

► Remote devices

Hospitals are turning to remote monitoring solutions, including wearable medical sensors, to extend medical care and reduce manpower allocated to patient monitoring. The Asia-Pacific market for wearable medical devices is projected to grow at a CAGR of 26.7 percent from 2022 to 2027, driven by increasing demand for remote monitoring. Companies are developing non-contact devices that track patient symptoms, such as EOFlow’s new smartphone app for wearable insulin delivery devices. Technological advancements, rising wealth, and the usability of such remote devices are fuelling industry growth. Competition is fierce in the Asia-Pacific wearable medical devices market, and companies are expanding their reach through strategic acquisitions, partnerships, and collaborations³.



1. *Asia Pacific bioinformatics market size, share & industry trends analysis report*, KBV Research
2. *Large-scale whole-genome sequencing of three diverse Asian populations in Singapore, United States’ National Center for Biotechnology Information*
3. *Asia-Pacific wearable medical devices market - growth, trends, Covid-19 impact, and forecasts (2023-2028)*, Mordor Intelligence



► Digital wellness

Asia-Pacific's wellness market experienced robust growth, expanding by 8.1 percent from 2017 to 2019. As the least affected market from the pandemic, with a decline of 6.4 percent, it still recorded a total market value of US\$1.5 trillion in 2020. The wellness economy is projected to register an average annual growth rate of 9.9 percent from 2020 to 2025. Workplace wellness, facilitated by digital wellness start-ups, is a key driving factor in this market as employers are recognising the importance of wellness to remain competitive in attracting and retaining top talent⁴. 89 percent of working professionals reported suffering from burnout during the pandemic, leading to a significant uptake of digital wellness solutions to address productivity and mental health concerns⁵. Naluri, a Malaysian start-up, specialises in employee wellness by delivering customised mental resilience programs to corporate clients in the region. Singapore-based start-ups, such as MindFi and Intellect, also provide digital mental health and wellness solutions tailored to enterprise clients throughout Asia⁶.

► Telemedicine

During the COVID-19 pandemic, there was a surge in the adoption of digital healthcare services, which has continued to remain high above 2020 levels. Digital native companies continue to dominate the telemedicine market in Asia, accounting for about 80 percent of monthly active telemedicine users in 2022. Recognising the segment's potential, traditional healthcare providers are also looking to push out their own telemedicine apps, with the share of such apps increasing 7 percent from 2020. One advantage that these traditional healthcare providers have is the ability to offer both digital and in-person services to their existing patient base. Despite fast-growing usage in Malaysia, Thailand, and the Philippines, telemedicine adoption in these countries significantly lags behind Singapore and India, where companies or governments provide these telehealth platforms. In other emerging Asian markets where private health insurance coverage remains low and private provider groups are fragmented, digital natives are struggling to play a meaningful role. To stay ahead, digital natives can find ways to increase their presence in the market, such as by changing perceptions that telemedicine is as good as traditional healthcare services. At the same time, traditional healthcare providers should make significant investments in digital capabilities to offer more comprehensive and accessible care to their patients⁷.



4. *The global wellness economy stands at \$4.4 trillion amidst the disruptions of COVID-19; Is forecast to reach \$7 trillion by 2025, Global Wellness Institute*
5. *Burnout blues: Korn Ferry survey shows professionals' stress levels skyrocketing, Korn Ferry.*
6. *Pandemic blues drive demand for mental health apps in Singapore, Channel News Asia.*
7. *Asia maintains high telemedicine usage in 2022, Healthcare Asia Magazine.*

**Top 10 digital health start-ups under US\$800m, ranked by post valuation¹**

	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ Synyi	Provider of AI-powered medical data platform for medical research, healthcare, and patient services.	620.21M	China
2	▶ BioMind	Developer of a healthcare diagnosis technology.	500.00M	China
3	▶ SPH Health Commerce	Developer of an online prescription platform in China.	465.75M	China
4	▶ Xing Fu Kang Yang	Developer of service platform designed for health and wellness.	438.15M	China
5	▶ Doctor Anywhere	Developer of a integrated healthcare and wellness platform	434.25M	Singapore
6	▶ Shanzhen	Developer of a health service platform to solve physical health and pension problems for parents after 80s and 90s.	400.00M	China
7	▶ MediBuddy	Developer of a medical consultation application providing quality healthcare that is easily accessible to patients.	341.73M	India
8	▶ AI Medical Service	Developer of an endoscopy technology to support diagnosis of the digestive tract.	322.77M	Japan
9	▶ Chain Medical Labs	Provider of clinical laboratory services for medical institutions.	305.51M	China
10	▶ Healthians	Operator of a healthcare platform	294.25M	India

* 1. Pitchbook data as at 25 April 2023



Web 3

Global Web 3 markets have seen ups and downs in recent years, with DeFi summer (2020), DeFi summer 2.0 (2021) and crypto winter (2022). The crypto winter saw many notable collapses in the cryptocurrency space, with the crash of TerraUSD/LUNA, the default of Three Arrows Capital from margin calls, Voyager Digital's bankruptcy filing following Three Arrows Capital's default on a US\$650 million loan, the chapter 11 filings of FTX and BlockFi being key notable examples. The markets however, have shown resiliency, with the global venture activity growing from US\$23.87 billion in 2021 to US\$30.45 billion in 2022. With Q1 2023 at US\$3.02 billion, Web 3 is experiencing the funding crunch faced across every sector. Despite this, the market has grown long term, with Q1 2023 funding higher than the total capital funded in 2019 (US\$2.86 billion). Asian markets have largely held consistent with global trends, with invested capital growing from US\$4.26 billion in 2021 to US\$4.59 billion in 2022. With Q1 2023 showing at approximately US\$373 million, Asia's funding slowdown has been exacerbated by domestic factors, such as a bout of COVID-19 running through China. In spite of this, Web 3 still remains on the rise in the long term¹.

Increasing regulatory focus across Asia

Some more developed Asian markets have already established advanced regulatory frameworks on cryptocurrency and digital assets. In South Korea, virtual asset service providers such as virtual asset trading service providers, virtual asset safekeeping and administration service providers are required to register their business with the Korea Financial Intelligence Unit (KoFIU) prior to the commencement of their business operations. Japan has

cryptocurrency providers under the regulatory oversight of Financial Services Agency (FSA), while Singapore licenses and regulates crypto services within the Payment Services Act. With the multiple collapses in 2022, this increased regulation in cryptocurrencies will help to build additional confidence in crypto originating from these markets. With crypto seen as a way for the unbanked to access investments, and the emerging Asian markets viewed as a potential market for crypto, five of the eight biggest crypto and blockchain markets are in Asia². Cryptocurrency is also seen as a way for the unbanked to access investments, with a number of Asian emerging markets landing a spot on this list.

Global top 8 crypto adoption markets³

1		▶ Vietnam
2		▶ Philippines
3		▶ Ukraine
4		▶ India
5		▶ United States
6		▶ Pakistan
7		▶ Brazil
8		▶ Thailand

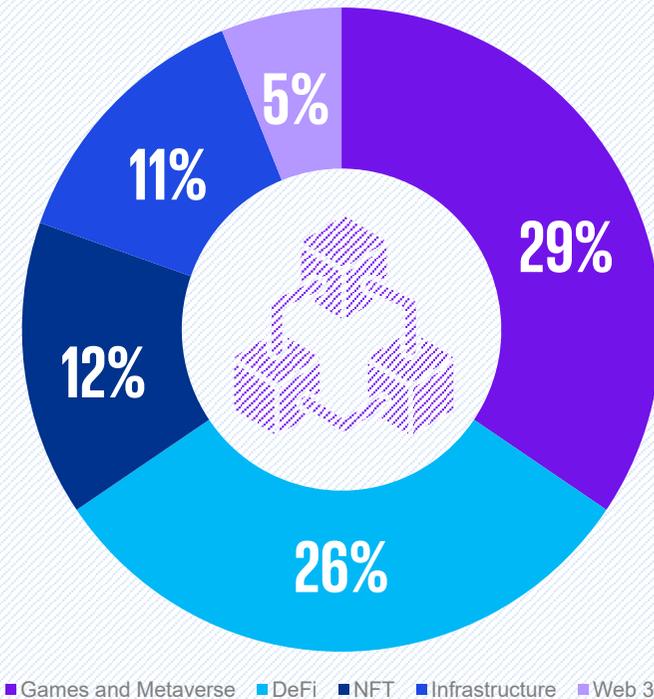
(Asian countries in bold)
Source: Coin98 Insights, Vietnam crypto market report 2022: Breakdown of 200 blockchain projects in Vietnam



Emerging markets in Asia are hot beds for Web 3 development

Of the emerging markets in Asia, Vietnam is an extremely important market for Web 3. About 21 percent of the country's residents own cryptocurrencies³ as many see this as a hedge against inflation, with bitcoin as the leading choice. With a rich community of blockchain enthusiasts, developer resources, and family offices in Vietnam providing funding support, the Vietnamese market is certainly key to the continued rise of Web 3. NFT and Web 3 gaming is an up-and-coming market which will be driven by Asia, with Animoca Brands, Oasys chain, Immutable X as notable players in Asia. With Play to Earn a popular mechanic in NFT gaming, it has seen rising traction from emerging markets, with the Philippines a major market for NFT games. Renowned gaming companies with large franchise intellectual property rights are also entering this space, with Square Enix, Bandai Namco, and Nexon as key examples. As an increasing number of large franchises develop Web 3 game offerings, the gaming space is certainly one to watch.

Overview blockchain projects in Vietnam⁴



Source: Coin98 Insights, Vietnam crypto market report 2022: Breakdown of 200 blockchain projects in Vietnam



1. Pitchbook data
2. The 2022 global crypto adoption index: Emerging markets lead in grassroots adoption, China remains active despite ban, and crypto fundamentals appear healthy, Chainalysis
3. How Common is Crypto?, Statista
4. Vietnam crypto market report 2022: Breakdown of 200 blockchain projects in Vietnam, Coin98 Insights



Subsectors to watch in Asia

► Gaming

The Web 3 gaming space is on the rise, building on the back of Massively Multiplayer Online Role Playing Games. There is also rising interest in play to earn (P2E) mechanics which is particularly popular with NFT gaming in emerging markets such as Vietnam and Philippines. More ambitious projects are on the horizon, with a fully ‘interoperable blockchain game’ model at Illuvium being developed by Immutable X, having already raised US\$72 million in funding. Furthermore, incumbent gaming giants are also expressing interest in developing blockchain gaming solutions. For example, Square Enix announcing plans to bring the Final Fantasy Franchise onto blockchain¹, and Animoca Brands obtaining licensed games for a large number of franchises.

► Blockchain

There are many uses of blockchain beyond just digital currencies and tokens. Based on a decentralized ledger technology (DLT), blockchain enables an auditable and traceable system for recording of information, both transactions or other data types. With high levels of traceability, blockchain is seeing increasing demand for enterprise use cases, with companies racing to meet market requirements. Open Application Programming Interface (API) protocols such as The Graph² enable linkages of the different networks, enabling a more interconnected dataset, while the emergence of layer-2 protocols such as Polygon allow solutions to be optimised for speed. China, for instance, has been championing enterprise use for blockchain. The country has been developing its own state-backed Blockchain Service Network³; large fintech incumbents have also been building their own blockchains⁴.



1. Square Enix to release Final Fantasy NFTs, Eurogamer
2. APIs for a vibrant decentralized future, The Graph
3. China's state-backed BSN pushes new public blockchain network unlinked to cryptocurrencies for international markets, South China Morning Post
4. Ant Group Digital Technologies



► Metaverse

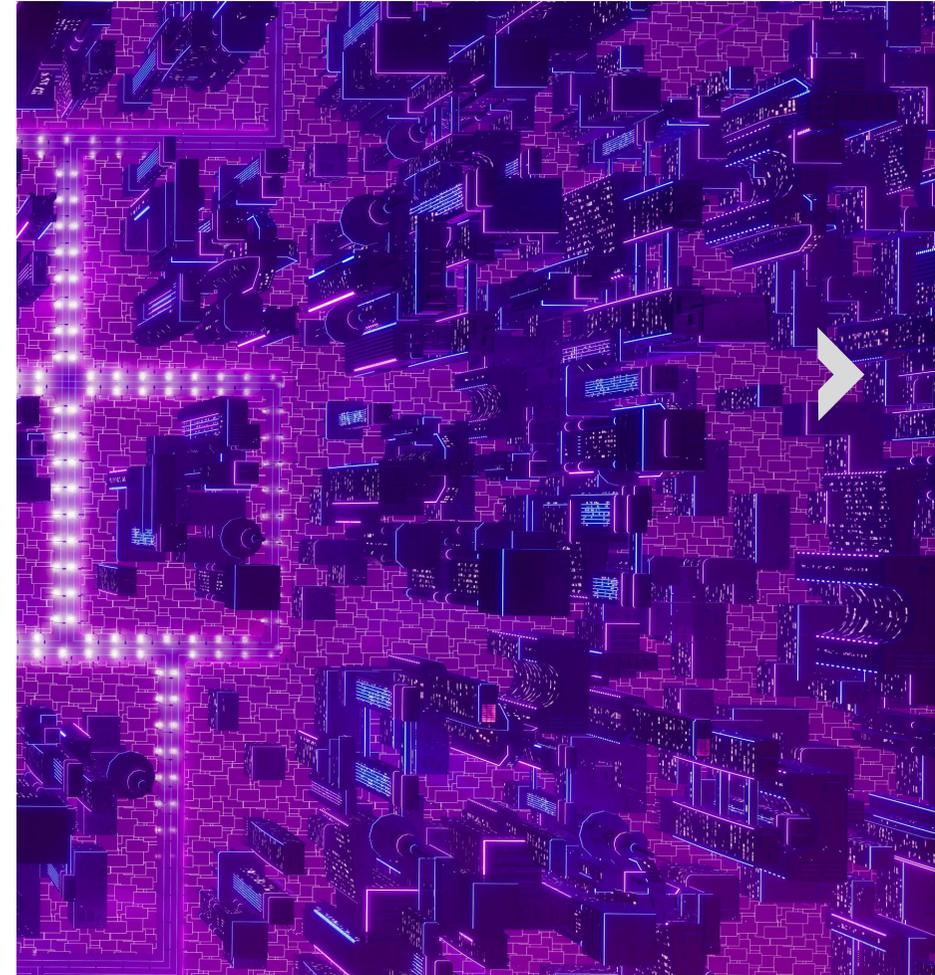
During the pandemic, teleconferencing was seen as a way to allow people to continue daily interactions. Increasingly, more people are tapping on the metaverse as a return to normalcy, with metaverse platforms such as Roblox seeing more than 217 million monthly users⁵. In Asia, awareness of the metaverse is well above the global average, with key Asian markets such as India (80 percent), China (73 percent), South Korea (71 percent) and Singapore (58 percent) reflecting well⁶. South Korean entertainment companies have used the metaverse to increase the reach and access of their pop-stars. For example, BlackPink held a virtual fan signing event within the metaverse platform ZEPETO, which saw over 46 million fans attending⁷. With increasing usage of virtual reality (VR) and augmented reality (AR) technology, accessibility into the metaverse may become more prevalent.

► Smart contracts

Financing and invoicing systems can be instantly processed and executed through blockchain that enforces the payment terms. At the originating supplier level, this can help to drive financial inclusion with the unbanked as they receive payments without delay and are able to utilise earnings to address immediate needs. Consequently, this can result in a significant end-to-end efficiency boost across the chain as suppliers can operate with the knowledge and confidence stemming from greater transparency and timely payments. Project mBridge is a key use case across select nations in Asia and the Middle East⁸.



5. Roblox
6. *How the world sees metaverse and extended reality, a 29-country global survey, Ipsos. Base: 21,005 online adults under the age of 75 across 29 countries, interviewed*
7. *South Korea's K-pop stars extending their reach as avatars in the metaverse, The Straits Times*
8. *Project mBridge: Connecting economies through CBDC, BIS*



**Top 10 Web 3 start-ups under US\$800m, ranked by post valuation¹**

	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ Nansen	Developer of blockchain analytics platform helping to discover opportunities.	749.90M	Singapore
2	▶ UINO	Developer of smart visual management platform and applications.	605.11M	China
3	▶ Hikky	Operator of virtual reality (VR) platforms to create the value of creativity.	562.46M	Japan
4	▶ Animoca Brands KK	Developer of a Web3 platform offering intellectual property holders the launch of Web 3 content such as non-fungible tokens.	553.30M	Japan
5	▶ Pintu	Developer of a mobile cryptocurrency application designed to create convenience for the crypto market.	521.69M	Indonesia
6	▶ Stader Labs	Developer of a decentralised financial protocol and application designed for efficient stake management on public blockchain networks.	450.00M	Singapore
7	▶ MaicoIn	Operator of an online cryptocurrency exchange and investment platform.	400.00M	Taiwan
8	▶ Coinhako	Operator of a digital asset platform to improve the access to blockchain technology for daily consumers.	390.00M	Singapore
9	▶ Luniverse	Developer of blockchain platform designed to help businesses unlock value from blockchain innovation.	380.24M	South Korea
10	▶ PDAX	Operator of a cryptocurrency exchange platform to empower people to have easy access to investing.	345.07M	Philippines

* 1. Pitchbook data as at 25 April 2023



Agritech

Agritech investments in Asia show strong growth potential

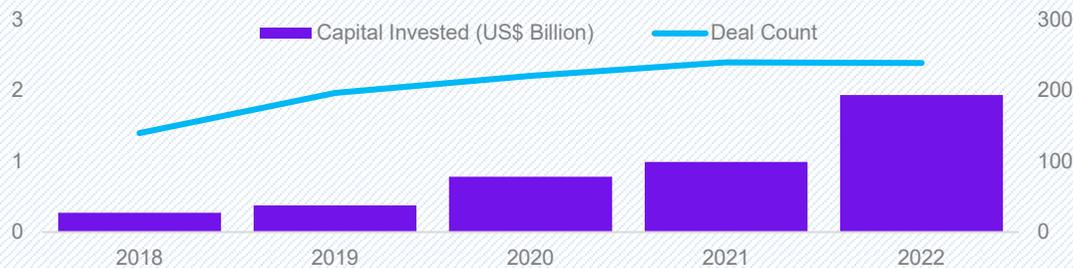
Agritech proved to be highly sought after by investors in 2022, with venture funding for agritechs in the region reaching a record high of US\$1.94 billion¹. This amount was more than double the US\$991 million capital raised in the previous year. Despite total deal volume in 2022 remaining flat (239 deals in 2022 and 240 deals in 2021), the outstanding performance of 2022 can be largely attributed to the sustained interest of investors in later-stage agritech start-ups. These start-ups saw an increase in both deal volume and size, making up 60 percent of the total deals for the year¹.

Indonesian start-up, eFishery, benefited from this trend. The business provides technology and services for aquaculture farmers and raised US\$90 million from investors including Singapore sovereign fund Temasek, Sequoia Capital, and Softbank, and subsequently, a US\$33 million debt raise from

DBS Indonesia. India-based Ninjacart was also among the top agritech deals of 2020, having raised US\$150 million from investors, along with five other Indian start-ups. In 2022, the median deal valuation increased to US\$15 million from US\$13 million in 2021¹.

Hence, the agritech ecosystem in Asia continues to present itself as a thriving agricultural centre, from the world's biggest producers of agri-commodities such as India and Indonesia to the innovation hubs of research and development in Singapore. Start-ups aiming to modernise and transform Asia's agriculture, fuelled by the need to future-proof solutions while staying resource efficient and inclusive, have promising growth potential and can position themselves as attractive investment opportunities in the long run. Furthermore, VC investments in agritech is expected to grow considerably over the next 12 to 24 months as start-ups in this space mature and attract larger funding rounds².

Capital invested & deal count for agritech in Asia



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



- 1. Pitchbook data
- 2. Venture Pulse Q2 2022, KPMG





Opportunities for agritech fall in line with the fight against climate change

The threat of climate change to agriculture in Asia is evident, with significant production losses in crops and livestock amounting to US\$207 billion from 2008 to 2018 – this represents 74 percent of the global figure¹. Of this amount, China accounted for over US\$153 billion, while Southeast Asia accounted for US\$21 billion and South Asia for US\$25 billion. The fight against climate change has honed in on the need for resilient food supply chains. This has driven increasing adoption of agritech solutions, especially in emerging markets across Asia. India has an economy that is heavily dependent on agriculture (~17 percent of GDP)² and an agriculture sector that is highly fragmented in its current form. Combined with the rising digital penetration in rural India, this makes the country well positioned as one of the hot beds for agritech penetration. Similar trends are observed in domestic markets such as Indonesia, with a huge farming community and thus large agritech opportunities in the space. Agritech solutions that incorporate supply chain traceability and geospatial, satellite-based technologies are on the rise. These solutions not only aid in predicting and mitigating climate and disaster risk but also educate farmers on how to maximise crop yield by adopting more efficient farming methods. Furthermore, solutions focusing on improving operations and providing new services to the agricultural sector are seeing increasing uptake.

Crop and livestock production loss (in billions) between 2008-2019 due to disasters



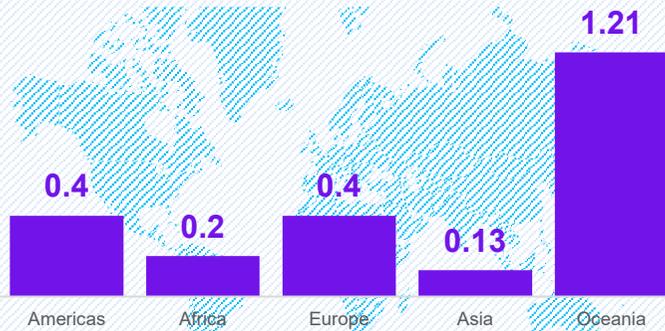
Source: Food and Agriculture Organization of the United Nations, Land use in agriculture by the numbers



1. Asian development outlook 2021 update, transforming agriculture in Asia, Asian Development Bank
 2. Role of agriculture in Indian economy, Insights IAS



Cropland area per capita (hectares) between 2007-2016



Source: Food and Agriculture Organization of the United Nations, Land use in agriculture by the numbers

Some factors that can affect agriculture output in Asia include the limited arable land and inadequate water resources available³. Between 2007-2016, Asia had the smallest cropland area per capita at 0.13 hectares, followed by Africa (0.22 hectares), the Americas and Europe (0.40 hectares), and Oceania (1.21 hectares)⁴. Precision agriculture technologies which include drones and imagery analytics and farm management softwares, have been making headway and providing farm operators with real time data on crops and the environment through linked internet of things (IoT) systems, allowing for timely action. For example, Aerodyne in Malaysia provides on-demand drone precision agriculture services such as drone seeding, spraying, plant analysis, mapping and more while technology enabled farming is targeted at for traditional field farmers . Meanwhile, urban farming solutions can be targeted at land-scarce cities like Singapore.



3. *Asia Pacific agricultural perspectives*, Rabobank

4. *Land use in agriculture by the numbers*, Food and Agriculture Organization of the United Nations

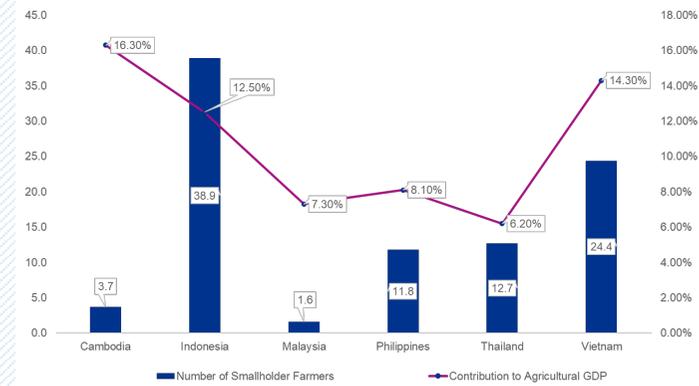


Enabling smallholder farmers with agritech in Asia

Around 350 million smallholder farmers – farmers who occupy two hectares of land each at most – live in Asia, with over a 100 million of them in Southeast Asia (SEA). Smallholder farmers are the backbone of Southeast Asia's agricultural production, accounting for 6 to 16 percent of GDP for countries in Southeast Asia¹. Despite their small land size, they produce up to 80 percent² of the food consumed in the region. Yet, a myriad of interconnected problems such as lack of access to information, markets, and capital trap them in a vicious cycle of subsistence farming.

Furthermore, only 2.5 percent of farmers in Southeast Asia are active users of digital technologies³, leaving large potential gains unexploited. Equipping these small farmers with digital tools to improve their profits and efficiency, along with a business model that suited for small and remote firms, present an outsized opportunity for start-ups in the region. For example, some agritech start-ups partnered with banks to leverage on technology as a way to provide better financing access for smallholder farmers and allow the banks to better assess risk when providing loans to this underserved community. These solutions can also help to build a holistic ecosystem of trusted partners and other solution providers. An example is CROWDE, an Indonesia-based start-up that addresses the problems faced by smallholder farmers in getting access to capital to grow their farms. The company offers not only funding, but also market access to other farmers and farming advisory to its community of 50,000 farmers.

Number of smallholder farmers and contribution to agricultural GDP for selected countries in Southeast Asia



Source: WWF, Unlocking smallholder finance for sustainable agriculture in Southeast Asia



1. Unlocking smallholder finance for sustainable agriculture in Southeast Asia, WWF
2. How can Asia's smallholder farmers endure both climate change and Covid-19, Eco-Business
3. Shifting investments toward the smallholder farmer, GrowAsia

350 million Smallholder farmers are in Asia

80% Asia's food supply produced are consumed in the region¹

100 million Smallholder farmers are in Southeast Asia

2.5% SEA farmers are active users of digital tech

Source: WWF, Unlocking smallholder finance for sustainable agriculture in Southeast Asia



Subsectors to watch in Asia

► Urban farming

More than half of the world’s population live in cities today. Urban farming is key to developing a stronger food system in cities, which tend to rely heavily on food imports. Singapore has been increasingly embracing urban farming, maximising underutilised spaces such as rooftops. With an ambitious target to produce 30 percent¹ of its nutritional needs domestically by 2030, there are opportunities for the urban farming sector to grow, as well as for start-ups developing enabling or adjacent technologies for growing more with less.

► Water technologies

Water scarcity is a significant issue at local, regional, and global levels. India, with 18 percent of the world’s population, faces this issue more acutely with only 4 percent of the world’s water resources². India relies heavily on underground water, resulting in a sharp decline in water levels, and irrigation efficiency is currently low. While several public and non-governmental organisation water management initiatives have been implemented, many of the digital solutions for mapping and

assessing water resources remain primarily static. There is a significant opportunity for smart irrigation systems and water efficiency technologies to innovate and improve the situation.

► Agriculture carbon markets

In the current landscape, only 1 percent of carbon credit issuances stem from agriculture carbon markets³. However, this sector holds significant untapped potential to drive farmer incentivisation via the sale of offsets, thereby improving their income streams while advancing the adoption of sustainable farming practices that optimise soil health and fertiliser usage, amongst others. This creates new revenue opportunities for existing agritech companies to offer carbon financing as a service, while also promoting the transition to a low-carbon agriculture future. For the carbon marketplace to become more robust, more research and collaboration is needed particularly in developing innovative technologies for measuring carbon sequestration, creating tools for farmers to optimise their carbon reduction efforts, and exploring alternative payment structures, such as blockchain-based transactions.



1. *Strengthening our food Security*, Singapore Food Agency
2. *How is India addressing its water needs*, The World Bank
3. *Designing carbon markets for agriculture: World agritech 2022 takeaways*, AgFunderNews



► Crop insurance

Crop insurance can help farmers better manage risks and protect their livelihoods. Traditional crop insurance schemes in Asia have been limited in their ability to provide effective coverage to farmers due to challenges in assessing crop damage and high transaction costs. Parametric insurance, such as weather-based index insurance, offers a promising alternative using remote sensing and other technologies to automatically trigger payouts when predefined weather conditions are met, reducing costly damage assessments. However, there are limitations and risks associated in this developing area, such as data accuracy and reliability, the potential for basis (i.e., the mismatch between the trigger and the actual losses), and moral hazard risks (i.e., farmers taking risks that they would not have taken otherwise). Opportunities exist to expand parametric insurance in Asia by improving weather data and modelling, increasing trust and awareness among farmers, and reducing the costs of insurance products through technology and innovation⁴.

► Farmer advisory and onboarding/ enablement

Farmers, particularly smallholders, often lack knowledge about climate risks and how to mitigate them. They also lack the necessary skills and resources to transition towards more sustainable and resilient systems. Existing market solutions help to enable them with digestible information and insights on maximising crop yield, predict climate risks, and transparent pricing information for farm inputs and produce. While these solutions help reduce transaction costs, enhance information flow within the agriculture sector and improve yield and farmers' incomes, farmers have been slow to adopt these. Providing finance, advisory services, and market connections to small farmers in remote locations has been challenging for businesses to scale profitably. One interesting aspect of the adoption curve is farmers' strong preference for conversational technologies⁵, herein lies the opportunity for the development of mobile solutions, leveraging generative AI, that are also optimised for the low-connectivity conditions in remote places.



4. Here's how better crop insurance can help Asia's farmers survive climate change, *Asian Development Blog*
5. Driving agritech adoption: Insights from Southeast Asia's farmers, *GrowAsia*

**Top 10 agritech start-ups under US\$800m, ranked by post valuation¹**

	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ Ninjacart	An agricultural marketing and supply chain platform.	756.77M	India
2	▶ Absolute	Operator of large-scale indoor and semi-indoor vertical farms.	501.93M	India
3	▶ TurtleTree	Cell-based technology designed to produce clean milk and cultured milk products.	379.00M	Singapore
4	▶ Arya.ag	Agricultural warehousing platform to provide post-harvest agriculture.	300.00M	India
5	▶ Jinyuan Seed	Provider of agricultural information services.	157.29M	China
6	▶ YuanYao	Provider of agricultural services.	165.10M	China
7	▶ Bijak	Developer of agricultural trading platform.	163.50M	India
8	▶ VeGrow	Operator of a farming support platform.	159.37M	India
9	▶ AgriAku	Operator of an agriculture marketplace.	143.84M	Indonesia
10	▶ FarMart	AgriTech platform connecting farmers with farm-related information.	133.56M	India

* 1. Pitchbook data as at 25 April 2023



Smart cities

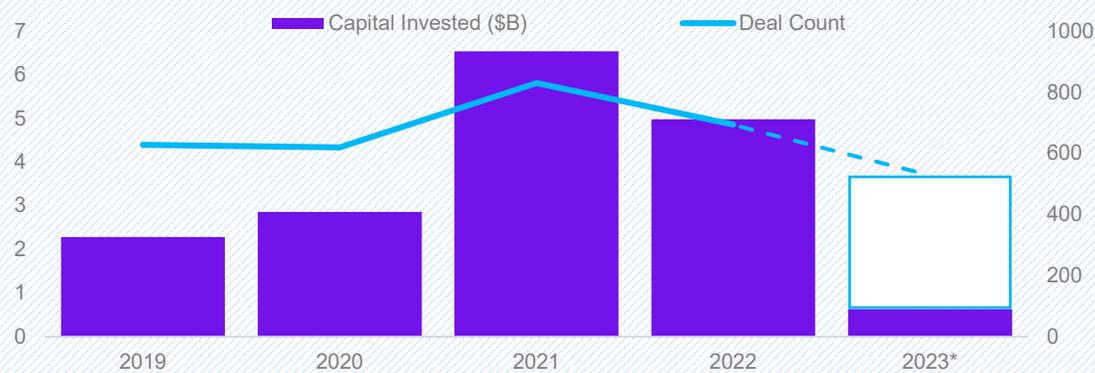
Smart cities are enabled by a framework of information and communication technologies to improve operational efficiency, share information with the public and provide a better quality of government service and citizen welfare¹. As cities become ever more sprawling and resources becoming increasingly scarce, optimisation of resources through consolidating cross-sector information is becoming ever more essential. While certain insights may not be shared, enabling real-time display of key information and insights is where solutions such as digital twins come into play.

Funding for smart city solutions largely follows Asia's overall trends in 2020. This was followed by an explosion of funding in 2021 and contracted in 2022². With Q1 2023 continuing to show

restraint in funding patterns, the continued turmoil in the global economy and rising interest rates will likely depress venture funding towards smart cities start-ups in the near term. As holistic smart city development requires significant government buy-in, a significant number of solutions are driven by governments and research institutions. Alternatively, these solutions are developed in-house by large corporates, or are otherwise acquired for their intellectual property. A seminal example is nuTonomy, an autonomous vehicle spin-off company from the Massachusetts Institute of Technology, which received approval for public road testing in Singapore in 2016, before being acquired by Aptiv and is currently part of Motional, a joint venture for between Aptiv and Hyundai founded in March 2020³.



Capital invested & deal count for smart cities start-ups in Asia



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. What is a smart city? Definition and examples, TWI Global
2. Pitchbook data from 2019 to 2023 Q1
3. Driving into the future, Smart Nation and Digital Government Office, Prime Minister's Office Singapore



Developed Asian markets as a hotbed for smart cities solutions

As Asia becomes increasingly digital, cities will likely further integrate IoT sensors to develop insights and optimisations, empowering intelligent optimization and modelling. Developed Asian markets, with their high levels of digitalisation and strong technical expertise, are key markets for the development of smart cities. Singapore is one such key market driving the development of smart cities, with a dedicated government arm (Smart Nation and Digital Government Group) to plan, develop and implement solutions in this space. Through a combination of policy and technological development, a number of different key strategic projects have been implemented, including digital identity (Singpass) and the Smart Town framework. Through the Smart Town framework, various sensors are placed within the towns, urban planners are able to further intelligently optimise and allocate resources, and design energy efficient apartments⁴. Going one step further, the Virtual Singapore project⁵ is building a digital twin of the island state, combining topographical models

with real-time, dynamic data. This will enable both real-time insights while also providing an analogue for the modelling of multi-variable problems, such as network coverage and other urban environment improvement measures.

Yet another key market for smart cities is China, with a large number of IoT sensors required to empower smart cities developed by Chinese start-ups. While there may be a number of smaller players developing IoT solutions to be integrated into an over-arching smart city framework, incumbents like Alibaba are developing large-scale software solutions to solve key problems, such as City Brain to solve traffic congestion. In Feb 2021, Shanghai Huangpu District with Huawei jointly selected the Nanjing Building as a pilot site for urban digital governance⁶. With 29 “dual-gigabit” cities with wired and wireless broadband, and 1.85 million 5G base centers, combined with a five-year plan incorporating smart city development across all provinces, the Chinese market is ready for smart cities solutions⁷.



4. *The smart town framework*, Smart Nation and Digital Government Office, Prime Minister's Office Singapore
5. *Virtual Singapore*, National Research Foundation, Prime Minister's Office Singapore
6. *Digital twin cities: Framework and global practices*, World Economic Forum
7. *The Chinese start-ups working on developing smart cities*, The China Project



Subsectors to watch in Asia

► IoT and digital twins

As countries get increasingly digital, there has been a rise in demand for real-time connectivity, with many devices now constantly connected and providing data to the cloud. This dynamic information sharing enables new service models which were previously unfeasible, such as real-time tracking of delivery and courier services as seen with Lalamove and their real-time tracking of P2P delivery¹. These real-time insights also enable the modelling of full system-level interactions, rather than isolated elements. This system-level modelling and real-time data, in concert with digital visualisations, give rise to the digital twin, a virtual representation of a physical system. Digital twins have enabled optimisations in manufacturing by enabling a full internal view of the manufacturing line and empowering new insights which were previously hidden. The Chinese market looks very much to be key for digital twins, with Chongqing, Beijing, Shanghai among the many Chinese cities announcing digital twin projects. As the Asian economies become increasingly urban with development, expect to see digital twins paving the way for new developments.



1. Lalamove





► Mobility solutions

The span of solutions in the mobility space for smart cities is broad, starting with bike sharing solutions such as SG Bike and Anybike enabling commuters to affordable and environmentally friendly transportation, all the way to Alibaba’s City Brain, an AI solution to minimise congestion in the city. While bike sharing solutions are relatively straightforward to implement, other mobility solutions may require a full suite of sensors to complement. City Brain requires significant integration with cameras and traffic lights to distil insights and optimise traffic and this has improved the congestion in implemented cities. Hangzhou, Alibaba’s base, dropped from 5th to 57th among China’s most congested cities², with commutes through the Zhonghe-Shangtang Highway reduced by 4.6 minutes on average³. One to watch for the future is autonomous vehicles, with South Korea having deployed autonomous taxi and bus services on the popular tourist destination of Jeju⁴. Singapore is another key testbed, with eight different autonomous vehicle projects tested across the years, and ranked number one in 2020’s Autonomous Vehicle Readiness Index⁵.

► Intelligent power solutions

With climate change and achieving net zero a key challenge across Asian economies, renewable energy sources are essential to this effort. Most renewable energy sources currently do not provide a steady flow of electricity compared to traditional power plants. To account for this fluctuation in power supply, intelligent power solutions will provide a bridge to enable these renewables to integrate with the existing power supply. ASEAN has been laying the groundwork since 2018, with a study on smart grids in ASEAN, providing recommendations for member countries to achieve the regional renewable energy target of 23 percent of total power supply by 2025⁶. At a consumer level, small scale solar panel deployment has been gaining traction, with companies such as Sunseap enabling individuals and corporations to store and sell energy back to the grid as they generate more than they consume. Further developments, particularly in the use of intelligent power solutions to manage large scale renewable power generation, will be of paramount importance in the transition away from fossil fuels.



2. Alibaba’s ‘City Brain’ is slashing congestion in its hometown, CNN
3. City Brain now in 23 Cities in Asia, Alibaba Cloud
4. Jeju kicks off autonomous driving service, Asia News Network
5. Singapore tops autonomous vehicles readiness index for the first time, FinTech News Singapore
6. Study on smart grid overview in ASEAN, ASEAN Centre for Energy

**Top 10 smart cities start-ups under US\$800m, ranked by post valuation¹**

	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ WingTMG	Operator of an media technology platform designed to produce original brand content and popular shows.	779.22M	China
2	▶ UINO	Developer of smart visual management platform and applications.	605.11M	China
3	▶ Ejiayou	Provider of petroleum payment solutions at gas stations.	542.68M	China
4	▶ Bouffalo Lab	Developer of semiconductor chips designed to enable a full range of Internet of Things services.	515.00M	China
5	▶ Sito Microelectronics	Developers and suppliers of radio frequency (RF) filters.	437.92M	China
6	▶ Zmeng Network Technology	Developer of AI and big data powered business intelligence platform intended to serve small and medium sized enterprises.	435.52M	China
7	▶ Beam	Provider of micro-mobility services to for the integration of urban mobility across public and private modes of transport.	301.38M	Singapore
8	▶ Neuron Mobility	Developer of a rental e-scooter platform designed to provide safe and convenient inner-city transport.	265.54M	Singapore
9	▶ ZhishengLianfa Information Technology	Developer of an IOT software development company.	262.23M	China
10	▶ Leador Space	Developer of big data application, smart machine and mobile mapping system designed to provide customers with high technology application.	252.43M	China

* 1. Pitchbook data as at 25 April 2023



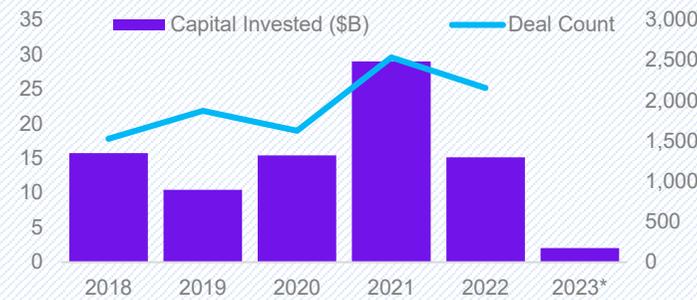
Artificial intelligence

AI is the latest buzzword to hit the tech sphere. PitchBook's H1 2023 VC Tech Survey found that respondents expect AI to be the core source of technology innovation over the next year¹. While ChatGPT may be top-of-mind when it comes to AI, the foundations for AI in Asia have been long established. Singapore established AI.SG jointly between six government agencies in 2017, pledging over S\$100 million to the development of AI². In 2017, China's State Council issued "New Generation Artificial Intelligence Development Plan"³, with the goal to be a world leader in AI. China took a majority of global equity funding into AI start-ups in 2017 at 48 percent, taking the top spot from the United States at 38 percent, and up from the 11.3 percent in 2016⁴. In 2016, Japan positioned AI as a core technology to its plans to realise a super-smart society, Japan's Artificial Intelligence Technology Strategy was initially launched in 2017⁵ and has been refreshed in 2022⁶. It is apparent that AI in Asia is not a mere flash in the pan, but a key cog in the long term development roadmap.

Funding in Asia has been steadily high, with venture funding annually above US\$15 billion from 2018 to 2022 apart from 2019. Deal counts have been growing steadily at a CAGR of ~9 percent from 2018 to 2022. While Q1 2023 remains subdued in total funding, deal counts have not fluctuated far from past years. In addition, governments in Asia have been investing in research, with Singapore announcing in 2022 another S\$180 million into national research and innovation strategy for AI adoption into key sectors⁷ and Japan announcing ¥100 billion towards advanced technologies, with AI being one of the 4⁸. South Korea's Ministry

of Science and ICT had also announced a ₩2.2 trillion budget in 2018 to fund the country's bid to become an AI heavyweight by 2022⁹, and has re-committed over ₩800 billion to companies producing advanced AI chips¹⁰.

Capital invested & deal count for AI/ML in Asia



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. PitchBook H1 2023 VC Tech Survey, PitchBook Data, Inc.
2. Singapore to invest over \$100 million in A.I. in next five years in smart nation, innovation hub push, CNBC
3. Full translation: China's 'new generation artificial intelligence development plan' (2017), Stanford University
4. China plans to be a world leader in artificial intelligence by 2030, South China Morning Post
5. Japan: Japan AI strategy: Artificial intelligence technology strategy, Digital Policy Alert
6. AI strategy 2022 (overview), Secretariat of Science, Technology and Innovation Policy Cabinet office, Government of Japan
7. Singapore launches national AI schemes, adds \$133M investment to research, ZDNET
8. Japan to set up advanced-tech fund with eye on economic security, Nikkei Asia
9. South Korea to invest 2.2 trillion won in bid to seize the lead in AI technology by 2022, OpenGov
10. South Korea boosts its AI chip industry with \$642M amid ChatGPT frenzy, TechCrunch





Incumbents in Japan and South Korea have not been laying low, with leading technology companies in Japan and South Korea having some of the highest counts of patents filed for AI¹¹. In November 2022, Singapore’s Smart Nation and Digital Government Group signed a Memorandum of Understanding with Google Cloud to co-create AI solutions in key sectors like finance, sustainability and healthcare¹². Alibaba¹³ and SenseTime¹⁴ launched their own versions of generative chatbots in April 2023. Other Asian countries are also seeking to be disruptors. Malaysia’s government announced their National Artificial Intelligence Roadmap in 2021¹⁵, and Thailand’s government is developing a National Artificial Intelligence Plan, moving towards Thailand 4.0¹⁶. Thailand’s National Electronics and Computer Technology Centre has pledged to provide support for Thai start-ups developing AI, with their AI Thailand programme providing AI infrastructure such as Government Data Centre and Cloud service, AI tools (supercomputer), and an AI platform for

developers to scale up their own AI¹⁷. Both of these countries rank highly within Oxford’s 2022 Government AI readiness index, with Malaysia at 29 and Thailand at 31¹⁸.

As digital adoption in Asia continues to grow, AI has been increasingly incorporated into daily usage. For instance, there has been a rise in uptake of chatbots as companies seek process automation in a bid to reduce operating costs. These technologies are also being utilised for personalized insights and predictions, as the growing middle class in Asia gain spending power and seek more bespoke experiences, which AI is well poised to deliver autonomously.



11. *The IP behind the AI boom, WIPO*
12. *Google beefs up Singapore investments, cloud unit inks AI partnership with govt, The Business Times*
13. *Alibaba launches its own AI chatbot technology to be used across all its business units, Forbes*
14. *Chinese AI firm SenseTime launches ChatGPT rival SenseNova, joining giants like Alibaba and Baidu in chatbot race, South China Morning Post*
15. *Malaysia national artificial intelligence roadmap 2021-2025, Ministry of Science, Technology & Innovation, Government of Malaysia*
16. *Thailand to develop AI action plan to drive national growth, OpenGov*
17. *Nectec gears up to facilitate AI development in Thailand, The Nation Thailand*
18. *Government AI readiness index 2022, Oxford Insights*



Subsectors to watch in Asia

► Chatbots

AI within chatbots, which are a combination of AI, ML and Natural Language Processing, have long been utilized to automate conversations. 64 percent of businesses polled in Asia Pacific indicated that the performance of AI and chatbots have improved, with interactions becoming more natural and human-like. Yet, customer expectations are increasing. 73 percent of customers expect the same level of service as compared to a human agent, with enabling the handling of complex questions and integration of voice-based AI and synthetic agents into the customer experience¹. Japan in particular has been an early adopter of the chatbot in tourism, with AI tourist chatbots in use from as early as 2018². As customers become increasingly digital, customer journeys are increasingly shifting online. The eventual evolution of the chatbot to further integrate itself into customer journeys will be one to keep an eye on.

► Real time insights and diagnostics

A core benefit of AI is the ability to not only develop key insights from large amounts of data, but also to react at extremely low latencies. Capital markets have been an early adopter, with high frequency trading utilising AI algorithms to react and optimise trading strategies. IBM utilises AI in their supply chain management suite, delivering real-time insights and visibility to accelerate decision making³. Advanced AI analytics empower fraud detection in financial institutions while reducing false positives, with AI optimising its algorithm as new information is being fed in⁴. In medical imaging, where there is heavy reliance on the human eye, AI can assist with diagnostics to identify potential issues in patient scans, while a trained technician interprets these findings⁵.



1. APAC consumers expect human-like service from chatbots, ComputerWeekly.com
2. AI-powered chatbot Miko to guide your next Japan vacation, Microsoft
3. IBM supply chain intelligence suite, IBM
4. Fraud detection with machine learning & AI, SEON
5. How can artificial intelligence change medical imaging?, HealthITAnalytics



► Predictive analysis and hyper-personalisation

With the analysis of and insights developed from large datasets, AI as a technology is capable of observing patterns and trends. These may involve complex underlying patterns which a traditional simple analysis may not uncover. These observed patterns can then be used to draw predictions, which could help to optimise resources and enable dynamic interaction. A key use case is in energy, where predictions of high energy consumption periods assist with mitigation strategies to prevent power surges. This becomes increasingly important as smart power grids become a key feature in our journey towards a greener future⁶. As consumers increasingly seek hyper-personal experiences, AI will help to further shape customer journeys⁷. In educational technology, learning programmes and apps create personalised modules based on problems students have previously struggled with, enabling targeted revision to strengthen core concepts⁸.

► Generative AI

Generative AI may pose some considerations for jobs, with large corporates like IBM looking to AI to replace certain roles, and simple duties such as the generation of employment verification letters being automated⁹. Automated content generation has a myriad use cases, with marketing being a key use case¹⁰ and even coding¹¹ in its sights. Generative AI is here to stay – with Chinese companies like Baidu, Alibaba and SenseTime¹² having released their own AI chatbots, Korea’s SK Telecom scheduled to release their own generative AI chatbot¹³, as well as the Japanese¹⁴ and Singapore¹⁵ governments looking to ChatGPT to assist with tasks.



6. *Energy intelligence: the use of AI in energy management, Dexma*
7. *Hyper-personalization, Optimizely*
8. *Edtech firm scores \$1.4m to expand AI-based tailored learning across SEA, Tech In Asia*
9. *AI threatens 7,800 jobs as IBM pauses hiring, ZDNET*
10. *How generative AI is transforming marketing—for better or worse, Typeform*
11. *CodiumAI is using generative AI to help developers build code logic tests automatically, TechCrunch*
12. *Chinese AI firm SenseTime launches ChatGPT rival SenseNova, joining giants like Alibaba and Baidu in chatbot race, South China Morning Post*
13. *A South Korean telco giant has its own A.I. chatbot — and says it’s a ‘super app’ version of ChatGPT, CNBC*
14. *Japan Government to use ChatGPT for first time on red tape, Bloomberg*
15. *Civil servants to soon use ChatGPT to help with research, speech writing, The Straits Times*

**Top 10 AI start-ups under US\$800m, ranked by post valuation¹**

	Name	Business	Valuation (US\$)	Jurisdiction
1	▶ Korea Credit Data	Developer of financial and accounting platform to help businesses with data and connections.	782.88M	South Korea
2	▶ LaiPic	Developer of a short video animation platform for enterprises looking to incorporate hand-drawn graphics on their website or in advertisements.	766.90M	China
3	▶ Hua Kong Tsingjiao	Developer of a cybersecurity platform to ensure data safety.	670.63M	China
4	▶ WorkTrans	Developer of a human resource management software designed to offer diversified attendance, mobile scheduling and unified management.	669.00M	China
5	▶ INDmoney	Developer of an artificial intelligence and machine learning-based wealth management and advisory platform designed to cater to the needs of investors.	650.00M	India
6	▶ LegalForce	Developer of a legal data analysis platform designed to provide contract review support service to professionals.	632.07M	Japan
7	▶ Synyi	Provider of artificial intelligence-powered medical data platform for the development big data-driven application for medical research, healthcare, and patient services.	620.21M	China
8	▶ BangDB	Developer of a cloud-based hardware-software converged platform designed to offer actionable data insights in real time.	609.31M	India
9	▶ UINO	Developer of smart visual management platform and applications.	605.11M	China
10	▶ Tier IV	Developer of autonomous vehicles designed to help individuals and organisations to overcome the barriers of time and space.	588.08M	Japan

* 1. Pitchbook data as at 25 April 2023



Key innovation hubs in Asia





Major start-up hubs

Asia's emergence as a key player in the global start-up ecosystem can be attributed to several factors. Firstly, with a large and rapidly expanding population of 4.7 billion people¹, Asia presents itself as a huge potential market for new products and services, making it an attractive destination for start-ups looking to scale quickly and achieve significant growth. This demographic advantage has also caught the attention of global investors, who see Asia as a hotbed of innovation and a prime investment opportunity.

Secondly, the emergence of a burgeoning middle class in many Asian countries has led to an increased demand for innovative offerings, especially in areas such as fintech, e-commerce, and digital health. As this middle class continues to grow and become more affluent, the demand for high-quality, innovative products and services is expected to increase even further, creating even more opportunities for start-ups in the region. Furthermore, the pace of digitalisation in Asia has accelerated in recent years, with many countries adopting advanced technologies and digital platforms at a rapid pace post-pandemic. This has opened new opportunities in various sectors. With Asia's tech-savvy

population and growing digital infrastructure, start-ups in the region are well-positioned to capitalise on these emerging trends.

China, Japan, India, and Singapore are notable countries in Asia that have made significant strides in building a robust start-up ecosystem. These countries also possess unique attributes that have positioned them as major innovation hubs in Asia.

Access to large markets

All four countries mentioned above have benefitted from access to large markets. China and India have the distinct advantage of having large domestic markets. Japan, being the third largest economy in the world, still has access to a sizable affluent market despite a declining population.

Singapore is strategically located within the heart of Southeast Asia and anchors itself as a key hub for regional start-ups with global ambitions, leveraging on the city-state's international linkages.

* 1. Population of Asia, Worldometers





Conducive business environment

A key enabling factor that allows these countries to serve as major start-up hubs is the implementation of supportive government policies, and coordinated measures aimed at driving further growth of their respective start-up ecosystems.

In China, tax breaks and financial incentives are offered to nearly 9,000 "little giants" start-ups² in strategically important sectors. Furthermore, cities such as Beijing and Nanjing have established science parks³ where qualifying companies can receive tax breaks and other incentives.

In both Hong Kong (SAR), China as well as in India, dedicated support for start-ups is provided under a single unifying brand called StartmeupHK and Startup India respectively, to facilitate access to relevant government support programs and resources.

Japan, on the other hand, focuses on implementing steps to turn its cities like Tokyo into major start-up hubs⁴. It is also increasing government procurement from start-ups, attracting global talents, and luring more investments from foreign VC firms through regulatory reforms⁵.

Similarly in Singapore, comprehensive government support through streamlined access to government agency contracts, attracting international talents, and coordinated government support are all key drivers for the growth of start-ups in the city state.

The powerful combination of favourable pro-business policies, coordinated support, access to a large and expanding middle class, and an accelerated pace of digitalisation have enabled these countries to establish themselves as vital hubs for innovation and entrepreneurship in Asia.



- 2. Experts call for bigger policy, financial support for tech-savvy 'little giants', *China Daily*
- 3. China's vast blueprint for tech supremacy over U.S., *Bloomberg*
- 4. Tokyo aims to be 'most startup-friendly' city with new support for firms, *The Japan Times*
- 5. Japan to remove limit on overseas investment by startup funds, *Nikkei Asia*

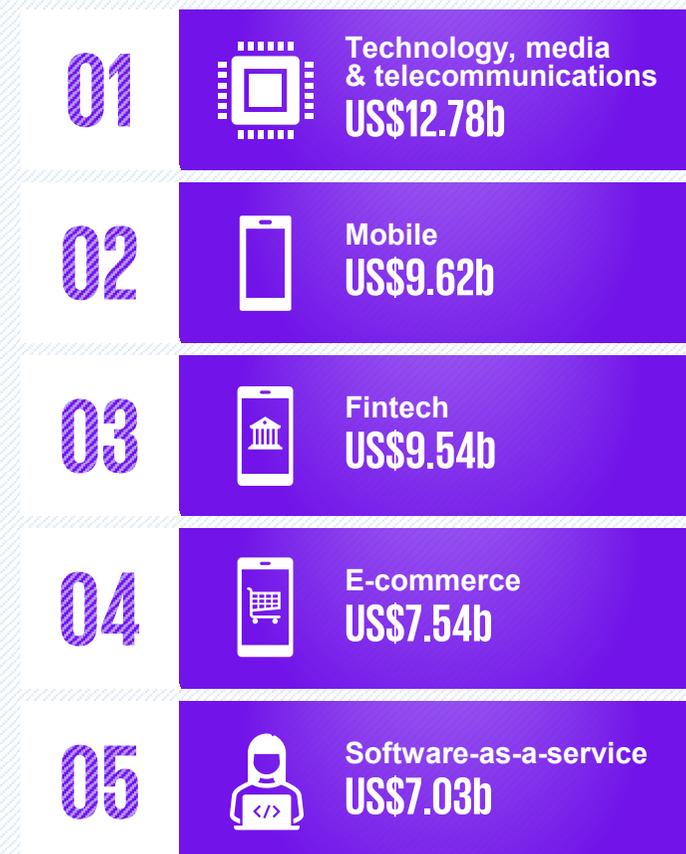


Singapore

Singapore is a thriving hub for start-ups with a growing number of successful ventures, including the creation of 16 unicorns, each valued at over US\$1 billion, making it a key player in Southeast Asia's start-up ecosystem. With over 2,777 start-ups and a robust investor community of 7,247, including 1,231 accelerators and incubator programmes¹, Singapore has established a strong start-up ecosystem. As a major global financial hub, Singapore also has a strong presence in fintech, with blockchain and cryptocurrency start-ups accounting for the largest segment of the community, followed by payments businesses and wealthtechs². Under the Green Plan 2030, Singapore also aims to be a leader in green finance and services and seeks to nurture local enterprises to capture market opportunities in the sustainability space, while facilitating Asia's transition towards a more sustainable future³.

The Singapore government offers comprehensive support for start-ups, enabling them to gain access to funding, accelerators, talent, cross-border collaborations, and customers. The Digital Industry Singapore (DISG) is one such initiative, bringing together the Economic Development Board (EDB), Enterprise Singapore (ESG), and the Info-communications Media Development Authority (IMDA) to act as a single point of contact for digital enterprises. By combining resources, DISG is helping to establish Singapore as a global technology hub with a thriving ecosystem for innovative products, services, business models, and partnerships, both in Asia and beyond.

Top sectors¹ include:



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. Pitchbook Data
2. Singapore fintech report 2021, FinTech New Singapore
3. New programme will help SMEs go green, capture business opportunities in sustainability: Grace Fu, The Straits Times



Singapore

Key economic indicators

5.98 million



Population

US\$397 billion



GDP (2021)

US\$72,794



GDP per capita (2021)

GDP growth

▶ 2017 4.7%

▶ 2018 3.7%

▶ 2019 1.1%

▶ 2020 -4.1%

▶ 2021 7.6%

9.22 million



Active cellular mobile connections

5.81 million



Internet users

96.9%



Internet penetration

All data in Q1 2023, unless otherwise indicated.

Source: World Bank (GDP, GDP per capita), Worldometers (Population), Meltwater (Internet users, active cellular mobile connections & internet penetration)

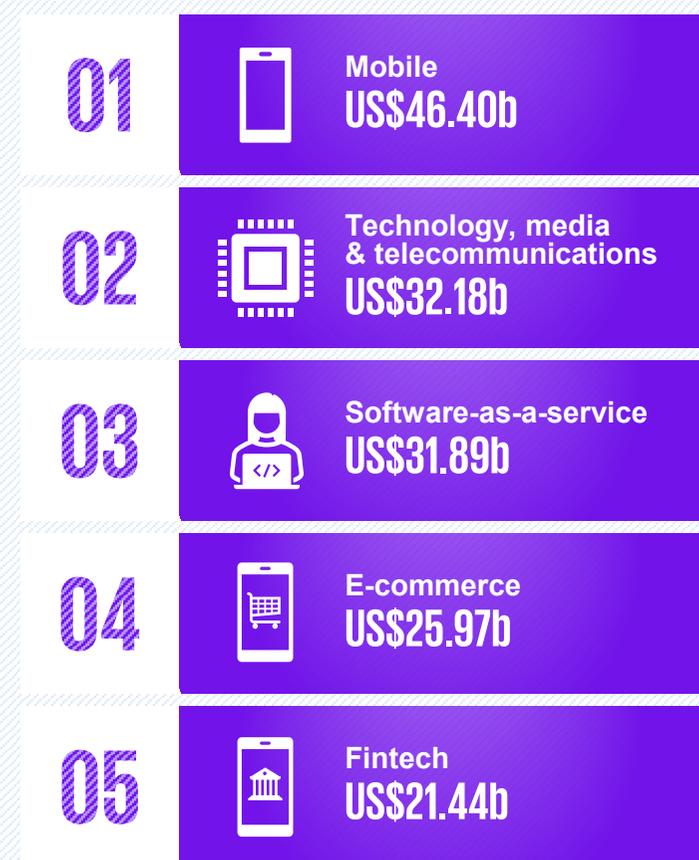


India

India, now among the world’s most populous nations is rapidly becoming a thriving hub for start-ups. With over 7,547 start-ups head-quartered in India, and home to 65 unicorns¹, India is ranked among the top countries for start-up growth, with only the United States and China ahead in terms of numbers. This exceptional growth reflects India’s immense potential as a leading place for innovation and entrepreneurship. To support this growing start-up landscape, the government has launched the Startup India Initiative², which provides support in three key areas: simplifying regulations, providing funding and incentives, and promoting incubation and industry-academia partnerships.

Indian start-ups have capitalised on market inefficiencies, drawing on decades of high-tech experience in areas such as finance, insurance, business services, and data management. The rapid growth of India's start-up scene can also be attributed to strong government support aimed at encouraging the growth of the domestic ecosystem. However, despite having improved on its funding ecosystem, India has yet to establish a full-fledged VC and private equity ecosystem, leaving it more dependent on global funding sources. There are signs that the government is seeking to address this in consultation with industry players on how best to revamp its regulations to better serve start-ups and grow the number of unicorns in the country. Furthermore, the government’s public digital platforms, such as Aadhar and the Unified Payments Interface (UPI), offer start-ups with opportunities to leverage these platforms to offer innovative solutions in the market¹.

Top sectors¹ include:



Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. Pitchbook data
2. Startup India initiative, Department for Promotion of Industry and Internal Trade, India



India

Key economic indicators

1.42 billion



Population

US\$3.18 trillion



GDP (2021)

US\$2,257



GDP per capita (2021)

GDP growth

▶ 2017 6.8%

▶ 2018 6.5%

▶ 2019 3.7%

▶ 2020 -6.6%

▶ 2021 8.7%

1.1 billion



Active cellular mobile connections

692 million



Internet users

48.7%



Internet penetration

All data in Q1 2023, unless otherwise indicated.

Source: World Bank (GDP, GDP per capita), Worldometers (Population), Meltwater (Internet users, active cellular mobile connections & internet penetration)



China

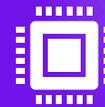
China is one of the largest markets in the world, supported by a thriving tech ecosystem that has given rise to innovation hubs in major cities. For example, Beijing has established itself as a leader in artificial intelligence (AI) and deep tech¹, while Shanghai excels in fintech, digital health, and broader customer services¹. Shenzhen is a hub for hardware innovation¹, and Hong Kong (SAR), China is a developed service economy, covering trade and logistics, financial services, and tourism, and has traditionally played a pivotal role in connecting the Chinese Mainland's trade and investment with the rest of the world. The government is also working towards linking the nine cities in the Guangdong Pearl River Delta Economic Zone with Hong Kong (SAR) and Macau (SAR) to create an international city cluster and technology center, a critical supporting pillar for the Belt and Road Initiative².

Cities in China play a major role in driving the rapid growth of start-ups. For instance, Hong Kong provides dedicated start-up ecosystem support through InvestHK's StartmeupHK initiative⁴, while in the capital city, the Beijing Stock Exchange was launched to provide a capital-raising platform for start-ups and small-and-medium enterprises in their early stages of growth⁵.

Furthermore, China has made efforts to promote technological advancement in strategically important sectors. For example, around 9,000 start-ups in China that are designated as "little giants"³ have the opportunity to gain access to certain incentives. This includes state investments, low-interest loans, tax breaks, and assistance with talent recruitment. These initiatives will help to further accelerate the growth of the ecosystem in China.

Top sectors⁶ include:

01



Technology, media & telecommunications
US\$125.32b

02



Artificial intelligence & machine learning
US\$81.38b

03



Software-as-a-service
US\$79.23b

04



Mobility tech
US\$61.23b

05



Manufacturing
US\$60.61b

Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



1. So my tech start-up Is ready for China. Where do I go?, Enterprise Singapore
2. Market guides: South China, Enterprise Singapore
3. Experts call for bigger policy, financial support for tech-savvy 'little giants'. China Daily
4. StartmeupHK
5. An overview of Beijing Stock Exchange, Refinitiv
6. Pitchbook data



China

Key economic indicators

1.45 billion



Population

US\$17.73 trillion



GDP (2021)

US\$49,801



GDP per capita (2021)

GDP growth %

▶ 2017 6.9%

▶ 2018 6.7%

▶ 2019 6%

▶ 2020 2.2%

▶ 2021 8.1%

1.69 billion



Active cellular mobile connections

1.05 billion



Internet users

73.7%



Internet penetration

All data in Q1 2023, unless otherwise indicated.

Source: World Bank (GDP, GDP per capita), Worldometers (Population), Meltwater (Internet users, active cellular mobile connections & internet penetration)



Japan

Japan has a rich history of innovation and entrepreneurship. Despite its aging and shrinking population, it remains a leader in technology. Japan offers an ideal environment for start-ups to thrive since it has a strong technological base and wealthy domestic market. This is evident from the creation of 11 unicorns and presence of 4,055 start-ups in the country¹. To promote the growth of technology start-ups, Japan has established a ¥100 billion fund focused on research and development in fields such as big data, AI, robotics, quantum technology, and biotechnology. To bolster the start-up ecosystem, initiatives such as the Startup City Project was introduced to provide intensive support alongside local governments, universities, and the private sector³. Major institutions such as the University of Tokyo launched a fund of up to ¥60 billion to support start-ups originating from the university, with the goal of creating 300 new ventures².

Japan is also making strides towards strengthening its start-up ecosystem by removing a restriction that limits domestic venture funds from investing more than 50 percent of their portfolio holdings in foreign companies. This change will increase flexibility for funds to diversify their investment targets and encourage capital inflow into Japan. The country has set an ambitious goal of increasing annual investment to ¥10 trillion (US\$77b) by 2027 – ten times more than the current levels. This move will help to increase foreign capital and create a more dynamic and competitive environment for start-ups. These initiatives are expected to have a significant impact on the Japanese economy and solidify its position as a leading innovation hub in Asia⁴.

Top sectors¹ include:

01



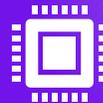
Software-as-a-service
US\$6.32b

02



Artificial intelligence & machine learning
US\$5.72b

03



Technology, media & telecommunications
US\$5.66b

04



Mobile
US\$4.44b

05



Fintech
US\$3.75b



1. Pitchbook data
2. University of Tokyo to set up \$536m fund for school-born startups, Nikkei Asia
3. Startup City Project Japan, J-Startup
4. Japan to remove limit on overseas investment by startup funds, Nikkei Asia

Source: PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts*



Japan

Key economic indicators

125.39 million



Population

US\$4.94 trillion



GDP (2021)

US\$39,313



GDP per capita (2021)

184.4 million



Active cellular mobile connections

102.5 million



Internet users

82.9%



Internet penetration

GDP growth %

▶ 2017 1.7%

▶ 2018 0.6%

▶ 2019 -0.2%

▶ 2020 -4.5%

▶ 2021 1.7%

All data in Q1 2023, unless otherwise indicated.

Source: World Bank (GDP, GDP per capita), Worldometers (Population), Meltwater (Internet users, active cellular mobile connections & internet penetration)



Government support





Government initiatives

Throughout Asia, a range of initiatives are being implemented to promote and cultivate successful start-up ecosystems in various industries. These initiatives actively support start-ups through improving access to capital, providing incentives, implementing regulatory reforms, and developing cross-border partnerships with other major global hubs. Furthermore, several markets are consolidating multiple government support measures into a unified brand, such as StartmeupHK, Startup India, and Startup Island Taiwan, to boost the facilitation and ease of accessing support for start-ups. In addition, countries are specialising in specific hubs to improve their global competitiveness. For instance, Singapore aims to become a carbon services and trading hub for Southeast Asia and the Asia Pacific¹, while Indonesia seeks to establish its new capital in Borneo as a major fintech hub². Hong Kong (SAR), China, on the other hand, is striving to lead in emerging technologies and set regulatory standards in areas such as Web 3 and virtual assets, with the aim of cementing its reputation as a premier hub for innovation and technology³.

Supporting start-ups amidst the funding crunch

Government support for start-ups is crucial amid the current economic climate of higher interest rates, geopolitical tensions, and a more risk-averse investor base. One of the primary ways in which governments are currently supporting start-ups is by improving access to funding through grants and incentives. Funding support is increasingly tailored and aims to provide support to solution providers in specific funding sectors. Examples include Singapore’s IMDA Spark programme where innovative infocomm media (ICM) start-ups would be provided priority processing of grant applications by IMDA⁴, and the Hong Kong SAR Government’s Social Innovation and Entrepreneurship (SIE) Development Fund, which aims to catalyse social impact through the funding of innovative ventures in this space⁵. Across Asia, countries have general venture funding support, tax breaks, and incentives aimed at addressing the various capital needs of start-ups and the wider micro, small, and medium enterprise (MSME) sector.



1. Singapore is well-positioned to become a carbon services and trading hub for Southeast Asia and the Asia Pacific, EDB Singapore
2. Jokowi promotes Indonesia capital project as Asia’s FinTech hub, Nikkei Asia
3. The 2023-24 budget speech, Web3, Hong Kong Government
4. About the IMDA Spark Programme, IMDA
5. Social innovation and entrepreneurship development fund, SIE Fund



Enabling expansions and entry into new markets

Other key initiatives taken by governments to boost domestic start-up ecosystems have been through measures that help start-ups access new markets, along with expansion support. An example is Singapore’s innovation hubs across the world. With acceleration programmes in 17 nodes and co-innovation programmes with 37 countries, the Global Innovation Alliance (GIA) helps Singapore companies gain access across markets and collaborate on research and development projects to develop innovative solutions with strong market potential⁶. Similarly, the Japan External Trade Organization’s (JETRO) programme, Startup City Acceleration Program (SCAP), offers acceleration support for Japanese start-ups looking to expand their business overseas⁷. Initiatives such as Singapore’s IMDA Accreditation and Thailand’s Digital Catalog Scheme⁹ both facilitate greater opportunities for qualified start-ups to access both the government and private sector’s procurement process as part of a quality assured cohort. Similar market access and expansion support are also available throughout the region as governments across Asia seek to accelerate the growth of their start-up ecosystem amid the challenging macroeconomic environment.

Addressing the talent shortage

Talent shortage remains a key concern across Asia as countries seek to attract the brightest minds globally to build a strong and capable domestic workforce. For example, Singapore’s Tech.Pass¹⁰, is an initiative aimed to attract start-up founders, leaders and technical experts with experience in established or fast-growing companies to contribute to the local tech ecosystem. Other markets across Asia have similar visa programmes that aim to fill the talent gap in their respective key sectors. Attention is also being focused on equipping the domestic talent pool to be future ready in an increasingly digitalised world. For example, South Korea announced “the Digital Strategy of Korea”, addressing the shortage in digital professionals¹¹. This is done through trainings conducted via a public-private partnership model over the next five years.

Governments across Asia are helping to create a more supportive environment for start-ups to thrive and contribute to the overall economic growth of the region. As the start-up ecosystem in Asia continues to evolve, it will be interesting to see how governments adapt their strategies and initiatives to ensure that start-ups in their respective countries continuously grow and thrive in the ever-changing environment.



6. Global Innovation Alliance, Enterprise Singapore
7. Acceleration program “SCAP” starts from mid-September, JETRO
8. IMDA Accreditation, IMDA
9. “MDES-depa” speed up ‘Thailand Digital Catalog’, Digital Economy Promotion Agency, Thailand
10. Tech.Pass, EDB Singapore
11. Korea to come up with the roadmap of Digital ROK, realizing the New York Initiative, Ministry of Science and ICT, South Korea

Key challenges





Start-up challenges

The current market environment in Asia continues to pose obstacles for start-ups in various sectors, limiting their access especially on the funding and talent front. Furthermore, heightened investor caution and a shortage of skilled workers have exacerbated the market environment, affecting all start-ups in the region across sectors.



1. Tighter monetary conditions rein in Asian unicorns, Deal Street Asia
2. PitchBook Data, Inc.; *Data has not been reviewed by PitchBook analysts.”
3. Funding winter: VCs ask start-ups to focus on corporate funds from developed countries, E27
4. ASEAN growth and scale talent playbook, Alpha JWC Ventures, Kearney & Grit
5. ASEAN start-ups struggle to find tech talent despite mass layoffs: Study, Deal Street Asia

Funding

- ▶ The tightening of monetary policies and market uncertainties have impacted Asia's unicorns, resulting in fewer and smaller companies reaching the US\$1 billion mark, and further slowing the emergence of new unicorns¹.
- ▶ VC investment in Asia has dropped to US\$20.3 billion, the lowest quarter of VC investment seen in the region since 2017².
- ▶ Investors are taking a more cautious approach, leading to a slowdown in investment from VC firms¹.
- ▶ The slower fundraising environment would also increase competition among start-ups for a reduced pool of funding¹.
- ▶ The prolonged winter funding will force many start-ups, including unicorns to be more prudent, reduce cost and stall their growth activities³.

Talent

- ▶ Nine in 10 start-ups in Southeast Asia face challenges in recruiting, nurturing and retaining tech talent as start-ups across capitalises on the digitalisation trend⁴.
- ▶ 91 percent of employees in Southeast Asian start-ups are open to leaving existing jobs to bigger tech firms that offer larger salary increments⁴.
- ▶ 62 percent of start-ups cited offering competitive rewards and compensation as a key challenge as they struggle to match offerings by bigger tech firms⁴.
- ▶ Skilled tech professionals such as engineers and data scientists are in short supply and in high demand, with salaries on average 38 percent higher than non-tech roles⁵.
- ▶ Given the current slowdown in funding, start-ups are compelled to be more discerning in their recruitment of talent⁵.

Recommendations





Key recommendations

Start-up entrepreneurs

▶ **Focus on creating value, not just higher valuations:**

With the current funding winter, it is imperative for start-ups to shift their focus from just aggressive growth towards achieving profitable unit economics. To do so, founders across all start-up stages should prioritise refining their company's value proposition, which is critical to achieving product-market fit and streamlining time to profitability. As for unicorns and more established players with bigger investment appetites for high-impact projects (also known as moonshot projects), its founders must approach projects with a clear-eyed view of the risks and challenges involved and be equipped with a robust plan to mitigate risks.

▶ **Explore multiple funding sources:**

To weather the funding winter, start-up founders should explore non-dilutive funding sources such as grants and government support schemes. Start-ups should take full advantage of available government support schemes to help cushion their costs from developing new products, capabilities, to launching new projects in markets. Strategic partnerships can also help start-ups weather the lack of external funding.

▶ **Identify talent needs early and build a strong employer brand:**

The recent big technology layoff freed up thousands of top-notch talent. Previously, founders struggled with the lack of high-quality talent in the broader talent pool. Currently, start-ups have access to more high-quality talent than before. Founders should focus on strengthening the company's brand and culture, alongside rewards and recognition, to attract and retain top talent. For example, adopting a fully remote and/or flexible work environment, providing new learning opportunities for employees as well as allowing companies to access a wide global talent pool. In turn, this would make employees feel empowered in a post-Covid work environment.

▶ **Enhance the governance framework:**

Amid the uncertain economic environment, it is increasingly important for start-up founders to prioritise enhancing and establishing a robust governance framework. Strong accountability and transparency will be needed to weather potential economic headwinds. Potential spending cuts may also need to be implemented to ensure sufficient liquidity and runway.



Investors

► Collaborate with start-ups to establish robust governance frameworks:

With investment activity remaining subdued, start-ups may be forced to make a number of crucial decisions including re-prioritising projects. This includes implementing cost-saving measures, while striving to achieve their goals and current investors' expectations. To enable improved decision making, investors can provide much needed support and guidance to their portfolio companies, especially those with less experienced senior management teams to establish a strong framework.

► Scale down on risk aversion towards emerging innovations:

Investors need to widen their investment search field and explore funding innovations from emerging markets and sectors. This will involve risk appetite broadening towards new ideas and business models. Emerging sectors such as ESG fintechs and greentechs offer significant growth and could be the next big bet.

► Leverage networks to ensure two-way success in the long term:

Investors may tap into both regional and global networks to help start-ups facilitate connections with potential clients and partners, as well as provide start-ups with the necessary guidance to effectively navigate the competitive landscape. This will not only help the streamlining of the start-ups' path towards success, but also enable investors to maintain a healthy portfolio of strong performing start-ups in the long term.



Policy makers

► Invest in talent development:

Policy makers should focus on investing in talent development via funding and support for educational and training programmes. This will equip start-up employees with the skills required to thrive in the digital and green economy, while helping these start-ups to consistently maintain a global pool of top-notch talent.

► Foster cross-border cooperation:

Differing regulations across borders, such as data privacy and cybersecurity, have been an ongoing hurdle for start-ups looking to expand regionally. Policy makers can collaborate to harmonise standards and create a more seamless regulatory environment, unlocking the full potential of the region and promote greater collaboration and innovation. This can help strengthen Asia’s attractiveness as a top-of-mind market for global start-ups to penetrate.

► Cross-border learning and best practices:

Policy makers should synthesise key learnings and successes across markets with proven robust business environments, entrepreneurship policies, and advanced mechanisms. Best practices from other markets can serve as examples for policymakers striving to create effective legislation and initiatives, to move towards an ideal state ecosystem well equipped to address the various support areas required by both budding and established soonicorns based on the markets and sectors they operate in.



Accelerators & incubators

► Two-pronged start-up enablement approach:

Accelerators and incubators should first prioritise activities that facilitate the creation of commercial and investment opportunities while also enabling start-ups access to resources. Furthermore, they need to equip start-ups with credible branding and seamless ecosystem access, empowering them to establish strategic partnerships with commercial outcomes. By merging these two approaches, accelerators and incubators can help start-ups scale faster to become soonicorns, and augment the ecosystem value add.

► Drive deeper ecosystem innovation with talent:

Accelerators and incubators have a prime opportunity to empower talented individuals seeking new career paths (those affected by the big technology layoff). This can be done by providing a platform for start-up ideas and facilitating their potential transition to entrepreneurship. These organisations can attract a diverse range of skilled professionals to the start-up community and drive further innovation in the region.

► Facilitate support for niche sectors:

Accelerators and incubators can unlock new growth opportunities by enabling start-ups to tap into global markets. In some cases, especially in niche or developing sectors, qualified mentors and advisors may only exist in other geographies. This is where accelerators and incubators may come in to help their start-ups identify and connect with those individuals. Furthermore, for many hardware tech start-ups, securing key hardware components and raw materials can be challenging - accelerators and incubators could help start-ups to identify and get connected to well-established suppliers.

► Tailored support and metrics towards bespoke start-up goals:

Start-ups joining accelerator programmes are at different stages of development with a diverse set of needs, hence a one-size-fits-all approach is often not highly effective. To truly add value, accelerators and incubators must tailor their metrics and implement bespoke activities and services according the specific objectives of each start-up.



Approach & methodology





Approach and methodology

Dataset

The underlying data and analysis for this report (the “Dataset”) was extracted from PitchBook Data, Inc (“PitchBook”) on 25 April 2023 and utilises their research and classification methodology for transactions as outlined on their website at <https://help.pitchbook.com/s/>. The Dataset used for this report considers the following deal types: Pre/Accelerator/Incubator, Angel, Seed, Early Stage VC and Later Stage VC. The Dataset has not been reviewed by Pitchbook Analysts.

Due to the private nature of many of the transactions, the dataset cannot be definitive, but is an estimate based on industry leading practice research methodology and information available to PitchBook at 25 April 2023. Similarly, due to ongoing updates to PitchBook’s data as additional information comes to light, data extracted before or after that date may differ from the data within the Dataset.

Categorisation of deal types

Pitchbook uses 5 key definitions for deal types.

- **Pre/Accelerator/Incubator:** An event where a company joins a temporary programme that variably provides funding, office space, technological development and/or mentorship. Often in exchange for an equity in the company.
- **Angel:** Investment by an individual in a company from their individual funds and not using funds raised from other people.
- **Seed:** When any investor type provides the initial financing for a new enterprise that is in the earliest stages of developing.
- **Early Stage VC:** An early stage financing by a VC firm in a company. Early stage is usually a Series A to Series B financing.
- **Later Stage VC:** A later stage round of financing by a VC firm into a company. Later stage is usually Series C to Series Z+ rounds.

Key words for marking start-ups

If a company is tagged with any PitchBook vertical, excepting manufacturing and infrastructure, it is kept under the analysis for Market Overview. Otherwise, the following industries are excluded from growth equity financing calculations: buildings and property, thrifts and mortgage finance, real estate investment trusts, and oil & gas equipment, utilities, exploration, production and refining.

Our curated dataset for sector-categorised start-ups includes all deal types (dated till 31 March 2023), Pre/Accelerator/Incubator, Angel, Seed, Early Stage VCs and Later Stage VCs. Ownership status is privately held (both backing and no backing). Backing status includes PE-backed, VC-backed, Accelerator/Incubator-backed, Angel-Backed, and within Asia HQs only.

However, under start-ups to look out for we added a limitation on post-valuation. We excluded start-ups with post-valuation more than US \$800 million.



Categorisation of start-ups into sectors

We used a combination of PitchBook’s verticals and keywords based on the defined sub-categories of AgriTech, Digital Health, FinTech, Artificial Intelligence, Web 3, Smart Cities and ESG Tech.

Verticals represent a specific investment area of focus that cannot be accurately depicted by industry groups alone. Verticals commonly span across industries, such that companies tagged to a vertical may belong to a variety of different industries.

1. Agritech – vertical search under ‘Agritech’; Companies that provide services, engage in scientific research, or develop technology with the explicit purpose of enhancing the sustainability of agriculture. This includes wireless sensors to monitor soil, air and animal health; hydroponic and aquaponic systems; remote-controlled irrigation systems; aerial photo technology to analyze field conditions; biotech platforms for crop yields; data-analysis software to augment planting, herd, poultry and livestock management; automation software to manage farm task workflows; and accounting software to track and manage facility and task expenses.

- 2. Digital health** – vertical search under ‘HealthTech’; Companies that provide mobility and other information technologies to improve healthcare delivery while decreasing costs. It entails the use of technology and services - including cloud computing, internet services and social mobility - to optimise patient-centric healthcare
- 3. Fintech** – vertical search under ‘FinTech’ Companies using new technologies including the internet, blockchain, software and algorithms to offer financial services usually offered by traditional banks including loans, payments, wealth or investment management, as well as software providers automating financial processes or addressing core business needs of financial firms.
- 4. Artificial Intelligence** – vertical search under ‘Artificial Intelligence & Machine Learning’; Companies developing technologies that enable computers to autonomously learn, deduce and act, through utilisation of large data sets. The technology enables development of systems that collect and store massive amounts of data, and analyse that content to make decisions based on probability and statistical analysis. Applications for Artificial Intelligence & Machine Learning include speech

recognition, computer vision, robotic control and accelerating processes in the empirical sciences where large data sets are essential.

However, due to the lack of verticals for Web 3, Smart Cities and ESG Tech, keyword searches were used instead.

Keywords are assigned based on the content of a company’s business description as well as PitchBook researcher-curated keywords, which include words and phrases related to a company’s products, services, related technology, and target market.



5. **Web 3** – keyword search ‘Web3, Metaverse’ and vertical search ‘Cryptocurrency/Blockchain’; Cryptocurrency refers to a virtual medium of exchange, created and stored electronically in the blockchain, distinguishable from other currencies in that it uses cryptographic technology to decentralize the creation of monetary units and securely verify transactions. This space includes companies providing services or developing technology related to the exchange of cryptocurrency, the storage of cryptocurrency, the facilitation of payments using cryptocurrency, and securing cryptocurrency ledgers via mining activities. The blockchain refers to a digital ledger that provides a secure way of making and recording transactions, agreements and contracts. Blockchains are unique in that their ledger is distributed across a network of computers such that it cannot be controlled by a single entity and has no single point of failure. This space includes companies involved in developing blockchain applications related to smart contracts, crowd funding, supply chain auditing, cryptocurrency, identity management, intellectual property, and file storage among others.

6. **Smart cities** – keyword search ‘Smart City’ and vertical ‘Internet of Things’; A company that provides a product that is enabled with sensors and actuators embedded in physical objects and/or software that uses this sensor data to improve the user experience or allows for sharing this data with a network of other devices, often using the same Internet Protocol (IP) that connects the Internet.

7. **ESG tech** – keyword search ‘*ESG Tech/’Regtech, Carbon service, Green data infrastructure, ESG data, Renewable energy, Smart energy’

**ESG Tech’ is used for sector analysis and ‘Regtech, Carbon service, Green data infrastructure, ESG data, Renewable energy, Smart energy’ is used as keyword search to identify upcoming start-ups based on sector and post-valuation.*

Country snapshot

The four countries in our snapshot – Japan, China, India and Singapore feature capital invested, deal count and top sectors from start-ups founded till 31 March 2023. Dataset included all VC Stages deal type and location parameters includes HQs based in the four countries only, excluding Non-HQ and Any Office Location.

Standardisation of currency to be USD

This report uses the United States Dollar (USD) as the standard due to its international recognition as a reserve currency and its widespread use in international trade. As the most widely held reserve currency in the world, USD eases the complexity for benchmarking for financial reporting.



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