



# Counterpoint Southeast Asia

*A publication of the Centre on Asia and Globalisation*

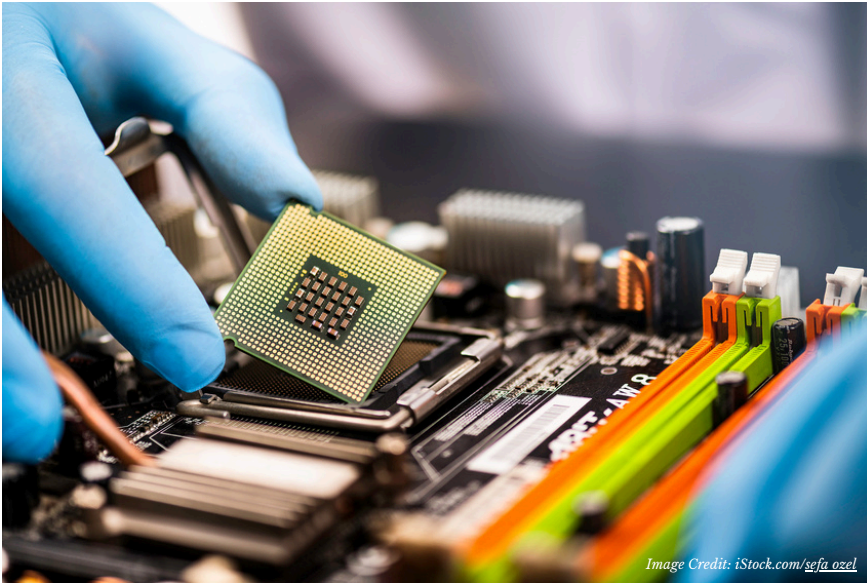


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## How Will Southeast Asia Navigate the US-China Chip Competition?

By Yongwook Ryu

The tech sector is at the center of the strategic rivalry between the United States (US) and China. Under the Trump administration, the US targeted Huawei specifically, which soon became the most sanctioned Chinese company in the world. However, under the Biden administration, the focus of tech pressure has shifted to the semiconductor sector, with an ever-expanding list of export restrictions ranging from advanced logic, memory and AI chips, to equipment for chip fabrication.

The semiconductor industry is one of the very few remaining tech sectors where the US still maintains a

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Counterpoint Southeast Asia is published regularly by the Centre on Asia and Globalisation at the National University of Singapore's Lee Kuan Yew School of Public Policy. It seeks to answer major questions of strategic significance for Southeast Asia by bringing in diverse voices from around the region. Each issue will tackle one question from three different perspectives.

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decisive edge over China. While China is rapidly developing its own chip capabilities, it is currently in no position to challenge US dominance in the sector. Therefore, it is no surprise that the US has targeted the chip sector to put pressure on China, especially given the far-reaching implications of chips for tech, industrial and military advancement.

Amidst this escalating chip conflict between the two great powers, Southeast Asian states find themselves navigating a complex external environment, with difficult choices to make. Both the US and China are key technology and trade partners, making it undesirable for Southeast Asian states to take sides between the two. At the same time, to advance their own economic development, these Southeast Asian states are eager to collaborate with established tech powerhouses to bolster their own chip capabilities.

What are the perspectives of key Southeast Asian states on the US-China chip competition? How do they perceive the key challenges and potential policy options? And what implications will all this have for the region's future development? To shed light on these questions and other issues, the Centre on Asia and Globalisation (CAG) has invited three leading experts to share their views.

**Jassie Hsi Cheng** discusses the industrial policies of China and Taiwan, two critical players in the semiconductor industry. The former is the direct target of US chip pressure, while the latter is a critical player in chip fabrication with a complicated political

relationship with China. Cheng highlights the case of China's so-called Big Fund, an investment initiative which aims to help the country achieve a 70 percent self-sufficiency rate in chips by 2025—a goal that appears unlikely to be realised by the deadline. She argues that China's urgency stems from “deep concern over its reliance on foreign firms for critical steps in chip production.” Her assessment is that while the Big Fund has accelerated the growth of China's tech sector, with firms like SMIC reaping benefits through expanded operations, it has simultaneously triggered tighter export controls from the US, as well as domestic problems like corruption and misuse of the fund.

Taiwan's industrial policy, on the other hand, is aimed at maintaining its current edge in advanced chip fabrication. Concerns over Taiwan's dominance being undermined by challenges such as global talent competition and targeted talent acquisition and industrial espionage from China led to the passage of the Taiwan Chips Act in 2023. This legislation aims to encourage investment in advanced manufacturing processes and boost investor confidence amidst rising geopolitical tensions across the Taiwan Strait. Cheng concludes that the evolving technological landscape involving the US, China, and Taiwan is “opening new doors for Southeast Asia...with Malaysia and Singapore reaping the rewards.” This suggests that the effect of the US-China chip conflict will vary across Southeast Asia, with some states poised to benefit depending on their ability to adjust and adapt to the shifting global dynamics.

**Lili Yan Ing** offers a comprehensive analysis of Southeast Asia's role in the global chip industry highlighting the pivotal role of governments in nurturing and developing this vital sector, recognising its critical importance to the broader economy. In her essay with Ria Fortuna Wijaya, they argue that the Southeast Asian governments play a key role in attracting global investment, providing infrastructure, and encouraging innovation and R&D. However, they caution that these efforts must be guided by a clear framework and a well-defined exit strategy in order to “prevent governments from being trapped in a cycle of providing endless incentives.”

Another aspect they focus on is the need to build a robust semiconductor supply chain within Southeast Asia. The disruptions the world experienced during the COVID-19 pandemic highlighted the necessity for resilient regional supply chains. Currently, Singapore and Malaysia are significant players in wafer fabrication/equipment and assembly, testing, and packaging (ATP), respectively. Ing and Wijaya argue that ASEAN countries should aim to cover the entire semiconductor ecosystem, including chip design and R&D, which would require collaboration among the ASEAN countries. Exactly how this will be done, and which country will specialise in which area, remains uncertain. Ing acknowledges that determining this will likely involve delicate political negotiations among the ten ASEAN member states, making it difficult to predict a clear path forward.

**Manoj Harjani** discusses Singapore, where the semiconductor industry accounts for approximately 40 percent of the nation's entire manufacturing value added. He notes that Singapore is less concerned with regional competition, as neighbouring countries such as Malaysia and Vietnam focus on different segments of chip production. Instead, Singapore's main concern is navigating current and future US export controls while ensuring the continued inflow of foreign investment into its semiconductor sector.

A major issue facing Singapore relates to the so-called “Singapore-washing,” which refers to Chinese companies relocating to Singapore to bypass US sanctions and access talent and technology otherwise restricted to them. This is not merely a hypothetical scenario, as the Singapore affiliate of Corad Technology was added to the Entity List in 2021 for its dealings with the Chinese government and defence industry. Harjani's assessment is that the Singapore government has so far managed these geopolitical issues with a clear-eyed approach and sensible goals. However, he cautions that Singapore will continue to face the challenge of balancing the repercussions of geopolitical tensions while adapting to the ongoing transformation within the chip industry to stay competitive. How Singapore navigates the troubled waters of the US-China chip conflict could offer valuable lessons to other states in similar positions.

All three experts agree that the US-China chip conflict presents both opportunities and risks

for Southeast Asia. They also stress the critical importance of the chip sector for the region's technological, industrial, and military development. Hence, they urge Southeast Asian governments to increase investment in the sector and to coordinate their policies in order to establish efficient and robust supply chains across the region.

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*Guest Column*

## Inside the Semiconductor Race: China's Ambition vs. Taiwan's Strategy

By Jassie Hsi Cheng

*China's push for semiconductor self-reliance and Taiwan's quest to retain its chipmaking edge are opening new doors for Southeast Asia. To sustain momentum, the region must strengthen collaboration and ensure that geopolitical tensions do not spill over and disrupt growth.*

Two recent policy developments in East Asia have captured the attention of semiconductor industry observers. In May 2024, China committed **CNY 344 billion** (USD 47.5 billion) to the third phase of its Big Fund, a state-backed semiconductor investment initiative designed to boost chip industry growth and counter US export controls. Around the same time, across the Taiwan Strait, Taiwan's Ministry of Economic Affairs was actively accepting applications for tax incentives from companies. These incentives are grounded in amendments to Article 10-2 of the *Statute for Industrial Innovation*, also known as the *Taiwan Chips Act*, which was passed by the island's Legislative Yuan on 7 January 2023. The act encourages eligible industry participants to invest in advanced manufacturing processes within Taiwan.

These developments highlight the distinct strategies of Taiwan and China in the high-stakes semiconductor sector. China's



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substantial investments reflect a clear ambition to bolster its technological capabilities and reduce reliance on external sources. Meanwhile, Taiwan's focus on fostering advanced chip manufacturing signals its desire to maintain its leadership role in semiconductor innovation. For Southeast Asian countries seeking to strengthen their roles in the global supply chain, understanding how these initiatives fit into the broader strategies of China and Taiwan in the global chip race is crucial.

China's ambition in the semiconductor industry stems from its deep concern over its reliance on foreign firms for critical stages of chip production. In 2014, China launched the "National Integrated Circuit Industry Investment Fund," also known as the Big Fund, to lay the foundation for a self-sufficient semiconductor sector. A year later, the government unveiled the "Made in China 2025" initiative, a bold ten-year plan aimed at transforming China into a global leader in

advanced manufacturing, with semiconductors at its core. The goal is to achieve a **70 percent self-sufficiency** rate in chips by 2025.

The three phases of the Big Fund highlight China's shifting priorities in the sector. The first phase, established in 2014, focused on foundational investments in manufacturing and infrastructure. With **CNY 138.7 billion** in capital, investments were directed towards building the country's manufacturing capacities by funding foundries, design firms, packaging and testing companies, and supporting Chinese chip makers such as Semiconductor Manufacturing International Corporation (SMIC). The second phase, launched in 2019 with **CNY 204 billion**, targeted more specialised segments of the supply chain, such as etching machines and testing equipment.

Now, in 2024, China is stepping into the third phase with a 148 percent increase in investment over the first phase and 68.6 percent more than the second. With nineteen founders on board, including the Ministry of Finance and China Development Bank Capital, this ambitious plan aims to tackle the entire integrated circuit industry chain. It addresses critical **bottlenecks** such as the development of large semiconductor manufacturing plants and high-bandwidth memory (HBM), while prioritising advanced chip technologies for artificial intelligence—an area in which China has struggled to break its import reliance.

The Big Fund has undeniably given a

monumental boost to China's key players in the tech sector, with companies like SMIC reaping the benefits through expanded operations, innovative R&D, and talent acquisition. Yet, this seemingly unstoppable rise is not without its hurdles. The fund's lofty ambitions have rung alarm bells in the Western world, triggering tighter export controls from the US on technology, talent, and capital. Internally, the story is equally complex. Since 2021, a series of **corruption probes** involving fund executives have cast a long shadow over the Big Fund's grand investments. These scandals highlight an urgent need for tighter management and more judicious investment strategies.

Despite the support from the Big Fund and several other initiatives, China's ambition to achieve 70 percent self-sufficiency in semiconductors by next year remains uncertain. While there have been advances in designing logic chips for mobile devices and AI, and some improvements in **mature-node production capacity** (process nodes larger than 28 nm), progress has been uneven. The country still lags in semiconductor manufacturing equipment and is about **five years behind** global leaders in producing the most advanced chips. It remains to be seen whether the massive new investments in advanced chip technology will ultimately yield results.

On the other side of the Taiwan Strait, Taiwan's unique geopolitical position between the US and China, along with its vital role in semiconductor production—especially in advanced chips—makes its semiconductor

policies essential to monitor closely. As home to industry giants like Taiwan Semiconductor Manufacturing Company (TSMC) and United Microelectronics Corporation (UMC), Taiwan produced **63.8 percent** of the world's semiconductors in 2022 and controlled over 70 percent of the market for chips smaller than 7 nm. Its 2 nm process technology is the most advanced available globally. The government is now focused on securing Taiwan's leadership and ensuring that high-end manufacturing remains rooted on the island.

However, challenges loom. Post-COVID, many nations have realised the risks of over-reliance on Taiwan and are now fortifying their own economic security. The US, EU, South Korea, and Japan have all rolled out chip legislation or strategies aimed at building domestic capabilities, a shift that's already being felt in Taiwan. With TSMC receiving invitations to establish overseas facilities, there's a growing concern that Taiwan's once-unquestioned irreplaceability may be eroding. Talent competition is another pressing issue, with countries offering lucrative packages to attract engineers and intensifying the global race for skilled professionals. Following the US's chip restrictions on China, there has been a notable uptick in efforts to infiltrate Taiwan's tech sector. For instance, reports surfaced in September of Chinese companies covertly setting up operations in Taiwan to poach tech talent with generous offers and "**steal trade secrets.**" Lastly, Taiwan's unique political relationship with China adds a layer of uncertainty. This geopolitical complexity is making foreign investors cautious about the

long-term stability of Taiwan's semiconductor industry and its strategic outlook.

To address these challenges and achieve its policy goals, Taiwan's Legislative Yuan passed the *Taiwan Chips Act* last year. The Act introduces appealing tax incentives, including a **25 percent** deduction on R&D expenses and a 5 percent deduction on the costs for acquiring new advanced machinery. Its two main objectives are to encourage investment in advanced manufacturing processes within Taiwan, and to boost investor confidence amid rising geopolitical tensions and concerns about potential conflicts in the Taiwan Strait. In response to fierce global competition for talent, authorities have intensified efforts to curb what they consider underhanded and illegal activities by Chinese firms. Companies are also ramping up international recruitment efforts. For instance, TSMC is expanding its operations in the US, Japan, and Germany, a move that not only diversifies its supply chain but also broadens its access to a wider talent pool.

With both China and Taiwan shifting gears to manage risks from the ongoing US-China tensions, Southeast Asia is becoming a hotspot for investments. Malaysia and Singapore, in particular, are reaping the rewards. For instance, Taiwan's ASE launched its **fourth plant** in Penang earlier this year. Meanwhile, UMC has **poured resources** into Singapore, and Vanguard International Semiconductor (VIS) has plans to follow suit. These moves highlight Southeast Asia's growing role in the semiconductor scene,

particularly in assembly, testing, and packaging (ATP).

To keep the momentum going, Southeast Asia needs to focus on strengthening collaboration and building an integrated semiconductor supply chain. This strategy will bolster its competitive edge and resilience. As the US-China rivalry continues to spur innovation and capital flows into the region, Southeast Asia must navigate the thin line between opportunity and risk. Ensuring that geopolitical tensions do not spill over and disrupt growth will be key to maintaining a steady upward trajectory.

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## Developing ASEAN's Semiconductor Industry: Insights from Taiwan and South Korea

By Lili Yan Ing and Ria Fortuna Wijaya

*To advance up the regional value chains, ASEAN countries need to invest in semiconductor capabilities and collaborate, with each nation specialising in different supply chain aspects for a more resilient industry.*

The global semiconductor industry is a cornerstone of modern technology, driving innovation across a wide array of sectors such as consumer electronics, computers, automotive, information and communication technologies (ICT), digital technologies, and artificial intelligence (AI). As the demand for semiconductors continues to surge, the ASEAN region has been gaining recognition for its pivotal role in this field. The growth of the semiconductor industry in ASEAN has been partly driven by rising tensions between the US and China, as well as the well-established semiconductor sectors in Southeast Asia, particularly in Singapore and Malaysia.

The US-China tensions in trade, technology, and security have positioned ASEAN as an alternative for the diversification of input imports and for FDI relocation. In terms of trade diversification, total exports of goods from ASEAN increased by 26.1 percent, from

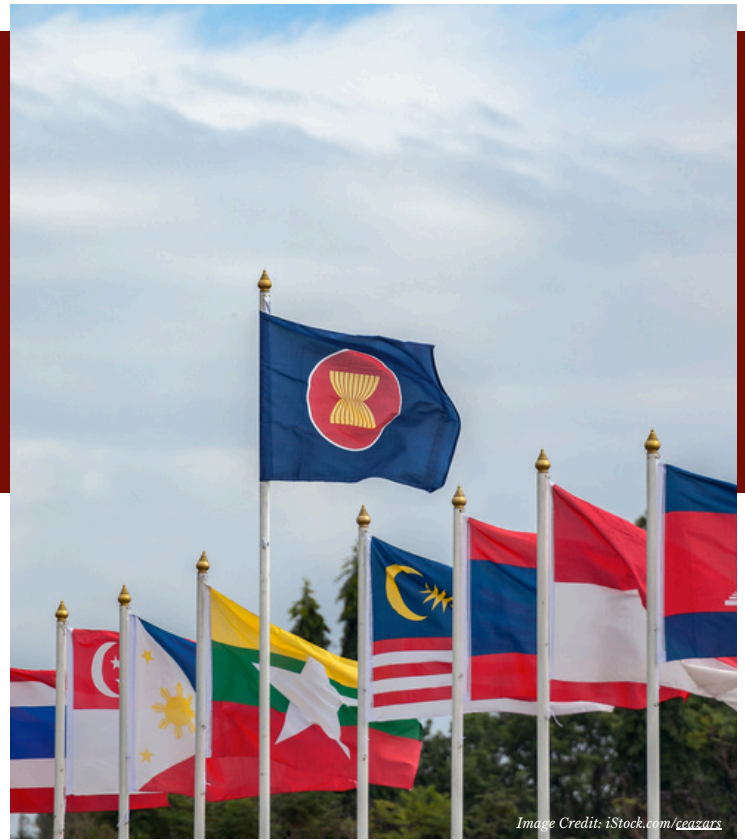


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USD 1.43 trillion in 2018 to USD 1.81 trillion in 2023. In 2023, ASEAN exports to the US surged by 68.4 percent, from USD 142.4 billion in 2018 to USD 269.8 billion, while exports to Europe rose by 11 percent, from USD 141.1 billion in 2018 to USD 156.6 billion. During the same period, while FDI into China dropped by 91.5 percent, FDI into ASEAN increased by 58 percent (aseanstats.org, accessed on 30 July 2024).

In 2023, ASEAN's top export categories by value to the world included electrical machinery and equipment, fuels and oils, and mechanical appliances. Notably, the region saw significant growth in semiconductor exports, which increased by 41.6 percent, rising from USD 189.9 billion in 2018 to USD 268.8 billion in 2023. This growth highlights ASEAN's substantial role in the global semiconductor market. In 2023, the total value of the world's semiconductor exports reached USD 1.14 trillion, with ASEAN

contributing USD 268.8 billion, accounting for 23.6 percent of the global semiconductor exports (ITC Database, accessed on 31 July 2024).

To further develop the semiconductor industry in ASEAN, the success stories of Taiwan and South Korea—two of the world’s semiconductor powerhouses—can offer valuable lessons that ASEAN countries can learn from and apply.

### Strategic Investments

One of the fundamental factors behind the success of Taiwan and South Korea in the semiconductor industry is the proactive role of their governments in developing not only hard infrastructure, but also soft infrastructure. In Taiwan, the government laid the groundwork for the semiconductor industry as early as the 1980s by establishing the Hsinchu Science Park, a hub for technology and innovation. This initiative was complemented by **substantial government investment in research and development** (R&D), creating a fertile environment for companies like Taiwan Semiconductor Manufacturing Company (TSMC) to thrive. Today, TSMC is the world’s largest contract chipmaker, accounting for over 50 percent of the global semiconductor market share.

Similarly, the South Korean government played a crucial role in the rise of its semiconductor industry. The ‘Miracle on the Han River,’ a term that describes **South Korea’s rapid industrialisation and**

**economic growth, was partly fuelled by substantial government support** for key industries, including semiconductors. The South Korean government provided tax incentives and developed infrastructure to bolster semiconductor firms. Companies like **Samsung Electronics and SK Hynix benefitted** from these policies, enabling them to become global leaders in semiconductor manufacturing and memory chips.

For ASEAN, the lesson is that government support is crucial. Countries like Singapore, Malaysia, and Vietnam have recognised this by offering incentives to attract semiconductor investments. However, it is important to ensure that these incentives are focused on providing infrastructure and encouraging innovation and R&D, with a clear framework outlining how to obtain these incentives and a defined exit strategy. This approach will prevent governments from being trapped in a cycle of providing endless incentives without any evident outputs and/or outcomes. Additionally, a more coordinated regional approach could further strengthen ASEAN’s position. This initiative should be agreed upon and supported by all ASEAN countries, with **Singapore and Malaysia** potentially leading the effort, as they are relatively advanced in the semiconductor industry compared to their peers. Establishing semiconductor hubs, akin to Taiwan’s Hsinchu Science Park, and investing in R&D are essential steps for ASEAN countries to develop a competitive edge in this high-tech industry.

### Industry–Academia Collaboration

Another key factor in the success of Taiwan and South Korea's semiconductor industries is the strong collaboration between industry and academia. In Taiwan, the **Industrial Technology Research Institute (ITRI)** played a pivotal role in bridging the gap between research and industry. ITRI's efforts in semiconductor R&D provided the technical expertise that local companies needed to innovate and compete on a global scale. This collaboration has been instrumental in driving continuous innovation, enabling Taiwan to stay at the forefront of semiconductor technology.

South Korea adopted **a similar approach**, with both **the government and private sector investing** heavily in education and training programs specifically tailored to the semiconductor industry. Universities, vocational training centers, and research institutions in South Korea work closely in collaboration with companies like **Samsung and SK Hynix** to ensure a steady pipeline of skilled engineers, researchers, and workers. This symbiotic relationship between academia and industry has been vital in maintaining South Korea's competitive advantage in semiconductors.

ASEAN countries can learn from this model by fostering stronger ties between universities, research institutions, and the semiconductor industry. Developing specialised programmes focused on semiconductor technology and ensuring that academic research aligns with industry needs can help ASEAN build a workforce capable of driving innovation in this field. Countries like

**Singapore**, which already have a robust education system and research infrastructure, can lead this effort by establishing centres of excellence dedicated to semiconductor research and innovation.

### **Building a Robust Regional Supply Chain**

The semiconductor industry is highly complex and demands a well-established supply chain that supports each stage of production, from the procurement of raw materials to the delivery of finished products. Taiwan and South Korea have successfully built robust supply chains, which have enabled them to maintain leading positions in the global semiconductor market.

In semiconductors, there are three main stages of production: R&D, wafer fabrication, and assembly, testing, and packaging (ATP). In Taiwan, the semiconductor supply chain is tightly integrated, with companies like TSMC, ASE Technology, and MediaTek playing crucial roles at different stages of the production process. **This integration has enabled Taiwan** to maintain high levels of efficiency and quality control, which are essential for producing advanced semiconductors. Likewise, **South Korea has developed a strong supply chain, supported by its conglomerates**, or chaebols, such as Samsung and LG. These conglomerates have vertically integrated their operations, controlling everything from semiconductor design to manufacturing and distribution. This level of integration not only ensures a steady supply of components but also fosters greater innovation and responsiveness to

market demands.

In the case of ASEAN, building a robust semiconductor supply chain presents a critical challenge. The region is already a significant player in wafer fabrication and ATP. Singapore and Malaysia are key contributors to the global semiconductor industry, with Vietnam also emerging as a notable player recently. Singapore specialises in wafer fabrication, accounting for about 11 percent of global production (ITC Database, accessed on 1 August 2024), while Malaysia focuses on ATP, contributing approximately 5.4 percent to global ATP (ITC Database, accessed on 1 August 2024). To advance up the regional value chains, ASEAN countries need to invest in developing capabilities across the entire semiconductor ecosystem, from wafer fabrication and design to R&D. Collaboration among ASEAN countries is crucial, with each nation specialising in different aspects of the supply chain to create a more integrated and resilient regional semiconductor industry.

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## Singapore and China-US Chip Rivalry: Steady in Choppy Waters for Now

By Manoj Harjani

*Singapore is advancing its chip industry with a clear-eyed approach and sensible goals but will still face challenges from geopolitical tensions to stay competitive.*

Ongoing debates about how Southeast Asia will navigate the rivalry between China and the United States (US) over semiconductor chips are mainly focused on Singapore and Malaysia—for now. Vietnam is a **rising player**, but chip industry supply and value chains change slowly due to brutal competitive dynamics that create significant barriers to entry, even for countries with all the essential ingredients for a successful ecosystem.

For Singapore, securing the future of its chip industry is less about out-competing regional players than it is about managing various geopolitical currents. After all, Singapore and other Southeast Asian countries are focused on different segments of the value chain. The city-state cannot count on the recent influx of investments into Southeast Asia being sustained in the long term.

What is at stake? Singapore's traditional strengths in attracting investments remain an important foundation, supplemented by



recent efforts to break into new segments that should continue to be supported. The challenge lies in managing the fallout from future export controls implemented by the US as well as the reputational risk from “Singapore-washing.”

### Situating Singapore in the Global Chip Industry

The semiconductor chip industry **dominates** manufacturing in Singapore. In 2023, it contributed approximately 40 percent of the country's total manufacturing value added. Singapore also **accounts** for 5 percent of global wafer fabrication and 20 percent of chip equipment output. It is therefore not an insignificant player overall, but is also not among the largest.

Other than Singapore, the other major player in Southeast Asia is Malaysia, which has significant advantages over Singapore in land and labour costs, but cannot yet match the

city-state's ability to attract talent and anchor higher value functions which rests on a conducive business environment and R&D ecosystem.

However, the two countries actually play in different segments of the supply and value chain. Malaysia's chip industry is currently more focused on downstream activities such as assembly, testing, and packaging (ATP) whereas Singapore focuses more on wafer fabrication and R&D.

Both countries have attracted a **slew of investments** in recent years as key global chip players look to manage the fallout of American pressure on China's chip industry. But many of these investments are expansions of existing facilities, which might suggest that the emphasis is on supply chain resilience rather than reconfiguration per se.

### Singapore's Competitive Strategy for Chips

Nevertheless, Singapore's ability to expand into new segments demonstrates its keenness to maintain defensible niches in global value chains. For example, a chip packaging materials plant by Japan's Toppan Holdings **broke ground** in March 2024, the first such facility in the country.

Singapore will also benefit from the growing adoption of AI, as this is expected to drive up demand for NAND memory chips. The American chipmaker Micron relies on its Singapore plant to produce most of its cutting-edge NAND chips, which represent **30 percent** of its revenue and gives Singapore a

**10 percent** share of the global market.

Guided by a **vision** to grow manufacturing value-add by 50 percent by 2030 and an ongoing transformation **plan** focusing on industry ecosystem and talent pool development, the general outlook in terms of competitive strategy is positive. However, ensuring that expected outcomes materialise will be an ongoing challenge given Singapore's longstanding constraints as a small, open economy with an ageing workforce and limited water and energy resources.

### Managing Geopolitical Currents

While Singapore's traditional strengths and constraints in attracting advanced manufacturing investments remain important, much will also depend on the geopolitics surrounding the chip industry. The Biden administration's **planned expansion** of export controls on chip manufacturing equipment will likely affect Singapore, which highlights the vulnerability of its chip industry to external factors that it has little or no control over.

There is also a reputational risk from "**Singapore-washing**," which refers to the practice of Chinese companies moving to Singapore to avoid American scrutiny and gain access to talent and technology that might not otherwise be available to them. Several Singapore-based entities with links to China's chip industry have been included in the US Department of Commerce's **Entity List** to date, suggesting that this is not an

isolated phenomenon.

An example is the Singapore affiliate of Corad Technology, which was added to the Entity List in 2021 for supplying China's government and defence industry. Corad designs and manufactures different types of printed circuit boards.

How Singapore manages these challenges will determine the ability of its chip industry to remain globally relevant. Thus far, the country has been clear-eyed in setting out sensible goals—for example, instead of diving head-first into manufacturing cutting-edge chips that are the preserve of a handful of unique companies such as Taiwan's TSMC, Singapore is **doubling down** on its advantages in the much larger market for legacy chips.

The question is whether sensible can be sustained when the competitive landscape will undoubtedly change in the coming decade. Singapore will have the unenviable task of having to account not only for rising regional competitors, but also for ongoing transformations among existing key players beyond China and the US such as Japan, South Korea, and Taiwan.

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