

ERIA One ASEAN Start-up White Paper 2024

Towards an ASEAN Innovation Ecosystem: Start-up Creation for Inclusive and Sustainable Economic Development

ERIA Digital Innovation
and Sustainable Economy Centre (E-DISC)



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Economic Research Institute for ASEAN and East Asia (ERIA)

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Foreword

As Southeast Asian countries navigate a period of recovery and fast economic development following the setbacks resulting from the coronavirus disease (COVID-19) pandemic, policymakers must seize the opportunities the region is facing in a timely manner, both in terms of economic development and social inclusion. As adoption of technology has grown tremendously in the region, innovation and entrepreneurship have spurred economic opportunities that must be analysed carefully.

Technological advancements, such as the use of digital technologies like artificial intelligence (AI) (including generative AI) and green and financial technologies present significant opportunities to strengthen economic development, improve production and business operations, and foster societal progress. These developments are crucial to increase productivity – a key factor in economic expansion. Investments in research and development (R&D) and technology adoption facilitate innovation in both private sector entities (e.g. manufacturing assembly lines) or public sector institutions (e.g. research labs in universities and other public research organisations).

Tech-based entrepreneurship is the result of a healthy innovative ecosystem, where innovation and entrepreneurship enable economies to stay competitive in regional and global markets. Start-ups, through their innovative business models, spur new ways to achieve goals and targets that may lead to more environmentally sustainable and inclusive economic development aligned with the United Nations Sustainable Development Goals. The achievement of these comprehensive and interrelated goals through inclusive and sustainable economic growth can lift many countries in the Association of Southeast Asian Nations (ASEAN) region out of the middle-income trap and accelerate the transition towards a knowledge-based economy. As such, innovation and entrepreneurship are catalytic drivers of inclusive and sustainable economic growth; innovation addresses consumer needs, supports market expansion, and boosts economic activity (McFetridge, 2022). Innovation-driven growth enhances productivity, generates new jobs, and, if channelled aptly, addresses significant societal issues.

The Economic Research Institute for ASEAN and East Asia (ERIA) aims to support ASEAN in this economic transformation. ERIA aims to contribute to sustainable economic growth, social development, and environmental stewardship by fostering the development of an inclusive and innovative entrepreneurship ecosystem in ASEAN. This includes the launch of its new centre, the ERIA Digital Innovation and Sustainable Economy Centre (E-DISC) in 2023. E-DISC aims to conduct research; facilitate collaboration, knowledge sharing, and policy dialogue to unleash the potential of digital technologies; create evidence-based policymaking; and attract and support promising start-ups that contribute to a more inclusive and sustainable region.

As part of the E-DISC mandate, this inaugural white paper aims to provide an analytical framework to advance a sustainable start-up ecosystem within the ASEAN region. By providing a comprehensive analysis of the current landscape, encompassing challenges and opportunities, this document outlines a trajectory for nurturing innovation, fostering

entrepreneurship, and propelling economic growth. Through actionable recommendations, ASEAN leaders, policymakers, and stakeholders will be better equipped to forge effective collaborations, optimise resource allocation, and enact policies conducive to nurturing a resilient start-up ecosystem. Ultimately, by leveraging the insights and directives within this document, AMS will be able to unlock the full potential of their start-up landscape – catalysing economic prosperity, promoting continuous innovation, and effectively addressing societal challenges.

Acknowledgements

This white paper is a collective effort spanning several months of desk research, data collection, round-table policy discussions, and interviews with key actors of the Association of Southeast Asian Nations (ASEAN) innovation and start-up ecosystem. This white paper has been produced under the supervision of Giulia Ajmone Marsan, Head of Startups and Inclusion (Economic Research Institute for ASEAN and East Asia (ERIA)/E-DISC); Aladdin Rillo, Managing Director for Policy Design and Operations (ERIA); and Hiroshi Ishikawa, Special Advisor to the President (ERIA) on Digital Innovation, provided strategic guidance. Principal editorial coordination was provided by Rubeena Singh, ERIA's External Consultant and Senior Research Consultant at International Labour Organization; Mahirah Mahusin, Manager for Digital Innovation and Sustainable Economy (ERIA/E-DISC); and Hilmy Prilliadi, Research Associate (ERIA/E-DISC), developed the chapter on ASEAN Governance and provided additional comments and inputs. Hilmy Prilliadi, research associate (ERIA/E-DISC); Lina Maulidina, Senior Programme Officer (ERIA); and Charles-Étienne Sirois, Intern (ERIA/E-DISC) conducted desk research and provided inputs, statistical support, fact-checking, and overall comments. This white paper benefited from additional comments from Hul Seingheng, Chair of the ASEAN Committee on Science, Technology and Innovation (COSTI), and Zurina Moktar, Head of the Science and Technology Division at the ASEAN Secretariat. Further desk research and data collection was undertaken by Deloitte, which also conducted and summarised findings from interviews with relevant stakeholders and prepared country notes. The country notes were reviewed by Kentaro Machii, Manager for the Startup Ecosystem (ERIA/E-DISC); Mudhya Razanne Tiara, Programme Officer (ERIA/E-DISC); and Nadya Mayrosa Latifah, Research Assistant (ERIA/E-DISC); and fact-checked by national innovation agencies in all 10 ASEAN Member States. The authors wish to thank all the individuals and stakeholders who contributed to this study: interviewees from various ASEAN Member States (comprehensive list in Annex IV); participants at the first ASEAN Startup Policy Roundtable held at E-DISC in January 2024, organised by Aladdin Rillo, Mahirah Mahusin, Hilmy Prilliadi, and Satria Muhammad (comprehensive list in Annex V); participants at the One ASEAN Startup Award events, organised by Hiroshi Ishikawa, Kentaro Machii, Mudhya Razanne Tiara, Rosa Nathalia, and Nadya Mayrosa Latifah (comprehensive list in Annex VI); and representatives of national innovation agencies that provided inputs to the country notes.

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Executive Summary

Since the establishment of the Association of Southeast Asian Nations (ASEAN) Economic Community in 2015, ASEAN has aimed to become an integrated market of more than 600 million people, comparable in size to other major economic blocks around the world. This integration presents a significant opportunity for start-ups.

While ASEAN represents a growing market of high interest to innovation and start-up ecosystem players, significant disparities remain in the characteristics and maturity levels of innovation ecosystems across its Member States. However, there is potential for ASEAN to function as an integrated innovation and start-up ecosystem where countries can complement each other's strengths and weaknesses to foster innovation and entrepreneurship. Despite ASEAN being an attractive and rapidly growing market with growing cohorts of tech-savvy younger consumers, it faces obstacles that prevent it from being seen as a seamless integrated market.

This paper provides an overview of key trends affecting innovation and start-up creation across ASEAN: its favourable demographics for the next decade, robust economic growth, and the fast pace of digitalisation. It also provides an overview of innovation performance in each ASEAN Member State (AMS) and the region as a whole, describing the linkages between innovation and start-up creation and the Sustainable Development Goals (SDGs) and analysing success stories from other innovation-advanced countries and emerging economies. The paper summarises the key findings of a survey covering start-ups and ecosystem players in ASEAN and compiles the elements necessary for ASEAN to become an integrated start-up ecosystem in terms of talent, infrastructure, and finance.

Key messages, takeaways, and recommendations from this research include:

- (i) Building an ASEAN innovation ecosystem should become an immediate top policy priority for ASEAN leaders and policymakers.
- (ii) Innovation policy needs to be context specific and build on the diversity of ASEAN's ecosystems.
- (iii) Policies to support start-up creation, growth, and development need to look at innovation and entrepreneurship ecosystems in their entirety and support all necessary 'building blocks'.
- (iv) Improve access to capital.
- (v) Improve access to markets.
- (vi) Improve access to talent.
- (vii) ASEAN needs to strengthen and invest in the collection of innovation-related indicators to monitor and assess the development of its innovation and entrepreneurship ecosystem for stronger evidence-based policymaking.
- (viii) ASEAN should build on its half-a-century history of regional integration in innovation and entrepreneurship to enhance coordination and effective policy delivery and implementation.

- (ix) ASEAN leaders and policymakers should recognise the important role that innovation and start-ups play in meeting the SDGs.
- (x) While building its region-wide ecosystem, ASEAN should increasingly play a leading role in the global innovation landscape, become more visible on the global stage, and participate in key international networks and processes.

Amongst these key messages, ASEAN policymakers must pay attention to policies that improve access to finance, markets, and talent. Through this work, policymakers can create opportunities for developed and developing countries in ASEAN to grow together as a region and to grow inclusively to avoid enlarging existing disparities amongst and within countries.

Chapter 1

Why Innovation Matters for ASEAN

The Association of Southeast Asian Nations (ASEAN) needs innovation and entrepreneurship to become a knowledge-based economy and a high-income region. Economic growth in most ASEAN Member States (AMS) has traditionally been fuelled by labour-intensive manufacturing and a low-wage labour force. However, as wages rise in many countries in the region, the competitiveness of ASEAN's manufacturing sector and of its economy at large cannot continue to rely solely on this economic model. Instead, the region needs to develop its innovation and entrepreneurship ecosystem. Innovation can enhance the complexity of ASEAN's economies and increase the competitiveness of its market, production base, and services (Hidalgo and Hausmann, 2009). Innovation not only boosts productivity in firms, industries, and economies, but also stimulates consumption, investment, and exports. In essence, ASEAN has now achieved a level of development where innovation has become a key policy priority for the transition towards a modern knowledge-based economy.

1.1. Role of Innovation and Entrepreneurship in the Transition to Knowledge-based Economies

Entrepreneurial ecosystems play a crucial role in nurturing innovation and advancing economic development (Wurth, Stam, and Spigel, 2022). Emerging economies striving for sustainable and long-term growth must, therefore, promote innovation, support entrepreneurship, upgrade science and research institutions (including universities), and invest in skills development to lay the groundwork for enhanced productivity and inclusive development. Skills development is a fundamental factor for innovation ecosystems to drive the shift to a knowledge-based economy (Powell and Snellman, 2004). By strategically using technology capabilities as a skills-based competitive advantage, knowledge-based economies can enhance economic performance; promote dynamism, agility, and innovation; and offer opportunities for continuous learning (OECD, 2009; Sycheva, Budagov, and Novikov, 2020). In this context, start-ups emerge as a key element of innovation and entrepreneurship ecosystems

A start-up is typically a newly established business characterised by innovation, agility, adaptability, and rapid growth. Usually founded within the last 10 years, start-ups have technology at the core of their business model (Startup Genome, 2023a) and can scale up (Lee, 2015). It is important to note that there are key differences between start-ups and micro, small, and medium-sized enterprises (MSMEs). Typically, an MSME is a more established business (i.e. not as new) with a smaller scale of operations, primarily focused on steady, sustainable growth (i.e. not as rapid growth), often operating in traditional

sectors. MSMEs prioritise stability and incremental development, while start-ups aim for disruptive market impact.

The power of start-ups lies in their ability to move swiftly from innovative disruptors to established players on the global stage. Changes in the composition of major indices like the S&P 500 reflect the rise and growth of start-ups. A notable example from ASEAN is Grab, initially a start-up, which has earned its place on the NASDAQ, listed in 2021 with a valuation of US\$39.6 billion (Grab, 2021), amongst well established companies such as Amazon and Apple, which also began as start-ups.

Globally, funding for start-ups has been variable and nuanced since the pandemic. Corporate valuations are influenced by financial performance, macroeconomic and industry trends, and market sentiment. In the first half (H1) of 2021, venture capital increased by 61%, reaching a record US\$171.7 billion in the third quarter (Q3) of 2021 (Eli and Caines, 2024). Although late-stage funding saw a sharp decline in 2022 and inflated valuations were corrected, early-stage funding overall remained stable. Fewer start-ups were funded in 2022, but those that were funded received larger sums (Startup Genome, 2023a). In 2023, Series A funding dropped 46% from 2022, and the value of large exits (at least US\$50 million) decreased by 47%. Despite this, Q1 2024 is projected to see an increase in Series A funding and deal count compared with Q4 2023. The number of new unicorns in 2023 fell by 58% from 2022 and 87% from the 2021 peak. Over half of the new unicorns in 2023 were in the generative artificial intelligence (AI) and deep technology (deep tech) sectors, a higher rate than in 2021. Late-stage clean technology (cleantech) start-ups raised 2.5 times more funding in H2 2023 than in H1 2020, with Europe outperforming the United States (US) and China in cleantech Series A funding growth from 2021 to 2023. Generative AI start-ups attracted nearly 20% of all venture capital funding in 2023, with funding tripling and deal counts nearly doubling compared with 2022 (Walther, 2024).

In H1 2024, Southeast Asia's IPO market experienced a sharp decline, with market capitalisation plummeting 71% to US\$5.8 billion. The region saw 67 IPOs, a 21.2% decrease from the previous year, raising US\$1.38 billion, which is a 59.4% drop. Only one IPO surpassed US\$1 billion in market capitalisation and raised over US\$200 million, compared with three large IPOs the previous year. This decline, which began in late 2022, is due to geopolitical instability and high interest rates. Indonesia was hit hardest, with the market capitalisation of listings falling 92.2% to US\$1.22 billion and IPO proceeds dropping 89.1% to US\$248 million. Despite this, there is cautious optimism for a post-2024 recovery, with potential for AI-related IPOs and a return of real estate interest trust listings as interest rates fall (Chiang, 2024)

Both start-ups and more traditional MSMEs are crucial for ASEAN economies. Over the years, MSMEs have constituted the largest share of enterprises and have become the backbone of the ASEAN economy, contributing to 85.0% of employment, 44.8% of gross domestic product (GDP), and 18.0% of national exports (ASEAN, 2024g). However, the coronavirus disease (COVID-19) pandemic presented challenges for entrepreneurs to operate and develop their ventures due to lockdowns and border restrictions. While some businesses failed because of lack of agility and adaptability (OECD, 2020), the crisis

spurred innovation, leading to the emergence of new business models such as tech start-ups that offered solutions tailored to the needs of the pandemic and post-pandemic era.¹

Developing a start-up ecosystem that cultivates collaboration (including with MSMEs), innovation, and competitiveness can unleash additional economic growth, stimulate further innovation and entrepreneurship, and address societal challenges, thereby enhancing the region's development. By providing comprehensive support to both start-ups and MSMEs, ASEAN can effectively confront challenges and sustain economic growth (Hara, 2023). Indeed, start-ups that emerge from strong pre-accelerator environments tend to experience greater gains, underscoring the importance of a supportive ecosystem (Fehder, 2024).

A mature start-up ecosystem can also advance the technological capabilities of more traditional MSMEs. Some leading ASEAN start-ups that have evolved into major tech companies exemplify this dynamic. Digital marketplaces and fintech platforms in ASEAN (e.g. Tokopedia, Shopee, and Traveloka), with their e-money and e-wallet features, have introduced innovations that help traditional MSMEs (e.g. small shops, restaurants, and travel and tourism businesses) by expanding their customer reach, improving revenue streams, and broadening their growth opportunities. Moreover, their data-intensive business model and detailed knowledge of their users allows for a better assessment of customer risk profiles. This has led many fintech start-ups to expand their service offering to microloans and micro-insurance schemes, which can be particularly beneficial to MSMEs and micro entrepreneurs (Mackintosh and Monga, 2024). These examples illustrate how, despite not being the same category of firm, linkages between start-ups and MSMEs are essential. These linkages, especially in tech-intensive sectors, may bring innovations to more traditional MSMEs and upgrade their capability, making them more productive and bringing benefits to the whole economy. However, it is important to note that technological advancements can also allow firms to achieve massive economies of scale, leading to increased market concentration. This reduces competition and creates barriers for MSMEs and start-ups, as large tech companies use integration to dominate markets and capture more revenue, often at the expense of consumers (Ajmone Marsan, 2022a; Ing and Markus, 2023).

Furthermore, as companies become more innovative and adopt more knowledge-intensive business models, they typically strengthen their participation in the formal economy (OECD, 1996). Entry into the formal labour market brings numerous benefits, including increased tax revenue that can be reinvested in development projects such as digital and physical infrastructure in rural areas, social services, and improved health and education systems. Additionally, increased productivity can enhance a country's competitive edge in the global trade market. By approaching these growth dimensions through partnership, collaboration, and knowledge exchange, AMS can ensure that growth benefits the entire region, preventing wider economic disparities between nations.

¹ Interesting examples started to emerge, particularly in the medical sector, as in the case of the Indonesian start-up Halodoc (Gunasegaran, 2021).

With these factors in mind, particularly the benefit that innovation brings to the economy at large, attention to the innovation ecosystem development should be at the top of the agenda of ASEAN leaders and policymaking. This attention can enable and accelerate the transition towards a knowledge-based economy, which has become one of the most pressing priorities for the region.

1.2. Innovation-driven Economic Growth makes Economies More Productive

Innovation-driven economic growth is more sustainable in the long term because it enhances productivity, creates higher-value industries, and can foster sustainable development, leading to improved standards of living. In ASEAN, this approach is particularly beneficial as it leverages the region's dynamic workforce and enhances technological capabilities, enabling countries to move up the value chain and reduce dependency on low-cost manufacturing. By prioritising innovation, ASEAN economies can foster resilient and inclusive growth, enabling them to better adapt to global market shifts and technological advancements.

The evolving landscape of modern innovation-based economies highlights the increasing importance of intangible assets, i.e. non-physical assets such as intellectual property, software, patents, and brand reputation. Haskel and Westlake (2017) argued that these intangible assets are critical drivers of economic growth and productivity in today's global market. The Organisation for Economic Co-operation and Development (OECD) underscored this perspective, emphasising how intangible assets influence resource allocation and economic performance by enhancing innovation and efficiency (Andrews and de Serres, 2012). Additionally, Mohnen (2019) highlighted the transformative role of innovation and intangible investments in boosting productivity and economic competitiveness across various regions, including Europe, Japan, and the US (Mohnen, 2019). Collectively, these resources illustrate the pivotal role of intangible assets in shaping the future of economic development and innovation.

Several examples of innovation-driven economic growth in ASEAN showcase the region's potential. Singapore has transformed into a global financial and technology hub, emphasising research and development (R&D), advanced infrastructure, and supportive government policies. This environment has attracted multinational tech companies and fostered a vibrant start-up ecosystem. Malaysia's Multimedia Super Corridor initiative has created a conducive environment for information and communication technology (ICT) companies, promoting digital innovation and attracting significant foreign direct investment. Indonesia has become a bustling centre for fintech and e-commerce, with companies like Grab and Tokopedia driving economic expansion through digital services and innovative business models. Thailand's Eastern Economic Corridor has been pivotal in advancing high-tech industries, including robotics, aviation, and biofuels, positioning the region as a significant investment destination. Viet Nam's Ho Chi Minh City is emerging as a tech hub, with strong government support for start-ups and substantial investments

in information technology (IT) infrastructure fostering a rapidly growing digital economy. In other emerging AMS, vibrant technology and innovation communities are surfacing, especially in major metropolitan areas. These examples illustrate how focusing on innovation can lead to dynamic, diversified economies and long-term growth in the region.

1.3. Current ASEAN Demographics are Favourable to Innovation: the Window of Opportunity is Now

The urgency to adopt innovation and entrepreneurship for economic and sustainable development is underscored by current demographic trends in the ASEAN region. With the Generation Z (Gen Z) and Millennial population expected to peak in the coming decade and an ageing demographic on the horizon, the **window of opportunity** to transition to innovation-driven economic development is now. If the region misses this window, the transition towards a knowledge-based economy will become more difficult to achieve, as older demographics are generally associated with lower levels of innovation, entrepreneurship, and technology adoption (Colovic, Lamotte, and Bayon, 2019). An interesting example is offered by the quick commerce start-up sector (i.e. companies focusing on making deliveries in under 1 hour): in this sector, ASEAN start-ups lag their Indian peers. According to *Tech in Asia*, one of the factors behind the higher dynamism of the Indian quick commerce ecosystem is its younger population compared with that of ASEAN, as younger consumers are driving the demand for these types of innovations (Yordan, 2024b). Therefore, it is crucial to act now with a focused strategy on nurturing innovation and entrepreneurial ecosystems across the region in a unified way to strengthen innovation hotspots and simultaneously support the most vulnerable economies and help them to develop. Through these efforts, the risk of falling into a persistent low middle-income trap is also mitigated (World Bank, 2024c).

Detailed information on population trends in the ASEAN region is provided in chapter 2 of this report.

1.4. ASEAN's Fast-growing Digital Economy is a Driver of Innovation and Start-up Creation

The digital economy plays a pivotal role in fostering innovation in the ASEAN region, serving as a key enabler of technological advancement and economic growth. Rapid digitalisation has accelerated the development and adoption of new technologies, driven productivity, and created new business opportunities. Effective policy frameworks are essential in this context, as they provide the necessary infrastructure, regulatory support, and incentives to stimulate digital innovation.

ASEAN's digital economy was set to add US\$100 billion in revenue in 2023, with e-commerce, travel, transport, and media contributing US\$70 billion in revenue (Google,

Temasek, and Bain & Company, 2023). Most AMS increased their exports and imports of ICT goods from 2019 to 2020, with Singapore and Indonesia experiencing the highest growth in ICT goods imports in 2020. The COVID-19 pandemic accelerated the adoption of online services, adding 20 million new digital consumers in H1 2021, bringing the total to 350 million in ASEAN, up from 290 million before the pandemic. About 80% of Southeast Asia's 440 million internet users have made online purchases, with internet penetration at around 75%. Nearly 70% of internet users in several AMS have shopped online. Despite a slowdown in 2022, Southeast Asian tech start-ups raised about US\$8.2 billion in 2020 (Ing and Markus, 2023). However, a major concern for digital transformation in ASEAN is the growing digital divide within and amongst countries. Disparities in technology deployment, internet speed, the number of internet users, and technology production contribute to this divide amongst AMS (Ajmone Marsan, 2022a; Ing and Markus, 2023).

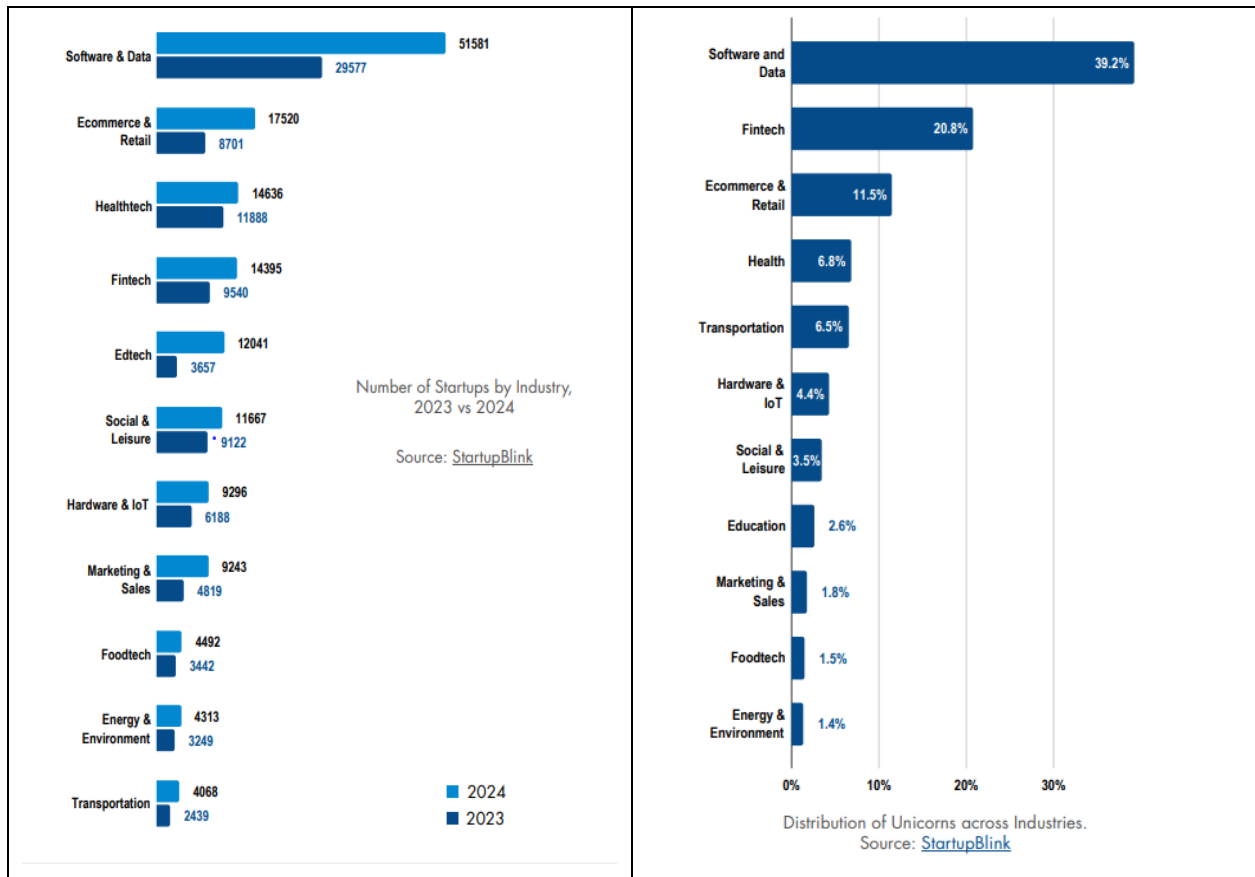
Rapid digital adoption in ASEAN is likely to persist, driven by tech-savvy consumers, investor funding in innovation, and government initiatives for digital transformation. According to some estimates, by 2030 the region is expected to have nearly 575 million internet users, with digital integration becoming part of everyday life. As digital access expands to rural and low-income areas, it has the potential to break down barriers for small business growth and further facilitate the delivery of essential services like healthcare, education, and financial services (World Economic Forum, 2020).

Furthermore, start-up activity has been a major driver of growth in the digital economy across ASEAN, encompassing sectors such as e-commerce, fintech, enterprise solutions, big data, and consumer goods and services. Companies like Grab and Gojek have reshaped the ASEAN economy through their innovative solutions by leveraging IT advancements. These companies offer services like online deliveries and cashless payments, meeting consumer demand while generating jobs, offering opportunities to the MSME sector, and stimulating economic growth. Their ability to adapt and innovate has enabled them to identify and cater to customer preferences effectively, solidifying their status as key market players and contributors to economic development (Arifin and Purnama, 2023). The rise of transformational entrepreneurship demonstrated by digital platforms like Grab and Gojek highlights their contribution to addressing societal challenges and driving progress on a global scale (Jones and Maas, 2019).

In addition, the agri-tech (a combination of agriculture and digital tech), fintech (a combination of financial services and digital tech, e.g. e-wallets and e-money), and health tech (a combination of healthcare and digital tech, including via digital health platforms and mobile health) sectors are very dynamic, driving innovation and growth in Southeast Asia (Park, Villafuerte, and Yap, 2021; Ajmone Marsan and Sirois, 2024). Figure 1 presents the global breakdown of start-ups by industry. Companies like Traveloka, Lazada, Shopee, Halodoc, and SariSuki have made significant contributions to the region's digital economy, as well as addressing societal challenges. For example, Indonesia faces a shortage of healthcare providers, with only 0.4 doctors per 1,000 residents (Khotimah, Fahmi, and Sri Hartono, 2022). Since its foundation in 2016, Halodoc has used technology to simplify access to health services. The use of the app can help deliver medicine within 60 minutes. During the pandemic, Halodoc played a crucial role in facilitating vaccine and test

distribution. In the Philippines, SariSuki's technology empowers individuals to become business owners by selling produce in their communities, with 65% of these community leaders being women (Chesson and Luchterhand, 2021). These start-up case studies across various sectors showcase ASEAN's capacity to innovate and grow successful firms. These examples highlight the region's potential, and it is now time to mainstream and build upon these successes.

Figure 1: Start-ups and Unicorns by Industry



IoT = internet of things.
 Source: StartupBlink (2024b).

Chapter 2

ASEAN's Innovation Ecosystem: A Diverse Landscape

This chapter reviews in detail some of the trends introduced in chapter 1. It identifies key drivers of ASEAN innovation: favourable demographics until the 2030s; robust economic growth and rapid digitalisation, including AI developments; and skills development trends, an area where most of ASEAN is currently lagging. This chapter also provides an overview of innovation performance in ASEAN and the characteristics of the various building blocks of a regional ASEAN innovation ecosystem.

2.1. Key Drivers Affecting ASEAN Innovation

ASEAN's future innovation trajectory will be driven by various factors, including favourable demographics until the next decade; economic growth and increasing income levels; and technological advancements, including AI.

2.1.1. Favourable Demographics until the 2030s

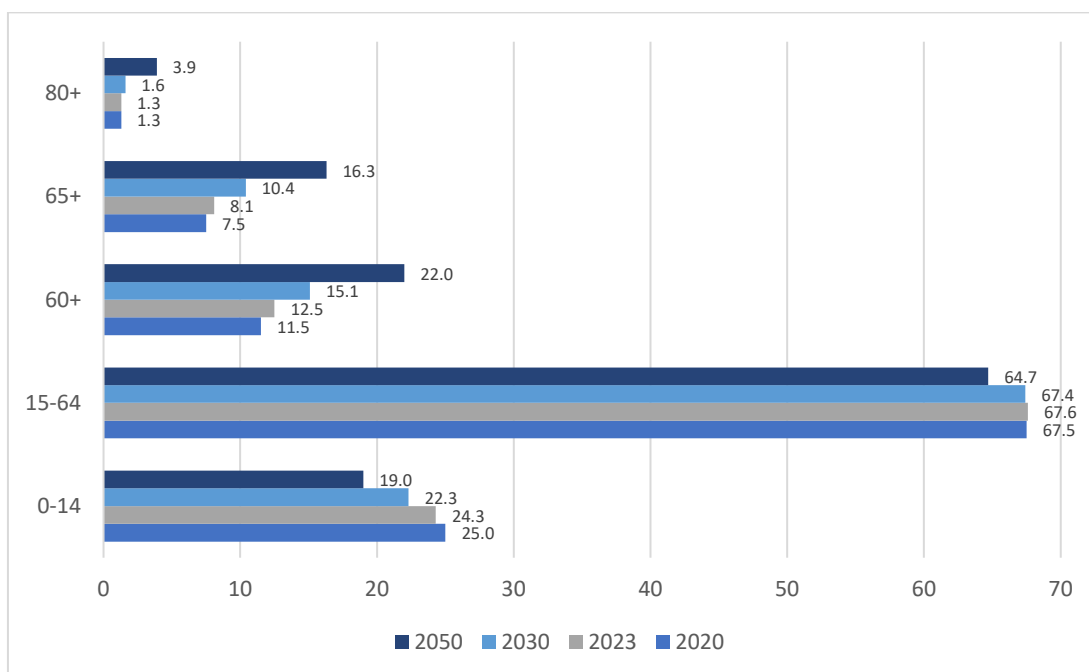
The population of ASEAN continues to grow and is projected to reach 720 million by 2030 (ASEAN, 2023a). ASEAN's current youthful population, as well as the growth of this demographic in the coming decade, lay the foundation for a tech-savvy workforce and a large consumer base for digital products. The region will gain 140 million new consumers, accounting for 16% of global consumers, many of whom will make their first online and luxury purchases. The number of high-income and upper middle-income households will nearly double from 30 million to 57 million between 2019 and 2030.

ASEAN's next decade should therefore focus on talent development and socio-economic inclusion. The COVID-19 pandemic has already accelerated the transition to automated services, making it essential to create new jobs; bridge the skills gap; and improve access to education, healthcare, and nutrition to maintain a competitive and healthy workforce.

In 2020, ASEAN had 224.2 million youths, with 53% being Gen Z (15–25 years old) and 47% being Millennials (26–35 years old). The youth share of the total population is expected to peak in 2038 (ASEAN and UNCTAD, 2022). Millennials and Gen Z, the primary segments for digital consumption, will drive this growth. Millennials (born 1981–1995) and Gen Z (born 1996–2012) will together account for 75% of ASEAN consumers and 70% of Indonesian consumers by 2030 (World Economic Forum, 2020). These cohorts are important drivers of technology adoption and innovation: their demand is likely to create a market for new tech-based products and services, representing an opportunity for start-ups in the region. Moreover, ASEAN Millennials and Gen Z consumers pay more attention to environmental sustainability and inclusion compared with previous generations (World Economic Forum, 2020) and are likely to create a market for green and inclusive

innovations where this kind of start-ups can grow and scale up Figure 2 shows the population of Southeast Asia by group and age.

Figure 2: Ageing Population in Southeast Asia
(population by group, age, selected years, %)

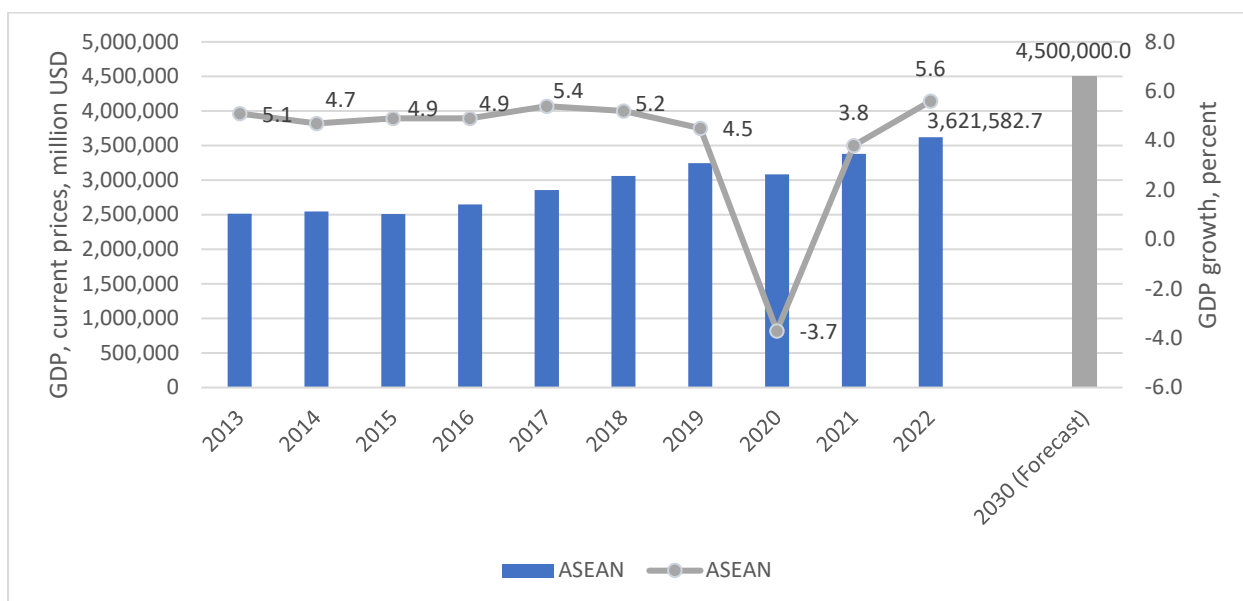


Source: UNESCAP (2022).

2.1.2 Robust Economic Growth

The region is experiencing an increase in income levels and robust economic growth. The projected regional GDP is expected to reach US\$4.5 trillion by 2030 (Figure 3 shows a breakdown of growth from 2013 to 2030). Additionally, ASEAN is expected to attract substantial foreign direct investment as multinationals diversify their supply chains (World Economic Forum, 2020). These macroeconomic trends represent an opportunity for ASEAN start-ups. As mentioned, despite the current 'venture capital winter' slowing the number of start-ups funded, strategic investments continue selectively in high-potential sectors. Although venture capital investments in ASEAN are mainly concentrated in Singapore and Indonesia, investments in countries like Viet Nam, Thailand, Malaysia, and the Philippines (Ajmone Marsan, 2022b) have been growing recently. This expanding regional market is garnering significant attention on the global stage, highlighting ASEAN as a key area of interest for international investors and stakeholders.

Figure 3: ASEAN GDP at Current Prices and Growth Rate, 2013–2022 and 2030



ASEAN = Association of Southeast Asian Nations, GDP = gross domestic product.
Sources: Authors based on ASEANstats (2024); and ASEAN (2023a).

2.1.3. Rapid technological advancements: the role of AI

Southeast Asia’s digital transformation has been propelled by widespread mobile internet usage and high mobile app adoption, leading to a doubling of online users in countries like Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Viet Nam since 2016 (Chadha, 2023). However, as seen in section 1.4, despite a strong acceleration in digital technology adoption during the pandemic, digital indicators like internet penetration and speed reveal significant disparities across the region (see Annex 1 for an overview of digital economy-related indicators).

As a key emerging digital technology, AI simulates human intelligence in machines designed to think and learn like humans, while generative AI – a subset of AI – focuses on creating new content based on learned patterns from existing data. As mentioned above, post-pandemic AI start-ups have witnessed an important increase in investment flows: globally, more than half of the unicorns minted in 2023 were in the AI and deep tech sectors – a higher proportion compared with 2021. Generative AI start-ups raised 20% of all venture capital funding in 2023, a figure that is almost three times higher than in 2022 (Walther, 2024).

Many start-ups are already leveraging these technologies in innovative ways in ASEAN. In the Philippines, TALA uses AI to provide financial services and credit scoring to underserved populations, enhancing financial inclusion. Malaysia’s Hyperlab offers AI-driven conversational platforms to improve customer service and engagement through chatbots and virtual assistants. These start-ups exemplify the diverse and impactful applications of AI and Gen AI in the ASEAN region.

Moreover, foreign tech giants like Microsoft, Google, and Amazon have recently committed sizeable AI investments in ASEAN. According to *Tech in Asia* data, these companies have invested more than US\$50 billion since January 2023 (Yordan, 2024a). Malaysia, which has one of the highest levels of investment, has received US\$25 billion in investment combined from Microsoft, Amazon Web Services, Google, Infineon Technologies, Nvidia, Vantage Data Centers, and ByteDance. Thailand follows with about US\$8 billion in investment from Amazon Web Services, Google, and Microsoft. Indonesia, despite being the largest economy in the region, has received a smaller figure than Malaysia and Thailand: less than US\$2 billion from Nvidia and Microsoft. Nvidia is partnering with Indosat Ooredoo Hutchison for the development of an AI centre. Despite this development, according to *Tech in Asia* data, the lower level of investment in Indonesia is connected to the lower skills base in the country (Yordan, 2024a). This example underscores once again the importance of skills development in ASEAN for boosting innovation, start-up creation, technology adoption, and ultimately economic growth and social progress.

Overall, AI readiness varies considerably in the region, with Singapore and Malaysia often ranking at the top of AI indexes within ASEAN (Isono and Prilliadi, 2023). According to Duan, Edwards, and Dwivedi (2019), the region faces additional limitations regarding AI technology and infrastructure. One primary issue is the need to address bottlenecks in AI applications related to human intuition and judgement, which are crucial in many real-world scenarios. Additionally, there is an infrastructure gap in ASEAN economies, with factors like lack of awareness, technological infrastructure limitations, financial constraints, and data availability impeding AI integration (Barsha and Munshi, 2024). Insufficient funds, lack of trust in AI, cybersecurity risks, and overall lack of infrastructure further slow AI adoption. See Box 3 for information on the ASEAN Guide on AI Governance and Ethics.

Globally and across ASEAN, there are several notable key trends in the use of AI across various sectors, including healthcare, finance, and logistics. Start-ups are increasingly focusing on enhancing AI's practical applications, such as predictive analytics, natural language processing, and automated decision-making. Additionally, there is a growing emphasis on ethical AI development and regulation to address concerns about bias and transparency. These trends indicate a maturation of the AI landscape, with more robust, versatile, and responsible AI technologies emerging globally (StartupBlink, 2024b). See chapter 3 for details on AI, including Box 3 for a description of ethical AI governance in ASEAN.

Governments across ASEAN are aware of these issues and have developed national AI strategies and frameworks, including various elements conducive to AI technology development, deployment, and adoption (Isono and Prilliadi, 2023). These strategies and frameworks address (i) talent development, which remains a top priority issue (Ajmone Marsan, 2021) and is a factor driving investment decisions as illustrated above in the case of Indonesia; (ii) the development of large language models in native languages to support localised applications; (iii) the acceleration of AI applications in various existing industries (including the ones illustrated above); and (iv) the promotion of start-up development in AI. In Singapore, for example, the National Research Foundation has allocated US\$70

million to promote the development of large language models tailored to the diversity of Southeast Asian languages and cultures. This initiative aims to promote innovation and start-ups in this field and foster partnerships between government entities (e.g. the Infocomm Media Development Authority; the Agency for Science, Technology and Research (A*Star); and AI Singapore); start-ups; and larger corporations.

Within ASEAN, one of the most comprehensive fully fledged strategies is Singapore's second National AI Strategy (NAIS 2.0) – an example of an AI governance framework that touches on several of these AI building blocks (Box 1). To fully harness AI's potential, Singapore recognises that AI must be viewed as essential rather than optional and needs both technical experts and informed users to maximise AI's impact. Moving beyond isolated projects, a systems approach is necessary, integrating resources, capabilities, and stakeholders to implement AI solutions on a large scale, ensuring widespread benefits for the economy and society. This strategy reflects Singapore's commitment to harnessing AI for economic growth and societal benefits while ensuring that AI is developed and used responsibly.

Box 1: Singapore's NAIS 2.0

Singapore's second National AI Strategy (NAIS 2.0), developed through extensive consultations, aims to harness artificial intelligence (AI) for the public good, both in Singapore and globally, and to position the country as a global leader in AI innovation and deployment. The strategy focuses on leveraging AI to address critical challenges such as population health and climate change, while acting as an equaliser by empowering individuals and businesses with AI capabilities. NAIS 2.0 has two main goals: (i) excellence – developing specialised areas of AI expertise to maximise value, and (ii) empowerment – enabling people and organisations to use AI confidently and responsibly.

The strategy focuses on 3 key systems, 10 enablers, and 15 actions to take place before 2030.

1. System 1: activity drivers

Singapore aims to develop areas of AI excellence that deliver significant impact for the country and its citizens. This includes promoting AI innovation in major economic sectors like manufacturing, financial services, transport, and biomedical sciences, as well as supporting national priorities like healthcare, education, and public services. It also includes investing in AI to enhance business operations, accelerate scientific research, and advance foundational AI, focusing on reasoning, resource efficiency, and responsible AI to make it more affordable, widely adopted, and trusted.

For example, In December 2022, American Express established a Decision Science Center of Excellence in Singapore, focusing on AI, machine learning, and natural language processing for credit and fraud risk models. By November 2023, the centre had expanded to optimise customer marketing and service, delivering personalised digital experiences through AI and machine learning. Additionally, the centre launched

a generative AI research and development practice to explore new AI applications in servicing, risk management, and technology.

Enablers: industry, government, research

2. System 2: people & communities

Strong AI innovation relies on tight-knit knowledge communities that foster idea exchange and expertise sharing. Singapore aims to become a hub for leading AI creators, practitioners, and users by (i) attracting top-tier AI talent from industry and academia to drive advanced research and novel applications, (ii) increasing the number of skilled tech workers capable of developing and deploying AI at scale, (iii) empowering enterprises and the workforce to use AI tools for greater productivity and meaningful work, and (iv) enhancing collaboration within the local AI community and with global networks.

For example, led by the Government of Singapore's Infocomm Media Development Authority (IMDA) in collaboration with industry partners, SkillsFuture Singapore, Workforce Singapore, and the National Trades Union Congress, the TechSkills Accelerator (TeSA) seeks to develop a skilled information and communication technology (ICT) workforce, including AI talent. Through initiatives like Company-Led Training and Career Conversion Programmes, TeSA has successfully trained over 2,700 individuals in AI and data analytics, placing them in quality jobs.

Enablers: talent, capabilities, place-making

3. System 3: infrastructure & environment

Singapore plans to generate successful AI value creation, which requires strong infrastructure and a supportive environment throughout the AI life cycle. For Singapore, this involves (i) ensuring access to essential resources like computing power and data for AI innovation; (ii) building a trusted environment where AI systems are secure and reliable, fostering public confidence; and (iii) protecting Singapore's AI interests internationally by helping shape emerging global AI standards and regulations.

For example, in July 2022, the IMDA launched Singapore's first privacy-enhancing technology (PET) sandbox to help companies explore PETs through pilot projects. The initiative connects businesses with PET solution providers, offers grant support for project development, and ensures regulatory compliance, recognising that PETs are still in the early stages of real-world application.

Enablers: compute, data, trusted environment, leader in thought and action

Singapore's NAIS 2.0 also highlights the importance of international collaboration, recognising that AI is a global field that benefits from shared knowledge and innovation. The strategy positions Singapore not just as a consumer of AI technologies but as a key player in the global AI ecosystem, contributing to and shaping the future of AI on a global scale.

Source: Government of Singapore (2023), NAIS 2.0: Singapore's National Strategy – AI for the Public Good for Singapore and the World. <https://file.go.gov.sg/nais2023.pdf>

2.1.4. ASEAN diversity impacts the way these key drivers manifest

While keeping these key trends in mind, it is important to note that ASEAN comprises 10 countries that are remarkably diverse in terms of development, population size, geography, and economic structure. Economic growth rates within ASEAN vary considerably, reflecting different stages of development and economic policies. Singapore, for instance, stands out as one of the most advanced economies in the region with high GDP per capita, driven by its robust financial services sector and technological advancements. On the other hand, the Lao People's Democratic Republic (Lao PDR) remains one of the lowest in terms of GDP per capita, reflecting its developmental challenges. Indonesia, with its vast population, contrasts sharply with Brunei, which has a small domestic market but enjoys substantial wealth due to its oil reserves. The size and geographies (StartupBlink, 2024b) of countries vary greatly as well and have an impact on the way companies do business and economies develop. In this regard, widening access to a larger market is advantageous for smaller countries (Startup Genome, 2023b). For instance, Grab, which operates out of Malaysia – a country with a relatively small population – has expanded its business across eight AMS: Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Viet Nam (Grab, 2024). The region's diversity extends beyond economics to cultural aspects, encompassing a rich tapestry of languages, ethnicities, and religions. The region is home to a mix of Hinduism, Islam, Buddhism, Christianity, and other faiths, contributing to its vibrant cultural mosaic. See Annex III for country notes on all 10 AMS.

ASEAN's diversity presents both opportunities and challenges, requiring nuanced policies that consider each nation's unique context while fostering regional cooperation and integration. Despite these differences, AMS work together towards common goals of economic growth, stability, and prosperity, as evidenced by the many regional governance policies that are described in detailed in chapter 4 of this report.

2.2. Innovation Performance in ASEAN: An Overview

To evaluate the success and maturity of entrepreneurial and innovation ecosystems in ASEAN, several metrics can be considered. In other words, indicators assessing the entrepreneurial and innovation ecosystem in the ASEAN region can be categorised into framework conditions and context indicators, innovation inputs, talent-related indicators, and innovation outputs. Table 1 contains an overview of innovation-related indicators categorised as follows:

Framework conditions and context indicators include economic development rates and cultural and context-specific factors. AMS have diverse economic development rates, influencing the growth and sustainability of start-ups. Cultural factors, such as societal attitudes towards entrepreneurship and risk-taking, vary significantly across the region, impacting innovation differently. The Global Innovation Index of the World Intellectual Property Organization (WIPO) measures the innovation performance of AMS, combining inputs, outputs, and talent-related indicators, and offers comparative insights. However,

these indicators can be affected by institutional settings or regional economic challenges and may not fully capture the unique characteristics of each AMS.

Innovation inputs are reflected through investment in R&D and other resources that fuel innovation. In ASEAN, countries like Singapore and Malaysia lead in R&D investment, often correlating with increased innovation activity. However, the effectiveness of R&D spending varies, and it may not always lead to successful products or services if the innovation environment is not supportive or if resources are not managed efficiently. It is worth noting that traditional indicators like R&D investment may not accurately capture innovation in developing economies, where firms often have low R&D investment and informal sectors are a significant share of the economy. Researchers and policymakers must use the data available to monitor trends and developments. This approach will enhance understanding of the region and help identify measures needed to develop broad-based digital capabilities in the future.

Talent in ASEAN is shaped by universities and educational institutions, as well as the availability of highly skilled individuals. Talent is reflected in educational performance indicators such as the OECD Programme for International Student Assessment (PISA) results. Leading universities in Singapore, Malaysia, and Thailand, for example, contribute significantly to the talent pool. PISA, conducted by the OECD, evaluates 15-year-olds' abilities in reading, mathematics, and science every 3 years, providing a comparative measure of education systems worldwide. PISA scores offer insights into the quality of education at the secondary level across ASEAN. Nonetheless, these indicators might overlook informal education channels and other talent development forms, which are crucial in some AMS. As highlighted elsewhere in this paper, talent and skills development continue to remain weak, and this represents an important obstacle to the transition towards mature and advanced innovation ecosystems in most of the ASEAN region.

Innovation outputs include the number of patents and academic publications and the emergence of unicorns (start-ups valued at US\$1 billion or more). These outputs indicate the tangible results of innovation efforts within the region. Patents and publications measure the creation and dissemination of new knowledge, while unicorns reflect market success – the ability for innovation ecosystems to unleash business scale-ups and have economic impact such as through job creation. However, focusing solely on these outputs can be misleading, as it may not account for incremental innovations or the broader impact of new technologies on society and the economy in the ASEAN context.

Understanding these indicators and their pitfalls is crucial for creating and sustaining a thriving entrepreneurial ecosystem in ASEAN, as each provides valuable insights as well as limitations that must be considered in the regional context. For example, patent counts tend to predominantly capture tech- and R&D-based innovation data and may not appropriately reflect other forms of innovation and entrepreneurship, especially in the context of emerging economies. The number of unicorns in each country tends to be volatile and depends on estimates of market valuations, which fluctuate often. This is why the number of unicorns should be interpreted as an indication of the ability of a system to make new companies significantly scale up and grow, rather than just an individual count.

All unicorn-related statistics in this publication refer to the number found at the time of writing.

Despite considering these factors, innovation performance remains notoriously difficult to measure and quantify, especially in the context of emerging economies (OECD, 2017). Nevertheless, a snapshot of key indicators attempting to measure innovation inputs and outputs presents an idea of the different stages of development of innovation ecosystems across ASEAN (Table 1). Context indicators are provided as well as innovation inputs, innovation outputs, and talent/skills scores for the 10 AMS and an ASEAN average.

Table 1: Key Innovation Metrics and Economic Indicators Overview

	Context indicators				Innovation inputs		Innovation outputs			Talent/Skills	
	Population, total, 2023 (million)	GDP per capita (PPP), 2023 (current intemation)	GDP (constant prices change), 2023 (%)	Global Innovation Index Rank, 2023	Gross expenditure on R&D, 2015-2022 (% of GDP)	GERD financed by business enterprises, 2015-2020 (% of GERD)	Total patent applications, direct and PCT	Number of unicorns, 2024	Scientific and technical article journal publicatio	School enrolment (tertiary), 2018-2022 (% of gross)	Universities in top 500 in Asia, 2023
ASEAN	685.37	16,665.77	4.3** (Southeast Asia)	NA	NA	NA	22.85	31	135.50	NA	39
Brunei Darussalam	0.45	86,445.66	1.41	87	0.28 (2018)	0.00 (2018)	12.03	0	634.22	32.70 (2020)	1
Cambodia	16.94	5,624.14	5.00*	101	0.12 (2015)	19.40 (2015)	1.04	0	9.80	15.00 (2022)	0***
Indonesia	277.53	15,612.80	5.05	61	0.24 (2022)	8.00 (2018)	5.37	7	117.30	42.603 (2022)	5
Lao PDR	7.63	9,326.27	3.70*	110	NA	NA	NA	0	11.66	12.46 (2021)	0***
Malaysia	34.31	37,247.70	3.68	36	1.08 (2022)	38.20 (2018)	55.09	1	637.89	40.27 (2022)	17
Myanmar	54.58	5,905.24	2.55*	NA	0.15 (2021)	NA	NA	0	7.68	20.39 (2018)	0***
Philippines	117.34	10,755.50	5.57	56	0.32 (2018)	38.00 (2015)	5.85	1	26.18	34.89 (2021)	1
Singapore	5.92	141,500.22	1.08*	5	1.92 (2022)	58.30 (2020)	1571.24	17	2065.18	97.1 (2021)	2****
Thailand	71.80	23,422.92	1.87	43	1.00 (2022)	80.80 (2017)	20.84	3	194.47	48.75 (2022)	11
Viet Nam	98.86	15,194.34	5.05	46	0.43 (2021)	64.10 (2017)	11.62	2	83.08	42.22 (2022)	2
Source	World Development Indicators	World Development Indicators	IMF (2024) – with minor	Global Innovation Index 2023	WIPO; UNESCO Institute for Statistics;	WIPO GII 2023 Report	WIPO IP Statistics Data Center	CBInsights (2024)	World Development Indicators	World Development Indicators	Times Higher Education Asia

ASEAN = Association of Southeast Asian Nations; GDP = gross domestic product; GERD = gross expenditure on research and development; GII = Global Innovation Index; IMF = International Monetary Fund; IP = intellectual property; NA = not available; OECD = Organisation for Economic Co-operation and Development; PCT = Patent Cooperation Treaty; PPP = purchasing power parity; R&D = research and development; RICYT = Red de Indicadores de Ciencia y Tecnología – Iberoamericana e Interamericana (Network for Science and Technology Indicators – Ibero-American and Inter-American); UNESCO = United Nations Educational, Scientific and Cultural Organization; WIPO = World Intellectual Property Organization.

Notes: The total patent applications column consists of a 3-year average. Such an average levels potential variabilities in patent application processes.

1. The number of unicorns is subject to variation as their valuation may change over time. The number indicated here therefore holds true at the time of writing (22 July 2024).

* Forecast value.

** Growth in Southeast Asia (Includes Timor-Leste) as forecast by the Asian Development Bank in December 2023. GDP growth is expected to reach 4.7% in 2024 (ADB, 2023).

*** No university from this country appears in the ranking.

**** Although Singapore has a very high quality of education, the *Times Higher Education* methodology only considered two universities for comparison. The QS World University Rankings include four of Singapore's universities. Globally, they rank 3rd and 5th according to the *Times Higher Education* ranking system, and 8th, 15th, 440th, and 585th according to the QS World University Rankings.

Table 1 displays the great diversity of innovation characteristics across ASEAN. For a detailed description of the indicators listed in Table 1, see Annex II. Overall, there is a lack of consistent data gathering on basic measures of innovation for countries like Cambodia, Myanmar, and the Lao PDR. This data gap makes it difficult to paint an accurate and comprehensive ASEAN-wide picture of innovation, preventing a greater understanding of these ecosystems. For example, Cambodia's most recent gross expenditure on R&D (GERD) data are from 2015, while the Lao PDR's GERD data are unavailable.

Singapore is firmly placed at the top of the AMS in terms of innovation performance, given the maturity of its innovation ecosystem. Singapore has a high number of patent applications per million inhabitants, reflecting robust innovation output. With 1,571.24 patents per million inhabitants, it is comparable to the US figure of 1,526.13 patents per million inhabitants (Table 7). In terms of emerging countries, Malaysia (55.09) has more patents per million inhabitants than other emerging countries like Brazil (32.93) and India (40) (Table 7).

Indonesia, ASEAN's largest economy, has benefitted from the size of its domestic market and managed to produce a significant number of fast-growing tech start-ups. However, scientific performance and talent-related indicators remain low, with significant potential for growth. In this context, Indonesia has gained regional attention for its development potential – the country lags its ASEAN neighbours in terms of GERD, ranking second last on this indicator. Although it has relatively strong economic growth figures, its meagre innovation statistics seem to indicate that such growth is not primarily coming from innovation. It performs less well than its neighbour, Malaysia, on all indicators other than the number of unicorns and enrolment rates in tertiary education. Normalised for population differences, the interpretation of the quality of educational institutions worsens. Viet Nam stands out with respect to talent-related indicators.

While the previous chapters offer a characterisation of the ASEAN innovation ecosystem, it is important to highlight that data collection and comparison remain challenges. Innovation-related statistics are often difficult to gather and compare. For example, many data points on R&D statistics are not available for some AMS, or in certain cases, data are not up to date (especially in less mature innovation ecosystems, where the latest available data for R&D statistics are almost a decade old for Cambodia and even older for the Lao PDR). Regularly tracking key performance indicators and metrics is a necessary step for accurate and meaningful measurement of innovation performance metrics, and to help countries measure progress, identify issues, and make data-driven and evidence-based decisions for improving their innovation ecosystems.

2.3. Developing Skills for Innovation and Entrepreneurship across ASEAN

ASEAN must ramp up digital skills education, problem-solving skills, and critical thinking; foster innovation in STEM fields; and align educational curricula with industry demands across AMS. Higher education rankings such as the *Times Higher Education World University Rankings 2024* show the dominance of European and North American

universities, underscoring the need for AMS to enhance the quality and impact of higher education institutions (no other AMS except two Singaporean universities rank in the top 100 list – one in 19th place and one in 32nd place).

The OECD PISA scores are critical indicators of a country's future talent pool, especially in the context of the digital economy, innovation, and entrepreneurship. High scores suggest strong problem-solving and analytical skills amongst students, which are essential for thriving in technology-driven industries. Conversely, lower scores may indicate potential challenges in developing a workforce equipped with the necessary skills for digital innovation and competitiveness. The downward trend in PISA scores across several countries in the region could hinder the efforts of AMS to capitalise on opportunities in the digital economy and innovation, impacting long-term economic growth and development.

Many countries in the ASEAN region fall below the OECD average in PISA scores (Table 2). The results from 2018 to 2022 show a variable trend, largely influenced by the negative impact on schooling of the COVID-19 pandemic. Most AMS for which data are available have seen a general decline in performance during this period.

Table 2: Mean PISA Results of ASEAN Member States Participating in the Assessment, and OECD Average

Country	Mathematics		Science		Reading	
	Mean score, 2022	Performance change, 2018–2022	Mean score, 2022	Performance change, 2018–2022	Mean Score, 2022	Performance change, 2018–2022
Singapore	575	Up	561	Up	543	Down
OECD average	472	Down	485	Down	476	Down
Viet Nam	469	NA	472	NA	464	NA
Brunei	442	Up	446	Up	429	Up
Malaysia	409	Down	416	Down	388	Down
Thailand	394	Down	409	Down	379	Down
Indonesia	366	Down	383	Down	359	Down
Philippines	355	Up	356	Down	347	Up
Cambodia	336	Up	347	Up	329	Up

ASEAN = Association of Southeast Asian Nations, NA = not available, OECD = Organisation for Economic Co-operation and Development, PISA = Programme for International Student Assessment.

Source: OECD (2023b).

2.4. Building Blocks of a Thriving Start-up Ecosystem in ASEAN

Creating a thriving start-up ecosystem in ASEAN requires a comprehensive framework that integrates social, institutional, and infrastructural elements. This involves establishing hubs that connect entrepreneurs with **leadership, financial institutions, talent, knowledge, and support services** (Rosiello, Vidmar, and Ajmone Marsan, 2022). Strong networks, including industry connections and mentorship from experienced entrepreneurs, provide valuable guidance and support. In ASEAN, institutional support has grown significantly at the national and regional levels for entrepreneurial research and infrastructure, including services from public sector organisations such as government innovation agencies, public universities, and research institutions; private sectors actors like large enterprises, financial institutions (e.g. banks, venture capital funds, and impact investors.); and intermediaries (e.g. incubators and accelerators). These clusters of research, knowledge, networks, resources, and capital facilitate the transformation of start-up ideas into minimum viable products and their successful commercialisation (Noble, Charles, and Keast, 2020). Mobilising a diverse set of actors – businesses, governments, the scientific community, and citizens – to cooperate on innovation and start-up creation is essential.

Strong **digital infrastructure** with widespread connectivity across ASEAN fosters a business-friendly environment that attracts and supports entrepreneurship, trade, and investment. It also enables technology adoption and innovation among start-ups, driving economic productivity. Enhanced digital connectivity reduces barriers to market entry, allowing businesses of all sizes to access regional and global markets more easily. Additionally, it promotes financial inclusion by expanding access to digital financial services, while improving public service delivery through e-government initiatives. By bridging the digital divide, ASEAN's digital infrastructure plays a key role in advancing socio-economic development across the region.

Governments and other relevant public sector agencies must develop strategies that consider regional specifics to foster conducive environments for entrepreneurship. For example, tax incentives, grants, and streamlined regulations can create a favourable environment for start-ups. Cultivating a culture of innovation within start-ups, as well as encouraging creativity, risk-taking, and continuous improvement, further drives growth and adaptation. Additionally, forming strategic alliances with businesses, academic institutions, and research organisations can significantly accelerate growth and innovation, such as through innovation sandboxes. These players are further described in this section.

Governments have long promoted **industry-academia linkages** through funding, regulation, and incentives. They now use challenge-based funding and mission-oriented innovation policies (Larrue, 2021) to foster collaboration amongst these actors. As technology advances, innovation is shifting towards **platform-based cooperation models**. These platforms enable rapid innovation and collaboration, involving both public and private sectors. These platforms are flexible and can set technical standards, manage

risks, and de-risk investments in emerging technologies. Transdisciplinary research (TDR) is crucial for addressing complex issues like sustainability transitions. TDR integrates researchers from diverse disciplines and non-academic participants to create new knowledge and theory. Scaling up and mainstreaming TDR is vital for tackling human–environmental challenges, necessitating changes in research prioritisation and funding processes (OECD, 2023a).

A significant government-related obstacle to innovation and entrepreneurship in ASEAN is the inadequate protection of intellectual property rights (IPR) (ASEAN, 2015b). To foster innovation and technological advancement, AMS need to collaborate on strengthening IPR protections. In response to these challenges, the ASEAN Working Group on Intellectual Property Cooperation, established in 1996, is working to harmonise IPR regulations across the region. This includes initiatives such as task forces on trademarks and patent examination cooperation, the ASEAN Network of IPR Enforcement Experts, and the ASEAN IP Academy Working Group. These efforts aim to streamline processes, improve enforcement, and enhance capacity building to better protect intellectual property and support the growth of innovation-driven economies in ASEAN (ASEAN, 2024f).

Research-intensive organisations and laboratories, especially in the tech space, enable university–business linkages and promote the development of **university spin-offs** (start-ups originating from university labs) as well as research and tech-based entrepreneurship and start-up creation (Unger et al., 2020). However, since the quality of scientific production and academic research is weak across most of ASEAN, academic start-ups and university–business linkages are more difficult to develop and grow. Leading emerging start-ups in cutting-edge technologies often need to collaborate with and rely on top academic talent, which is often limited in the region. These weak connections between start-ups and universities and research organisations represent an obstacle to further development of the ASEAN innovation ecosystem.

Incubators and **accelerators** play crucial roles in supporting start-up development by offering mentorship, networking opportunities, resources, and product enhancement – enabling start-ups to scale, innovate, and expand their market presence. Incubators focus on nurturing early-stage start-up ideas and provide long-term support, while accelerators target start-ups ready for rapid growth, offering intensive, short-term programs to scale up (Bone et al., 2019). Initiatives like the ASEAN Business Incubator Network, which held its first meeting in 2018, have united hundreds of incubators across the region. This initiative exemplifies regional efforts to support these critical components of the entrepreneurial ecosystem. However, in the ASEAN region, the start-up ecosystem overall tends to lack programmes tailored for more mature start-ups, focusing instead on nurturing early-stage ventures. This results in a neglect of crucial areas such as leadership development and team management.

Collaborative efforts amongst **universities and other learning organisations** are crucial for nurturing innovative talent effectively. These networks facilitate the exchange of knowledge, resources, and expertise, enabling interdisciplinary collaboration and comprehensive learning experiences. Programmes like '42', which uses a peer-to-peer learning model without formal teachers, demonstrate the potential of alternative

education models in fostering digital talent (Dillet, 2016). Countries in the ASEAN region have begun to address the talent shortage and support the region's digital transformation through such programmes. In Thailand, 42 Bangkok employs this innovative learning model in which students are responsible for their own and their peers' progress. The curriculum is gamified, with students earning points and levelling up by completing projects (42 Bangkok, 2021). In Malaysia, 42 Kuala Lumpur offers a similar approach through an introductory 26-day coding bootcamp. This programme targets individuals over 18 and aims to build a future-ready digital workforce through peer learning and industry placements (Disruptr MY, 2022). Singapore is also home to recently developed 42 programmes. Moreover, the Economic Research Institute for ASEAN and East Asia (ERIA) is working on establishing a network of technical universities to promote innovation and digital technology adoption in the region. Collaboration with governmental initiatives across AMS is crucial for effectively addressing the talent shortage and nurturing a skilled workforce capable of driving the region's digital transformation.

Chapter 3

Aligning Innovation with Inclusion and the SDGs

Start-ups play a crucial role in fostering inclusive development by addressing diverse societal needs and promoting equitable growth (Startup20, 2023a). By their very nature, start-ups are agile and innovative, making them well suited to developing solutions that cater to under-represented groups. Start-ups can drive inclusive development through various avenues, such as women's empowerment, green entrepreneurship and innovation, social inclusion, disability inclusion, and inclusive education.

3.1. Start-ups that Focus on Sustainable and Inclusive Growth are Important for ASEAN

Start-ups contribute to solving social issues not only through their business outputs but also by creating employment opportunities. For instance, although women make up about half of the global population, they are under-represented in entrepreneurship and innovation. Encouraging female entrepreneurship is crucial not only for achieving a fairer economy but also for fostering global economic development. This highlights the broader impact start-ups can have beyond their immediate commercial activities (Startup20, 2023a; 2023b; Sahasranamam and Lonescu-Somers, 2024).

ASEAN girls and women, however, face challenges in accessing advanced digital skills, jobs, and leadership roles in the digital economy. To boost their participation, the digital economy must ensure a safe environment by combating cyber violence and addressing discriminatory practices and biases. While all 10 AMS have policies to promote women's economic empowerment, few specifically target the digital gender divide (Ajmone Marsan and Sey, 2021). Furthermore, data show that women in ASEAN are under-represented in science, technology, engineering, and mathematics (STEM) education and employment, with many running MSMEs that use fewer advanced digital technologies (Ajmone Marsan and Sey, 2021). Gender lens investing for women-led entrepreneurs remains limited but has gained more attention since 2020 (Prasad et al., 2023).

With that said, women-led start-ups have the potential to significantly impact gender equality and economic development. Supporting women entrepreneurs through targeted policies and funding can help bridge the gender gap in business ownership and leadership. By providing mentorship, access to capital, and supportive networks, start-ups led by women can create job opportunities and drive economic growth, particularly in communities where women's participation in the workforce is limited (Singh, 2023b). A comprehensive framework for women entrepreneur-centric policies should address several key areas: fostering innovation and technology, increasing access to gender-responsive finance, and creating enabling laws to support a gender-responsive legal and regulatory system that advances women's economic empowerment. Additionally, it

should aim to expand market access both domestically and internationally, enhance human capital, and provide access to gender-responsive business development support services. Establishing multi-stakeholder governance mechanisms, ensuring effective policy leadership and coordination for promoting women's entrepreneurship development, and monitoring the impact of these policies and programmes on women-owned enterprises are also crucial components of development and inclusion (ASEAN, UNESCAP, and Government of Canada, 2022). Many AMS have developed policies to support women entrepreneurs; however, women-led start-ups continue to face additional barriers, especially in tech-intensive fields and outside metropolitan areas (Ajmone Marsan and Sey, 2021, Ajmone Marsan et al., 2022).

Furthermore, improving the inclusivity of formal and informal education systems is an area where start-ups can make a significant impact. Leveraging technology and innovative teaching methods can enhance educational access and quality of learning for marginalised groups (Singh, 2023a). As such, educational technology start-ups can develop adaptive learning tools, online courses, and interactive platforms that cater to diverse learning needs, ensuring that students from all backgrounds have access to quality education. By addressing educational disparities, start-ups can contribute to a more inclusive and skilled workforce, driving economic growth and social progress. For example, Toy Eight (as part of Toybox Creations and Technology) is an educational technology start-up that helps screen preschool children for cognitive and language-based milestones. Early screening programmes can ensure students get the support they need to become ready for future learning. This example addresses a key challenge presented in ERIA's report on inclusive education for school-aged children with disability, which is awareness and data on achieving developmental milestones (Singh, 2022). For more information about Toy Eight and its recent participation in the One ASEAN Startup Award 2024 pre-event in Kuala Lumpur, see Box 5.

Despite the commitment of all 10 AMS that have ratified the United Nations Convention on the Rights of Persons with Disabilities, many of the 690 million people with disability in Asia and the Pacific continue to face barriers to participating in the digital economy. These challenges stem from inadequate working conditions and insufficient support for acquiring new skills needed for digital jobs. Start-ups active in this area are already emerging across ASEAN: the Thai-based Vulcan Coalition trains and employs people with disability to work as data labellers for AI tools; in Viet Nam, Enablecode focuses on launching people with disability into technology careers (Cashmore and Crosta, 2022). Start-ups can lead the way in developing assistive technologies, inclusive workplaces, and accessible services, ensuring that people with disability have equal opportunities to participate in the economy and society (Singh, 2023a). Social enterprises also have significant potential for promoting inclusion, including in relation to people with disability (Crosta et al., 2021).

Green entrepreneurship is another critical area where start-ups can contribute to inclusive development (Startup20, 2023b). Start-ups focusing on sustainable practices and eco-friendly products can promote environmental stewardship while creating economic opportunities. Green start-ups can address environmental challenges and

generate employment in emerging sectors, such as renewable energy, waste management, and sustainable agriculture, benefiting communities and fostering long-term sustainable development (Startup20, 2023b; Ajmone Marsan and Litania, 2023; Ajmone Marsan and Singh, 2023b). Even in the green sector, women face substantial barriers to entry, and men predominantly hold leadership positions and receive more funding and resources. For example, women's representation on energy company boards in ASEAN is under 50%, ranging from 10.7% in Thailand to 29.7% in Viet Nam. This limited representation hinders women's meaningful and equal participation in energy decision-making across the region (Ajmone Marsan and Singh, 2023a).

Box 2: Sustainability and Digital Connectivity

Artificial intelligence (AI) uses significant energy consumption and has a large carbon footprint, highlighting the need for sustainable practices in AI development. Integrating environmental considerations into AI regulatory frameworks and promoting innovations like renewable energy use, carbon dioxide-removal technologies, and more efficient data centres can minimise the negative environmental effects of AI development. Examples from companies such as Microsoft and Google demonstrate efforts to reduce AI's environmental impact, while government policies are crucial for driving broader adoption of greener AI practices (West et al., 2024).

In the Association of Southeast Asian Nations (ASEAN), Singapore is the main data centre hub, with 100 data centres, 1,195 cloud service providers, and 22 network fabrics, making it a global leader in cloud connectivity. To enhance the sustainability of its data centres, Singapore has implemented several initiatives:

Green Data Centre Standard (SS564): Launched in 2011 and revised in 2013, this standard, tailored to Singapore's needs, defines performance metrics for energy efficiency and includes best practices for data centre design and operations.

Green Mark for Data Centres: Introduced in 2012, this rating system promotes energy-efficient design and management. Since 2022, new data centres must meet 'platinum' certification criteria, achieve a design power usage effectiveness of 1.3 or below, and show a clear path to 100% renewable energy.

Green Data Centre Technology Roadmap: Published in 2014, this roadmap outlines pathways for advancing technologies from research and development (R&D) to deployment, with the goal of improving energy efficiency and reducing carbon emissions in data centres.

Tropical Data Centre Standard (SS 697:2023): Launched in 2023, this standard optimises energy efficiency for data centres in tropical climates, supporting an increase in operating temperatures to 26°C and above, potentially saving 2%–5% in cooling energy per degree increase. This standard is part of Singapore's Digital Connectivity Blueprint, emphasising sustainability.

Source: UNCTAD (2024).

3.2 How ASEAN Start-ups are Contributing to the SDGs

Start-ups play a crucial role in advancing the Sustainable Development Goals (SDGs) through innovative solutions that increasingly focus on sustainability and inclusion (Startup20, 2023b; 2023a; Gionfriddo and Piccaluga, 2024). According to StartUs insight, an analysis of 3,365 start-ups that promote the SDGs revealed that a significant number of start-ups are already contributing to the advancement of these goals (StartUs insight, 2021). Table 3 showcases the role that start-ups can play in achieving each of the SDGs, with a focus on start-ups operating in ASEAN.

Table 3: Start-ups and the Sustainable Development Goals

There are 17 Sustainable Development Goals (SDGs), split into 169 targets. Achieving them would indicate great progress on many of the pressing social and environmental challenges our world currently faces. Although every player in the global economy has a role in achieving them, start-ups play a particularly crucial role due to their unique characteristics and capabilities. Notably, their innate capacity for innovation allows them to generate novel technologies and offerings that tackle modern social, environmental, and economic problems. They also challenge the status quo and participate in the creative destruction of complacent firms by introducing disruptive solutions. In doing so, they are able to catalyse change by providing alternatives to the traditionally unsustainable practices and offerings. Additionally, they tend to be less burdened by bureaucratic process. Their smaller size allows them a greater degree of flexibility and agility, enabling them to adapt more quickly to the market and other signals. It also allows them to test their novel approaches and pivot or implement their strategies more rapidly than their larger counterparts. This is especially crucial for implementing environmentally friendly or socially responsible practices in an increasingly uncertain world. Here's how start-ups tackle the 17 challenges:

 <p>1 NO POVERTY</p>	<p>Start-ups can create jobs, foster economic growth, and develop offerings that improve the livelihoods of low-income populations. Fintech start-ups, for example, often provide financial services to underserved communities. Indonesia's eFishery gives farmers access to the digital economy and alleviates rural poverty.</p>	 <p>9 INDUSTRY, INNOVATION AND INFRASTRUCTURE</p>	<p>Start-ups contribute to the creative destruction of outdated businesses, building resilient infrastructure and fostering innovation. They develop new technologies and business models that improve productive processes. Indonesian AwanTunai improves financial infrastructure by providing digital credit solutions to MSMEs.</p>
 <p>2 ZERO HUNGER</p>	<p>Agri-tech start-ups innovate in areas like precision farming, vertical farming, and sustainable agriculture to increase yield and efficiency. They also work on reducing food waste through better supply chain management. Vietnamese Mimosatek tackles this SDG with their precision agriculture system.</p>	 <p>10 REDUCED INEQUALITIES</p>	<p>start-ups work on financial inclusion, affordable housing, and access to education and healthcare for marginalised groups. They also create platforms to promote social inclusion and equal opportunities. Indonesia's Difalink helps secure jobs for people with disability, and equip them with the necessary skills.</p>
 <p>3 GOOD HEALTH AND WELL-BEING</p>	<p>Health-tech start-ups develop telemedicine platforms, wearable health devices, and AI-driven diagnostics to make healthcare more accessible and affordable. They also work on solutions for mental health and chronic disease management. Nalagenetics, a Malaysian start-up, uses AI in the healthcare industry.</p>	 <p>11 SUSTAINABLE CITIES AND COMMUNITIES</p>	<p>Urban-tech start-ups develop smart city solutions, including sustainable transportation, waste management, and energy-efficient buildings. They focus on making cities more livable and sustainable. Malaysia's JomParking is a smart parking solution that helps reduce traffic and improve urban mobility.</p>
 <p>4 QUALITY EDUCATION</p>	<p>Ed-tech start-ups offer online learning platforms, personalised education technology, and virtual classrooms to provide quality education to people in remote and underserved areas. They also focus on lifelong learning and skills development. Globish is a Thai online tutoring platform for individuals to learn English.</p>	 <p>12 RESPONSIBLE CONSUMPTION AND PRODUCTION</p>	<p>Start-ups promote circular economy practices, sustainable product design, and eco-friendly packaging. They also work on reducing waste and promoting sustainable consumption patterns. Indonesia's Geenhope manufactures cassava-based biodegradable products and chemicals for sustainable packaging.</p>
 <p>5 GENDER EQUALITY</p>	<p>Start-ups focusing on gender equality work on closing the gender gap in various sectors. They create platforms for women's empowerment, provide access to reproductive health services, and promote gender-inclusive workplaces. Malaysia's MadCash provides microfinancing solutions tailored for women entrepreneurs.</p>	 <p>13 CLIMATE ACTION</p>	<p>Start-ups focus on developing technologies for carbon capture, renewable energy, and climate-resilient agriculture. They also create solutions for monitoring and mitigating the effects of climate change. Okra Solar, a Cambodian start-up, provides off-grid solar energy solutions to rural and underserved areas.</p>
 <p>6 CLEAN WATER AND SANITATION</p>	<p>Start-ups innovate in water purification, efficient water management systems, and sanitation solutions to ensure clean and safe water for all. They also develop technologies for wastewater treatment and reuse. EnvironSens, a Singaporean start-up, is developing a biosensor-based water toxicity monitoring technology.</p>	 <p>14 LIFE BELOW WATER</p>	<p>Start-ups in the blue economy work on sustainable fishing practices, marine conservation, and pollution control. They develop technologies to protect and restore ocean ecosystems, and remove waste from our oceans. Malaysian start-up Coralku works on coral reef restoration and conservation projects.</p>
 <p>7 AFFORDABLE AND CLEAN ENERGY</p>	<p>Renewable energy start-ups develop solar, wind, and other sustainable energy solutions. They work on making clean energy affordable and accessible, especially in off-grid and remote areas. SunGreenH2, a Singapore-based cleantech start-up, is working on green hydrogen production.</p>	 <p>15 LIFE ON LAND</p>	<p>Environmental start-ups focus on reforestation, biodiversity conservation, and sustainable land management. They develop solutions for protecting terrestrial ecosystems and combating deforestation. ACRE is a Myanmar start-up combatting climate change by restoring forests out of degraded land.</p>
 <p>8 DECENT WORK AND ECONOMIC GROWTH</p>	<p>Start-ups drive economic growth by creating new industries, providing employment, and fostering entrepreneurship. They also focus on fair labour practices and inclusive economic development. Philippine start-up BeamAndGo is addressing this goal.</p>	 <p>16 PEACE, JUSTICE AND STRONG INSTITUTIONS</p>	<p>Start-ups contribute to transparency and accountability through technologies like blockchain. They also work on legal tech solutions, access to justice, and platforms for civic engagement. Better.sg, a Singapore start-up, has developed digital solutions that promote transparency, social justice, and more.</p>
 <p>17 PARTNERSHIPS FOR THE GOALS</p>	<p>Start-ups often collaborate with governments, NGOs, and other businesses to achieve the SDGs. They foster partnerships and create networks to scale their impact and promote sustainable development. Cambodia's KOOMPI partners with educational institutions and NGOs to promote digital literacy and give young students access to technology.</p>		

AI = artificial intelligence; MSMEs = micro, small, and medium-sized enterprises; NGO = nongovernmental organisation; SDG = Sustainable Development Goal.
Source: Authors.

In ASEAN, many start-ups are contributing to the achievement of the 17 SDGs. Table 4 highlights some of this work, based on interviews conducted for this research paper.

Table 4: Case Studies of Start-ups Supporting the SDGs

Company (Country)	Business that Contributes to the SDGs	Related Goals
Ethnicraft (Lao PDR)	<ul style="list-style-type: none"> Ethnicraft designs and produces mainly tablecloths and tableware with unique ethnic embroidery patterns. 	10. Reduced inequalities 16. Peace, justice, and strong institutions
FathomX (Singapore)	<ul style="list-style-type: none"> FathomX operates in Asian countries, including India, Indonesia, Japan, Malaysia, the Philippines, Taiwan, and Thailand. It specialises in AI for mammography, having developed innovative AI technology that accurately reads mammography images to detect cancer cells. FathomX has secured regulatory licences in multiple countries (e.g. India, Indonesia, Malaysia, the Philippines, Taiwan, and Thailand). 	3. Good health and well-being 9. Industry, innovation, and infrastructure 17. Partnerships for the Goals
Julo (Indonesia)	<ul style="list-style-type: none"> Julo, a top digital finance provider in Indonesia, offers virtual credit lines and lending support to clients, including microfinance. 	1. No poverty 8. Decent work and economic growth
LOCA (Lao PDR)	<ul style="list-style-type: none"> LOCA provides e-hiring, e-payment, electric vehicle infrastructure, and electric vehicle finance. Its platform includes public transportation and car-sharing services aimed at improving urban mobility. 	7. Affordable and clean energy 11. Sustainable cities and communities 13. Climate action
PillTech (Cambodia)	<ul style="list-style-type: none"> PillTech provides pharmaceutical deliveries, connecting pharmacy owners to the registered products available in the country through an online platform. 	3. Good health and well-being
Resync (Singapore)	<ul style="list-style-type: none"> Resync operates in 13 countries, including Cambodia, Singapore, and Thailand in Southeast Asia; Turkey; and the United Arab Emirates and the United Kingdom. Resync is a smart energy management solution provider. The start-up offers intelligent control of HVAC systems to allow users to optimise their energy use and save costs. 	7. Affordable and clean energy 11. Sustainable cities and communities 13. Climate action
SalaTech Pte. Ltd. (Cambodia)	<ul style="list-style-type: none"> SalaTech provides a learning management system and educational marketplace for schools and universities, 	4. Quality education

Company (Country)	Business that Contributes to the SDGs	Related Goals
	assists high school students in university selection, and offers career-matching tools.	9. Industry, innovation, and infrastructure
sunE (Philippines)	<ul style="list-style-type: none"> sunE provides a renewable energy solution. It focuses on the tricycle sector in the Philippines. 	7. Affordable and clean energy 11. Sustainable cities and communities 13. Climate action
Tech Up (Malaysia)	<ul style="list-style-type: none"> Tech Up offers educational technology solutions. It focuses on developing online education platforms to enhance access and quality of learning. 	4. Quality education 10. Reduced inequalities
Tun Yat (Myanmar)	<ul style="list-style-type: none"> Tun Yat is a tractor sharing application that provides access to tractor rental services, in a similar way to the ride-hailing service Uber, for farmers who cannot afford to buy or rent agricultural machinery. The aim is to improve productivity. The company also provides support to vulnerable young and female farming communities at its operational bases to develop higher value-added food products. 	1. No poverty 5. Gender equality
ULAP Networks (Brunei)	<ul style="list-style-type: none"> ULAP Networks operates in 85 countries and serves customers in 113 countries, including Southeast Asia. ULAP Networks offers telecommunications solutions and has developed middleware that enables Zoom customers to receive phone calls to their local numbers directly within the Zoom application. This service also extends coverage to countries that Zoom does not support very well. 	9. Industry, innovation, and infrastructure

AI = artificial intelligence; HVAC = heating, ventilation, and air conditioning; SDG = Sustainable Development Goal.

Note: The authors carried out interviews with the above start-ups, amongst others, from January to June 2024. Details are in Annex IV.

Source: Authors' summary of insights gathered from interviews conducted for this white paper.

3.3. The Role of Impact Investing

Impact investing plays an important role in the creation and scale-up of start-ups that develop solutions which contribute to the SDGs. Impact investing in ASEAN has shown significant growth in recent years, although it still has substantial room for development compared with the more established markets of Europe and the US. Furthermore, despite the growing demand for impact investing across ASEAN, the region lags in the number of impact funds headquartered there. Nevertheless, the potential for growth is evident as

investors increasingly recognise the opportunities to generate both financial returns and positive social or environmental outcomes in the region (Gupta, 2022). This growth trajectory suggests that ASEAN is an emerging market for impact investing, poised for expansion as awareness and infrastructure continue to develop.

3.3.1. Definition of Impact Investing

Impact investing is a form of commercial investment that prioritises creating genuine and long-term environmental or social impact while aiming for financial returns (Eisenberg and Plakalo, 2024). Impact investing is, however, only one form of impact-oriented investment. Other types of impact-oriented investments also aim to address global environmental and societal challenges. These may include socially responsible investing; environmental, social, and governance investing; and philanthropy – each with varying levels of impact focus and financial goals. The key distinction in impact investing is the clear intention to create measurable positive change (CIIP, Singapore Management University, and Accenture, 2022).

Impact investing has the potential to enhance various aspects of society from access to education, healthcare, and clean water to addressing deep-rooted and complex socio-economic issues such as gender equality, poverty alleviation, and effects of climate change. Given the complexities of social issues, defining them clearly is essential as it helps investors and other stakeholders (e.g. companies) align their objectives and measure their contributions towards resolving these challenges. Impact investing can also create indirect outcomes such as increased income opportunities or improved overall quality of life in the long term. For example, a business that indirectly boosts household incomes for farmers can enable farmers with young children to send them to school. Numerous studies have shown the positive relationship between strong early childhood education and later social and economic development (Save the Children, n.d.).

The Global Impact Investing Network (GIIN) 2022 report estimated the global impact investing market size to be US\$1.164 trillion, exceeding US\$1 trillion for the first time (Hand, Ringel, and Danel, 2022). This milestone reflects the sector's growth, increasing sophistication, and diversification of projects. The report also highlighted the rise in green bonds and corporate impact investing, stressing the need for more significant capital allocation to achieve the SDGs by 2030 and net zero emissions by 2050.

A key actor in impact investing is institutional investors, which play a pivotal role in the growth and scalability of impact investing. Institutional investors are organisations like corporations, trusts, and other legal entities that invest on behalf of individuals or groups. With over US\$70 trillion in assets globally, they have substantial influence in financial markets. These investors include pension plans, sovereign wealth funds, endowments, foundations, banks, and insurance companies. Their large-scale capital and influence can drive significant social and environmental change, particularly when they incorporate impact criteria into their investment decisions. By committing to impact investing, institutional investors can help set industry standards, push for more rigorous impact measurement, and influence other investors to consider the social and environmental

consequences of their investments. Additionally, their involvement can help bridge the gap between profitability and impacts on people and the planet, encouraging broader adoption of sustainable investment practices across the financial sector.

The International Finance Corporation (IFC), part of the World Bank Group, is the largest development institution focused on the private sector in emerging markets. In fiscal year 2024, it committed US\$56 billion to private companies and financial institutions, mobilising private capital to address poverty and sustainability. IFC's extensive presence in over 100 countries allows it to source unique impact investment opportunities for public sector partners.² The IFC emphasises that authenticity in impact investing requires investors and companies to have a clear intention of creating positive change and be accountable for measuring both the positive and negative impacts they generate. This principle is central to the IFC's Operating Principles for Impact Management (IFC, 2024).

The GIIN also explores how institutional asset owners can incorporate an impact lens in their portfolio construction to address global challenges like climate change and social inequality. It has provided a practical guide, sharing best practices and lessons learned from 2 years of discussions with institutional asset owners. The report emphasised that a holistic impact-focused strategy can enhance both financial returns and societal benefits, making it essential for institutional asset owners looking to adapt to a changing world (Hand and Gilbert, 2023).

3.3.2 Impact Investing in ASEAN

Southeast Asia, projected to be the world's fourth-largest economy by 2030, shows significant diversity in social and economic development across its countries. Over the past 15 years, impact investing has grown substantially in the region, with investors increasing their support for impact-driven enterprises. According to a GIIN survey, around 30% of global impact investors focus on ASEAN, with US\$12.2 billion invested in the region from 2007 to 2017. Development financial institutions (DFIs) were key players, contributing over 90% of investments (Nomura, 2020).

Although private investment is growing, it remains smaller than DFI contributions. DFIs primarily provide loans, while private investments favour equity, often through impact funds managed in Singapore. The landscape is evolving, with increased entrepreneurship and technology-driven socio-economic impact in ASEAN. There are indications that impact investing is accelerating across ASEAN: between 2020 and 2022, US\$6.9 billion was invested across 379 impact deals, accounting for over 67% of the total capital invested during the decade from 2007 to 2016 (Prasad et al., 2023). This investment, even during the COVID-19 pandemic, underscores the resilience and commitment of impact investors in Southeast Asia. Despite these gains, challenges like limited access to capital and regulatory hurdles persist, especially in emerging markets within the region. The

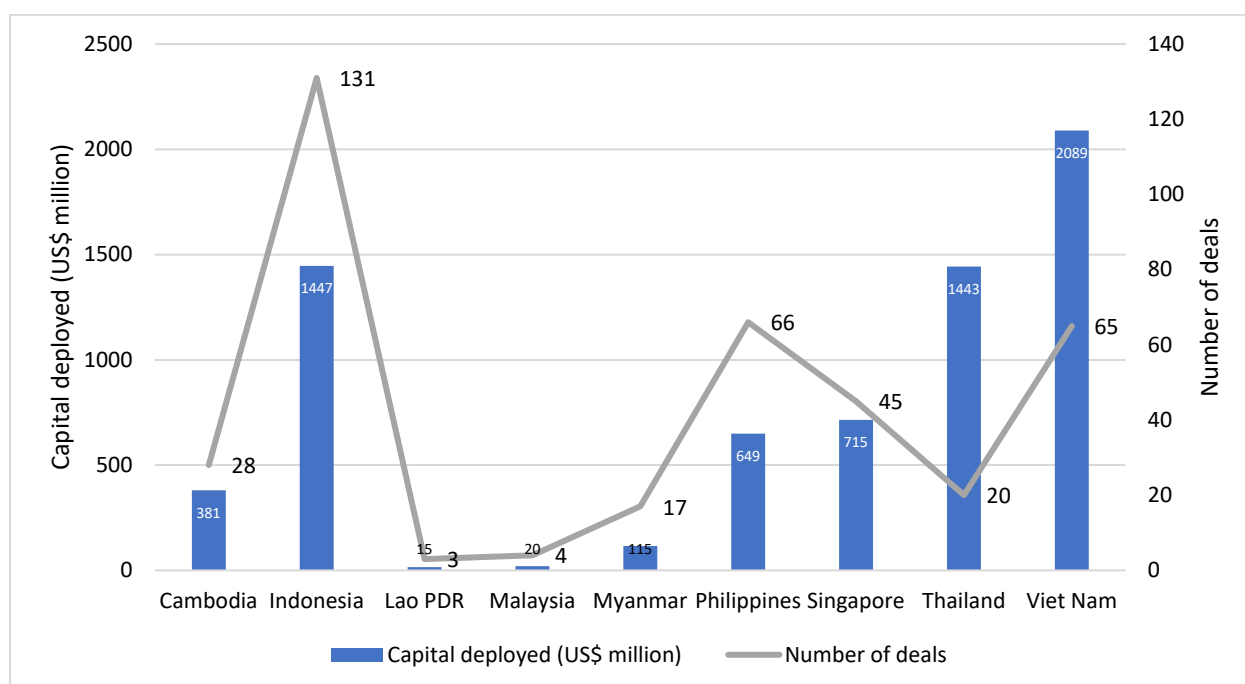
² For more information, see IFC (n.d.-b).

COVID-19 pandemic further influenced investment flows, redirecting the focus towards healthcare and digital services.

During 2020–2022, private impact investors deployed about 40% more capital across 40% more deals compared with 2017–2019. Private impact investors invested US\$624.69 million in 226 deals during this period, with a growing focus on equity investments. The financial services sector attracted the most capital, while the ICT sector led in deal volume, driven by the region’s digital transformation accelerated by the COVID-19 pandemic. About 80% of private impact investor deals were under US\$5 million, reflecting a broadening of the impact investment ecosystem in Southeast Asia (Prasad et al., 2023).

Across the ASEAN region, the impact investing market is diverse in deal value and volume. Indonesia remains the leader, attracting 44% of deals and 55% of private impact investor capital during 2020–2022, solidifying its status as a hub for impact entrepreneurs. Viet Nam, however, has surpassed Indonesia as the top destination for DFI investments, with 60% growth in investment value. Thailand secures large-ticket deals, ranking just behind Indonesia in deal value, while Myanmar has seen a significant decline in both deal value and volume (Prasad et al., 2023). Figure 4 shows the regional impact investing activity by country during 2020–2022.

Figure 4: Regional Impact Investing Activity by Country, 2020–2022



Source: Author, based on Prasad et al. (2023).

Furthermore, the complementary and bidirectional collaborative relationship between government and start-ups can lead to positive policy change. For example, the Extended Producer Responsibility Law, which came into effect in 2022 in the Philippines, and which

regulates plastic usage, was implemented after the establishment of PCX, a start-up working to tackle the plastic waste crisis in the country, established in 2019.

The region has also seen notable ASEAN-based venture capital firms. As of May 2022, many firms were established, including GIC, a Singapore-based sovereign wealth fund; Golden Gate Ventures, also headquartered in Singapore, which focuses on business processes, mobile technologies, and Software-as-a-Service; Insignia Ventures Partners, which invests in start-ups across Asia; Ruvento, a seed capital firm supporting start-ups in the internet of things, robotics, and emerging technologies across Asia and the US; and Cradle Fund, headquartered in Malaysia, which invests in ICT, biotechnology, life sciences, material sciences, and technology industries (ASEAN and UNCTAD , 2022).

Other firms include ABC Impact (formerly known as Pavilion Capital), which is based in Singapore and invests across Southeast Asia, focusing on sectors like healthcare, education, sustainable agriculture, and clean energy. Its goal is to generate measurable social and environmental impact alongside financial returns (World Economic Forum, 2023). While based outside ASEAN, LeapFrog Investments is a global impact investment firm that has invested heavily in the region. It focuses on financial services and healthcare, aiming to reach underserved populations across emerging markets, including AMS (World Economic Forum, 2023). Based in Viet Nam, the Lotus Impact Fund targets investments in small and medium-sized enterprises (SMEs) that contribute to social and environmental improvements in sectors like renewable energy, agriculture, and waste management (Lotus Impact, n.d.).

3.3.3 Measuring the Returns on Impact Investment

Impact measurement is crucial in impact investing as it provides the evidence needed to demonstrate that investments are achieving their intended social or environmental outcomes. Without accurate and standardised metrics, it becomes difficult for investors to assess the true effectiveness of their investments. This measurement not only validates the social impact but also builds credibility and trust amongst stakeholders, enabling better decision-making and attracting more capital to impactful projects. Furthermore, clear impact metrics help align investor expectations with the long-term goals of social and environmental change, ensuring that impact is at the forefront of investment strategies.

Standardising impact measurement is crucial for advancing impact investing. Social impact is often difficult to quantify because it requires a deep understanding of the specific issues being addressed, making it challenging to develop comparable evaluation methods across different challenges. Accumulating expertise in evaluation methods through the analysis of similar investment cases is essential, and organisations like ERIA could play a vital role in this process.

The GIIN's core characteristics of impact investing serve as a guide for investors committed to driving meaningful change through their investments. The core characteristics of impact measurement emphasise four key principles: intentionality, where investments are made with a clear goal to create positive social or environmental

outcomes; use of evidence and data to assess and improve impact; managing for impact to ensure continuous improvement; and transparency in sharing results, both successes and challenges. These principles guide impact investors in creating measurable and meaningful change (GIIN, 2019).

In 2017, IFC introduced the Anticipated Impact Measurement and Monitoring system, an ex ante tool for assessing the development impact of projects. This system allows IFC to define, measure, and monitor the expected outcomes of each project more effectively. It is now applied to all investment projects and is gradually being extended to advisory services. Fully embedded in IFC's operations, the system ensures that development impact is evaluated alongside strategic goals like financial returns, risk, and thematic priorities.³

3.3.4 Challenges in Impact Investment

Impact investing involves a longer investment horizon than traditional funds, requiring a balance between short-term profits and long-term social impact. Many impact investment funds operate with timeframes of 10 years or more. Managing these investments requires specific expertise, and raising awareness amongst investors of the importance of long-term impact-oriented projects remains a challenge.

In addition to navigating long-term commitments, impact funds must consider exit strategies that not only generate returns but also sustain their impact. This might involve selling stock back to the community to ensure that the social or environmental benefits continue. Therefore, impact investors face the challenge of balancing profitability with the need to achieve measurable long-term impacts, while considering short-term profit potential.

Another challenge in impact investing is measuring and determining the impact itself. Investors need to use specific or proxy metrics to assess whether their portfolio companies are creating positive societal impacts within a specific timeframe. For example, KonsultaMD tracks metrics related to improving the access to and efficiency of healthcare in the Philippines, measuring success based on how these improvements affect individual lives.⁴ While some metrics, such as increasing gender diversity, are relatively straightforward to measure, others, like reducing carbon emissions, are more difficult to quantify. This complexity in selecting precise metrics for subsequent measurement may deter early-stage investors.

To address this issue, standardised methods of measuring impact are needed, recognising that impact is a multifaceted concept with varying standards and metrics across different investors. Credible and comparable impact data are crucial for guiding impact investment decisions and maximising results. IRIS+ addresses this need by enhancing data clarity and comparability, offering practical guidance for impact investors

³ For more information, see IFC (n.d.-a).

⁴ For more information, see KonsultaMD (n.d.).

in a user-friendly system. Managed by the GIIN, it is a free and publicly accessible resource to support the impact investing community.⁵

3.3.5 Initiatives by International Organisations in ASEAN

International organisations such as the United Nations Development Programme (UNDP) and the World Economic Forum have been involved in promoting and facilitating impact investing in the ASEAN region. Both UNDP and the World Economic Forum regularly organise roundtables, forums, and high-level meetings that bring together investors, governments, and civil society organisations in ASEAN. These events focus on building capacity, sharing best practices, and fostering collaborations that enhance the impact investment landscape in the region. Both organisations promote blended finance mechanisms in ASEAN, which combine public and private capital to de-risk investments and attract more private sector involvement in impact investing. These initiatives are crucial in mobilising larger amounts of capital for sustainable development projects in the region.

The UNDP has developed SDG Investor Maps for several AMS, including Indonesia, Thailand, and Viet Nam. These maps provide investors with actionable market intelligence that aligns with the SDGs. They identify investment opportunities that can deliver both financial returns and measurable social impact.⁶ The UNDP promotes standardised impact measurement and management practices that align with the SDGs, encouraging investors in ASEAN to adopt these frameworks to enhance the credibility and effectiveness of their impact investments.⁷ The UNDP also established a Finance Sector Hub in Singapore, focusing on mobilising private sector capital for the SDGs in ASEAN. This hub serves as a regional platform for innovation in sustainable finance, including impact investing.⁸

3.4 AI and Ethical AI Frameworks

As mentioned earlier in this paper, a key element of ASEAN's digital transformation is the rise of digital innovations, including AI and generative AI. This technology has shown the potential to revolutionise industries such as healthcare, finance, manufacturing, and entertainment by creating content, images, and code, thereby driving innovation and productivity. By promoting digital literacy, ensuring cybersecurity, and facilitating access to digital infrastructure, AMS can harness the full potential of the digital economy. This approach not only supports the growth of start-ups but also ensures inclusive economic

⁵ For more information, see GIIN (n.d.).

⁶ For more information, see SDG Impact (n.d.).

⁷ For more information, see UNDP (n.d.-c).

⁸ For more information, see UNDP (n.d.-b).

development, bridging the digital divide and enhancing the region's global competitiveness.

Ethical AI principles have therefore become a focal point for many international organisations, guiding the development and deployment of AI in ways that ensure fairness, transparency, and accountability (International Organisation of Employers, 2024). Key frameworks from the United Nations Educational, Scientific and Cultural Organization (UNESCO), the OECD, the African Union, the European Union (EU), the Group of Seven (G7), the United Nations General Assembly, and ASEAN, amongst others, provide comprehensive guidelines for AI governance.

UNESCO's Recommendation on the Ethics of AI emphasises the need for human-centred AI development, promoting principles such as respect for human rights, inclusiveness, and sustainability. It advocates for AI that benefits all humanity while preventing harm, particularly to vulnerable groups. This framework underscores the importance of international cooperation in setting ethical standards and ensuring global adherence to them (UNESCO, 2022).

Similarly, the **OECD's** AI Principles focus on promoting AI that is innovative and trustworthy and respects human rights and democratic values. The principles highlight five key areas: (i) inclusive growth, sustainable development, and well-being; (ii) human-centred values and fairness; (iii) transparency and explainability; (iv) robustness, security, and safety; and (v) accountability. These guidelines are designed to foster public trust in AI systems and ensure they contribute positively to society (OECD, 2024).

The **European Commission** has also made significant strides in AI governance with its Artificial Intelligence Act, in full force as of August 2024. The act aims to create a legal framework that addresses the risks associated with AI while fostering innovation. It includes provisions for high-risk AI systems, ensuring they meet stringent requirements before being deployed. The European Commission also emphasises the need for clear rules on AI transparency and the accountability of AI developers and users (European Commission, 2023a; 2023b).

The **African Union** has adopted a landmark Continental Artificial Intelligence Strategy and African Digital Compact aimed at driving the continent's development and inclusive growth. This strategy, endorsed by 130 African ministers, emphasises the use of AI to address key challenges and enhance various sectors such as healthcare, agriculture, and education. The strategy and compact are anchored in the African Union's Digital Transformation Strategy for Africa (2020–2030) and Agenda 2063 (African Union, 2024).

Additionally, the **G7's Hiroshima Process International Code of Conduct for Organizations Developing Advanced AI Systems** focuses on the responsible development and use of AI technologies. It advocates for ethical guidelines that ensure AI systems are developed with a strong commitment to safety, fairness, and respect for human rights, aligning closely with other international standards (European Commission, 2023b).

The **United Nations General Assembly** has also adopted a resolution on AI, reinforcing the need for ethical AI principles on a global scale. This resolution highlights the

importance of international collaboration in addressing the ethical, legal, and societal impacts of AI (United Nations, 2024)

The ASEAN region is making progress in establishing ethical guidelines for AI, reflecting a commitment to responsible and human-centric technology development (Box 3). The **ASEAN Guide on AI Governance and Ethics**, released in early 2024, serves as a comprehensive framework to promote the trustworthy and ethical deployment of AI across Member States. This resource for organisations involved in AI systems offers recommendations for national and regional policies, financial support, capacity building, and cross-border collaboration. This guide is voluntary for companies to adopt, emphasising a flexible approach to AI governance that accommodates the diverse technological and economic landscapes within ASEAN (ASEAN, 2024e). However, this guide does not override existing or forthcoming AI-related laws and regulations, potentially leading to varied approaches amongst AMS. These differing policy approaches may influence the pace of adopting national AI frameworks and pose challenges for the ongoing ASEAN Digital Economy Framework Agreement (DEFA) negotiations. Companies must engage closely with ASEAN and Member States to provide industry perspectives, training, and capacity building, strengthening DEFA to foster innovation and regulatory coherence across the region (BGA Enterprise Technology Team, 2024).

Box 3: ASEAN Guide on AI Governance and Ethics

Key Principles of the ASEAN Guide on AI Governance and Ethics

1. **Human centricity:** Artificial intelligence (AI) systems should prioritise human well-being and societal benefits. They must be designed to respect human values and avoid exploiting vulnerable individuals. This principle ensures that AI contributes positively to society, enhancing well-being, nutrition, and overall happiness.
2. **Privacy and data governance:** Robust mechanisms must be in place to protect data privacy and maintain data integrity throughout the AI life cycle. This includes stringent data governance protocols to ensure compliance with relevant laws and ethical standards.
3. **Accountability and integrity:** Organisations deploying AI are accountable for the systems' decisions and their compliance with laws and ethical principles. This includes establishing clear internal governance structures and reporting mechanisms to ensure ethical AI development and deployment.
4. **Safety and security:** AI systems must undergo thorough risk assessments to identify and mitigate potential harms. Cybersecurity measures are crucial to protect against threats such as data poisoning and model inversion, ensuring the safety of developers, users, and AI systems.
5. **Robustness and reliability:** AI systems need to be resilient, capable of handling errors and delivering consistent results across various scenarios. Rigorous pre-deployment testing is essential to ensure robustness and reliability.

Regional and Global Context

The Association of Southeast Asian Nations (ASEAN) AI Guide is part of a broader regional effort to align AI governance frameworks and foster cross-border collaboration. It supports the ASEAN Digital Masterplan 2025 (ASEAN, 2021a), aiming to create a cohesive policy environment that facilitates AI innovation while safeguarding ethical standards. Notably, Singapore has been a frontrunner in this domain, with initiatives like the model AI Governance Framework and the AI Verify Foundation serving as key case studies in the guide (BGA Enterprise Technology Team, 2024).

This guide's release coincides with significant global developments, such as the European Union's AI Act launched in 2024, highlighting the importance of international benchmarks in shaping regional policies. The ASEAN guide recognises the need for interoperability with global standards while tailoring its recommendations to local contexts.

In conclusion, the ASEAN Guide on AI Governance and Ethics represents a pivotal step towards responsible AI adoption in Southeast Asia. By embedding ethical principles into AI frameworks, ASEAN is positioning itself as a region that values both technological advancement and societal well-being.

Source: ASEAN (2024e).

Chapter 4

Governing ASEAN's Innovation Ecosystem

ASEAN has a long history of governance mechanisms, frameworks, and initiatives to advance the process of regional integration vis-à-vis science, technology, and innovation (STI) and entrepreneurship. This chapter provides an overview of these arrangements and related initiatives.

4.1. Good Governance Fosters Good Innovation

The governance of the ASEAN innovation ecosystem is a critical aspect of fostering ASEAN-wide sustainable growth and inclusive development. Innovation-led growth and development is a cross-cutting policy issue; effective governance and delivery requires well-coordinated involvement of multiple ministries and bodies across various sectors including higher education and research, economic development, skills and talent development, business promotion (including both start-ups and MSMEs), and the digital economy. Regional efforts have aimed at enhancing the collaborative governance structures within ASEAN to better align national policies and create a cohesive regional innovation strategy, although their implementation has long been divided along sectoral responsibilities, including through the ASEAN Committee on Science, Technology, and Innovation (COSTI), the ASEAN Coordinating Committee on Micro, Small and Medium Enterprises (ACCMSME), and the ASEAN Digital Senior Officials' Meeting, with its emphasis on digital innovation. There is therefore room to strengthen innovation and entrepreneurship governance in ASEAN, focusing on creating more integrated and cohesive policy frameworks to support the regional STI ecosystem effectively.

4.1.2. ASEAN's Efforts in Promoting Innovation: A Historical Perspective

STI cooperation in ASEAN has progressed along with a set of frameworks developed within the region. In 1971, the ASEAN Permanent Committee on Science and Technology was reorganised to enhance the work of promoting and intensifying cooperation in science and technology activities. Subsequently, in 1978, the ASEAN Committee on Science and Technology was established as a primary dialogue and cooperation platform for ASEAN science and technology policies and activities, guided by the ASEAN Summits and the ASEAN Ministerial Meetings on Science and Technology (AMMSTs). A notable achievement of the ASEAN Committee on Science and Technology was the formulation of the first ASEAN Plan of Action on Science and Technology, adopted in 1985.

In 2018, at the 10th Informal ASEAN Ministerial Meeting on Science and Technology (IAMMST), ASEAN renamed the science and technology ministerial body and the senior official committee the ASEAN Ministerial Meeting on Science, Technology, and Innovation

(AMMSTI) and ASEAN COSTI, respectively. This renaming reflects ASEAN's recognition of the increasing importance of STI in making the ASEAN community more competitive, vibrant, sustainable, and economically integrated.

ASEAN COSTI is responsible for all aspects of ASEAN STI cooperation and integration, as outlined in the various STI developments and plans of action of ASEAN. ASEAN COSTI reviews the progress of regional programmes, supports new initiatives, and guides the implementation of projects by its subsidiary groups. The biannual AMMSTIs and annual IAMMSTs ensure continuous dialogue and progress. These meetings also include cooperation with Dialogue and Sectoral Partners such as China, the EU, Japan, the Republic of Korea (henceforth, Korea), and the US, as well as the ASEAN Plus Three framework.

An important institutional development is the repositioning of ASEAN COSTI from the ASEAN Socio-Cultural Community (ASCC) to the ASEAN Economic Community (AEC). This move aligns ASEAN COSTI's objectives with the economic priorities outlined in the AEC Blueprint 2025, such as productivity-driven growth, innovation, R&D, and technology commercialisation (Ambashi, 2018). The decision was initially agreed during the 15th AMMST held on 12 November 2013 in Kuala Lumpur, which concluded that both the AMMST and the then ASEAN Committee on Science and Technology would remain under the purview of the AEC, as specified in Annex 1 of the ASEAN Charter. Despite this, recognising that science and technology actions were reflected in the ASCC Blueprint, the ASEAN Committee on Science and Technology continued reporting to both the AEC and ASCC Councils until the end of 2015 (ASEAN, 2014). This shift not only streamlined the ASEAN Secretariat's organisation but also underscored ASEAN's commitment to enhancing productivity and global industrial competitiveness through innovation. Consequently, further promotion of STI, with a focus on R&D investment in industries and firms, is crucial for achieving these economic objectives.

STI's significance was further highlighted in the ASEAN Vision 2020, which envisions a technologically competitive ASEAN equipped with strategic and enabling technologies, a well-trained workforce, and robust networks of scientific institutions and centres of excellence. The ASEAN Plan of Action on Science, Technology, and Innovation, 2016–2025, formulated after the AEC launch in 2015, aims to create an STI-enabled ASEAN that is innovative, competitive, vibrant, sustainable, and economically integrated. This plan emphasises collaboration between the public and private sectors, talent mobility, STI awareness, innovation-driven economies, active R&D collaboration, technology commercialisation, and entrepreneurship (ASEAN, 2017).

Another major ASEAN sectoral body that links markets with the strategic priorities of innovation, R&D, and technology commercialisation is the ACCMSME. The ASEAN Strategic Action Plan for SME Development, 2016–2025, adopted on 1 January 2016, identifies specific STI implementations to develop SMEs. The strategic plan aims to promote key technology applications to businesses for innovation by enhancing incentives for innovation awards and knowledge-based creative and green industries at the national level, creating a knowledge platform and incentives for fostering manufacturing and knowledge-based industries by leveraging the ASEAN Business Incubator Network

platform, developing capacity building programs on IPR awareness and commercialisation for SMEs at the national level, and strengthening existing Technology Transfer Centres to commercialise new products (ASEAN, 2015a).

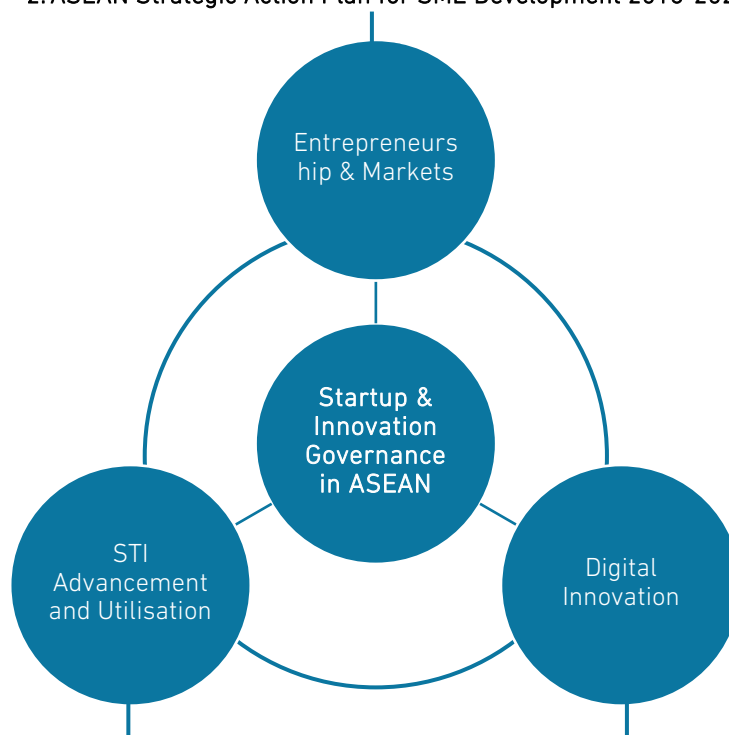
While the AEC framework primarily focuses on economic impacts, the sociocultural implications of innovation should not be neglected. The ASCC Blueprint 2025 continues to emphasise STI within the context of education systems, aiming for a creative, innovative, and responsive ASEAN. By incorporating these elements, ASEAN aims to build a cohesive and integrated STI ecosystem that supports both economic and sociocultural development across the region (ASEAN, 2016). ASEAN innovation efforts also increasingly acknowledge the role of start-ups in driving economic growth and innovation, for which skills development, creativity, and higher education are very important building blocks, as highlighted in previous chapters of this paper.

When looking more specifically at start-up development, in addition to the broad STI governance landscape, various sectoral bodies within ASEAN have developed significant regional initiatives to support and grow start-ups, reflecting the significance of start-ups to economic growth. These initiatives align with specific policies and sectoral focuses of different ASEAN bodies. This sectoral approach mirrors the fragmented start-up ecosystem governance at the national level, where no single agency within AMS addresses start-up promotion and development across all stages but instead the work for start-up promotion, development, and growth is spread over multiple governmental/semi-governmental agencies, based on their mandates. This results in a networked model of national start-up ecosystem policymaking, sometimes anchored by SME agencies (e.g. Darussalam Enterprise (DARE) in Brunei Darussalam and Enterprise Singapore) and sometimes by innovation ministries and related agencies (e.g. the Ministry of Industry, Science, Technology and Innovation in Cambodia and the Ministry of Science, Technology and Innovation in Malaysia). This governance arrangement is not unique to ASEAN but is quite common in many countries around the world, and it reflects the interdisciplinary nature of innovation and start-up policy that lies at the intersection of different policy domains (e.g. skills development, industrial policy, science and technology and research policy, higher education, and university policy). This fragmented yet interconnected approach ensures that diverse needs and stages of start-up development are met, on the one hand, but risks exacerbating fragmentation and lack of horizontal coordination on the other hand.

ASEAN sectoral bodies and related initiatives shown in Figure 5 have produced some key milestones and strategic actions to support the start-up ecosystem in the region. These initiatives are reflected in various ASEAN documents, annual priorities, and events; and are discussed in section 4.2.

Figure 5: The Nexus of Start-up and Innovation Governance in ASEAN

1. ASEAN Coordinating Committee of Micro, Small, and Medium Enterprises (ACCMSME)
 - ASEAN-ROK Startups Partnership
 - ASEAN-ROK Startup Ecosystem Study
 - ASEAN Guidelines on Fostering a Vibrant Ecosystem for Startups across Southeast Asia
2. ASEAN Strategic Action Plan for SME Development 2016-2025



1. ASEAN Committee on Science, Technology and Innovation (COSTI)
 - ASEAN Startup Initiative
 - ASEAN-India Startup Festival
 - ASEAN-India ScaleHub
 - ASEAN-ROK AI Startup Competition
 - China-ASEAN Innovation and Entrepreneurship Competition
 - ASEAN Plan of Action on Science, Technology and Innovation (APASTI) 2016-2025
2. ASEAN Ministerial Meeting on Science, Technology and Innovation (AMMSTI)
3. AEC-wide framework: The ASEAN Comprehensive Recovery Framework (ACRF)

1. ASEAN Digital Ministers Meeting (ADGMIN)¹
 - ASEAN ICT Masterplan 2016-2020
 - Framework for Promoting the Growth of Digital Startups in ASEAN
 - The ASEAN Digital Awards
2. ASEAN Digital Senior Officials Meeting (ADSOM)
 - ASEAN Digital Masterplan 2025 (ADM 2025)
3. ASEAN Coordinating Committee on E-Commerce and Digital Economy (ACCED)²
 - ASEAN Digital Integration Framework (DIF 2018) and its action plan (DIFAP 2019-2025)

ACCMSME = ASEAN Coordinating Committee of Micro, Small, and Medium Enterprises; ACCED = ASEAN Coordinating Committee on E-Commerce and Digital Economy; ACRF = ASEAN Comprehensive Recovery Framework; ADGMIN = ASEAN Digital Ministers Meeting; ADGSOM = ASEAN Digital Senior Officials' Meeting; AEC = ASEAN Economic Community; AI = artificial intelligence; AMMSTI = ASEAN Ministerial Meeting on Science, Technology and Innovation; ASEAN = Association of Southeast Asian Nations; COSTI = ASEAN Committee on Science, Technology and Innovation; ICT = information and communication technology; ROK = Republic of Korea; SMEs = small and medium-sized enterprises; STI = science, technology, and innovation.

* Formerly known as the ASEAN Telecommunications and Information Technology Ministers Meeting (TELMIN), which held its inaugural meeting in July 2001. In October 2019, TELMIN agreed to rename the ministerial body ADGMIN.

** Renamed in 2022, formerly the ASEAN Coordinating Committee on E-Commerce.

Source: Authors.

4.2. Key ASEAN Initiatives to Support Regional Start-up and Entrepreneurship Ecosystems

The ASEAN ICT Masterplan, 2016–2020 was adopted in November 2015 during Malaysia’s ASEAN Chairmanship at the 15th ASEAN Telecommunications and Information Technology Ministers Meeting (TELMIN). Initiative 3.2 of the masterplan made innovation one of the strategic thrusts in promoting collaboration and innovation between the public and private sectors. Notably, action point 3.2.1 was the first specific action in an ASEAN document referring to the nurturing of the start-up ecosystem, recognising that start-ups require different approaches compared with traditional MSMEs, although they are still considered a subset of MSMEs. This action point aimed to develop a supportive ecosystem for start-ups by connecting government, schools, and the private sector. The targets of this action point included studying the existing start-up ecosystem and developing platforms to connect start-ups with private investors (ASEAN, 2015b). Although the ASEAN ICT Masterplan 2020 Final Review indicated that these initiatives were only moderately complete, it found the insights valuable for stakeholders (ASEAN, 2021b).

In 2020, the ACCMSME released the ASEAN Guidelines on Fostering a Vibrant Ecosystem for Startups across Southeast Asia. These guidelines serve as a common reference for ACCMSME and AMS in shaping start-up policies. They detail how policymakers can create and sustain a vibrant ecosystem for scalable start-ups at the subnational, national, and regional levels, outlining common principles and priority intervention areas for AMS. The guidelines also emphasise the need for continuous policy support for entrepreneurship and start-ups, even as governments bolster traditional enterprises to manage the fallout from COVID-19. This broader approach acknowledges the importance of enhancing the environment for traditional new businesses, though the primary focus remains on high-risk, high-reward enterprises (ASEAN, 2020a). Box 4 lists the seven factors and 10 guidelines of the ACCMSME Guidelines.

Box 4: ACCMSME Guidelines on Fostering a Vibrant Ecosystem for Start-ups Across Southeast Asia

The guidelines of the Association of Southeast Asian Nations (ASEAN) Coordinating Committee on Micro, Small and Medium Enterprises (ACCMSME) aim to create a supportive environment for scalable start-up growth, facilitate cross-border expansion, and enhance regional integration. They highlight seven factors that contribute to a thriving start-up ecosystem: regulatory frameworks, infrastructure, market conditions, access to finance, knowledge generation and dissemination, capabilities, and cultural aspects (ASEAN, 2020b). By addressing these factors comprehensively, ASEAN policymakers can continuously create a conducive ecosystem that supports the growth and success of start-ups, driving economic development and innovation. The committee suggests developing a ‘doing business’ index for start-ups to evaluate regulatory environments across different regions.

The guidelines also emphasise the need for regional and local efforts. Regionally, simplifying and harmonising regulations and promoting cross-border information exchange are crucial. Locally, 10 guidelines are proposed to foster vibrant entrepreneurship ecosystems:

- (i) Establish a policy lead, define active start-ups, and set objectives.
- (ii) Consider start-up impact in policy frameworks.
- (iii) Identify policy priorities for the entire ecosystem.
- (iv) Recognise that progress may be slow, especially in younger markets.
- (v) Build partnerships between higher and lower middle-income countries.
- (vi) Incorporate competition into eligibility criteria and establish exit mechanisms.
- (vii) Continuously test the policy environment for start-ups, particularly in new sectors.
- (viii) Engage in regular dialogue with the private sector.
- (ix) Level the playing field for under-represented groups.
- (x) Make measurement and evaluation a cornerstone of policy.

Source: ASEAN (2020b).

Priority Area V of the ASEAN Digital Integration Framework adopted in August 2018 focuses on fostering entrepreneurship – recognising the need to assist digital MSMEs in navigating the business ecosystem, from ease of start-up to digital regulations. AMS are encouraged to simplify business set-up processes and ensure that new digital policies do not hinder MSMEs (ASEAN, 2018). The ASEAN Digital Integration Framework Action Plan, 2019–2025 provides further policy directions for formalising and promoting digitalised microenterprises. Outputs include the Policy Guidelines on the Digitalisation of ASEAN Micro Enterprises, adopted by the ASEAN Economic Ministers at the 51st ASEAN Economic Ministers Meeting in 2019, and an action agenda for digitalising ASEAN MSMEs through capacity building initiatives (ASEAN Coordinating Committee on Electronic Commerce, 2018).

The ASEAN Comprehensive Recovery Framework (ACRF) and its Implementation Plan were adopted in November 2020 at the 37th ASEAN Summit. The ACRF recognises the development of innovative and scalable start-ups as crucial for adapting to new business conditions post-COVID-19. It encourages the development of start-up guidelines and follow-up activities to maximise intra-ASEAN market potential and broader economic integration (ASEAN, 2020a). The ACRF also emphasises the need for a more sustainable and inclusive post-pandemic recovery, of which start-ups ecosystems can be an important pillar.

The ASEAN Digital Masterplan 2025, adopted in January 2021 at the First ASEAN Digital Ministers Meeting, addresses the need for local innovation and digital start-ups. It builds on the ASEAN ICT Masterplan 2020 projects and sets enabling actions to develop frameworks encouraging digital start-up growth. One key action (enabling action 7.3) aims to foster a conducive environment for digital start-ups in ASEAN, while enabling action

EA4.1 focuses on harmonising digital regulations to facilitate cross-border data flows and establish a regional computer security incident response team (ASEAN, 2021a).

Under Cambodia's ASEAN Chairmanship in 2022, the ASEAN Digital Ministers Meeting endorsed the Framework for Promoting the Growth of Digital Startups in ASEAN. This framework provides a voluntary and non-binding reference for developing enabling ecosystems for digital start-ups. It identifies six key pillars – talent, education, funding, connectedness, legal environment, and infrastructure – and offers a comprehensive examination of each pillar to support national start-up ecosystem design (ASEAN, 2021b).

The ASEAN Digital Awards, formerly known as the ASEAN ICT Awards, celebrate digital achievements in various categories, such as the public sector, the private sector, digital content, digital inclusivity, digital start-ups, and digital innovation. These awards recognise the utilisation of emerging technologies, including AI and data, within the ASEAN digital economy, fostering innovative endeavours and contributing to the region's digital landscape. The winners of the awards were announced at the Fourth ASEAN Digital Ministers Meeting in Singapore on 30 January–2 February 2024 (ASEAN, 2024c).

In June 2023, the 12th IAMMSTI endorsed an annual priority titled 'Establishing ASEAN Technology Startup Initiative', led by Malaysia (ASEAN, 2023c). This initiative aims to regionalise ventures, develop cross-border talent, establish go-to-market channels, and stimulate foreign direct investment and potential investments amongst start-ups, investors, AMS, Dialogue Partners, and corporations. Success metrics align with ASEAN's Guidelines on Fostering a Vibrant Ecosystem for Startups Across Southeast Asia 2021, targeting achievements by 2026. By Q4 2024, development includes data categorisation, user interface and user experience (UI/UX) improvements, and ASEAN-focused content curation (ASEAN, 2024a). The 20th AMMSTI in June 2024 noted the progress on the annual priority, highlighting it as a comprehensive ASEAN start-up ecosystem portal offering start-up information, tech entrepreneurship activities, and a news section. The portal also facilitates direct engagement between start-ups and investors, enhancing funding and partnership opportunities regionally (ASEAN, 2024b).

The numerous initiatives described above exemplify how ASEAN has recognised the importance of regional cooperation on innovation since the 1970s, as witnessed by the establishment of STI-dedicated bodies. Moreover, over the last decade, start-up and entrepreneurship regional initiatives have become increasingly frequent and visible. These initiatives go beyond policies and strategies in each AMS and are an attempt to foster an ASEAN-wide innovation ecosystem. The evolution of these ASEAN-wide bodies and initiatives since the 1970s shows the increasing importance of innovation and entrepreneurship as a regional policy priority and reflects how important they have become for the economic development trajectory of ASEAN and its transition towards a knowledge-based economy, as detailed in the initial chapters of this report.

Since its establishment in 2023, the ERIA Digital Innovation and Sustainable Economy Centre (E-DISC) has aimed to support the overall ASEAN innovation and entrepreneurship regional agenda. By organising initiatives such as the ASEAN Policy Roundtables and the One ASEAN Startup Award (Box 5), E-DISC brings together stakeholders from various sectors to discuss and address the challenges faced by ASEAN start-ups. This

collaboration aims not only to help identify and navigate obstacles but also to chart a future path for the tech start-up ecosystem in ASEAN. E-DISC's commitment extends beyond policy dialogue and knowledge products to support innovation through funding and partnerships. By promoting collaboration amongst start-ups, academia, and industry experts, E-DISC aims to drive digital transformation and sustainable economic growth in the region. These activities have the goal of creating an environment conducive to innovation, ultimately benefiting the broader ASEAN economy (Box 5).

Box 5: E-DISC and the One ASEAN Startup Award

The newly established Economic Research Institute for ASEAN and East Asia (ERIA) Digital Innovation and Sustainable Economy Centre (E-DISC) facilitates collaboration, knowledge sharing, and transformative initiatives that aim to harness the power of digital technologies for sustainable economic growth, social development, and environmental stewardship. E-DISC's priorities include:

1. **Digital trade:** using technology to bolster digital goods and services, global value chains, and e-commerce
2. **Data governance:** developing unified rules and cybersecurity measures
3. **Innovation and entrepreneurship:** empowering small and inclusive businesses and start-ups through technology and innovation

E-DISC's flagship initiative on innovation and entrepreneurship is the **One ASEAN Startup Award**, initiated to support the development of a start-up ecosystem in the Association of Southeast Asian Nations (ASEAN). This award, launched in 2024, seeks to recognise, reward, and promote start-ups to grow rapidly; address ASEAN-wide issues; and drive positive change. The award consists of three pre-events held in Manila, Kuala Lumpur, and Phnom Penh, where winning start-ups from each pre-event compete in the final competition in the Lao People's Democratic Republic (Lao PDR), which will hold the ASEAN Chairmanship in 2024.

One ASEAN Startup Award: Celebrating Innovation and Impact

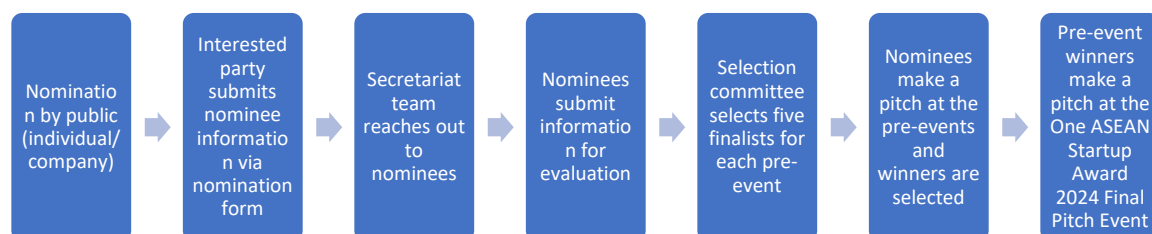
The One ASEAN Startup Award, spearheaded by E-DISC, recognises and rewards outstanding start-ups that demonstrate significant innovation and positive impact across Southeast Asia. This award is open to start-ups utilising cutting-edge technologies, such as artificial intelligence (AI), to solve real-world problems and drive socio-economic growth.

The award categories include digital/AI and impact start-up, focusing on entities that leverage AI for various applications and those that generate positive social and environmental impacts while achieving financial returns. Winners receive a US\$10,000 research grant; gain access to E-DISC's extensive network of industry stakeholders, which includes key players in the start-up ecosystem such as national agencies from ASEAN Member States (AMS), venture capitalists, incubators, and large corporations; and are invited to collaborate on year-long research projects that influence policy and drive regional development.

By recognising and supporting these start-ups, the One ASEAN Startup Award aims to strengthen the ASEAN start-up ecosystem, foster innovation, and promote sustainable

development. This initiative not only highlights the region's entrepreneurial talent but also encourages start-ups to contribute to ASEAN's economic integration and growth. Figure B5 illustrates the application process of the One ASEAN Startup Award.

Figure B5: One ASEAN Startup Award Application Process



Source: ERIA (2024).

To be eligible, start-ups must have business operations in any AMS, without limitations on their origin. The nominated start-up should propose a research topic with an actionable plan and be willing to collaborate with ERIA experts on studies. Start-ups that were not selected as finalists in the first round may be nominated in the next pre-event.

Pre-event 1

E-DISC hosted the first pre-event of the One ASEAN Startup Award on 23 April 2024 in Manila.* The winner of the digital/AI category was FathomX, a digital health start-up based in Singapore, which aims to provide screening and diagnostics of breast cancer through its AI-powered solution. The winner of the Impact Startup category was Rezbin Waste Technology, a waste recovery app based in the Philippines, which aims to reduce plastic waste in the country by preventing it from entering landfills. The award panel discussed the potential of AI to revolutionise sectors and drive impact investment for social and environmental benefits while achieving financial returns.

Key messages around AI: Venture capitalists view AI as essential for innovation and efficiency in start-up business models and in small and medium-sized enterprises (which can lack capabilities to fully leverage the power of AI.) Key challenges include finding and empowering talent for AI adoption and providing education and training for effective AI use for young people and seasoned business executives. Policy initiatives are needed to bridge the gap in AI accessibility.

Key messages around Impact Startup: Defined as intentional investment with social or environmental benefits, impact investment is growing but faces challenges like long return periods (10+ years) and difficult impact measurement. Start-ups need to balance short-term profitability with long-term impacts. Standardised metrics are needed to align the objectives of investors and start-ups. Despite these challenges, impact

investment can improve society, increasing household incomes and enhancing quality of life.

Pre-event 2

The second pre-event of the One ASEAN Startup Award took place in Kuala Lumpur on 25 June 2024.** The winner of the digital/AI category was Toybox Creations and Technology, the company that launched Toy Eight, a child developmental screening tool. This tech start-up is based in Malaysia and aims to create awareness for early intervention planning in preschool children. The winner of the Impact Startup category was Midwest Composites, a composites engineering firm based in Malaysia, which aims to lead the green materials technology revolution in the aerospace and defence industry through the use of natural fibres.

Key messages around AI: Emphasised market size, speed to market, and unique economics for investing in start-ups. Challenges include corporate reluctance to innovate and weak academia–industry collaboration. Recommendations included fostering an AI research ecosystem and partnerships with universities, as seen by AI Nusantara’s Selangor Digital School, and enhancing talent management and optimising organisational processes. Cautioned against misapplying AI in search of a problem.

Key messages around Impact Startup: Impact investments are growing but remain scarce in ASEAN, and few are headquartered in the region. Examples like Mayani, an innovative agri-tech social enterprise in the Philippines, show societal benefits, such as increased farmer incomes. Challenges include long return periods and measuring impact. Recommendations included improving funding access, promoting start-up–company collaborations, and developing supportive policies. The discussion called for a multi-stakeholder approach to support impact start-ups in ASEAN.

Pre-event 3

The final pre-event took place on 2 September 2024 in Phnom Penh.*** After a competitive process and pitch session, a judging committee from AMS and ERIA selected 10 finalists for the in-person pitch event. Two startups emerged as the winners of this final pre-event: Ipinfra Networks in the Digital/AI Category and Sala in the Impact Startup Category. These winners will compete with those from pre-event 1 and pre-event 2 at the final pitch event to determine the winner of the One ASEAN Startup Award 2024 in Lao PDR on 9 October 2024, as part of the ASEAN Business and Investment Summit 2024.

Key messages around AI: Stressed the need for better data management, AI talent, and capital access in Southeast Asia, particularly in Cambodia. Barriers include limited resources, infrastructure gaps, and a digital skills divide. Recommendations: raise data awareness, boost AI education, and foster government–industry collaboration through initiatives like Cambodia’s Digital Skills Roadmap 2024-2035. AI can bridge economic gaps by supporting rural communities but requires careful handling of bias in models. This panel session also encouraged forming partnerships with global tech firms for workforce upskilling and digital transformation.

Key messages around Impact Startup: Highlighted the role of financial services, education, and ecosystem support in enabling impact startups. Challenges include limited early-stage funding, the need for entrepreneurial skills, and integrating impact with business models. Recommendations focused on fostering entrepreneurial mindsets, offering prototyping funds, and expanding impact funding opportunities. The panel discussion emphasised the importance of developing local talent and engaging the Cambodian diaspora to drive further growth. It also highlighted the need for stronger government policies on data privacy, consumer protection, and streamlined business registration processes.

One ASEAN Startup Awards – Finals

The final event was held in Lao PDR as part of the ASEAN Business Investment Summit 2024 in October. Finalists included FathomX, Rezbins Waste Technology, Toy Eight, Midwest Composites, Ipinfra, and Sala. These startups showcased innovative solutions addressing key ASEAN-wide challenges, each contributing to positive change in their respective fields. In addition to the competition, two notable startups, Wayha Sokxay Technology in the Digital/AI category and FINA Fintech in the Impact Startup category, were invited by the Lao National Chamber of Commerce and Industry (LNCCI) to pitch their groundbreaking ideas, though they were not competing in the final round. A judging committee, composed of representatives from ASEAN Member States and ERIA, evaluated the finalists, and the grand prize winner was announced during the ceremony.

Notes:

* For more information, see ERIA (2024), 'ERIA Announces Winners of the First Pre-Event for the One ASEAN Startup Award 2024', Press release, 23 April. <https://www.eria.org/news-and-views/eria-announces-winners-of-first-pre-event-for-the-one-asean-startup-award-2024>

** For more information, see ERIA (2024), 'ERIA Unveils Winners of Second Pre-Event for 2024 One ASEAN Startup Award in Kuala Lumpur', Press release, 25 June. <https://www.eria.org/news-and-views/eria-unveils-winners-of-second-pre-event-for-2024-one-asean-startup-award-in-kuala-lumpur>

***For more information, see ERIA (2024), 'ERIA Names Winners of Third Pre-Event for 2024 One ASEAN Start-up Award in Phnom Penh'. Press release, 2 September. <https://www.eria.org/database-and-programmes/eria-names-winners-of-third-pre-event-for-2024-one-asean-start-up-award-in-phnom-penh>

Source: Authors.

Chapter 5

Comparing ASEAN's Innovation Ecosystem with the Rest of the World

Innovation rarely occurs in isolation, and global networks of talent, ideas, and knowledge flows are vital for start-ups and entrepreneurs (Kerr, 2019). Moreover, over the last few decades, the geography of innovation has been changing with the emergence of many new players globally (Ajmone Marsan, 2023). ASEAN needs to strengthen connections with established and emerging global innovation players, notably with countries within the Group of Twenty (G20) and other relevant global and regional forums. ASEAN must be aware of its positioning relative to the rest of the world, recognising that many players in emerging economies, such as Brazil, some African and Middle Eastern countries, and India, are rising fast. ASEAN is already connecting and looking at more advanced innovation ecosystems in North America, Europe, and Northeast Asia. These ecosystems and regions are often already relatively well known to ASEAN innovators, and several recently launched international cooperation mechanisms such as the China–ASEAN Innovation and Entrepreneurship Competition 2023 or the Korea–ASEAN AI Development Startup Competition are already in place. Linkages with the fast-emerging Indian ecosystems are also developing quickly, thanks to geographical proximity and several recent initiatives, including the ASEAN–India Startup Festival launched in 2022 (ASEAN, 2022a). ASEAN must understand its comparative advantages but also its weaknesses and challenges vis-à-vis both global emerging and established players, and ASEAN's global positioning should become an integral part of any ASEAN-wide innovation strategy.

At the G20 level, the recent Indonesian and Indian G20 presidencies represented an opportunity to foster innovation policy approaches in emerging economies (Ajmone Marsan, 2023). Both presidencies focused on innovation and entrepreneurship policy priorities by emphasising inclusivity and the importance of addressing the needs of emerging and developing countries. Indonesia's presidency was marked by initiatives in energy transition, digital financial inclusion, and a new financial intermediary fund for pandemic preparedness. India, on the other hand, focused on scientific expertise and behavioural change for environmental sustainability, and elevated the African Union to G20 membership. Key themes included promoting a fair and equitable global governance agenda; reforming multilateral development banks; and tackling issues like food insecurity, climate financing, and digital transformation. Both countries used their presidencies to project international leadership while addressing domestic priorities, with a strong focus on inclusivity and multilateral cooperation.

Connecting ASEAN to global start-up ecosystems is also important to promote global talent circulation, which is vital for fostering innovation and entrepreneurial ecosystems, as exemplified by leading international examples from the Silicon Valley (Saxenian, 2007) to the United Arab Emirates or at city level – Bengaluru, New York City, Paris, and London (Walther, 2024; StartupBlink, 2024a). These are all examples of innovation ecosystems

that benefitted tremendously from talent attraction and their ability to tap into global networks of highly skilled individuals. The mobility of highly skilled individuals benefits both their new locations and their home countries (Kerr, 2019). Post-pandemic, digital nomad visas and talent attraction schemes are gaining popularity in ASEAN, with significant variation across countries. These initiatives can attract global talent but must focus on creating effective ecosystems and connections between foreign and domestic talent (Ajmone Marsan and Litania, 2023).

5.1 Global Innovation Performance Comparison

This section offers an overview of ASEAN's position vis-à-vis leading and emerging global innovation players. Table 7 provides a snapshot of how ASEAN compares with other selected economies (for ease of comparison, some leading and emerging innovation players within the G20 have been selected).

Table 7: Comparative Overview of ASEAN and Selected Economies on Key Innovation and Economic Indicators

Indicator	Year	ASEAN	United States	UK + EU	China	Japan	Rep. of Korea	India	Brazil	South Africa	Source
Population, total (million)	2023	685.37	334.91	517.83	1,410.71	124.52	51.71	1,428.63	216.42	60.41	World Development Indicators
GDP per capita PPP (current international \$)	2023	16,665.77	81,695.19	60,158.11	24,557.64	50,206.61	54,033.16	10,175.77	20,584.42	15,847.43	World Development Indicators
GDP (constant prices change), 2023 (%)	2023	4.3**** (South east Asia)	2.53	EU: 0.60* UK: 0.15*	5.24	1.92	1.36	7.83	2.91	0.60*	International Monetary Fund (2024) – with minor processing by Our World in Data; ADB, 2023
School enrolment, tertiary (% of gross)	2021-2023	NA	79.36 (2022)	EU: 77.50 UK: 82.65 (2022)	71.98 (2022)	63.17 (2021)	103.28 (2022)	42.63 (2023)	60.39 (2022)	25.36 (2021)	World Development Indicators

Universities in top 300 globally	2023	3	73	123	20	6	9	1	1	1	Times Higher Education
Global Innovation Index Rank	2023	NA	3	NA	12	13	10	40	49	59	Global Innovation Index 2023
Number of unicorns	2024	31	656	160	168	7	14	71	17	1	CBInsights (2024)
Gross expenditure on R&D (% of GDP)	2020-2022	NA	3.59 [^] ,*** (2022)	EU: 2.11** UK: 2.90** * (EU - 2022, UK - 2021)	2.56 (2022)	3.41 (2022)	5.21*** (2022)	0.65 (2020)	1.15 (2020)	0.62 (2021)	OECD MSTI database World Development Indicators
Total patent applications, direct and PCT national phase entries, per million inhabitants	2020-2022 Average	22.85	1,526.14	910.50	1,077.99	3,295.07	5,157.42	32.53	32.93	38.27	WIPO IP Statistics Data Center

ASEAN = Association of Southeast Asian Nations; EU = European Union; GDP = gross domestic product; IP = intellectual property; NA = not available; OECD = Organisation for Economic Co-operation and Development; MSTI = Main Science and Technology Indicators; PCT = Patent Cooperation Treaty; PPP = purchasing power parity; R&D = research and development; UK = United Kingdom; WIPO = World Intellectual Property Organization.

Source: Compiled by the authors based on the sources listed in the table.

Apart from Singapore, no AMS competes at a global level in education. According to the *Times Higher Education* World University Rankings, ASEAN has only three universities ranked in the global top 300: two from Singapore and one from Malaysia. The region's low education quality is further evident in the PISA scores, where all AMS, except Singapore, rank below the OECD average, as detailed in chapter 2 of this report.

Furthermore, ASEAN underperforms on most indicators relative to its Northeast Asian G20 neighbours (China, Korea, and Japan). However, in its ability to produce unicorns, its performance is tied with India, superior to performance in South Africa, and just under Japan's figures. Therefore, although it vastly underperforms more mature economies in measurements related to education, R&D, and patent applications, the potential for start-up growth seems comparable to some of its neighbours and could outperform other emerging economies globally. This finding might indicate the need for more non-traditional units of innovation and entrepreneurship measurement. Table 8 shows the number of unicorns per 10 million inhabitants in ASEAN and around the globe as of July 2024.

Table 8: Unicorn Intensity Across Selected G20 Economies

Indicator	ASEAN	United States	UK + EU	China	Japan	Rep. of Korea	India	Brazil	South Africa	Source
Unicorns per 10 million inhabitants	0.45	19.59	3.09	1.19	0.56	2.71	0.50	0.79	0.17	CBInsights (2024)

ASEAN = Association of Southeast Asian Nations, EU = European Union, UK = United Kingdom.

Notes: The number of unicorns is subject to variation as their valuation may change over time. The unicorn valuations are as of 22 July 2024.

Source: Authors.

It is also important to understand innovation dynamics in other emerging economies in Latin America, Africa, and the Middle East. Some of these ecosystems have similar characteristics to ASEAN in terms of demographics or the size of the informal economy. For example, Box 7 presents interesting parallels amongst fintech innovations in Southeast Asia, Brazil, and Kenya, which some venture capital firms and innovation enthusiasts are closely monitoring (Looi, 2024).

The start-up ecosystem in Africa began to take shape during the early 2000s (2000–2009), primarily in South Africa, Nigeria, Egypt, and Kenya. These four nations continue to lead the continent’s start-up environment, collectively accounting for 81% of the total funding secured by African start-ups. This dominance underscores their pivotal role in driving innovation and economic growth across the region (Odufuwa and Mureithi, 2023). Countries like Egypt and Nigeria are large markets, with 111 million and 219 million inhabitants, respectively; a median age of less than 25 years; and economic growth rates of 3.2% and 6.6%, respectively, in 2022. Although unicorns from African countries do not perform as well as ASEAN on innovation and entrepreneurship indicators, they are emerging players showing early signs of high potential. This presents AMS with both an opportunity and a threat. As mentioned in chapter 1 of this report, the window to transitioning AMS economies from a resource-based economy to a knowledge-based entrepreneurial economy is closing. In the coming decade, investors may shift their focus to African countries like Egypt and Nigeria, driven by their young, rapidly growing populations and the progress of the African continental economic integration agenda. These markets could also offer opportunities for ASEAN-based companies that are able to scale their operations in time. However, regardless of these potential shifts, more action is needed now to ensure the long-term development of the ASEAN region.

Another part of the globe from which ASEAN can learn is the Gulf Cooperation Council countries, including Saudi Arabia and the United Arab Emirates, which have developed ambitious tech and innovation strategies and made sizeable investments in their domestic start-up ecosystems (Alwetaid, 2023; United Arab Emirates Ministry of Cabinet Affairs, 2024; Sutrisno, 2024). Over the next few decades, these emerging players may increasingly become recipients of innovation-related investments and potentially become both ASEAN ‘competitors’ and innovation partners. ASEAN should continue to monitor the fast-evolving global landscape to identify opportunities to foster international linkages and become an active player in global innovation networks.

Box 7: Fintech in Brazil and M-Pesa in Kenya

Investors and start-ups in the Association of Southeast Asian Nations (ASEAN) can draw valuable lessons from Brazil and Kenya's fintech evolution, adapting successful strategies to their local contexts to drive growth and innovation in the region.

Brazil's fintech sector can provide useful lessons for Southeast Asia. Brazil has experienced significant growth in digital banking, payments, and lending, driven by high consumer demand and supportive regulations from the Central Bank of Brazil, such as the open finance regulation and the instant payment mechanism PIX. These regulations encourage competition and innovation while ensuring financial stability. Brazilian fintech companies have overcome challenges such as high interest rates and economic volatility by leveraging technology to provide accessible and affordable financial services. They use advanced technologies like AI, machine learning, and blockchain to enhance services and the user experience. Collaborations between fintech start-ups, traditional banks, and technology companies have been crucial for rapid scaling and offering a wider range of services.

A concrete example of a fintech product is M-Pesa. Launched in 2007 in Kenya, M-Pesa is a mobile money transfer service that revolutionised fintech by enabling users to deposit, withdraw, and transfer money using mobile phones without the need for a bank account. It became pioneering due to its simplicity, accessibility, and ability to serve unbanked populations.

Lessons from Brazil and Kenya for the ASEAN region include leveraging mobile technology to enhance financial inclusion, ensuring regulatory support, and fostering public-private partnerships to build scalable and sustainable fintech solutions. Understanding and addressing the unique needs of the local population, such as the unbanked or underbanked, can drive adoption and growth. Collaborating with traditional financial institutions and tech companies can provide the necessary resources and scale for success, facilitating knowledge transfer and innovation.

Sources: Looi, 2024; Strange and Oliveira (2022).

Chapter 6

Lessons Learned from the E-DISC Survey of ASEAN Innovators

This chapter of the report describes key findings from a survey covering ASEAN innovators and ecosystem key players. The main three findings from the survey include the need for ASEAN's start-up and innovation ecosystem to improve **access to capital**, **access to markets**, and **access to talent**.

The interview process for this white paper collected insights from a diverse group of stakeholders across all 10 AMS. Conducted online from March to May 2024, the interviews included representatives from start-ups, venture capitalists, incubators, accelerators, and government agencies. In total, the interviews involved 24 start-ups, 14 venture capitalists, 3 incubators, 1 accelerator, 1 business association, 1 start-up ecosystem hub, and 10 government agencies. Key figures such as founders, chief executive officers (CEOs), managing partners, and directors provided perspectives on the current state and future of the start-up ecosystem, addressing challenges, opportunities, and policy recommendations for fostering innovation and growth within ASEAN. Annex IV lists the various stakeholders interviewed. To ensure a representative sample, respondents were selected from all 10 AMS and different industry sectors within ASEAN. Data analysis focused on identifying patterns and differences in investment strategies and priorities, providing a detailed overview of the current investment landscape in the ASEAN region.

The key topics that emerged from the interviews and survey results are the following:

6.1. Access to Capital

Access to capital is a pivotal factor for economic development, especially in emerging markets like ASEAN where start-up growth is essential for job creation and market dynamism. Venture capital, angel investors, and other funding sources play a crucial role in enabling start-ups to innovate and expand, contributing significantly to economic growth. However, accessing finance in ASEAN poses substantial challenges, particularly in weaker economies where high interest rates and limited borrowing power hinder entrepreneurial activities. These financial constraints, influenced by macroeconomic instability and underdeveloped financial markets, perpetuate cycles of poverty and stifle economic progress.

The macroeconomic environment, complicated by global factors and geopolitical tensions, has impacted investor confidence and financial market stability. For instance, trade disputes and political instability can lead to economic uncertainty and capital flight, exacerbating the challenges faced by start-ups in securing funding. In 2023, global equity funding for tech start-ups declined by 38%, amounting to US\$285 billion, while Southeast

Asia experienced a more pronounced 65% decrease, dropping from US\$12.4 billion to US\$4.3 billion, compared with 2022 figures. This downturn, referred to by some as the 'funding winter', reflects broader economic challenges including global inflation, higher interest rates, disrupted supply chains, and heightened geopolitical tensions (Mahusin, Prilliadi, and Muhammad, 2024). These factors collectively dampen investor confidence and limit financial support available to start-ups

Moreover, access to funding remains a significant hurdle in ASEAN due to insufficient government support, high taxes deterring foreign investment, and limited availability of venture capital, especially in smaller markets and at the early stages of start-up development. High capital gains taxes, such as in Indonesia (30%–35%) deter foreign investors, prompting them to seek tax-favourable investment alternatives elsewhere.⁹ This tax burden hampers investment inflows crucial for start-up growth and market expansion.

In smaller ASEAN markets like Cambodia and the Lao PDR, start-ups struggle to attract adequate funding due to their limited domestic markets, lack of investor attention, and the high risks perceived by potential investors.¹⁰ Start-ups in these countries, exemplified by Sala Tech, PillTech, and OBOR Capital, cite restricted access to funding options like venture capital and angel investors as major barriers to scaling operations.¹¹ Start-ups in Southeast Asia encounter significant challenges in securing their initial venture capital round, despite competitive markets, robust economic growth, and ample availability of Series A and Series B funding.¹² This gap at the seed stage highlights a critical funding hurdle that impedes early-stage start-up growth and innovation.

Additionally, a notable 'missing middle' phenomenon is present, where both start-ups and MSMEs in the early- to growth-stage phases struggle to access adequate financing. These businesses often exceed thresholds for microfinance yet are perceived as risky by traditional financial institutions, creating a funding gap that inhibits their development (ASEAN Business Advisory Council, Oxfam, and AVPN, 2017).

Improving access to finance for start-ups involves creating a diverse range of funding options tailored to their needs, which enhances market attractiveness and provides more exit opportunities for investors. This can be achieved by enhancing institutional transparency, clarifying regulations, and strengthening investor protection and corporate governance frameworks. Policymakers can play a pivotal role by implementing targeted interventions such as tax incentives for start-up investors, public-private co-investment initiatives, and educational programmes on financial literacy. These measures collectively stimulate investment, foster innovation, and support sustainable growth in the start-up ecosystem (ASEAN, 2020b).

⁹ Interview with Indogen Capital (venture capital firm).

¹⁰ Interviews with Tun Yat (start-up), PillTech (start-up), and LOCA (start-up).

¹¹ Interviews with Sala Tech (start-up), PillTech (start-up), and OBOR Capital (venture capital firm/incubator/accelerator).

¹² Interview with 1982 Ventures (venture capital firm)

6.2. Access to markets

Economic integration allows countries to leverage regional partnerships to enhance their domestic skill sets and capabilities. Access to regional partners enables countries to share knowledge, technology, and best practices, significantly boosting innovation and productivity. For instance, less mature countries can benefit from the expertise and technological advancements of more developed neighbours, while countries with smaller domestic markets can access bigger markets and talent pools. This collaborative approach not only strengthens individual economies but also contributes to the collective economic growth of the region.

ASEAN demonstrates significant dynamism in trade through various agreements and economic partnerships. The ASEAN Free Trade Area promotes regional trade by reducing tariffs amongst Member States. ASEAN+1 agreements extend this collaboration to include countries like China, Japan, and Korea, enhancing economic integration. The ASEAN-centred Regional Comprehensive Economic Partnership expands this network, creating a large free trade area. Additionally, the Comprehensive and Progressive Agreement for Trans-Pacific Partnership involves several AMS, fostering deeper trade ties across the Pacific. Forums like Asia-Pacific Economic Cooperation provide broader platforms for economic cooperation, underscoring ASEAN's active role in global trade and investment frameworks.

However, despite these developments, considerable obstacles and challenges for cross-border business operations remain. This economic fragmentation within ASEAN poses significant challenges to the region's pursuit of innovation and economic growth. A 2023 HSBC survey of over 3,500 businesses with a commercial interest in at least one ASEAN market revealed that 91% planned to expand in the region. However, 29% of respondents cited the pace of regulatory change as a hurdle to conducting business in ASEAN (HSBC Global Research, 2024).

As mentioned in chapter 2, AMS vary widely in terms of size, regulations, and languages, customer behaviour, culture, demand, and purchasing power, which further complicate market integration.¹³ In particular, the lack of harmonisation of rules and regulations results in inefficiencies and missed opportunities for businesses, including limiting trade within the region. Starting a new business in the Philippines, for example, takes an average of 33 days and 13 different processes (World Bank, 2020b), compared with just 1.5 days and two processes in Singapore (World Bank, 2020c).

Non-tariff measures continue to represent an important obstacle to market integration (Doan and Rosenow, 2019; Ing et al., 2019). Non-tariff measures and more general non-alignment of standards and regulations are typically a major obstacle for new firms like start-ups as they need to navigate, understand, and comply with multiple rules and

¹³ Interviews with FathomX (start-up), Living Lab Ventures (venture capital firm/incubator/accelerator), Softspace (start-up), Foxmont Capital Partners (venture capital firm/incubator/accelerator), Resync (start-up), and Aspire (start-up).

frameworks when deciding to export or set operations abroad and face the associated costs. Market fragmentation also results in high costs for cross-border transactions and difficulties in navigating legal frameworks and standards. These barriers are significant obstacles for start-ups to survive and scale, considering the limited resources available to firms at the beginning of their entrepreneurial journey.

AMS generally have more restrictive services policies compared with most regions, with their average Services Trade Restrictions Index being 60% higher than the global average. However, there is considerable variation across the region. Cambodia and Singapore have the most open policies, followed by Myanmar and Viet Nam with relatively few restrictions. In contrast, Indonesia, Thailand, the Philippines, and Malaysia have significant restrictions. The presence of few restrictions in some countries may reflect their regulatory readiness rather than true policy openness (ASEAN and World Bank, 2015).

Central to digital integration is the harmonisation of data regulations. Establishing clear rules governing the movement, use, and protection of cross-border data flows is crucial for countries to leverage an increasingly digitalised trade environment, and it is particularly beneficial for digital tech start-ups in the region. However, ASEAN faces challenges in regulatory harmonisation due to divergent preferences amongst Member States and limited intra-regional harmonisation. This vulnerability could lead to fragmentation in the global data governance regime, with ASEAN caught between distinct data regulatory models centred around major economies like China, the EU, and the US (Lee, 2023).

The issue of complex, inconsistent, and often opaque regulations across different AMS creates significant barriers to cross-border transactions and legal compliance for start-ups, especially for start-ups and MSMEs relying on digital services and operations such as e-commerce and cloud computing.¹⁴ Countries like Singapore and the Philippines have established frameworks that allow free data flow with minimal regulatory requirements, including personal data. Indonesia and Viet Nam, however, impose stringent requirements, for reasons related to public security and national security, which partially or completely prevents cross-border data flows. Malaysia and Thailand use rigorous compliance requirements such as domestic data protection or privacy laws to allow conditional cross-border data flows (Suvannaphakdy, 2023).

This variation in data flow regulations complicates the process of obtaining operational licences,¹⁵ and has financial consequences for countries in the region. Regulatory restrictions on cross-border data flows in countries like Indonesia and Viet Nam could reduce their GDP by 0.5% and 1.7%, respectively (Cory, 2017). International transfers can take days, and costs can add up to 10% of the transaction value, further complicating cross-border economic activities.

Additionally, the lack of interoperable payment solutions prevents both start-ups and MSMEs more generally from tapping into international markets. Some 97% of firms in the region fall into this category, with restricted information flows identified as a primary

¹⁴ Interview with Finbots.ai (start-up).

¹⁵ Interview with Julo (start-up).

obstacle (Suvannaphakdy, 2023). For instance, 37% of ASEAN's digital entrepreneurs and 42% of MSME owners face constraints in sending or receiving international payments, limiting their ability to expand operations across borders (World Economic Forum, 2022a). For some start-ups, the high costs associated with international transactions can amount to an additional 10% due to delays and foreign exchange spreads¹⁶ (World Economic Forum, 2022b).

To address these challenges, ASEAN could define its own rules for governing data through the DEFA. The DEFA demonstrates ASEAN's commitment to bolstering its digital economy, aiming to unlock US\$2 trillion by 2030. This initiative positions ASEAN as a leading player in the digital economy, providing significant benefits to start-ups and MSMEs by facilitating digital transformation and market expansion (ASEAN, 2023b). The DEFA underscores ASEAN's efforts to create a conducive ecosystem for entrepreneurship, innovation, and start-ups in the digital economy (ASEAN, 2023b). With DEFA negotiations set to conclude by 2025, ASEAN has an opportunity to shape its digital future holistically and succeed in the era of digital integration.

Continuing with the ASEAN integration agenda will strengthen ASEAN's cohesion and enhance its role in broader trade and economic agreements like the Regional Comprehensive Economic Partnership and the DEFA. Policymakers need to ensure that these agreements consider needs and opportunities for ASEAN start-ups, facilitating their ability to scale and thrive. By fostering a supportive environment for start-ups, ASEAN can leverage these agreements to drive innovation, economic growth, and regional competitiveness.

Finally, the global shift to a data-driven society further highlights the importance of addressing emerging security risks and enhancing international data governance. Asia, including ASEAN and Japan, should champion Data Free Flow with Trust, which promotes a trusted, interoperable global system for facilitating cross-border data flows. Japan has expressed interest in developing Data Free Flow with Trust projects in collaboration with ASEAN Digital Ministers and aligning with ASEAN priorities, including the DEFA. This collaborative approach aims to address security risks and legal uncertainties associated with cross-border data sharing and supply chains. Policy recommendations such as the Global Cross-Border Privacy Rules initiative, through ASEAN–Japan collaboration, could simplify market access for investors by providing more options for cross-border data flows. Involving all AMS could elevate the Global Cross-Border Privacy Rules to a truly global initiative, leveraging an ASEAN-led approach. Another recommendation is for ASEAN to collaborate with the OECD to create a transparent data governance repository. This repository would assist SMEs in navigating the complexities of cross-border data flows, making data governance more accessible and understandable. Additionally, establishing regulatory sandboxes for encryption, data security, and privacy-enhancing technologies could facilitate the testing of emerging technologies to ensure regulatory compliance across participating countries. Creating common checkpoints for testing

¹⁶ Interview with Tyne Solution (start-up).

could streamline processes and contribute to building an international infrastructure that enhances the interoperability of national systems (Oikawa, 2024).

6.3. Access to Talent

Access to a pool of skilled professionals – particularly in technology, marketing, management, innovation, creativity, and problem solving – is key to ASEAN's start-up ecosystem success. One of the key benefits of nurturing talent within ASEAN is the creation of a highly skilled workforce that can support the region's economic ambitions. Investment in education and vocational training programmes can help bridge the skills gap and meet the demands of various industries. This not only enhances individual employability but also boosts local and regional productivity, entrepreneurship, and innovation within companies. Furthermore, a well-educated and skilled workforce attracts foreign investment, as businesses seek regions with a competent labour pool to establish their operations. By prioritising talent development, ASEAN can create a competitive advantage in the global market. However, a United Nations Children's Fund (UNICEF) report on digital literacy in education systems across ASEAN underscored disparities in digital skills education amongst youth, with 61% of young people aged 10–24 not receiving formal instruction in digital skills because it is not part of the school curriculum (Nazara and Markus, 2024).

As such, start-ups across AMS are grappling with a severe shortage of tech talent amid fierce competition from large corporations.¹⁷ This challenge is compounded by ASEAN's low performance in the ASEAN Digital Integration Index, scoring 48.21 out of 100, emphasising the urgent need to enhance digital skills and talent development. Efforts must focus on promoting STEM education, combined with critical thinking and problem-solving skills development, and increasing employment in digital and knowledge-based industries (ASEAN and USAID, 2021). Additionally, mature start-ups face a shortage of advanced training programmes, particularly in leadership and management skills.

The average worker in Asia and the Pacific must acquire several new digital skills in the next 5 years, spanning basic skills like online communication and collaboration software, to advanced competencies such as cloud architecture design, to remain competitive amid technological advancements (Sklar, 2021). At the country level, Singapore alone needs 1.2 million more digital professionals by 2025, a 55% increase, to sustain competitiveness (Tan, 2021). Indonesia faces a significant shortfall of about 600,000 digital professionals for digital transformation until 2030, underscoring the critical need for skilled talent¹⁸ (OpenGov, 2021). Companies like ULAP Network are resorting to recruiting engineers from Eastern Europe by offering educational benefits due to difficulties in hiring locally.¹⁹ In

¹⁷ Interview with Enterprise Singapore (government agency).

¹⁸ Interview with KOMINFO (government agency).

¹⁹ Interview with ULAP Networks (start-up).

Malaysia, only 4.8% of private sector respondents believe the labour market adequately meets their digital talent needs, according to a survey by the Social and Economic Research Initiative (MyDIGITAL, 2021).

Limited funding and investment in technology R&D also affect the growth and retention of IT and AI professionals (King and Du, 2022), which has an effect on the level of talent in the region. As of 2022, less than 1% of the region's population possesses advanced digital skills such as AI (Bachtiar, Vandenberg, and Sawiji, 2022). To address this issue, Singapore, Malaysia, and Indonesia have made notable efforts to promote AI and IT talent. Singapore leads the region in government AI readiness, with Malaysia and Indonesia showing progress (Bachtiar, Vandenberg, and Sawiji, 2022). Educational institutions, universities, and talent development organisations have a major role to play in addressing these challenges. The above-mentioned data and interview findings provide an additional confirmation that ASEAN's education systems need to improve quickly and become a much-needed building block and necessary enabler for the economic transformation of the region.

Furthermore, mobility programmes can facilitate the movement of students, professionals, and researchers between countries to help disseminate best practices and innovative ideas. In this way, ASEAN can better match labour supply with demand, reducing unemployment and underemployment in some areas while addressing skill shortages in others. This flexibility in the labour market ensures that skills are utilised optimally, contributing to overall economic efficiency and growth. Additionally, talent circulation can help mitigate the impacts of demographic changes, such as ageing populations in certain countries, by providing a steady influx of young, skilled workers from other parts of the region.

These three topics – access to capital, access to markets, and access to talent – were raised during the interview and survey phase of this white paper. Related to these findings, the first ASEAN Startup Policy Roundtable, titled 'Building a Tech Startup Ecosystem in ASEAN: Taking Stock and Looking Ahead', which was organised by E-DISC, convened ASEAN Secretariat and ASEAN COSTI representatives, industry, academia, and international stakeholders at E-DISC in Jakarta on 29 January 2024. The discussions aimed to foster collaboration and generate actionable solutions to address challenges, including disparities in digital infrastructure, funding gaps, and human capital. Box 8 describes the main findings of this roundtable.

Box 8: First ASEAN Startup Policy Roundtable

The first ASEAN Startup Policy Roundtable revealed several points that are summarized in this box. Disparities in digital infrastructure across the Association of Southeast Asian Nations (ASEAN) hinder start-up growth, limiting innovation and economic development. Participants recommended enhancing public-private partnerships, such as the Huawei-Singapore collaboration, to strengthen digital

ecosystems. They emphasised creating win-win partnerships amongst ASEAN Member States (AMS) and international entities for technology transfer and capacity building.

Despite post-pandemic resilience, equity funding for tech start-ups in the region has declined. Participants advocated for policy innovations and diverse funding sources, including impact funds and strategic collaborations with the private sector, to promote inclusivity. They highlighted the need for a data-driven approach to assess start-up readiness for scaling and to bridge the financing gap effectively.

Limited access to tech talent, worsened by the brain drain and competition from established firms, poses challenges. The roundtable promoted initiatives like SEA Bridge and Amazon Web Services (AWS) programmes for regional talent development. Strategies discussed included raising pay and benefits, fostering inclusive recruitment, and upskilling through mentorship and apprenticeships.

Therefore, the roundtable called for ongoing dialogue and policy reforms to leverage ASEAN's start-up potential for sustainable economic development. It emphasised the importance of collaboration and innovative policy frameworks in overcoming challenges and fostering a vibrant tech start-up ecosystem across ASEAN.

Source: Mahusin, Prilliadi, and Muhammad (2024).

Chapter 7

Building ASEAN's Innovation Ecosystem: Key Findings and Policy Recommendations

The previous chapters of this report have characterised ASEAN's innovation ecosystem, both at the individual AMS level²⁰ and at the regional level. These findings are substantiated through evidence found during desk research, building on previous research at ERIA, and E-DISC policy roundtables with different AMS representatives, as well as insights from E-DISC interviews with key actors in the innovation ecosystems of the 10 AMS.²¹ What follows is a list of 10 key findings and policy recommendations that aim to propel and accelerate the development of a region-wide innovation and entrepreneurship ecosystem. These policy recommendations aim to provide suggestions to collectively transition the ASEAN region towards a knowledge-based economy that is sustainable and inclusive.

1. Developing a mature innovation ecosystem should be an immediate and urgent top policy priority for ASEAN leaders and policymakers. Innovation and the creation of young, dynamic high-growth firms (start-ups) is a fundamental aspect of ASEAN's transition towards a knowledge-based economy. This development can help countries in the region to overcome the so-called 'middle-income trap'. ASEAN is well positioned for this transition. It is characterised by (i) robust economic growth and projections for it to continue being one of the fastest-growing regions of the global economy (Biswas, 2024); (ii) a young and tech-savvy population – ASEAN Millennial and Gen Z consumers are projected to comprise 75% of consumers by 2030 and represent an important driver of innovation and entrepreneurship (World Economic Forum, 2020); and (iii) optimism towards the use and adoption of new technologies (Microsoft, 2024). With these factors in mind, ASEAN should aim to become a global player in the innovation landscape. However, geopolitical tensions combined with an ageing population (ASEAN's youth population is expected to peak by the late 2030s) may negatively affect ASEAN's regional openness and economic development models. This is why it is of the utmost importance that ASEAN leaders and policymakers urgently seize the current window of opportunity before it becomes too late: the immediate future is crucial for the region to transition to a knowledge-based economy to ensure country-by-country as well as regional prosperity.
2. **Innovation policy must be context specific, capitalising on the diversity of ASEAN's ecosystems.** Innovation and entrepreneurship ecosystems thrive on comparative advantages related to the specific conditions where they operate. ASEAN is marked by significant diversity in terms of economic development and growth trajectories;

²⁰ For further details, see the country notes on ERIA E-DISC's website and Annex I.

²¹ See Annex IV for an overview of survey participants.

cultural practices, including languages and religions; institutional frameworks; and geographical landscapes. This diversity influences the development and evolution of ASEAN's innovation ecosystem. While this diversity can hinder integration and entrepreneurial activities, it also serves as a powerful catalyst for innovation, enabling the creation of new business models (Hewlett, Marshall, and Sherbin, 2013). As an example, cultural diversity in ASEAN has spurred significant innovations such as the growing Islamic fintech developments in Malaysia and the halal agri-tech and cosmetic industry in Indonesia. These innovations exemplify how cultural diversity fosters economic diversification and innovation through the interplay of complementary knowledge, related variety (Content and Frenken, 2016), and knowledge spillovers (Frenken, Van Oort, and Verburg, 2007; Aghion and Jaravel, 2015). To harness this potential, ASEAN should aim to transform its diversity into a strategic advantage, fostering an environment where linkages and connections amongst various innovation and entrepreneurship hubs can flourish and grow across sectors.

3. Policies to foster start-up creation, growth, and development must adopt a holistic view of innovation and entrepreneurship ecosystems, addressing all essential 'building blocks'. Start-ups and innovative companies seldom thrive in isolation; they require a well-functioning ecosystem where various actors – including universities, public and private research centres, large corporations, innovation agencies, and government departments – collaborate, and in some cases, compete. In ASEAN, any strategy or policy aimed at supporting start-up ecosystems must consider the development of all the components and enabling factors of a robust innovation ecosystem. Key elements include cohesive and integrated markets;²² well-functioning finance institutions;²³ high-quality education and talent development systems (including strong primary, secondary, and tertiary education, where most of ASEAN lags); leading public and private research and scientific organisations (R&D investments remain very weak, and the quality of research and university is low in most of ASEAN);²⁴ strong university–business linkages (as yet underdeveloped in most countries in the region); and effective innovation and entrepreneurship governance.²⁵ Without these building blocks, start-ups will inevitably face greater risks and lower chances of success. Alternatively, they may be compelled to relocate to regions with more supportive ecosystems conducive to creativity, innovation, and scaling up.

The E-DISC survey and policy dialogues conducted for this paper highlighted three major areas where ASEAN leaders and policymakers should intervene to unleash innovation and create more opportunities for start-ups and entrepreneurs:

²² See recommendation 5.

²³ See recommendation 4.

²⁴ See recommendation 6.

²⁵ See recommendation 8.

4. **Improving access to capital.** Start-up founders and entrepreneurs particularly emphasised the shortage of early-stage capital as a critical issue. This challenge is especially pronounced in less developed, smaller countries in the region (e.g. Cambodia and the Lao PDR) as well as in remote locations, notably rural regions or locations outside capital districts. For example, in Indonesia, while Bali has shown promising innovation momentum, especially post-pandemic, there are concerns that funding remains overly concentrated in Jakarta, the capital city (Swigunski, 2021). This lack of access to capital is not a new issue, especially in developing economies that are off the radar of major investors. The current global 'venture capital winter' (Chan, 2022) exacerbates this situation. Policymakers should therefore consider mechanisms to attract and facilitate funding opportunities for entrepreneurs across the entire region, not just in the most well-known innovation hotspots. Ensuring more equitable distribution of capital will help unlock the potential of diverse and geographically dispersed innovators within ASEAN.
5. **Improving access to markets.** Market access is a significant challenge for innovation and entrepreneurship in ASEAN, primarily due to the regional fragmentation across 10 different countries with varying rules, regulations, and standards. Access to larger markets and broader consumer bases is essential for mitigating risks associated with entrepreneurial ventures and increasing the likelihood of start-ups surviving, scaling up, and thriving by providing the necessary critical mass of potential consumers. This is particularly crucial for start-ups and entrepreneurs from smaller economies in the region, such as Cambodia, the Lao PDR, and Brunei. The ongoing process of ASEAN economic integration is crucial for developing a cohesive innovation ecosystem. Leaders and senior officials responsible for negotiating integration deals must create frameworks and implementation plans that address the diverse needs of emerging innovative firms. This approach will promote innovation and facilitate the transition towards knowledge-based economies. A key example is the ongoing negotiations of the DEFA. With ASEAN's digital economy growing rapidly, and most innovations and start-ups being driven by digital technology, DEFA negotiations must focus on fostering an ASEAN-wide digital economy that is fertile ground for entrepreneurship and innovation.
6. **Improving access to talent.** The influx of highly skilled individuals is crucial for knowledge-based economies, serving as a significant driver of innovation and entrepreneurship (Kerr, 2019). However, talent development, attraction, and retention remain challenges for most of ASEAN. According to the survey and interviews conducted for this paper, many ASEAN start-ups and entrepreneurs struggle to recruit the necessary talent locally. The circulation and attraction of highly skilled individuals should be a critical policy focus in regional agreements and frameworks, including the DEFA. Measures such as talent and entrepreneurship visa schemes for the entire ASEAN region should be considered

during negotiations. These initiatives are fundamental building blocks for the development and growth of the ASEAN innovation ecosystem (Ajmone Marsan and Litania, 2023). Talent development, attraction, and retention are even more crucial during periods of important technological change, such as the ongoing digital transformation and the advent of AI technologies that ASEAN is experiencing. A top priority for the ASEAN region must be strengthening all levels of education – primary, secondary, and tertiary – while enhancing the quality of universities and research organizations. Talent scarcity is a major issue for the economic and social development of ASEAN, and only by fixing this talent shortage can ASEAN fully leverage its innovation potential, foster the creation of innovative firms, and remain competitive in the global market.

7. ASEAN needs better and up-to-date innovation-related indicators to monitor and assess the development of its innovation and entrepreneurship ecosystem effectively, facilitating stronger evidence-based policymaking. Gathering up-to-date and reliable innovation-related statistics and data across ASEAN can be challenging. In some countries, indicators are unavailable, outdated, or difficult to compare. As innovation and entrepreneurship become top policy priorities for ASEAN, it is crucial to bolster data collection and monitoring systems to inform the policymaking process and track emerging trends. Measuring innovation is notoriously difficult (OECD, 2017), and the indicators available to analysts and policymakers are often only proxies of certain innovation-related phenomena. Despite these shortcomings, ASEAN should enhance innovation-related data collection through national statistical agencies and the ASEAN Secretariat. Additionally, ASEAN should explore and experiment with innovative data collection processes, such as big data approaches (Rosiello, Vidmar, and Ajmone Marsan, 2022; Bernal and Sejersen, 2021). Establishing partnerships with various research bodies and international organisations, including E-DISC, will be instrumental for expanding data collection and supporting evidence-based policy planning and implementation.
8. ASEAN should leverage its half-century history of regional integration in innovation and entrepreneurship to enhance policy coordination and strengthen effective policy delivery and implementation. For over 50 years, beginning in the 1970s, ASEAN has developed regional governance mechanisms for innovation policy, as detailed in chapter 4. As innovation and entrepreneurship become increasingly top policy priorities for the region, it is crucial to strengthen these governance arrangements to improve coordination amongst relevant ASEAN bodies and initiatives, such as ASEAN COSTI, the ACCMSME, and other entities related to the digital economy and innovation. Current fragmentation and overlaps are partly due to the interdisciplinary nature of innovation policy, which often falls under the purview of multiple ministries and agencies (e.g. economic development, research, science, innovation, higher education, and skills development). This challenge is not unique to ASEAN but is common globally. Nevertheless, improved coordination

and alignment would significantly benefit the development of an ASEAN-wide regional innovation ecosystem. The 2025 ASEAN Chairmanship of Malaysia presents an opportunity to prioritise innovation policy and place start-up ecosystems at the core of the ASEAN integration agenda, given Malaysia's interest in this area. ASEAN should capitalise on this opportunity to strengthen its governance mechanisms and identify key innovation policy priorities and related action plans.

9. ASEAN leaders and policymakers should recognise the key role that innovation and start-ups play in achieving the SDGs and plan support accordingly. As illustrated in chapter 3, innovation and start-up ecosystems greatly contribute to the SDGs in various ways. Additionally, numerous innovations developed within the region are already advancing the SDG agenda (Table 3). With its young and tech-savvy population, ASEAN is well positioned to become a vital laboratory for SDG solutions and an important market for their implementation. Since the pandemic, inclusive and sustainable economic development has gained even more importance for ASEAN, as demonstrated by the adoption of the ASEAN Comprehensive Economic Recovery Framework during the 27th ASEAN Summit in 2020 (ASEAN, 2020a). This framework highlights the critical need for ASEAN leaders and policymakers to monitor, assess, and support innovation and start-ups as key drivers of sustainable development.
10. While building its region-wide ecosystem, ASEAN should play an increasingly leading role in the global innovation landscape, become more visible on the global stage, and participate in key international networks and processes. Over the last few decades, the geography of innovation has evolved considerably, with innovation hotspots emerging in Asia, Latin America, and Africa. ASEAN should seize the opportunity to become a leading, vibrant emerging global innovation hotspot. Enhancing its visibility as a global innovation player would attract more capital and talent to the region, reinforcing a virtuous cycle of ecosystem growth and development. One mechanism to achieve this position is to increase participation in global networks and forums where innovation is discussed, promoted, and regulated. Examples include active participation and leadership in innovation-related work under the G20, as seen during Indonesia's Presidency in 2022 (Ajmone Marsan, 2023), as well as relevant United Nations-led initiatives and the G7-led Hiroshima process. Such increased participation would offer ASEAN the opportunity to better understand its positioning relative to other emerging players and to establish and expand connections with relevant innovation ecosystems outside the region.

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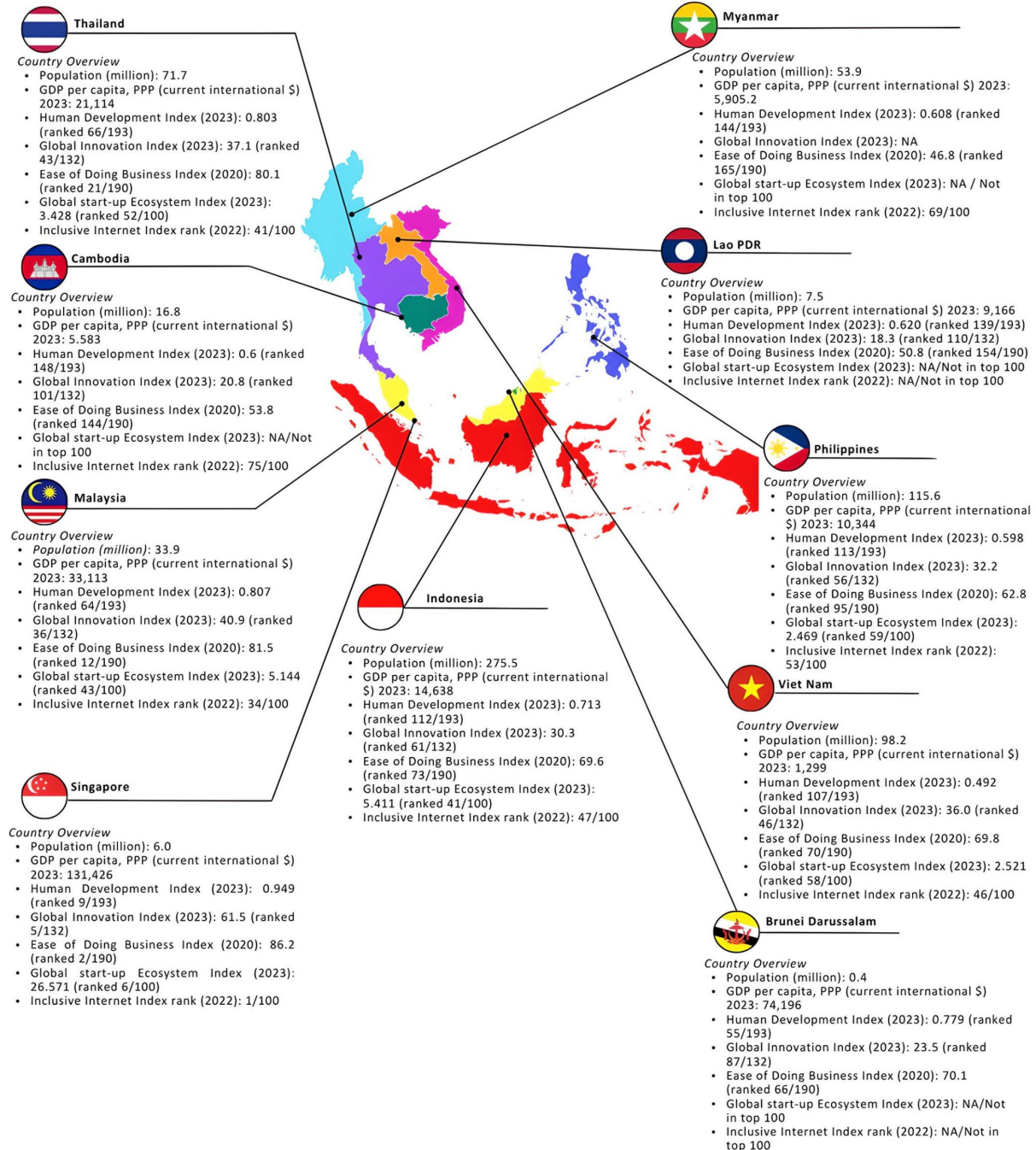
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Annex I

ASEAN Member States at a Glance



ASEAN = Association of Southeast Asian Nations, est. = estimated, GDP = gross domestic product, NA = not available, PPP = purchasing power parity.
 Note: The data sources were: (i) Global Innovation Index, population, and GDP per capita PPP (WIPO, 2023) except Myanmar (World Bank, 2024c); (ii) Human Development Index (UNDP, 2024); (iii) Ease of Doing Business rankings (World Bank, 2020a); (iv) Global Startup Ecosystem Index (StartupBlink, 2024b); (v) Inclusive Internet Index (Economist Impact, 2022); and (vi) GDP per capita, PPP (current international \$) (World Bank, 2024a).
 Sources: Compiled by the authors from World Bank (2020a); Economist Impact (2022); WIPO (2023); StartupBlink (2024b); World Bank (2024a); and UNDP (2024).

Table AI.1: ASEAN Economic, Human Development, and Innovation Indicators

Country	GDP per capita	HDI	GII	EDBI	GSEI	III
Brunei	74,196	0.823	23.5	70.1		
Cambodia	5,583	0.6	20.8	53.8		75
Indonesia	14,638	0.713	30.3	69.6	5411	47
Lao PDR	9,166	0.62	18.3	50.8		
Malaysia	33,113	0.807	40.9	81.5	5,144	34
Myanmar	5,032	0.608		46.8		69
Philippines	10,344	0.71	32.2	62.8	2,469	53
Singapore	131,426	0.949	61.5	86.2	26,571	1
Thailand	21,114	0.803	37.1	80.1	3,428	41
Viet Nam	1,299	0.726	36	69.8	2,521	46
ASEAN average	30,591.1	0.6969	33.4	67.15		

ASEAN = Association of Southeast Asian Nations, EDBI = Ease of Doing Business Index, GDP = gross domestic product, GII = Global Innovation Index, GSEI = Global Sustainable Enterprise Index, HDI = Human Development Index, III = International Innovation Index.

Sources: WIPO (2023); UNDP (2024); World Bank (2020a); StartupBlink (2024b); and Economist Impact (2022).

Table AI.2: Internet Access and Network Coverage Across ASEAN (%)

Country	Households with internet access at home, 2022	Pop. covered by at least a 3G network, 2022	Pop. covered by at least a 4G network, 2022	Individuals using the internet, 2022
Brunei	54	99	98	99
Cambodia	50	92	92	57
Indonesia	87	96	96	66
Lao PDR	72	85	52	66
Malaysia	96	100	100	97
Myanmar	62	95	94	48
Philippines	18	96	80	72
Singapore	99	100	100	96
Thailand	90	99	98	88
Viet Nam	85	100	100	79
ASEAN average	71	96	91	77

ASEAN = Association of Southeast Asian Nations, pop. = population.

Sources: World Bank (2024b); and ITU (n.d-a; n.d-b).

Annex II

List of Indicators in Innovation Assessment and Their Description

The list of indicators included in Table 1 constitute a proxy of data attempting to contextualise and capture the level of economic development in each country (gross domestic product (GDP) per capita and GDP growth) and the general innovation landscape (the World Intellectual Property Organization (WIPO) Global Innovation Index); indicators of inputs to innovation (e.g. research and development (R&D) investments); indicators of innovation outputs (patents, scientific publications, and high-growth start-ups or unicorns); and indicators about the level of skills in the system (e.g. enrolment in tertiary education and quality of universities). More detail is provided below:

- **GDP per capita purchasing power parity** (current international \$): This variable, a World Development Indicator collected by the World Bank, indicates the value of a country's GDP in per capita terms denoted in current international dollars. This denotation allows us to control for differences in price levels between the countries under comparison. Ultimately, this variable is a proxy for a country's per capita income – a higher figure should indicate more wealth available to stimulate entrepreneurial activities. The Association of Southeast Asian Nations (ASEAN) GDP per capita value was obtained through a weighted average of the ASEAN Member States (AMS), where their populations determine the weights.
- **GDP growth in constant prices:** Also referred to as real GDP growth, this variable, collected as part of the International Monetary Fund's World Economic Outlook database, expresses the growth of an economy's output while controlling for inflation. For lower middle-income countries, higher values here are often correlated with a growing middle class and strengthening consumer base – both requirements for a healthy entrepreneurship ecosystem.
- **Global Innovation Index:** WIPO's Global Innovation Index captures the overall performance of the innovation ecosystems of 132 economies, ranking them accordingly. It is a composite of indicators measuring the quality and sophistication of a nation's institutions, human capital and research, infrastructure, markets, businesses, knowledge, and technology outputs, as well as creative outputs.
- **Gross expenditure on R&D (GERD) as a percentage of GDP:** This indicator typically serves as a proxy for a country's innovation performance. It is important to note, however, that in developing countries innovation is more often linked to technological acquisition and absorption rather than through R&D-based activities. It may therefore fail to depict innovation intensity accurately in AMS.
- **GERD financed by business enterprises:** Typically, GERD financed by business enterprises is the main source of R&D funding in advanced countries. This is different from developing countries where governments are often the main

funding source. Higher values for this variable indicate the private sector's appetite for risk, and their investment return expectations.

- **Total patent applications per million inhabitants:** The patent count variable is also a traditional measure of a country's innovation intensity and technological progress. It reflects the development and absorption of knowledge into productive activities. Included in the value are patents filed both locally and abroad. Controlling for the different population sizes allows for comparison between nations. Given that patent applications are a variable with notable year-to-year variation, a 3-year average was taken to smoothen out possible variations.
- **Scientific and technical article journal publications per million inhabitants:** High rates of scientific publications indicate active research environments, leading to new knowledge and innovation, which often result from academic and industry collaborations, facilitating practical applications of research.
- **Number of unicorns:** This variable indicates the number of privately held start-ups having reached a valuation of at least US\$1 billion. It serves as a signal that the ecosystem has reached a point of sophistication and maturity that enables start-ups to grow to such sizes.
- **Tertiary education enrolment rate:** The rate of enrolment in tertiary education roughly indicates a nation's potential to accumulate a skilled and knowledgeable workforce. This stock and accumulation of such human capital is necessary for a nation to absorb, diffuse, and generate new knowledge and technologies.
- **Universities in the top 500 in Asia:** To assess a nation's ability to form high-quality human capital and generate valuable research outputs, it is important to measure the quality of education. Narrowing the scope to universities in Asia was necessary for ASEAN universities, bar those in Singapore, to appear in the search for high-quality universities.

Annex III – Country Notes

(Available on E-DISC web page)

Annex IV – List of Interviews

Country	Organisation name	Interviewee Name	Position
Brunei	ULAP Networks	Dominic McDonald	Founder CEO
	Tyne Solutions	Aimi Ramlee	Founder/Director
	Shell liveWIRE Brunei	Aziemah Daud	Business network & projects lead
	DaRE	Adzimin Amin	Enterprise Programme (Brunei Innovation Lab)
Cambodia	PillTech	Vireak Chea	Co-founder and CEO
	OBOR Capital	Christophe Forsinetti	CEO
	Impact Hub	Melanie Mossard	CEO
	Techo Startup Center	Vantharith OUM	Senior start-up development specialist
	SalaTech Pte. Ltd.	Leap Sok	CEO
Indonesia	Julo	Ankur Mehrotra	Group president
	Mekari	Harutoshi Tanaka	Vice president, corporate finance & development
	East Ventures	Roderick Purwana	Managing partner
	Innovation Factory	Agustiadi Lee	Program head
	Indogen Capital	Chandra Firmanto	Managing partner
	Living Lab Ventures (Sinar Mas Land)	Jesha Vebrattie Effendie, Bayu Seto	New ventures manager, vice president of incubation and partnership
	Ministry of Communications and Informatics	Sonny Hendra Sudaryana	Program coordinator
Lao PDR	LOCA	Souliyo Vongdala	Co-Founder & CEO
	Ethnicraft	Ye Phonevilay	Founder
	Lao ICT Commerce Association	Nana Souannavong	Executive vice president
	Ministry of Industry and Commerce MSME Promotion Agency	Litthideth Khamhoung	Director of MSME Support and Development Division
Malaysia	Softspace	Chris Leong	Chief of strategy
	Tech Up Group	Ainaa Rosli	Founder

Country	Organisation name	Interviewee Name	Position
	Gobi Partners	Thomas Tsao	Co-founder
	1337 Ventures	Bikesh Lakhmichand	Founder
	MDEC	Mahadzir Aziz	CEO
Myanmar	Tun Yat	Hujjat Nadaarajah	Co-founder, CEO, & board member
	TecXplorer Co., Ltd	Than Tun Oo	Managing director
	Ministry of Science and Technology	Dr Mie Mie	Rector, UCSY
Philippines	Kalibr	Paul V. Rivera	Co-founder and executive chair
	sunE	Allan Gray	Director of Product Development/R&D
	Kickstart Ventures	Dan Siazon Bit Santos	SVP and treasurer AVP of portfolio operations
	Foxmont	Franco Varona	Managing partner
	DOST	Edward Paul	Senior science research specialist
	SISIDS FROM CONRES TBI (SLU)	Maria Corazon Ocampo	Founder and CEO
Singapore	Aspire	Thomas Jeng	General manager
	Resync	Emir Nurov	Managing director
	DiMuto	Gary Loh	Founder & chair
	FathomX	Stephen Lim	CEO
	Finbot.AI	Sanjay Uppal	Founder & CEO
	1982 Ventures	Herston Elton Powers	Founding managing partner
	Golden Gate Ventures	Jeffrey Paine	Managing partner
	Block 71	Prof. Ben	Associate vice president
	Wavemaker Impact	Doug Parker	Founding partner
	Enterprise Singapore	Bernice Tay	Director
Thailand	Ookbee	Panu Phonsilpanan	CFO
	Appman	Amarit Franssen	CBDO and Co-founder
	TrueDigitalPark	Monrudee Leelamasjakul	Head of event planning and sales

Country	Organisation name	Interviewee Name	Position
	Bualuang Venture	Krit Phanratanamala	Managing director
	National Innovation Agency	Dr. Krithpaka Boonfueng	Executive director
Viet Nam	Legback	Marc Chervalier	Co-founder
	GIMO	Quan Nguyen	CEO
	Patamar Capital	Dondi Hananto	Partner
	Ascend Vietnam Ventures	Eddie Thai	Co-founder
	National Innovation Centre	Vu Quoc Huy	Director

AVP = assistant vice president; CBD0 = chief of business expansion officer; CEO = chief executive officer; CFO = chief financial officer; ICT = information and communication technology; MSMEs = micro, small, and medium-sized enterprises; UCSY = University of Computer Studies; SVP = senior vice-president.

Source: Interviews conducted for this white paper.

Annex V

List of Participants at the First E-DISC ASEAN Startup Policy Roundtable

The first Association of Southeast Asian Nations (ASEAN) Startup Policy Roundtable – Building a Tech Startup Ecosystem in ASEAN: Taking Stock and Looking Ahead – was held at the Economic Research Institute for ASEAN and East Asia (ERIA) Digital Innovation and Sustainable Economy Centre (E-DISC) in Jakarta on 29 January 2024.

Speakers:

Marco Kamiya, United Nations Industrial Development Organization, Indonesia

Jeong Hyop Lee, Program Management Unit for Competitiveness, Thailand

Thibault Danjou, Phitrust Asia, Singapore

Casper Sermsuksan, SEA Bridge, Thailand

Llewellyn Vance, Huawei Cloud Asia Pacific (APAC), Singapore

Nitin Pangarkar, National University of Singapore, Singapore

Katrina Rausa Chan, QBO Innovation Hub, Philippines

Paul Vandenberg, Asian Development Bank (ADB), Philippines

Ivan Gn, Amazon Web Services, Asia-Pacific and Japan, Singapore

Charnwit Tridech, Technology and Innovation-Based Enterprise Development Fund (Ted Fund), Thailand

Shaun Wellbourne-Wood, ADB

Moderators:

Aladdin D. Rillo, ERIA, Indonesia

Gempei Asama, Deloitte Tohmatsu Venture Support, Japan

Abi Abadi Tisnadisastra, ATD Law in Association with Mori Hamada & Matsumoto, Indonesia

Ghai Leong Wong, Deloitte Tohmatsu Venture Support, Japan

Annex VI – List of Participants at the One ASEAN Startup Award Events Held Before the Publication of this White Paper

One ASEAN Startup Award Philippine Pre-Event 2024 Tuesday, 23 April 2024

Panel discussion – Digital AI		
#	Role	Participant
1	Moderator	Michelle Khoo Center leader/director, Center for the Edge, Deloitte Southeast Asia
2	Panellist	James Jefferson Tan Chief operating officer, Expedock
3	Panellist	Joan Yao Vice president of investments, Kickstart Ventures
4	Panellist	Dr Erika Fille T. Legara Associate professor and Aboitiz Chair in Data Science, Asian Institute of Management
5	Panellist	Luis F. Gonzalez Co-founder and advisor AI Asia Pacific Institute

Panel discussion – Impact Startup		
#	Role	Participant
1	Moderator	Hoa Nguyen Financial advisory director, Deloitte
2	Panellist	Taka Nakamura CEO, general partner, Taliki Fund
3	Panellist	Do Bui Founding partner & CEO, ThinkZone ventures
4	Panellist	Beia Latay CEO, KonsultaMD
5	Panellist	Franco Varona Co-founder and managing partner, Foxmont Capital Partners
6	Panellist	JT Solis Co-founder and CEO, Mayani

Start-up Pitch

In alphabetical order

Start-up Pitch – Digital AI

#	Company name	Speaker title
1	AtoANI Agriventures	Co-founder and head of strategy
2	Betterteem Technologies	Co-founder and CEO
3	Data8	Co-founder and CEO
4	FathomX	Business development director
5	IOL	CEO, IOL Inc.

Start-up Pitch – Impact Startup

#	Company name	Speaker title
1	AirX Carbon	CEO
2	Reconnai	Chief technology officer
3	Rezbin Waste Technology	Co-founder and COO
4	Sagri	Head of ASEAN business
5	Surplus Indonesia	Managing director

One ASEAN Startup Award Kuala Lumpur Pre-Event 2024
Tuesday, 25 June 2024

Panel discussion – Digital AI

#	Role	Speaker name
1	Moderator	Bonnie Lee Director, strategy, risk and transactions, Deloitte Malaysia
2	Panellist	Jeffrey Paine, Co-founding partner, Golden Gate Ventures
3	Panellist	Ng Yi Chung, Investment director, YTL Power
4	Panellist	Sharma Lachu Founder/CEO, Accendo Technologies
5	Panellist	Erin Hirakawa Officer of international relations, Matsuo-Iwasawa Laboratory, The University of Tokyo
6	Panellist	Syed Haizam, Managing partner, The Hive Southeast Asia

Panel discussion – Impact Startup

#	Role	Speaker name
1	Moderator	Justin Ong Financial services industry leader, Deloitte Malaysia
2	Panellist	Chris Leong Chief strategy officer, Soft Space
3	Panellist	Ng Sai Kit Managing partner, Artem Ventures
4	Panellist	Vince Low Managing director, Gobi Partners
5	Panellist	Mohd Noor Hisham Bin Abdul Bari Assistant vice president, MYStartup Malaysia (Cradle Fund)

Start-up Pitch

In alphabetical order

Start-up Pitch - Digital AI

#	Company name	Speaker title	Speaker name	Headquarters
1	Toybox Creations and Technology Sdn. Bhd.	Co-founder, CEO	Masaki Ishibashi	Malaysia
2	Nexmedis	Chief Operating Officer and co-founder	Matilda Narulita	Indonesia
3	Stratetics Experts Sdn. Bhd.	Founder and CEO	Shaktivell M. Letchumanan	Malaysia
4	Pacton Technologies Sdn. Bhd	Chief technology officer	Mahsa Dashtizadeh	Malaysia
5	UCTalent Labs Co. Ltd	CEO and founder	Django Duong Nguyen	Viet Nam

Start-up Pitch - Impact Startup

#	Company name	Speaker title	Speaker name	Headquarters
1	OUI Inc.	Research associate	Rohan Khemlani	Japan
2	PT Eratani Teknologi Nusantara	Chief financial officer	Bambang Cahyo Susilo	Indonesia
3	Galansiyang Inc.	Co-founder and CEO	Jay Gajudo	Philippines
4	Midwest Composites	CEO and Founder	Sethu Raaj	Malaysia
5	SoBanHang (Finan Pte. Ltd)	Co-founder and CPO	Long Bu Hai	Viet Nam

One ASEAN Startup Award Phnom Penh Pre-Event 2024
Tuesday, 2 September 2024

Panel discussion – Digital AI

#	Role	Speaker name
1	Moderator	Vanchan Khan Director, Deloitte Cambodia
2	Panellist	Amarit Franssen CBDO & Co-founder, AppMan
3	Panellist	Christophe Forsinetti Chairman, OBOR Management
4	Panellist	H.E Dr. Makara Khov, Chairman, Cambodia Academy of Digital Technology
5	Panellist	Denning Tan Partner, GenAI Fund
6	Panellist	Dr Vong Rylida Deputy Director, Techo Startup Center

Panel discussion – Impact Startup

#	Role	Speaker name
1	Moderator	Hoang Nguyen, Partner & Head of Investment, ThinkZone Ventures
2	Panellist	Makoto Takemiya, Group CEO, Soramitsu
3	Panellist	Melanie Mossard, CEO, Impact Hub Phnom Penh
4	Panellist	Nelson Ng, Partner, ACUIE
5	Panellist	San Sar, Impact SME Project Manager, Oxfam in Cambodia

Start-up Pitch

In alphabetical order

Start-up Pitch - Digital AI

#	Company name	Speaker title	Speaker name	Headquarters
1	Alquatic Enterprise	Co-founder and Lead Researcher	Dk Dr Nurun Najeeba Pg Md Tashim	Brunei Darussalam
2	Aircity Company Limited	Founder/CEO	Le Hoang Nhat	Viet Nam

3	DataTicon	Managing Partner	Sokhna Vor	Cambodia
4	Ipinfra Networks	Founder/CEO	Suzairi bin Abdul Rahman	Malaysia
5	SOPet	CEO and co-founder	Chawin Viriyasopon	Thailand

Start-up Pitch - Impact Startup

#	Company name	Speaker title	Speaker name	Headquarters
1	Atelier	CEO	Ryo Nakano	Cambodia
2	Ikanesia	Chief Financial Officer	Rizka Amalia	Indonesia
3	Innophys Co., Ltd.	Senior Manager	Minoru Shionoya	Japan
4	Kemaih Sdn Bhd	Founder	Ainol Razman	Malaysia
5	Sala	Co-founder & CEO	Leap Sok	Cambodia

One ASEAN Startup Award Vientiane Final Event 2024
Wednesday, 9 October 2024

Start-up Pitch

In alphabetical
order

Start-up Pitch - Digital AI

#	Company name	Speaker title	Speaker name	Headquarters
1	FathomX	Business development director	Galvin Lian	Singapore
2	Ipinfra Networks	Founder/CEO	Suzairi bin Abdul Rahman	Malaysia
3	Toybox Creations and Technology Sdn. Bhd.	Co-founder & CEO	Masaki Ishibashi	Malaysia
4	Wayha Sokxay Technology [Nominated by LNCCI]	CEO	Savath Saypadith	Lao PDR

Start-up Pitch - Impact Startup

#	Company name	Speaker title	Speaker name	Headquarters
1	FINA Fintech [Nominated by LNCII]	CEO	Souphaphone Souannavong	Lao PDR
2	Midwest Composites	CEO and Founder	Sethu Raaj	Malaysia
3	Rezbin Waste Technology	Co-founder and COO	Mica Martirez	The Philippines
4	Sala	Co-founder & CEO	Leap Sok	Cambodia

As ASEAN navigates a crucial period of recovery and rapid economic development following the COVID-19 pandemic, policymakers must leverage the region's evolving landscape to achieve both economic growth and social inclusion. This inaugural research project report, developed by ERIA Digital Innovation and Sustainable Economy Centre (E-DISC), offers a comprehensive analysis of how technological advancements can significantly strengthen economic development and promote societal progress.

Amid the rapid advancement of technology, this report highlights the crucial contributions of start-ups in driving sustainable economic growth, particularly in alignment with the United Nations Sustainable Development Goals (SDGs). By examining the current challenges and opportunities in the ASEAN region, this document provides actionable recommendations for leaders and stakeholders to nurture a resilient start-up ecosystem. Such an ecosystem is essential for enhancing productivity, generating employment, and addressing pressing societal issues.

The establishment of E-DISC in 2023 highlights ERIA's commitment to facilitating collaboration and evidence-based policymaking aimed at unleashing the potential of digital technologies. By leveraging the insights and directives presented in this research project report, ASEAN Member States will be better equipped to unlock the full potential of their start-up landscape. Ultimately, this initiative aims to drive economic prosperity, foster continuous innovation, and create a more inclusive future for all citizens in the region.

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