

Navigating Geopolitics & Supply Chains: An Analysis of Southeast Asia's Semiconductor Frontier

AUTHOR: MADHAV MAHESHWARI



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AUTHORS

Madhav Maheshwari

Madhav Maheshwari is a lawyer and an independent policy advisor. His key interests include South Asian geopolitics, international relations, and transnational diplomacy.

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Cover Image: Depiction of a Semiconductor Circuit Board (representational image). Source: Adobe Photoshop

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by Madhav Maheshwari

Abstract

Southeast Asia has emerged as a transformative critical player in the global semiconductor industry. Beyond its traditional role in manufacturing, the region is now a hub for innovation and new ideas. This shift is influencing global markets and establishing Southeast Asia as a significant player in the constantly evolving technology landscape. The paper explores how rising geopolitical tensions, supply chain vulnerabilities, and the explosive growth of artificial intelligence and electric vehicles have positioned Southeast Asian nations at the centre of a fundamental shift in semiconductor power dynamics. The paper provides a detailed analysis of key regional players, with Singapore leading as an innovation powerhouse contributing 11% of global semiconductor output while simultaneously driving 20% of worldwide semiconductor equipment production. Malaysia emerges as the assembly and testing champion, commanding 13% of global back-end manufacturing capacity and generating approximately USD 130 billion in semiconductor exports. The research also examines emerging markets, including Vietnam's ambitious three-phase development strategy targeting USD 25 billion in annual revenues by 2030, Thailand's focus on power electronics for electric vehicles, and the Philippines' specialisation in assembly and testing operations. A critical component of the analysis addresses China's strategic control over rare earth elements, with 60-70% of global production and 85-90% of processing capacity, creating significant vulnerabilities for regional supply chains. The paper also explores how China's economic leverage through rare earth restrictions, coupled with its complex relationship with Myanmar's mineral resources, presents both challenges and opportunities for Southeast Asian nations. The research concludes that Southeast Asia's semiconductor success depends on coordinated regional strategies that leverage complementary national strengths like Indonesia's mineral wealth, Malaysia's assembly expertise, Vietnam's manufacturing capabilities, and Singapore's technological sophistication to create integrated ecosystems capable of competing with traditional manufacturing centres in the rapidly evolving global semiconductor landscape.

Keywords: Semiconductor, Southeast Asia, Rare Earth Elements, Geopolitics, Supply Chains.

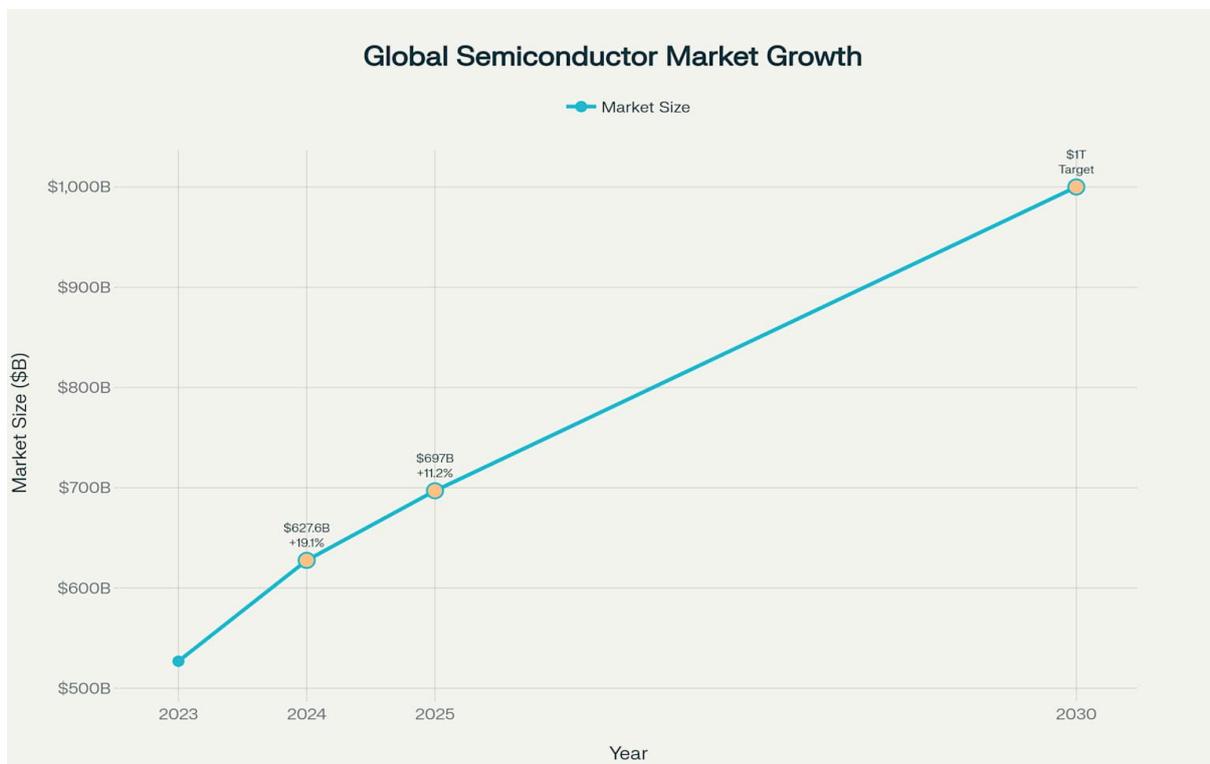
1. Introduction & Overview

With rising geopolitical tensions, impending tariff wars and vulnerabilities surrounding the supply chains, the stakes could not be higher, as semiconductors have become the new age oil, powering everything from smartphones to artificial intelligence systems that define today's lives.¹ Within this explosive growth story, Southeast Asia is emerging as critical player also acting as [China+1](#), fundamentally altering the traditional semiconductor power dynamics that have long been dominated by East Asian giants like China, Taiwan and South Korea.² Countries like Singapore and Malaysia have established themselves as essential nodes in the global supply chain, with Singapore contributing 11%

of the world's total semiconductor output and Malaysia commanding a 13% share in global back-end manufacturing.³ The semiconductor industry stands at an unprecedented inflection point, where the fusion of artificial intelligence, electric vehicles, and 5G infrastructure is creating seismic shifts across the global technology ecosystem.⁴

As the world recently witnessed Tesla’s groundbreaking fully autonomous vehicle delivery on June 27, 2025, a car that drove itself from the factory to a customer without any human intervention, the critical role of advanced semiconductors in enabling such revolutionary technologies has never been more apparent.⁵ Events like these exemplify the rapid technological advancement driving massive demand for sophisticated chips across global markets. The global semiconductor market reached a record-breaking high of USD 627.6 billion in 2024, marking a robust 19.1% year-over-year growth.⁶ It is setting the stage for an even more remarkable trajectory toward the widely anticipated USD 1 trillion milestone by 2030.⁷

Graph 1: Global Semiconductor Projections



Source: Based on global semiconductor market projections from the Semiconductor Industry Association | Created by Perplexity

2. Regional Analysis

2.1. Southeast Asia: An Established Semiconductor Powerhouse

Southeast Asia, having an established manufacturing base backed with decades of experience, the region has built a strong reputation for global semiconductor companies.⁸ The growth of the semiconductor industry in this region is not only due to their expertise but also to close territorial

proximity to each other, which offers the companies easier transportation routes and coordination, which leads to strategic distribution and division of capabilities.⁹

2.2. Singapore: The Regional Innovation Hub

Singapore has transcended its traditional role as an assembly hub to emerge as Southeast Asia's most sophisticated semiconductor ecosystem in manufacturing-focused operations and a powerful leader in innovation. The Lion City now holds 11% of global semiconductor output while simultaneously [contributing approximately 20%](#).¹⁰ of worldwide semiconductor equipment production, positioning it as a production powerhouse and a critical enabler of manufacturing capabilities. The landscape underwent a revolutionary transformation in 2024 and 2025, critically marked by unprecedented infrastructure and research investments.

In 2025, Singapore launched the [National Semiconductor Translation and Innovation Centre](#) for Gallium Nitride (NSTIC GaN), establishing the first facility in Southeast Asia capable of producing both 6-inch gallium nitride on silicon carbide and 8-inch gallium nitride on silicon wafer fabrication lines.¹¹ With this facility, Singapore broke into the elite global hubs capable of producing advanced semiconductor essentials. Complementing this technological advancement, Singapore announced a transformative [USD 500 million national fabrication facility](#) under Budget 2025, scheduled to become operational by 2027. The facility will feature cleanroom infrastructure and industry-grade tools specifically designed to support companies' research and development efforts while providing translational research and fabrication expertise to accelerate scaling and market entry.¹²

Singapore's strategic advantage extends beyond infrastructure to encompass a comprehensive ecosystem of hosting multinational corporations and innovative small-to-medium enterprises. The nation hosts 14 world-renowned international semiconductor companies, including nine of the world's top 15 semiconductor firms such as Micron, TSMC, Marvell Technology, GlobalFoundries, United Microelectronics Corporation, and Siltronic.¹³ Singapore's strategic location in Southeast Asia further makes it an attractive destination for semiconductor companies, it is nestled at the crossroads of major global trade routes, Singapore offers unparalleled access to key markets such as China, India, and Indonesia.¹⁴ The country's efficient logistics infrastructure enables companies to establish robust supply chains and streamline their operations. For semiconductor companies looking to expand their footprint in Asia, Singapore's prime location and superior logistics make it an ideal choice. As part of its ambitions to expand the manufacturing sector by [50% by 2030](#), Singapore aims to further grow its electronics sector, with the semiconductor industry as its backbone.¹⁵

2.3. Malaysia: The Assembly and Testing Champion

Malaysia's contribution to the region's share is 25% established itself as a global leader in assembly, testing, and packaging operations. It offers 13% (approx.) of the world's semiconductor testing and packaging capacity, majoring operations from Intel, Infineon and ASE Technology.¹⁶ The semiconductor industry's contribution to Malaysia's national economy is profound, sector exports reached approximately USD 130 billion in 2024,¹⁷ underlining semiconductors as the country's leading export category and reflecting the industry's critical importance to GDP and trade balance.¹⁸ This export performance cements Malaysia's status as the world's sixth-largest semiconductor exporter and a linchpin in global technology supply chains.

2.4. Emerging Players

Another bloc in this region is also emerging which consists of Vietnam, Thailand and the Philippines each playing a specialised role in the ecosystem. Thailand focuses on assembly and emerging electric vehicle semiconductors. Vietnam is becoming a major hub for companies like Samsung and Intel, while the Philippines specialises in assembly and testing operations. Discussed at length below:

2.4.1. Vietnam: Another ambitious player in the region. In September 2024, Prime Minister Phạm Minh Chính signed [Decision No. 1018/QĐ-TTg](#), establishing a revolutionary roadmap for developing Vietnam's semiconductor industry through 2030 with a vision extending to 2050.¹⁹ This strategy, conceptualised under the formula "C = SET + 1" (where C stands for Chip, S for Specialised, E for Electronics, T for Talent, and +1 for Vietnam as a new safe destination in the global semiconductor supply chain), represents one of the most ambitious national semiconductor development programs in Southeast Asia. Vietnam's three-phase development plan demonstrates remarkable strategic foresight. Phase 1 (2024-2030) focuses on leveraging geopolitical advantages and workforce capabilities to establish Vietnam as one of the global semiconductor manpower centres, targeting the formation of at least 100 design companies, one small-scale manufacturing factory, and ten packaging and testing plants. The semiconductor industry is poised to achieve annual revenues exceeding USD 25 billion having a growth rate of 10-15% in added value, while developing a workforce of more than 50,000 engineers and graduates. Phase 2 (2030-2040) envisions Vietnam becoming a global semiconductor and electronics centre with at least 200 design companies, two manufacturing factories, and 15 packaging and testing plants, targeting over USD 50 billion in annual semiconductor revenues.²⁰ Phase 3 (2040-2050) positions Vietnam as a world leader in semiconductors and electronics, mastering research and development with at least 300 design companies and three manufacturing factories.²¹

The country's market trajectory is equally impressive, with Vietnam's semiconductor market valued at USD 7.03 billion in 2024 and projected to reach [USD 16.64 billion by 2033](#).²² This growth is supported by major international investments, including Samsung's USD 22.4 billion commitment to Vietnam's high-tech sector,²³ Hana Micron Vina's USD 1 billion investment to boost chip production by 2025, and Nvidia's establishment of a Vietnamese base with USD 250 million in initial investment.²⁴

2.4.2. Thailand: Thailand has strategically positioned itself as Southeast Asia's emerging power electronics hub, capitalising on the growing demand for semiconductors in electric vehicles, data centres, and energy storage systems. The formation of the [National Semiconductor and Advanced Electronics Industry Policy Committee](#) in October 2024, chaired by the Prime Minister, shows the commitment of the government to uplifting Thailand's semiconductor capabilities beyond traditional assembly and packaging operations toward high-value chip design and wafer fabrication facilities.²⁵ Thailand's semiconductor strategy is anchored in its ambitious target to attract [500 billion baht \(USD 14.7 billion\)](#) in new investments by 2029, with a particular focus on power electronics and automotive semiconductors.²⁶ The country's Eastern Economic Corridor has emerged as a strategic platform for this transformation, hosting major operations from firms like Western Digital, Analog Devices, and Infineon Technologies.²⁷ Recent developments include a significant breakthrough with the Board of Investment's approval of a 10.5 billion baht investment from UniEQ Integrated Technology Co., Ltd., a subsidiary of Foxsemicon, to establish state-of-the-art manufacturing facilities producing critical components for semiconductor equipment.²⁸

The government’s comprehensive [workforce development initiative](#) aims to create 280,000 personnel in advanced industries over the next five years, with 80,000 specifically dedicated to the semiconductor sector.²⁹ This massive human capital investment, combined with strategic infrastructure development and international partnerships, positions Thailand as a critical node in the global semiconductor supply chain, particularly for power management and automotive applications.³⁰

2.4.3. Philippines: The Philippines is leveraging its building expertise in semiconductor assembly, testing, and packaging to become one of the world’s most important players in the global chip supply chain.³¹ Electronics and semiconductors have become the country’s dominant export category, accounting for more than [50% of total exports](#) and establishing the Philippines as a critical component in global technology manufacturing.³² The country’s semiconductor strength lies in its assembly, testing, and packaging operations, hosted primarily within Philippine Export Processing Zones in Laguna, Cavite, and Batangas.³³ Major global semiconductor companies including Texas Instruments, Amkor Technology, Analog Devices, STMicroelectronics, and ON Semiconductor have established significant operations in the Philippines. The Philippines’ inclusion in the United States’ Creating [Helpful Incentives](#) to Produce Semiconductors and Science Act of 2022 partnership. This partnership positions the Philippines to access valuable insights and best practices from leading global experts while strengthening its role in the international semiconductor ecosystem.³⁴

Table 1: An overview of major regional powers and their strategic objectives

Country	Strategic Focus	Market Value/Target	Key Milestones	Competitive Edge
Vietnam	Full Ecosystem Development	USD 7.03 billion → USD 16.64 billion (2033)	100→200→300 Design Companies	Safe Supply Chain Hub
Thailand	Power Electronics & Automotive Semi-Conductors	USD 14.7 billion Investment Target	280,000 Workforce by 2029	Electronic Vehicle Semiconductor Hub
Philippines	Assembly, Test & Packaging	50%+ National Exports	US CHIPS Act Partnership	Export Processing Zones

Source: Compiled from multiple data reports referenced throughout this paper

3. Some Remarkable Strategic Alliances

3.1. The [US-Vietnam Comprehensive Strategic Partnership](#), announced in September 2023, has facilitated unprecedented investment flows into Vietnam’s rapidly expanding semiconductor industry. This landmark partnership, announced during President [Biden’s state visit to Vietnam](#), represents the highest level of diplomatic relationship in Vietnam’s foreign policy framework and has positioned semiconductor cooperation as a cornerstone

of bilateral engagement.³⁵ The partnership has enabled major U.S. companies, including Intel and Qualcomm, to establish significant operations in Vietnam. Intel, which operates its largest chip testing and packaging facility globally in Ho Chi Minh City, has invested over USD 1.5 billion in Vietnam since establishing operations and continues to explore expansion opportunities that could potentially increase its [investment to USD 3.3 billion](#).³⁶ The company has contributed more than USD 96.2 billion to Vietnam's export turnover since 2010, accounting for approximately 25 % of Ho Chi Minh City's export revenue.³⁷ The partnership's emphasis on technology transfer and workforce development has positioned Vietnam as a critical alternative manufacturing destination as global supply chains diversify away from traditional centres. Vietnam's semiconductor industry, which currently employs approximately 5,000 engineers, aims to scale to 50,000 engineers by 2030 to meet growing demand and secure its position in the global supply chain.³⁸

3.2. Japan-Vietnam Partnership: Japan's semiconductor partnerships in Southeast Asia reflect a strategic approach to regional supply chain development and workforce cultivation, exemplified by the [Vietnam-Japan Semiconductor Cooperation Programme](#) formalised in February 2025.³⁹ This landmark initiative connects Vietnam's growing semiconductor ambitions with Japan's technological expertise and manufacturing legacy, spearheaded by the Kyushu Semiconductor Workforce Development Consortium.⁴⁰ The partnership leverages Kyushu's historical status as Japan's "Silicon Island," where semiconductor production contributed to Japan's dominant position in the global industry during its peak, accounting for half of the world's semiconductor market share.⁴¹ The Japanese government is now implementing a comprehensive strategy, attracting investments in 108 projects worth approximately [USD 31 billion](#), including two multi-billion-dollar chip manufacturing plants by TSMC.⁴² Renesas operates its largest research and development base outside Japan in Vietnam, employing nearly 1,000 engineers and representing a significant investment in local talent development.⁴³

3.3. Thailand-Japan Partnership: Thailand's collaboration with Japan through the [Eastern Economic Corridor \(EEC\)](#) represents a significant partnership focusing on workforce development and advanced manufacturing capabilities in semiconductors and related technologies.⁴⁴ The EEC, spanning 13,285 square kilometres across Thailand's Chachoengsao, Chonburi, and Rayong provinces, has been developed as a high-tech industrial hub with investment targets of 500 billion baht (USD 13.7 billion) over five years.⁴⁵ Japanese investments in Thailand's semiconductor sector have strengthened the country's position in power electronics and automotive chip production. Infineon Technologies has made substantial investments, including the construction of a new semiconductor backend production facility in Samut Prakan, with operations beginning in early 2026.⁴⁶ This facility will focus on manufacturing advanced packaging for power modules serving electric vehicles, data centres, energy storage systems, and clean energy equipment. The EEC framework specifically accommodates Thailand's 10 target industries, including next-generation automotive, intelligent electronics, and digital technologies.⁴⁷ The collaboration extends beyond manufacturing to include comprehensive workforce development programs and university partnerships aimed at building Thailand's semiconductor engineering capabilities.⁴⁸ These initiatives align with broader regional energy transition goals and Japan's commitment to supporting sustainable industrial development across Southeast Asia.

3.4. India's Renegotiation of the ASEAN Free Trade Agreement: India's ongoing [renegotiation of the ASEAN – India Trade in Goods Agreement \(AITIGA\)](#) has a significant potential to reshape the trade dynamics and supply chain movements between India and Southeast

Asian nations. The AITIGA was implemented in 2010 and is under review since 2023, the previous agreement had created substantial trade imbalances which directly impacted semiconductor trade.⁴⁹ India had offered duty concessions on 71% of its tariff lines whereas ASEAN countries provided significantly lower market access, with Indonesia opening only 41% of its tariff lines, Vietnam 66.5%, and Thailand 67%. This imbalance led to a substantial disparity and led to a significant increase in India's trade deficit with ASEAN, rising from just USD 5 billion in 2010 – 11 to USD 43.57 billion in 2022 – 23, with semiconductors constituting a major component among the imports.⁵⁰ India has significant trade volumes from Southeast Asian countries like Singapore, Malaysia and Thailand. Such imbalance and the exploitation of the rules of origin provisions which are also the main drivers of the ongoing renegotiation.⁵¹ The exploitation of these rules has also enabled the Chinese semiconductor products to enter the [Indian market through ASEAN countries](#) at favourable and preferential tariffs.⁵² This practice is often referred to as creating a “backdoor” channel for Chinese goods, which has directly undermined India's semiconductor initiatives and manufacturing competitiveness.⁵³ Such exploitation of the free trade lines by the Chinese has led to India's position, which will impact the semiconductor dynamics in Southeast Asia.⁵⁴ Indian authorities had also identified instances where Chinese companies establish minimal processing operations in ASEAN countries to circumvent trade restrictions. This is particularly problematic given India's strategic push to develop indigenous semiconductor capacity under the [India Semiconductor Mission](#).⁵⁵ Singapore faces one of the most complex implications from the renegotiations, given its unique position as a semiconductor powerhouse in Southeast Asia.⁵⁶ It poses challenges for Singapore's role, especially as a trade intermediary.⁵⁷ India has specifically targeted the practice of Chinese goods entering the Indian market through Southeast Asian countries. However, Singapore has actively addressed these problems through bilateral cooperation with India.⁵⁸ The [India-Singapore Comprehensive Strategic Partnership](#) signed in September 2024 provides for a specific memorandum of understanding on semiconductor ecosystem partnership, which establishes frameworks on strategic bilateral cooperation.⁵⁹ The fresh renegotiated agreement aims to tackle the Chinese problem faced by India while also facilitating Singapore's participation in the fast-growing Indian market.⁶⁰ However, stricter rules surrounding the rules of origin could still potentially impact Singapore's role in regional supply chains, particularly affecting companies that rely on third-country inputs.⁶¹ Malaysia is also one of the largest trading partners for India, with a total trade of [USD 20 billion in 2023–24](#).⁶²

The renegotiations specifically focus on collaboration in the semiconductor industry. However, Malaysia's expertise in assembly and packaging might face increased competition from India's growing outsourced semiconductor assembly and testing facilities.⁶³ The trade imbalance between Malaysia and India also suggests that Malaysia may need to offer greater market access in the renegotiation phase.⁶⁴ Vietnam's position is also important because it represents the type of manufacturing hub that India is competing with. The implementation of stricter rules of origin⁶⁵ could potentially benefit Vietnam if it reduces its reliance on Chinese companies routing through other ASEAN countries.⁶⁶ However, it could also limit Vietnam's ability to serve as a platform for accessing the Indian market for the companies that rely on Chinese inputs or technology.⁶⁷ Both Thailand and Indonesia also play an important role in reshaping the dynamics, considering intensified competition and essentially trying to serve themselves as alternatives to China-dependent supply chains and products. This reflects a broader shift in global semiconductor geopolitics. ASEAN's strategic position in global semiconductor trade networks with countries like Vietnam, Malaysia, Thailand and the Philippines well integrated into global value chains, means that any disruption to India-Southeast Asia

trade relationship could have broader implications for global supply chain resilience.⁶⁸ As per some reports, India is also considering exiting the ASEAN trade pact altogether, the implications of such an exit could be huge.

4. Key Drivers of Growth

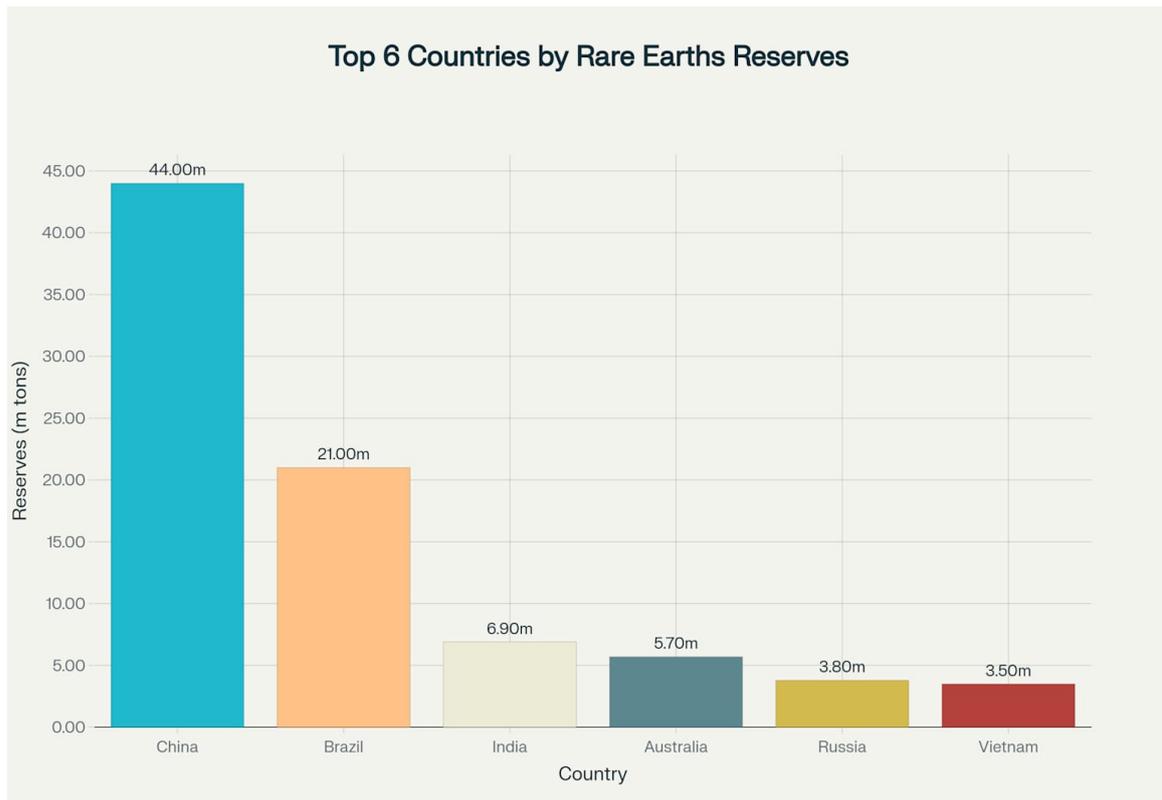
4.1. Artificial Intelligence and Electric Vehicles: The New Frontier

AI and machine learning processors are one of the highest growth segments in the semiconductor industry, with a growth trajectory of approximately 30%.⁶⁹ In 2024 alone, AI chips accounted for over 20% of total semiconductor sales, with projections suggesting this figure will exceed [USD 150 billion in 2025](#).⁷⁰ The automotive sector's transformation into a semiconductor-intensive industry is creating entirely new market dynamics. Modern electric vehicles require significantly more chips than traditional automobiles, with sophisticated systems managing everything from battery optimisation to autonomous driving capabilities.

4.2. The Chinese Factor: Rare Earth Element Wild Card

Tariff wars, territorial conflicts, and changing political landscapes yearn for calls for diversification. Amid global pressure, companies have started to explore ideas for alternative manufacturing locations, making Southeast Asia an attractive bet to traditional manufacturing centres.⁷¹ China's stronghold over the Rare Earth Elements (REE / "rare earth elements") supply chain represents one of the most significant strategic chokehold points. REE power everything from a drone to a wind turbine.⁷² 95% of an electric vehicle's traction motor torque is generated by neodymium-iron-boron magnets that contain dysprosium for stability at a high temperature.⁷³ With China monopolising approximately 60-70%⁷⁴ and a staggering [85-90% of the processing capacity](#),⁷⁵ the region's semiconductor industries remain perilously dependent on Beijing's mood and goodwill. This dependency extends beyond mere economics, it represents a geopolitical weapon that China has repeatedly demonstrated its willingness to deploy. The 2010 embargo against Japan following the Senkaku Islands dispute served as a preview of Beijing's strategy, causing rare earth prices to spike tenfold and triggering industry-wide panic.⁷⁶ More recently, China's April 2025 export restrictions on seven rare earth elements in response to US tariffs demonstrated the continued utility of this economic weapon.⁷⁷ Production concerns have affected automotive and electronics manufacturers across the region, exposing the fragility of supply chains dependent on Chinese goodwill. The concentration of rare earth element production in China, [holding 44 million tons or approximately 48% of global reserves](#), creates an overlooked vulnerability that transcends traditional security concerns.⁷⁸ China's overwhelming dominance, coupled with its control of over 90% of refining capacity, underlines a global dependency that has evolved from economic convenience into strategic problems.⁷⁹

Graph 2: Top 6 countries by Rare Earth Reserves



Source: Bar chart illustrating China’s leading position with 44 million tons, based on the US Geological Survey 2025 data | Created with Perplexity

Between 1978 and 1995, Chinese rare earth production surged at an astonishing rate of 40% per year, buoyed by state subsidies, abundant cheap labour, and environmental standards far more permissive than those in the West.⁸⁰ This strategic approach allowed China to systematically undermine global competition. As noted by Ajit Ranade, an economist and senior fellow at Pune International Centre, [“The Chinese policy was to actively undermine any new refinery coming up. They would flood the market with below-cost rare earth elements, so no new competition came up”](#).⁸¹ In the recent past, China has more openly leveraged its control over rare earths, using them both as a stick to pressure geostrategic rivals and as a carrot to incentivise cooperation with aligned states. Vietnam possesses the world’s sixth-largest rare earth reserves.⁸² Despite this geological fortune, Vietnam produces merely 600 tons annually, a fraction of its potential.⁸³ The country’s Dong Pao mine, boasting 11.3 million tons of reserves, has faced a decade-long [development delays](#).⁸⁴ Vietnam’s rare earth exports surged to USD 137 million in the first ten months of 2024, with projections reaching USD 220 million by year-end.⁸⁵ However, this growth remains heavily dependent on Chinese refining technology and processing capabilities, creating a paradoxical situation where Vietnam’s strategic resource requires Chinese expertise for monetisation. Malaysia, is entangled in the Chinese Technology Trap, having 16.2 million tons of untapped rare earth reserves, present both opportunity and strategic dilemma. The country’s ambition to develop a domestic rare earth supply chain faces a critical challenge that is Beijing’s monopoly on processing technology.⁸⁶ Thailand’s position as a key manufacturing hub in Southeast Asia makes it particularly vulnerable to Chinese rare earth restrictions.⁸⁷ The country’s automotive, electronics, and renewable energy sectors rely heavily on global supply chains that include critical minerals sourced from China. Beyond semiconductors, the concentration of rare earth element production in China (over 90% globally) creates an overlooked vulnerability that could be weaponised through further export restrictions, as demonstrated by China’s recent curbs on germanium and gallium exports.⁸⁸ This represents a material leverage point that could cripple

semiconductor manufacturing regardless of fabrication location. China's semiconductor ambitions represent both the greatest challenge and the most significant opportunity for Southeast Asia. The country's massive investments in domestic semiconductor capabilities, combined with US export restrictions, have fundamentally altered global supply chain dynamics.⁸⁹

Another less explored angle in these dynamics is the Chinese imports of the rare earths from Myanmar, a war-torn economy. Chinese dominance over the market is largely feared by the entire West and in the Indian sub-continent as well.⁹⁰ But both the West and New Delhi are missing the opportunities to stabilise the supply chain because of reluctance towards dealing with unstable politics in the region, unlike China.⁹¹ It is not the first time and not surprising that Beijing is getting involved in the complex local politics in Myanmar to get those critical minerals coming its way.⁹² As per some [reports](#), the rare earths mined in Myanmar, which are moved across the border, are almost double the amount of mining licensed in all of China.⁹³ In fact, Myanmar is proving to be a major supplier of some critical heavy minerals. On one hand, Beijing has been implementing strict controls over its rare earths exports and on the other, it is itself heavily reliant on imports from Myanmar, which accounted for 57% of China's total rare earth imports in recent years.⁹⁴ China has strategically leveraged Myanmar's rare earth resources not merely as a "proxy supplier" but as a critical component of its global supply chain dominance. Recent [data reveals](#) that Myanmar accounts for approximately 57% of China's total rare earth imports, with exports reaching nearly 42,000 metric tons by 2023.⁹⁵ The relationship has intensified since 2018, which transformed Myanmar into China's primary external source of rare earth elements, particularly dysprosium and terbium, which are essential for high-tech manufacturing.⁹⁶ This represents China's aggressive stockpiling strategy while simultaneously putting export restrictions on its local supplies, which suggests Beijing is hoarding these rare earths to maintain global dominance over global supply chains.⁹⁷ Even though Beijing is trying to woo Myanmar, Russia also remains an important ally. However, both China and Russia are collaborating with Myanmar, which represents complementary rather than competitive engagement, with Russia taking the military route by supplying military hardware while China follows the economic path.⁹⁸

Southeast Asia's role could be huge and impactful, and the region holds significant rare earth reserves. However, the challenge lies not just in extraction but in having the technology and the processing capacity. Malaysia's Lynas Corporation facility is one of the first locations outside China to produce heavy rare earth elements at a large commercial scale, including Dysprosium and Terbium.⁹⁹ This essentially poses as a game changer in breaking the Chinese monopoly on rare earth processing.¹⁰⁰ Particularly dealing with Myanmar, India could latch on to this opportunity, being the neighbour and help deal with the Chinese monopoly. While China has expanded its operations in Myanmar's Kachin region by over 40%, India has yet to establish a meaningful economic partnership in the sector. A recent visit by India's Geological Survey delegation to Myanmar to explore the potential for [collaboration on rare earths with Myanmar](#).¹⁰¹ However, there seems to be some reluctance on New Delhi's end to invest and maintain uncertain projects which may help New Delhi reap major economic benefits in the long term, the reluctance is mainly due to the border insurgencies and unstable political situation in Myanmar. India missed a rare earth bonanza in its own backyard while China quietly took control of Myanmar's mineral-rich north through a militant proxy.¹⁰² At some point, it will have to step up its game in order to compete with Beijing's ambitions. Additionally, the objective is not just to deal with China; such involvement will lead to stability in the global supply chains and will give New Delhi the leverage in the region. India and the Southeast Asian countries should prioritise upgrading their investments in Myanmar. Initiatives like the [G7 Critical Minerals Action Plan](#), which are widely endorsed by Australia, India and South Korea, should provide an expanded scope to provide targeted support for Southeast Asian processing capabilities and infrastructure development.¹⁰³

Table 2: Several countries within the region and beyond have begun taking measures to counter Beijing’s growing ambitions. Below is a snapshot of the global policy response at a glance

Country/Region	Policy Framework	Primary Strategy	Key Targets	Investment Level
United States	Defence Production Act	To Build domestic production capacity	A Self-sufficient supply chain by 2027	USD 3.4+ billion in grants and funding
European Union	Critical Raw Materials Act	To Reduce single-country dependence	To attain 10% extraction, 40% processing, 25% recycling capacities	EU-wide coordination and targets
Japan	Critical Minerals Law (JOGMEC)	To Secure overseas partnerships	To Reduce import dependency to 58% from 90%	USD 250+ million in partnerships
India	Mining Development Act 2023	To Develop and expand local and overseas mining operations	Expansion of domestic mining operations	13 new mining blocks allocated

Source: Compiled from multiple data reports referenced throughout this paper

No single silver bullet exists to overturn decades of Chinese dominance, yet the combination of U.S. defence funding, EU market regulations, JOGMEC diplomacy and Indian exploration is already reshaping the supply map.¹⁰⁴ Countries that combine capital, creativity, and credible standards stand the best chance of navigating the rare-earth era without succumbing to strategic chokeholds.

5. Future Outlook and Recommendations

Southeast Asia is emerging as a vital player in the global semiconductor ecosystem, collectively representing significant production capacity, with Southeast Asia contributing approximately 13% of global assembly and testing services, accounting for 20% of the world’s chip design workforce.¹⁰⁵ However, these regions face critical challenges in transitioning from manufacturing hubs to innovation leaders. To overcome these barriers, the regions should develop comprehensive cross-border talent mobility programs, similar to [Taiwan’s successful semiconductor talent initiatives](#), that bring together international students and professionals for intensive training, enabling skilled engineers to move seamlessly between countries and address workforce gaps.¹⁰⁶

Additionally, creating indigenous innovation clusters within special economic zones, similar to [Malaysia’s semiconductor assembly powerhouse](#) in Penang and Singapore’s advanced packaging leadership, would help these regions develop proprietary technologies rather than relying solely on contract manufacturing.¹⁰⁷ These coordinated strategies would leverage the region’s combined strengths, Southeast Asia’s established assembly and testing expertise commanding 13% of global capacity, to capture greater value within the global semiconductor market projected to reach USD 697 billion by 2025, while reducing dependency on traditional technology powers and positioning these regions as innovation leaders in next-generation semiconductor technologies.¹⁰⁸

6. Conclusion

The semiconductor industries of Southeast Asia represent more than just economic opportunities, they embody the hopes and ambitions of regions seeking to participate meaningfully in the digital future. Their journeys, while distinct, share common themes of government vision, private investment, and the recognition that semiconductors are fundamental to national competitiveness in the 21st century. The research reveals that success in this transformation extends far beyond simply attracting foreign investment or building manufacturing facilities. Countries like Singapore have shown that becoming true innovation hubs requires sustained commitment to research infrastructure, workforce development, and strategic partnerships that go beyond conventional contract manufacturing relationships. Malaysia's evolution from basic assembly operations to sophisticated testing and packaging capabilities illustrates how nations can gradually climb the semiconductor value chain through focused specialisation and consistent policy support.

Perhaps most significantly, the paper also highlights how China's control over rare earth elements represents both the greatest challenge and the most compelling argument for regional cooperation. The strategic vulnerability created by dependence on Chinese rare earth processing cannot be solved by any single nation but requires coordinated regional responses that leverage Southeast Asia's collective mineral wealth, processing capabilities, and technological expertise. The window of opportunity for Southeast Asian nations to establish themselves as indispensable players in the global semiconductor ecosystem remains open, but it requires bold action and strategic vision. The most successful countries will be those that recognise semiconductors not merely as an economic opportunity, but as fundamental to national competitiveness and regional security in an increasingly digital world. The future belongs to those who can combine capital, creativity, and credible standards to navigate the complexities of the semiconductor era while building sustainable, innovative industries that serve both national interests and global technological advancement.



Madhav Maheshwari is a lawyer and independent policy consultant. The views herein expressed are personal.

Notes

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